SIEMENS Industrial Turbomachinery	Project: CHP Vilnius	Document No.: 6066-7DS- 118		
Employer Contract No.: VKJ_S_2016-92	Employer Project Code: VKJ01	Employer Document No.: VKJ01-1730861	Language Code: EN	Revision No.: P00

Title

Instruction Manual

Turbogenerator
Erection Manual

Remarks

Name Department Date								
Name Department Date								
Name Department Date								
Name Department Date								
Name Department Date	Zwicker SDC Ing. Büro 22.01.19		Schülke SDC Ing. Büro 24.01.19		Müller PG PR R&D GN GNA STC 25.01.19		P00	First issue
	prepared		reviewed		released		Rev.	Remark

Cc for information		
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Turbogenerator Vilnius Biomass | EG000367

Installation Manual

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Installation Manual

Project name **Vilnius Biomass**

Generator type SGen5-100A-2P

Two-Pole Turbogenerator
with Directly Air-Cooled Rotor
and Indirectly Air-Cooled Stator Winding

Order no. 3000018595

Machine no. EG000367

Project ID FERT00574216

Siemens document no. DPSDES-00002588 en

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General

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Important!

The information, recommendations, descriptions, illustrations, drawings, warnings, cautions, and notes contained in these manual are based on Siemens experience and judgment with respect to generator operation and maintenance. Illustrations and drawings furnished in the descriptions are provided for general reference purposes only and are not designed to replace, modify, or supplement actual engineering drawing releases associated with this unit. In all cases, users must refer to the latest engineering drawing revision prior to planning installation, operation and maintenance activities of any nature.

This information should not be considered as all inclusive or covering all contingencies. If further information is required, Siemens should be consulted.

In no event will Siemens be responsible to the user in contract, in tort (including negligence), strict liability or otherwise for any special, indirect, incidental, or consequential damage or loss whatsoever, including but not limited to damage to or loss of use of equipment, plant, or power system; cost of capital; loss of profits or revenues; cost of replacement power- additional expenses in the use of existing power facilities or claims against the user by its customers resulting from use of the information, recommendations, descriptions, illustrations, drawings, warnings, cautions, and notes contained herein.

The tools, devices and aids specified in the following descriptions are not part of the delivery scope and must be appropriated by the installation contractor. All employments must be implemented by specialists.

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General Safety Instructions

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Siemens AG
Energy Sector

Safety Instructions

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1 General

This section contains the relevant information necessary for safe operation of a generator.

Although the generator is designed to state-of-the-art technology and complies with the applicable safety standards, hazards which could result in personal injury to the user or third parties and damage to the generator or other property cannot be ruled out completely.

Please read this section carefully and make sure that you comply with the instructions in order to safeguard against personal injury and damage to the generator.

Please note that the safety information in this section is general and applies to different types of generators. In the individual chapters of this document, you will find safety notes that must be obeyed absolutely, for your own safety, to protect other people and to avoid damage to property.

Apart from the safety instructions in this section observe all indications on safety in the supplier documentations included in this manual.

2 Warnings

The operating instructions use a range of key words and symbols to identify information which is of particular importance. The key words **Danger**, **Warning**, **Caution** and **Notice** give you a better idea of the significance of the warning notices:

⚠ DANGER — ... indicates an imminently hazardous situation which, if not avoided, **will** result in death or serious injury.

⚠ WARNING — ... indicates a potentially hazardous situation which, if not avoided, **could** result in death or serious injury.

⚠ CAUTION — ... indicates a potentially hazardous situation which, if not avoided, **may** result in minor or moderate injury.

NOTICE — ... indicates a potentially hazardous situation which, if not avoided, **may** result in property damage.

HINWEIS — Additionally, the signal word NOTE is used to identify any information relevant to ensure maximum generator efficiency.



Such kind of information can be complemented by the pictograph Information.

In order to emphasize the above mentioned warning notices, these are used together with pictographs. In this manual you will find the following hazard warning signs, mandatory signs and prohibition signs, which in each case are followed by an explanatory remark.

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Warning signs

A black graphical symbol inside a yellow triangle with a black triangular band defines a safety sign that indicates a hazard. For example:


General warning sign


Warning: Electricity

Prohibition signs

A black graphical symbol inside a red circular band with a red diagonal bar defines a safety sign that indicates that an action shall not be taken or shall be stopped.
For example:


General prohibition sign


No access

Mandatory signs

A white graphical symbol inside a blue circle defines a safety sign that indicates that an action shall be taken to avoid a hazard. For example:


General mandatory sign


Ear protection required

3 Proper Usage of the Generator

The function of a generator is to convert rotating mechanical energy to electrical energy. Alternatively generators are used as synchronous condensers.

To ensure normal and trouble-free operation of the generator, it is necessary to comply with the operating instructions as well as the inspection and maintenance intervals specified for the generator.

Siemens AG do not accept any liability for any damage which may occur as a result of use of the generator for any other purpose or noncompliance with the aforementioned operating instructions or inspection and maintenance intervals.

4 General Organization

The following instructions must be followed to ensure safe and reliable operation:

- Based on this technical documentation shift procedures must be prepared with additional information regarding responsibilities, work organization and workflows.

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- Any personnel working on the generator and its auxiliary systems must be familiarized with the operating instructions and shift procedures and in particular with the safety instructions and regulations before starting work. This particularly applies to personnel such as maintenance personnel who do not work on the generator on a regular basis.
- In addition to the operating instructions, the general legal provisions and other regulations for employment protection, the prevention of accidents and fire as well as the protection of the environment must be observed. The operator is responsible for the implantation and the correct adherence of the staff. Protective apparel and equipment must be used.
- Note safety data sheet when using hazardous material.
- Place signs at the entrance to the operating room of the generator according to the local legal and employment protection requirements. Every person who enters the operating room must wear personal protective equipment according to these local requirements and the requirements stated in this documentation.
- In case that equipment, protection systems or instrumentation and control components are damaged or defect, the generator must be handled as specified (shut down if necessary) and the supervisor must be informed. In some cases local authorities must be informed as well. The local authorities can conduct extraordinary examinations in an event of damage in some individual cases.
- It must be ensured that work on oil carrying systems and piping must be conducted after emptying. Switch off procedures must be strictly adhered. Special procedures for environmental and employment protection must also be considered.
- If work is done on several systems at the same time, it must be coordinated in a way to avoid mutual endangering.
- During start-up and synchronization of the generator only authorized staff with defined task is allowed to stay within the machine room.
- Only use suitable and faultless climbing equipment (e.g. ladders) for work in larger heights. Scaffolding can be necessary and further safeguards like anti-fall guard. Do not step on armatures, thermometers and the bearing.
- The use of pipes, cables, terminal boxes and fittings as a kick or hold is inadmissible. Parts get visible or invisible damages which may lead to a failure beside the danger of injury.
- The operating instructions must always be kept on hand.



NOTE

We recommend engaging the support and services of your local Siemens service center for all planning, installation, commissioning and maintenance work.

5 Personnel

With regard to personnel working on the generator, compliance must be ensured with the following:

- Work on the generator and its auxiliary systems is to be performed by authorized personnel only. Activities and associated responsibilities are to be clearly defined for the personnel.

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- Staff must be trained on the basis of the manufacturer technical documentation. They must be physically and mentally suitable for the tasks and must have the required expertise. Staff must be able to carry out maintenance measures independently and to take decisions in the case of disturbances or deviations from the stated operation condition independently. Depending on local regulations it can be required that these people have a certification from special trainings.
- Personnel requiring or undergoing training must only be allowed to perform work on the generator or its auxiliary systems under the constant supervision of an appropriately qualified member of staff.
- Work on the electrical systems of the generator may only be performed by electrical engineers or by suitably qualified personnel under the supervision of an electrical engineer in compliance with the relevant electrical engineering standards.
- The staff has to avoid dangers or reduce them as far as possible. This also contains the self-control of completed work. In addition, it has to be checked before work execution whether all necessary safety measures are taken.
- The operator's position during operation of the generator is the control room. Abidance near the generator is only permitted for inspection and attendance purposes which are required for the operation.

6 Lifting and Working Posture

When working on the generator make sure to comply with the local rules regarding lifting and working posture. All work shall be planned in order to be executed in a safe and healthy manor.

Lifting that can be a risk to health and safety shall be avoided. The usage of lifting equipment should be preferred for all lifting workings at the generator. This applies to all generator equipment such as filters, manhole covers etc. Observe the local requirements regarding the recommended lifting weight and carrying distance.

7 Modifications to Generator

Do not carry out any modifications to the generator or perform any other work on the generator which might impair safety. Any changes must be approved by Siemens AG prior to their implementation.

8 Spare Parts and Special Tools

Spare parts and special tools must comply with the technical standards set forth by Siemens and other suppliers. Compliance with the aforementioned standards is only ensured if original parts and tools are used. Special tools should only be used as intended by Siemens or the supplier.

Spare parts and special tools must be stored in a way to ensure quality and functionality. Further requirements from the supplier documentations must be fulfilled including the guarantee conditions. The spare parts and special tools should be checked at regular intervals.

Do not remove any blocks, braces, anchors and/or cushions used during shipment until just before erection or installation of spare parts.

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9 Environment Protection and Waste Disposal

Waste products of any kind (e.g. lubricants) must be disposed of in compliance with the applicable waste disposal regulations. An environmentally friendly disposal (recycling e.g.) has to be striven.

For the de-installation and professional disposal of the generator experts of Siemens AG have to be contacted.

10 Safety Instructions Regarding Special Operating Phases

10.1 Shipment, Transport and Storage

The following safety instructions apply during generator shipment, transport and storage:



⚠ WARNING

Suspended load

Falling loads may cause injury to persons.

- Keep safe distance. Place barriers if necessary.
- Only use specified load attachment points. Only use suitable lifting equipment. The lifting equipment must be in good condition and have a sufficient load carrying capacity.

- Refer to the shipping documents for information about the dimensions and weights of generator components.
- For transportation of heavy machine parts in buildings a sufficient load-capacity of the building has to be guaranteed along the complete transport route as well as at the operation or stock location.
- Prevent generator rotor from rope-induced damage by using suitable cushions at load attachment points. Hitch ropes to fully extracted bollards only. Insert and lock bollards during transport.
- Carefully check components for evidence of damage, moisture and corrosion on arrival. Notify manufacturer in written and photo documentation of any damage.
- If transport locks must be removed for the purpose of control of the components, these guards must be reattached and removed just before installation of the components.
- Adhere to all measures for protection during transport described in this manual.
- Take appropriate measures to protect and preserve the generator at standstill. Observe the storage instructions in this manual.
- Fill in the generator packing checklist for long time storage, if necessary. Storage goods must be checked monthly.

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10.2 Erection

The following safety instructions apply during generator erection:



⚠ CAUTION

Crushing hazard

These may cause injury to persons.

- Installation, raising, transporting of heavy objects only with the help of hoists.

- Before erection remove protective coating and any other protective material from components using a suitable cleaning agent. Observe environmental regulations.
- Check the generator for foreign objects. Even minimal-size metallic particles left inside after work on the generator can lead to large-scale damage during generator operation.
- If it is necessary to open parts of the system the openings must be covered. The used covers must be sufficiently exact and stable to prevent a contamination with foreign material.
- Use only suitable lubrication and seal material for the respective purpose. They must comply with the later operation conditions.

10.3 Start-up

The following safety instructions apply during generator start-up:



⚠ WARNING

Rotating components

These may cause injury to persons.

- Before commencing with generator start-up ensure that personnel are not exposed to any hazards. The start-up sequence must be adhered.

- All mechanical and hydraulic components as well as the generator protection system must be checked with regard to function and settings.
- Before start-up/ re-commissioning all components must be checked for safety and for recognizable defects. Defective parts and systems must be repaired before start-up.
- Obligatory documentation requirement: Prepare start-up record. Record all operating data after allowing sufficient time for steady-state conditions to be established.

10.4 Operation

The following safety instructions apply during generator operation:



⚠ CAUTION

Hot surface.

Parts of the generator can be very hot and may cause serious burns.

- Do not touch.

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⚠ CAUTION

Operating noise of generator may damage hearing.

- Wear ear plugs when staying next to the operating generator.

- Any irregular events which occur during operation must be reported directly, and the generator shut down if necessary.
- In the event of loss of control voltage the generator must be shut down immediately.
- Only qualified staff with a specified work order should stay near the running generator.
- Obligatory documentation requirement: Record requisite checks during generator operation.

10.5 Maintenance in Operation

The following safety instructions apply during generator maintenance in operation:



⚠ WARNING

Rotating components

These may cause injury to persons.

- Ensure compliance with the scope of work set forth in the maintenance instructions.
- Do not remove any safeguard during operation.

- Operating personnel must be notified before starting any maintenance work. Appoint a suitably qualified supervisor.
- Empty pockets before starting maintenance work. Deposit jewelry and other metal objects. Record all tools used in a list and check that tools have been completely removed from generator when finishing work.

10.6 Maintenance at Standstill

The following safety instructions apply during generator maintenance at standstill:



⚠ WARNING

Danger of serious injuries and substantial material damage.

- The machine must be electrically disconnected.
- Identify all additional dangerous sources of energy e.g. compressed air, hydraulic systems, water.
- The machine must be secured against being switched on accidentally.
- A notice must be attached in the control room that work is in progress.

- Parts which are undergoing inspection or repair activities must be de-energized. Disconnected parts must be checked for voltage, grounded and short-circuiting. Neighboring energized parts must be isolated and covered.
- It must be ensured that the generator cannot be switched on if somebody is working on it. It has to be made sure that no one stays in an area where it could come to injuries during start-up process.

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- The removal of safeguards must be avoided. It is only allowed when it is required for the work and does not endanger the staff. Removed safeguards must be re installed and checked just after the work task.
- Switch pressurized systems off before starting to work on it. Take care of ram pressures. Solving screw connections carefully.
- Disconnect cable connections to electrical devices and ground terminals before lifting any cover. Remove electrical devices before dismantling components.
- Check the generator for foreign objects. Even minimal-size metallic particles left inside after work on the generator can lead to large-scale damage during generator operation.

10.7 Shutdown

The following safety instructions apply during generator shutdown:



⚠ WARNING

Rotating components

These may cause severe injury to persons.

- Ensure that rotor has coasted down.
- Do not remove any guards until generator has come to a full standstill.

- Obligatory documentation requirement: Record requisite checks during and following generator shutdown.

11 Special Hazards

11.1 Electric Current

Ensure compliance with the following instructions:



⚠ DANGER

Electrical hazard

Touching electrical equipment during operation can result in damage to property, serious injury and even death.

- Do not remove any safeguards or open cabinets during operation.

- Work on the electrical systems of the generator may only be performed by electrical engineers or by suitably qualified personnel under the supervision of an electrical engineer in compliance with the relevant electrical engineering standards.
- Local requirements regarding work on electrical installations must be strictly adhered to.
- For all work on electrical installations observe the five safety rules:

  1 Disconnect from the mains

  2 Secure against reconnection

  3 Verify that the system is dead

  4 Carry out earthing and short circuiting

  5 Provide protection from adjacent live parts.

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- During operation very high voltages occur, which can remain in existence for long periods of time even after switching off due to remanence or discharge of capacitors. As long as the generator is still rotating it carries a dangerous voltage. Do not touch the equipment before all 5 rules are fulfilled.
- Regularly check the electrical equipment, grounding system and isolation levels. Immediately repair any defects.

11.2 Electromagnetic Fields



⚠ WARNING

Electromagnetic fields are generated during the operation of the generator.

Electromagnetic fields can interfere with electronic devices. This could lead to malfunction of such devices.

- Therefore persons with active medical implants must not enter these areas.

- The system operator must put appropriate measures, markings and warnings into effect so that the personnel working there are sufficiently protected against possible injury. Also observe the local requirements.

11.3 Heat



⚠ WARNING

Hot surface

Parts of the generator can be very hot and may cause serious burns.

- Do not touch.

- The surface of oil lines, covers etc. become hot during operation.
- The surface of anti-condensation heaters switched on automatically during standstill becomes hot.

11.4 Noise



⚠ CAUTION

Operating noise of generator may damage hearing.

- Wear ear plugs when staying next to the operating generator.

- The generator may produce noise levels of approx. 90 dB(A) depending on model and type. In the long term such noise levels may result in damage to hearing.

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Generator Preinstallation

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General
This instruction leaflet applies to the Siemens Air Cooled **2-pole** generator that is **T**otal **E**nclosed **W**ater **A**ir **C**ooled (TEWAC) and powered by a turbine.

Contents
The preinstallation instructions give directions for handling the generator from arrival to erection.

Receiving Generator
When the generator arrives at the site, the purchaser should first check the shipping lists and verify shipment completeness. Make this verification immediately to avoid installation delays.
Examine the equipment for shipping damage. File any damage claims with the carrier promptly.

Handling
The assembled generator is shipped with the stator, rotor, excitation device, bearings and base frame in place. Because of shipping size restrictions, the enclosure, the cooler unit and the cubicles are shipped separately for field assembly.

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Enclosure
When the trailer containing the enclosure has been spotted, the material should be checked for damage in shipment. If there is any damaged material, the freight agent should be notified at once. Once this has been accomplished, the material is ready to be unloaded.

	**NOTE** **Use a closed lifting system to lift the enclosure. Fix the rope on the lifting lugs in that way that the rope are not spread an angle of over 90°.**

	**CAUTION** **Separate the extra cover TE and/or EE, if present and mounted, from the basis enclosure. When you divide the enclosure (basis enclosure and extra cover), take care not to damage the rubber seals at parting line. Do not allow enclosure parts to stand in mud or water.**

If you remove extra covers from the enclosure (if necessary), watch for the demounted screws, washers, lock washers, nuts and connecting parts and store it for the further reinstallation of enclosure.
If you receive a indoor enclosure protect the enclosure with suitable material e.g. plastic sheeting.

Cooler Unit
The cooler unit consists of the coolers and the cover. The unit is setted on the enclosure. Preinstalled internal electrical wiring must be connected at site. For assembly and annex of the cooler unit see also the manufacturer's instructions.
The cooler unit prevents together with the enclosure a penetration of dirt, water and moisture. Therefore, it is important to set on the cooler unit as fast as possible. Meanwhile, all openings in the enclosure are to lock with right measures (for example with tarpaulin).

Lifting the Generator Assembly
Use the base frame trunnions, which are located two on each side of the generator base frame, for lifting the assembled generator. These lift points are located below the generator assembly center of gravity; they are accessible through slits provided in the protective tarpaulin. Each lift trunnion should be supported by a cable looped onto a single crane hook for stable lifting.



⚠ WARNING

The user is responsible for selecting the correct lifting equipment and for using it both properly and safely. Improper or unsafe equipment or its misuse in unsafe configurations could cause a load to shift or drop. Serious injury, death, or equipment damage could result.

Perform the following procedure to move the generator:

- Survey the proposed route from the point of relocation to the generator foundation for any obstructions that may pose a problem in movement.



NOTE

To lift the generator, the lift trunnions must be pulled out completely without damaging the packing or components.

- Revering to the drawing Method of Shipping use lifting beams.



NOTE

Do not remove any shipping bracing until just before moving the generator.

- Remove only the bracing required to unload the equipment from the shipping unit.



NOTE

It is recommended that the unit loaded with the generator not be driven onto the foundation.

- Make a positive check to see that the generator is securely anchored to the car before moving the car.

Loading the Generator on Foundation
The proper rigging, jacking and sliding procedures must be used to set the generator on the foundation. After moving the generator alongside the foundation to approximately the correct transverse centerline, use the following procedures as a guide to set the generator on the foundation:

- Before loading the generator on the foundation, tap all threaded bolt holes to facilitate installation of jack screws and other bolts.

- Clean and de-burr, where necessary, the generator bearing plates and shims.



NOTE

Lifting, of the generator shall be done at the trunnions except to adjust position of the generator on the foundation with jack screws. Provide protection to the generator to prevent, damages while rigging and moving. If the turbine is already set on the foundation, remove the transportation securing device on generator.

- Put the anchor bolts M36*2710 into the holes and put them into the bore holes of the generator base frame, after placing the generator on the foundation, or mount the anchor bolts M36*2710 on the generator base frame before loading on the foundation.

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- Position the generator on the foundation to within approximately 1 inch of the top surface of the jack screws. Lower the generator carefully, making sure it is level and at correct slope to land uniformly on all jack screws.

- Remove shipping covers and verify the rotor axial end play against the AC Turbine Generator-General Assembly Record drawing.

- Make preliminary adjustment of the generator to the turbine. Use jack screws for making the vertical and lateral moves.

Final Assembly of Generator (if delivered and in scope of Siemens)
Following alignment of the generator, the following steps should be completed:

- Install the neutral point cubicle, current transformers and associated conduits and wiring in accordance with the neutral point cubicle assembly drawing.

- Install the line side cubicle, current transformers and associated conduits and wiring in accordance with the line side cubicle assembly drawing.

- Install Vibrometer pick-ups, Proximeters, bearing metal temperature sensor wiring and all associated conduit and wiring in accordance with the Generator Auxiliary Wiring Diagrams.

- Install name plates, generator neutral and line side box covers and final assembly items in accordance with the Name Plate/Cover and Final Assembly Drawing.

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Storage

General

During storage, the generator requires special protection against the elements because it is not ventilated and warmed by operation. Appropriate storage requires:

- Exclusion of Contaminants
- Prevention of moisture condensation
- Monitoring to ensure appropriate storage conditions

Exclusion of Contaminants

During storage, the generator requires the complete assembly of the outdoor housings for protection against dirt and moisture. Shipping limitations prevent attachment of these housings before shipping; instead, special shipping covers are used to protect the generator. The shipping covers should be replaced by the permanent housing as soon as possible, because the covers are designed to provide effective protection for only a normal erection interval.
The generator should be periodically inspected to ensure that insects have not entered the generator. Insects can cause damage to windings and blockage of ventilation passages.

Prevention of Moisture Condensation

The generator is equipped with space heaters that can keep the temperature several degrees above ambient under normal conditions. These space heaters must be operated continuously to protect the equipment from moisture. Use the space heaters at all times, from initial arrival until the generator is put into operation.

	**CAUTION** **Be sure to remove the shipping tarpaulins and to install the permanent housing and covers before operating the space heaters. Damage to equipment could result.**

Monitoring of Storage Conditions
The stator winding embedded RTDs should be connected during storage and shutdown, so that the temperature of the generator can be monitored. Measured temperatures should be maintained at 10 degrees above ambient temperature, and should not exceed 167°F (75°C).
Supervision of the generator during storage also includes that insulation resistance measurements are taken periodically.

The procedure is described in the General Handling Guidelines, Insulation Resistance Measurements. If the measurements indicate a significant reduction of insulation resistance, begin drying-out procedures. Refer to the General Handling Guidelines, Drying the Windings.
If the bearing housings are exposed to any unusual environment that could degrade rust prevention, or if any rusting is noticed around the bearing housings, open the bearing housings and inspect for rust.

Storage of Enclosure
Store the enclosure as follows:

- Store indoor/outdoor enclosures dry and clean until needed. Close openings with suitable materials e.g. plastic sheeting.

- Protect the enclosure base frame with rubber sealing from the elements, mud and water. Put the enclosure on wood.

- Store additional covers TE and/or EE (if available) dry and clean until needed

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Generator Installation

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Generator Installation Procedure

for 2-Pole Generators

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Latest Rev.	Date	Revisions	Name of Reviser	Name of Approver
A	1118	First Edition	Zwicker	Schuelke

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4.1 Safety precaution for installation of the generator

4.1.1 General

This section contains the relevant information necessary for safe operation of a generator.
Although the generator is designed to state-of-the-art technology and complies with the applicable safety standards, hazards which could result in personal injury to the user or third parties and damage to the generator or other property cannot be ruled out completely.
Please read this section carefully and make sure that you comply with the instructions in order to safeguard against personal injury and damage to the generator and its components.
Please note that the safety information in this section is general and applies to different types of generators. Specific safety instructions are included in the operating instructions provided for the individual components and in the various appendices.

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4.1.2 Information for the person responsible for the plant

Observe the local and industry-specific safety regulations.
The persons responsible for the plant must ensure the following:

- Planning and configuration work and all work carried out on and with the generator is only to be done by qualified personnel.
- The operating manual must be available at all times during all work.
- The technical data and the specifications of the permissible assembly, connection, environmental and operating conditions must always be observed.
- The specific safety regulations as well as regulations on the use of personal protective equipment must be always observed.

	**NOTE** **Use the services and support provided by the appropriate Service Center for planning, installation, commissioning and servicing work.**

You will find safety instructions in the individual chapters of this document which must be observed without fail for your own safety, the safety of other persons and to prevent damage to property.
Observe the following safety instructions during all activities on and with the generator and its components.

4.1.3 The five safety rules

For your personal safety and to prevent material damage when working on the generator, always observe the safety instructions and the following five safety rules, according to EN 50110-1 (“Working in a voltage-free state”). Apply the five safety rules in the order stated before starting work at the generator.

Five safety rules:

1. Isolate from electrical supply. Disconnect the auxiliary circuits, for example anti-condensation heating.
2. Secure against being switched on again.
3. Make sure that the equipment is at zero voltage.
4. Earth and short-circuit.
5. Cover or isolate nearby components that are still live.

After completing the work, apply the measures in reverse order.

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4.1.4 Qualified personnel

All work on the generator and its components may only be performed by qualified personnel. Qualified personnel within the meaning of this documentation are persons who meet the following requirements:

- On account of their training and experience, they are able to recognize and avoid risks and potential dangers in their particular field of activity.
- They have been appointed by the relevant responsible persons to perform work on the generator and its components.

4.1.5 Safe handling

Safety in the workplace depends on the alertness, care and good sense of everyone involved with the disassembly and reassembly of the generator. As well as complying with the itemized safety precautions, care must always be taken when near the construction site. Always take care of your safety.

Comply with the following to avoid accidents:

- The general safety regulations applicable in the host country.
- The-specific regulations of the operator and those for field of application.
- Special agreements that have been made with operator.
- Separate safety instructions supplied with the generator.
- Safety symbols and notices on the generator and its components.

	**⚠ WARNING** **Live parts** There are live parts in electrical machines. Death, serious injury and/or property damage can result from the removal of covers, improper use of the machine and its components, incorrect operation or inadequate maintenance. - Always observe the "Five Safety Rules" when working on the generator. - Only remove covers in accordance with the instructions in the Operating Manual.
	**⚠ WARNING** **Rotating parts** There are dangerous rotating parts in electrical machines. Death, serious injury and/or property damage can result from the removal of covers, improper use of the machine and its components or inadequate maintenance. - Only remove covers in accordance with the instructions in the Operating Manual. - When working, be aware of rotating parts inside the generator and inside the exciter, for example when turning the rotor. - Special care is required when turning the rotor manually, for example when aligning the shaft train. - Protect against free shaft ends and freewheeling couplings.
	**⚠ WARNING** **Hot surfaces** Electrical devices, such as anti-condensation heaters, have hot surfaces. Do not touch them. This could cause serious burns. - Allow them to cool before starting work on and in the generator. - Only remove covers in accordance with the instructions in the Operating Manual.
	**⚠ WARNING** **Substances hazardous to health** Chemical substances required for the disassembly and reassembly of the generator and its components may be hazardous to health. They may cause poisoning, skin damage, irritation of the respiratory system and other harm to health. - Follow the instructions in the manufacturer's Operating Manual and product information. - Comply with the relevant safety regulations and wear the prescribed personal protective equipment.

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⚠ WARNING

Highly inflammable and combustible substances

Chemical substances required for the disassembly and reassembly of the generator and its components may be highly inflammable.

They can cause burns, other harm to health and property damage.

- Follow the instructions in the manufacturer's Operating Manual and product information.
- Comply with the relevant safety regulations and wear the prescribed personal protective equipment.



⚠ WARNING

Noise emissions

While working on or near the generator, noise emission levels can occur that are impermissible for workshops. This may cause hearing damage.

Ensure safe working within the plant by applying noise reduction measures, such as covers, sound insulation and taking measures to protect hearing.



NOTICE

Take care not to damage mounted parts

Parts, such as temperature sensors and vibration measurement transmitters, are mounted on the generator, and they can be torn off or destroyed if handled improperly. This can lead to malfunctions or even total loss of the machine.

- When required, use suitable access steps or scaffolding when performing assembly work on the generator or its components.
- Do not tread on lines or mounted parts when performing disassembly or reassembly work. Do not use mounted parts as climbing aids.
- When working at a height of above one meter, suitable, tested scaffolding must be used.

4.1.6 Abbreviations and figures in the document



NOTE

In this document as well as in applicable documents you will find the abbreviations **TE*** for “turbine end”; and **EE*** for “exciter end”. Accordingly, you find **DE***/ or **AS*** for “drive end” and **NDE***/ or **BS*** for “non-drive end”. Figures in this document are examples only and may differ from the actual generator type on site.

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4.2 Requirements for installation of the generator

4.2.1 General inspection of the component parts delivered

The generator and its components must be kept in a clean and dry condition throughout the entire period of disassembly and reassembly. The generator and its components must be protected at all times against mechanical damage, moisture, condensation, dirt, insects, dust, etc.
Check all moisture indicators, and write down the results indicated in a report. During storage on site, the moisture indicator of generator and components should be checked daily. Moisture indicator on package located behind control windows (1) on TE* and EE* end. Remove moisture protection and shipping covers a short time before moving the equipment to the installation position.





Figure 4.2-1: Moisture indicator sealed in transport packing (left)

Figure 4.2-2: Transport box with control window for moisture indicator (right)

The degree of humidity inside the sealed wrapping is indicated by humidity indicators in four stages:

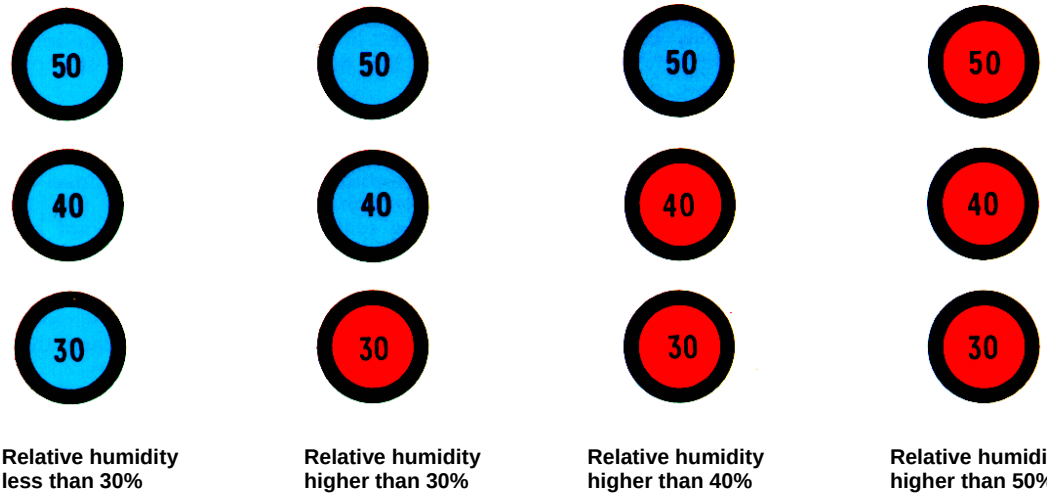


Figure 4.2-3: Humidity indicator colors at various degrees of humidity

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Please note this exception:

Sealed wrappings that are provided to protect against corrosion contain sufficient desiccant to last right through the transport and storage period so that, in this case, openings and indicators are not provided.

Measures to be taken in case of humidity:

If the indicator has turned red or should damage to the sealing wrapping be noticed, remove the contents and store them in a dry, well-ventilated room. Heat the room, if necessary, with an electric heater. If the above procedure cannot be adopted, insert bags with new or reconditioned desiccant in the wrapping. Patch the wrapping with tape or - if possible - weld it (foil welding).

4.2.2 Checking the load handling attachments

Check the load suspension devices, such as load blocks, lifting eyes, ring bolts, roller carriages and the lifting tackle, before lifting and transporting the generator and its components:

- Check the load suspension devices attached to the generator and its components for damage. Replace any damaged load suspension devices.
- Before use, check whether the load suspension devices are properly attached.
- Only use approved undamaged and adequately dimensioned lifting tackle for lifting and transporting the generator and its components. Check them before use.



⚠ WARNING

The generator components could fall down

If the load suspension devices and lifting tackle are damaged or not properly attached, the generator components could fall down when lifted or transported. This could cause death, serious injuries and property damage. Check the load suspension devices and lifting tackle before use.

4.2.3 Lifting and transporting the generator

The persons must have the relevant qualifications for operating cranes and fork-lift trucks.

Only use approved undamaged and adequately dimensioned oil-pressure jacks for lifting the generator components. Check them before use. You will find the weights of the generator components on their rating plates.

- When lifting, use the information on the rating plate. Be aware of the centres of gravity of the generator components. Comply with the specified spread angle.
- When lifting, do not exceed the maximum acceleration or speed, which may be stated on the lifting information plate. Lift the generator components without jerks.
  Acceleration $a \leq 0.4$ g; Velocity $v \leq 20\ ^{m}/_{min}$

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- Lift the generator components only by the load suspension devices located on it, such as lifting eyes. Lift the components by, for example, load blocks and ring bolts.

	**⚠ WARNING** **Lifting or transporting the generator components** The generator components may only be lifted and transported by load suspension devices in their normal upright positions. Otherwise the generator parts could tip over, slip in the lifting devices or fall down. This could cause death, serious injuries and property damage. Use suitable ropes when you lift generator parts. You will find the weights of the generator components on their rating plates or in the dimensioned drawing, dimensioned drawing text of the product manual. Generator transportation weight 131.700kg
	**⚠ WARNING** **Position of the centre of gravity when lifting or transporting the generator components** If the centre of gravity of a load does not lie in the middle of the attachment points, the lifted parts may tip over or slip in the lifting devices when lifted or transported. This could cause death, serious injuries and property damage. - Comply with the handling instructions of the generator components during all transport work. - Be aware of the differing loads on the slings or lifting straps, and do not exceed the loading capacity of the lifting device. - Only lift or transport the generator components in a manner appropriate to the position of their centre of gravity. If the centre of gravity does not lie in the middle of the hitching points, then place the lifting hook above the centre of gravity.
	**⚠ WARNING** **Do not stand or walk under suspended loads** The generator components could fall down if the lifting tackle or load suspension devices fail. This could cause death, serious injuries and property damage. Do not stand or walk under suspended generator parts. Before working under a suspended generator component, stands with an appropriate loading capacity must be placed beneath them.
	**⚠ DANGER** **Never remain under a suspended load** If the lifting gear or load handling attachments were to fail, the generator could fall. This can result in death serious injury, or material damage. Never remain under the generator when it is raised.

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	NOTE **Local space condition around the generator foundation** It could be through local space necessary, differ in each point of the sequence of the Assembly steps. Check therefore whether the local site conditions allow, the Assembly steps as in the manual can be described, carried out (E.g. sufficient crane hook height to mount of the assemblies), see also generator outline drawing.

4.2.4 Removing the anti-corrosion protection

Machined, bright surfaces of generator parts and small components such as screws, bolt, dowel pins, couplings and shaft ends, are treated with an anti-corrosion agent. Carefully remove the anti-corrosion agent and immediately start the installation work.

Bright surfaces on generator parts

- Use petroleum, petroleum ether, or a similar solvent or detergent to remove the anti-corrosion coating from the machined surface of generator parts and from small components.

	NOTE **Paintwork damage** Make sure that the detergent or solvent does not come into contact with any painted surface, as this could damage the lacquer. - Use a suitable solvent to soften thick layers of anti-corrosion agent. Then push the softened layers off using a piece of hardwood approximately 10x10x1cm. Do not sand the protective coating down or scrape it off. - Be carefully on the contact area of rotor grounding brushes, when removing anti-corrosion protection.
	⚠ CAUTION **Do not use metal tools** Do not use metal objects such as scrapers, spatulas, or plates to remove the anti-corrosion protection. This could damage the surface of the motor parts. - Lightly oil the depreserved surface.

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4.2.5 Corrosion and moisture protection of the Interior of the generator

During longer mounting interruptions or shutdowns such as overhauls or repairs, SIEMENS recommends the installation and use of an additional Munters dryer to reducing the moisture inside the generator.

	**NOTE** **Moisture concentration** Make sure that the heaters inside the generator always switched on during the installation, longer mounting interruptions and overhauls. - Close the openings on the generator base frame and stator core. - If possible, mount and close the generator enclosure.
	**⚠ CAUTION** **Moisture reduces the insulation resistance of the winding and damage unprotected parts inside of the generator.** Do not operate the generator with low insulation resistance. Keep the unprotected parts inside the generator free of rust.

4.2.6 Measuring Charts and Checklist Information

To facilitate the installation of the generator and to ensure the quality of the work on site or to log, different protocols for quality assurance have been provided. Observe the instructions in the installation manual, during the mounting process, fill out the appropriate protocols. At the end of the installation of the generator using the check list, check their work. All necessary activities must be coordinated before.

All records (filled out) must return after installation as copy to the quality department of Siemens.

	**NOTE** *During the installation the given values in the Generator Assembly Records (Measuring Charts) in **chapter 5.0** must be observed and the current values must be recorded in "field erection"! The (Checklist) in **chapter 16.0** must be filled out.*

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4.3 Preparation for installation of the generator

4.3.1 General

(*See DWG **DPPPG-70149178** – Generator Outline Drawing; DWG **DPPPG-70149179** – Outline Drawing Text, and DWG **DPPPG-70148624** – Anchoring, in chapter 17.0*)

4.3.2 Concrete foundation preparatory works

Inspect both the foundation and the anchor holes for dimensional accuracy before starting erection work. Remove any loose elements and loosely adhering cement grout from the foundation surface. Knock off any projecting stones. Create a suitable grouting channel either by cutting such a channel in the concrete, or by leaving a corresponding channel recess when placing the concrete in order to assist in grouting the anchor holes after the installation of anchor screws and the generator base frame. A suitably formed channel made of wood or sheet metal may also be used as an alternative. The channel must have a form which ensures that the grouting compound exclusively fills the anchor hole, while the other area remains without grouting compound.

	**NOTE** All concrete contaminated by oil or grease must be chiseled out to an adequate depth to ensure adequate adhesion of the casting compound. The underside of the generator base frame must also be free of oil and grease. A priming coat can remain.

4.3.3 Placing of the primary bearing plates and leveling plates

(*See DWG **DPPPG-70149178** – Generator Outline Drawing, and DWG **DPPPG-70148624** – Anchoring, in chapter 17.0*)

The four primary bearing plates 400*400*20mm and the sixteen leveling plates 150*150*20mm should be installed, according to the distance of the generator base frame corners, and according to the position of the sixteen leveling screws M36*1.5*100mm, in the base frame of the generator.
The final positions of all plates should be marked out, on the existing foundation according the foundation plan. All primary bearing- and leveling plates should be placed into the grouting mortar, such that their top surfaces are horizontal and at a uniform level. The height position should be determined with reference either to measuring marks, or to an existing machine (turbine), where the generator will be mounted. This position should be set such that the centerline of generator axis is located approximately **2mm** lower than the final generator alignment, after placing the generator on the primary bearing plates. A sliding sheet (greased Teflon) should be placed on every primary bearing plate, to make for an easier alignment in transverse direction.

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NOTE

The height position, of the four primary bearing plates 400*400*20mm can be compensated with regard to one another, using three hexagon set screws M8*50mm for leveling/offset at each plate, if any deviations are found. After drying the mortar, prior to the setting up of the base frame of the generator, all hexagon set screws M8*50mm for aligning are to be removed!

Place the sixteen leveling plates 150*150*20mm horizontally into the grouting mortar as per foundation drawing. Do not apply any load on the primary bearing plates / leveling plates unless **24 hours** have passed after placing; see the specifications as defined by the grouting mortar manufacturer.
The generator base frame contact surfaces must be free from oil and grease for later grouting. Determine the distance between the generator base frame bottom edge and the leveling plates before setting down the generator base frame onto the four primary bearing plates 400*400*20mm. Coat the threads of the sixteen leveling screws M36*1.5*100mm with antiseize agent, such as graphite paste or MoS_2 and screw them in until a distance of approximately **5mm** is left between leveling screws and leveling plates after setting down the generator base frame.

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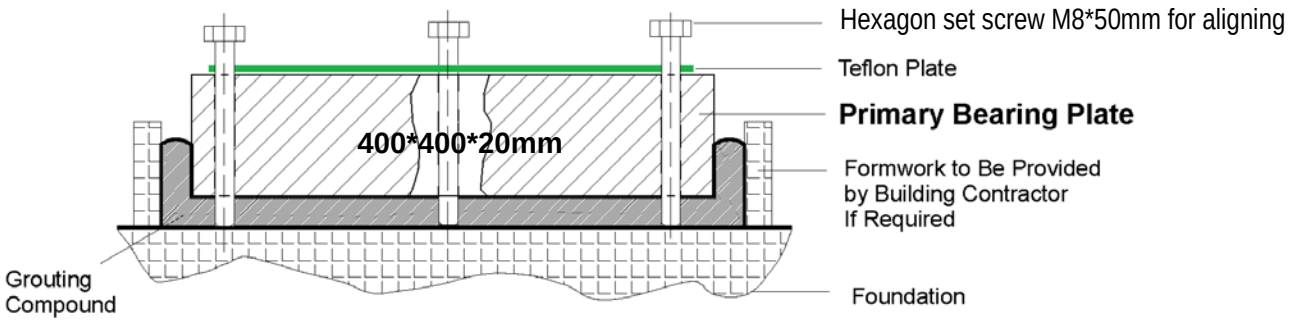


Figure 4.3-1: Primary bearing plate prepared on the concrete foundation; three hexagon set screws M8*50mm for aligning, are to be removed afterwards

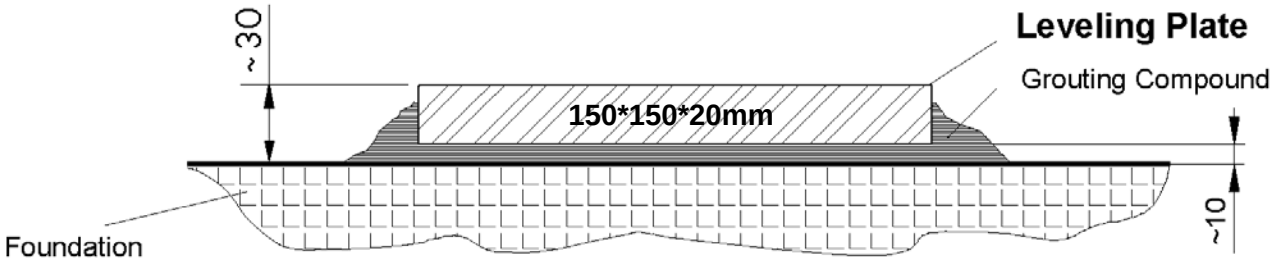
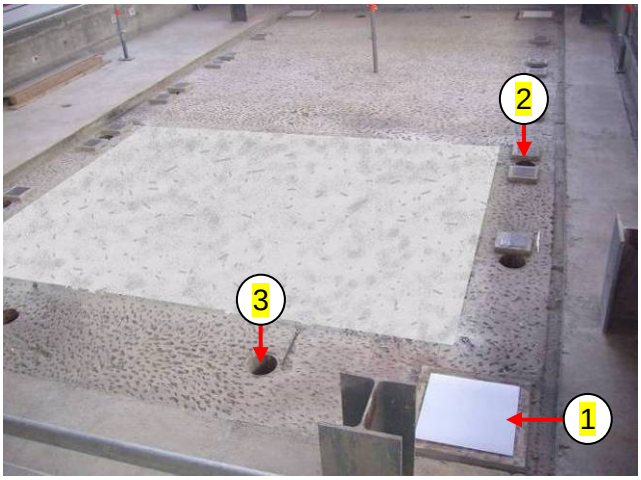


Figure 4.3-2: Leveling plate prepared on the concrete foundation



- **P**rimary bearing plate (1) prepared with Teflon sheet.
- **A**nchor hole (2) prepared with leveling plates.
- **A**nchor hole (3) without leveling plates.

NOTE: The Primary bearings- and the leveling plates must be aligned according the DWG **DPPPG-70149178** and DWG **DPPPG-70148624**.

Figure 4.3-3: Prepared foundation with primary bearing plates and leveling plates

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4.3.4 Grouting surface distribution and formwork erection, only if needed

(*See **FV/MP 12-011** – Manufacturing Procedure, in chapter 7.0, and DWG **DPPPG-70149178** – Generator Outline Drawing, in chapter 17.0*)

The surface to be grouted should be divided into individual grouting segments (if required), ensuring that the flow direction of the grouting compound is clearly defined. The dimensions of the individual grouting segments should be determined dependent on the pump capacity, but not larger than **10 square meters** per grouting segment. Only thus the processing time specified for the grouting compound can be observed. Use water-repellent and permanently elastic foamed material, e.g., ETA-foam, to divide the various sections to a sufficient width before placing the base frame. Ensure a tight separation between the various sections to prevent grouting compound from leaking to other sections. Install permanent formwork beforehand if limited space is available only. This permanent formwork will need to be installed at a distance of not less than **25mm** to the base frame wall in order to be able and check the grouting level. Use splash water to visually inspect the permanent formwork for tightness if required.
In case of generator base frame with finned bottom area (1) the hollow space between the rips cannot be filled completely, but it is important that all supporting base frame areas including the flat traversal girder (2) are complete grouted.

Examples are shown on the next page.

	NOTE Generators with current lead on the bottom side are the exception. The foundation area for the grouting of this design is shown in the DWG **DPPPG-70149178**.





Figure 4.3-4: Generator base frame with finned bottom areas (left)

Figure 4.3-5: Generator base frame areas with flat traversal girder (right)

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4.3.5 Preparing of the anchor screws M36*2710

(*See **FV/MP 12-010** – Manufacturing Procedure, in chapter 7.0, and DWG **DPPPG-70148624** – Anchoring, in chapter 17.0)*

The sixteen anchor screws M36*2710mm are supplied with a protective film on it, which needs to be removed from the threads. In order to preserve the elastic properties of the anchor screws M36*2710mm and to make it possible for them to be tightened, the grouting compound must not set on the bolt shaft or penetrate into the threads of the nuts. For that purpose, wrap two layers of bituminous jacketing (e.g. Denso Jacketing) around the anchor screws in following way:

- Remove the manufacturer`s Tectyl coat from the thread.

  If there are relief grooves

  Wrap bituminous jacketing around the relief grooves, up to the thread.

  If the shaft diameter is larger than the thread diameter

  Wrap bituminous jacketing around the thread (and relive grooves) on the lower shaft end up to the future position of the nut and on the upper shaft end up to about 50mm over the final grouting height. Wrap two layers of bituminous jacketing over the entire length of the shaft including the thread. The wrapping should be executed in such way that the jacketing will not come off or be pulled into the thread when the nut is screwed on. (Direction of winding = sense of rotation of nut)
- Grease the thread of anchor screws with MoS_2 or Graphite paste (not if using hydraulic stretching cylinder).

4.3.6 Mounting of the anchor screws M36*2710

(*See **FV/MP 12-010** – Manufacturing Procedure, in chapter 7.0*)

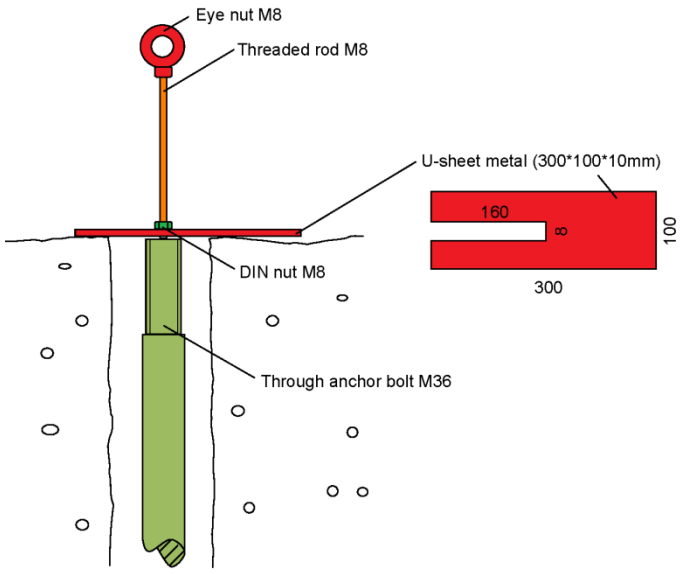
Two procedures can be used to install the anchor screws:

I. The sixteen prepared anchor screws M36*2710mm are put in the anchor holes and secure temporary with a flat U-steel (not scope of supply by Siemens). Later hang the anchor screws in the corresponding base frame holes from below shortly before placing the generator base frame on the concrete foundation.

II. The sixteen prepared anchor screws M36*2710mm are hung into the base frame after lifting of the generator. Later lower the base frame on the concrete foundation and thread the anchor screws into their anchor holes.

As example Variant I:

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- **B**efore lowering the generator base frame on foundation hang all anchor screws into the anchor holes; e.g. with a U-sheet metal.
- **A**nchor screw M36*2710mm, weight about **22kg**.
- **S**upport the anchor screw with a threaded rod (M8*300mm), a DIN nut M8 and flat U-sheet metal (not scope by Siemens).
- **A**fter the installation of the generator, lift all anchor screws on the eye nut M8 in the final position.

Figure 4.3-6: Anchor screw temporary mounted in the anchor hole

4.4 Installation of the generator

4.4.1 General

	**NOTE** Till the enclosure is finally assembled; the stator core and stator winding must keep protected against moisture, dust and rain. Protect exposed parts or openings, using suitable packaging material (e.g., plastic sheeting) to avoid contamination or the entry of foreign material.

	**NOTE** During the assembly the given values in **Generator Assembly Records**, in chapter 5.0 must be observed. The current values must be recorded in the column "field erection"!

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4.4.2 Installation of the generator on the primary bearing plates

(*See DWG **DPPPG-70149178** – Generator Outline Drawing; DWG **DPPPG-70149179** – Outline Drawing Text, in chapter 17.0*)

	**NOTE** Use only the four welded bollards for the lifting of the generator which is allowed for this purpose. Use the spreader beams when lifting the generator; if delivered.

	**NOTE** Check the required crane and working height over the generator foundation; see DWG **DPPPG-70149178**.

To allow proper erection, placing on the foundation should be with as little distortion as possible.
To ensure this, proceed as follows:

- The generator should be only lowered, with the four corners of the base frame onto the four primary bearing plates 400*400*20mm.
- A greased Teflon plate is placed on each primary bearing plate, to make the further generator alignment easier.
- The surfaces of bottom side of the base frame of the generator, which will later be in contact with the grout, must be under all circumstances free of oil and grease.
- Lubricant is applied to the threads of the sixteen leveling screws M36*1.5*100mm and they are screwed in, far enough, to leave a space of about **5mm** to each leveling plate 150*150*20mm; see Figure 4.4-4 on Page 23.

- The generator can now be lowered onto the four primary bearing plates 400*400*20mm while ensuring that distortion in the longitudinal and transverse axes is low.
- Lift and install the sixteen anchor screws M36*2710mm one by one in the corresponding anchor hole and secure them with the washers and M36 nut; see the chapter **4.3.6 Mounting of the anchor screws M36*2710** on Page 20.
- Protective tubes are then cut to about **10mm** over length and slid onto the lower ends of the threads of the sixteen leveling screws M36*1.5*100mm; see Figure 4.5-1 on Page 31.





Figure 4.4-1: Generator assembly by crane with temporary transport housing (left)

Figure 4.4-2: Generator is setted onto the foundation (right)

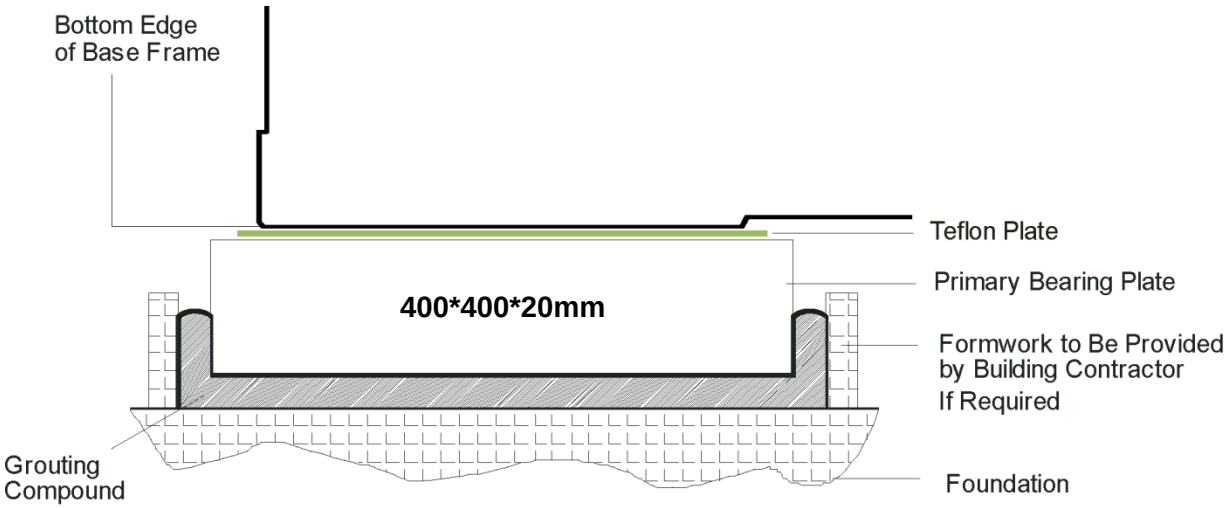


Figure 4.4-3: Primary bearing plate after setting down the generator; the three hexagon set screws M8*50mm have been previously removed

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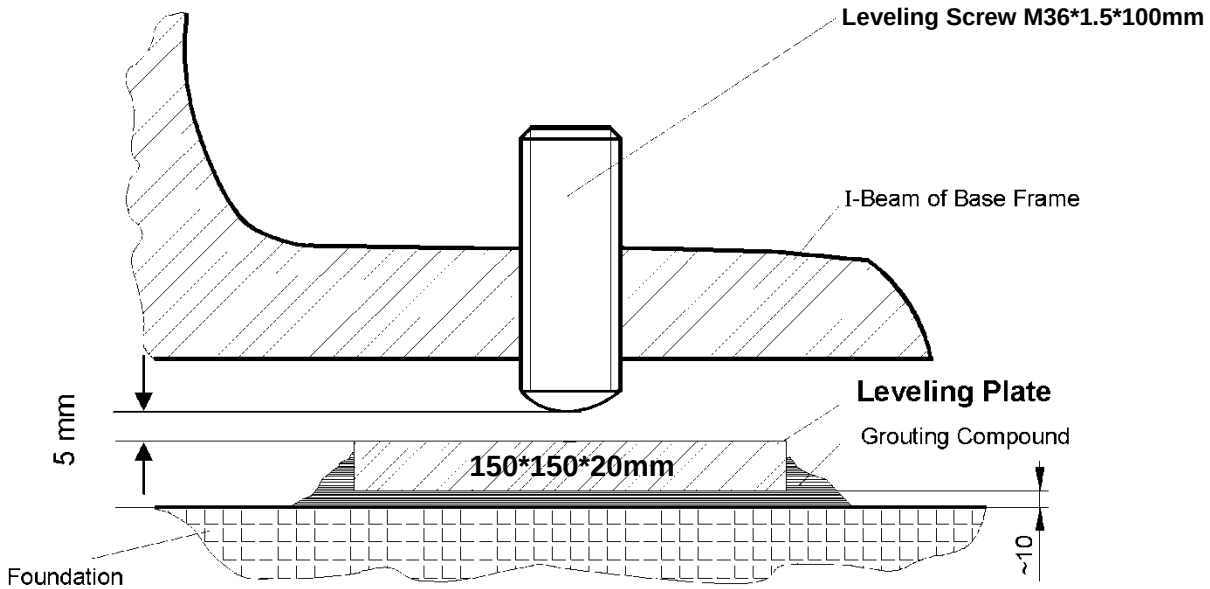
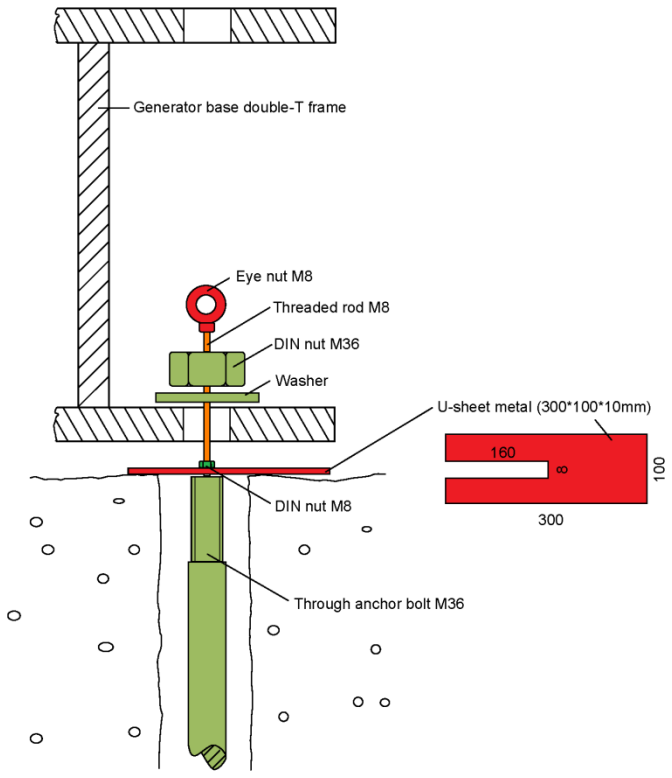


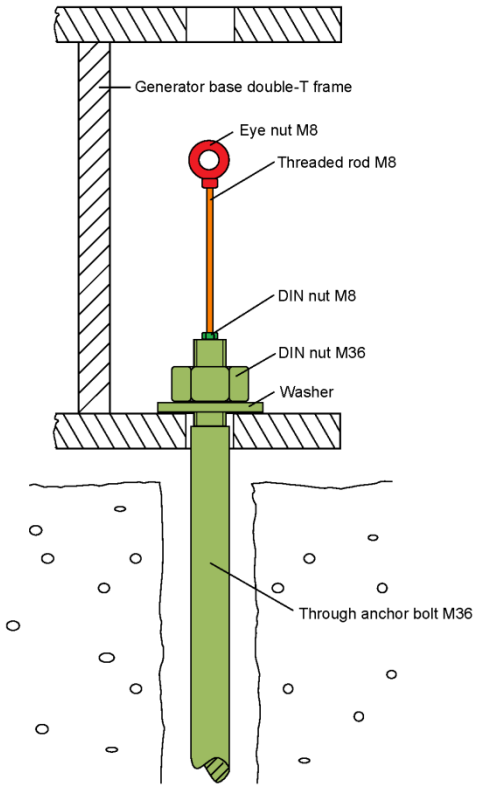
Figure 4.4-4: Leveling plate after setting down the generator on the four primary bearing plates



- **A**nchor screw M36*2710mm, weight about **22kg**.
- **L**ift the anchor screw one by one on the eye nut M8 in final position and secure the anchor screw with washer and DIN nut M36.
- **A**ssemble the lower anchor plates with DIN nut M36 on the lower end of anchor screw; weight about **18.0kg**. See also the next chapter **4.4.3 Installation of the lower anchor plates**.

Figure 4.4-5: Anchor screw and base frame of the generator

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- **A**nchor screw M36*2710mm lifted and secured with washer and DIN nut M36.
- **A**fter the lift of the anchor screw removes the eye nut M8, the threaded rod M8 with DIN nut M8 and the U-sheet metal.

Figure 4.4-6: Anchor screw installed in the base frame of the generator

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4.4.3 Installation of the lower anchor plates

After the installation of the generator and the sixteen anchor screws M36*2710mm, attach the lower anchor plates 30*280*280mm; D38, along with the DIN nuts M36 on the lower ends of the anchor screws. The DIN nuts M36 used must support the load applied over their entire contact surface of the lower anchor plate. Any significant inclination of the DIN nut face as against the thread can easily be recognized by tumbling motions of the anchor plate occurring when the DIN nut is screwed on.

The bituminous jacketing of the anchor screws must reach so far up that a roll is created when the nuts at the bottom are screwed on, see Figure 4.4-7. If this is not the case, be sure to rewrap a sufficiently large area.

The lower anchor plate must carry the load over its entire surface, so that the compressive stress resulting from the pretensioned anchor screw can be borne by the concrete for long time periods under normal operating conditions.

Remove projecting edges or stones, in particular, because these may lead to a reduced bearing surface, which in turn might entail the destruction of the concrete and result in loss of bolt prestress.

All loose matter and any poorly adhering cement grout, as well as dust, grease and oil need to be removed from the concrete seating surfaces for the lower anchor plates 30*280*280mm; D38.

To obtain even seating surfaces for the lower anchor plates, a suitable mortar (such as Pagel V14/10) may have to be applied.

If flat steel are present on the customer's premises secure the lower anchor plates with spot welding at the corners to the foundation. Till the generator alignment is finished, let the lower anchor plates and nuts loose. After that, tighten the anchor screws according Table 4.5-2 on Page 34.

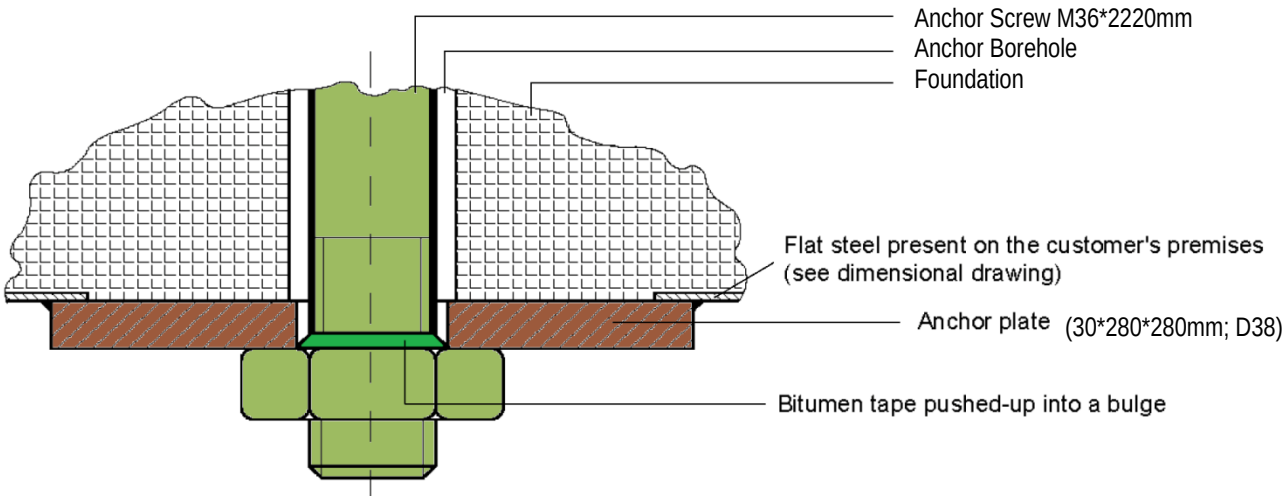


Figure 4.4-7: Anchor screw with lower anchor plate

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4.4.4 Demount the generator transportation hood, only if present

Demount the generator transportation hood (1) from the base frame of the generator (if delivered). Check the intactness of the humidity indicators of the inner foil-sealings. Lift the transportation hood with the four lifting lugs (2), left and right on the side.



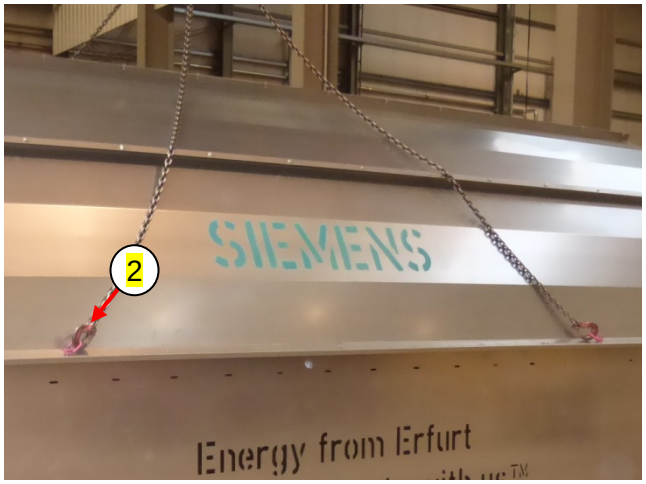


Figure 4.4-8: Example of generator transport hood (left)

Figure 4.4-9: Lifting lugs on transportation hood (right)

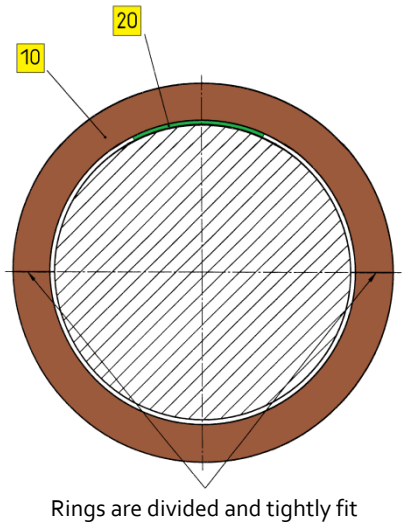
4.4.5 Demount the rotor transportation securing device

(*See **Slide Bearings Instructions for Installation and Maintenance**, in chapter 8.0; see DWG **3-279889** – Rotor Sipping Precaution; DWG **DPPPG-70158485** – TE* Bearing and DWG **DPPPG-70153217** – EE* Bearing, in chapter 17.0*)

	CAUTION There is an insulating pressboard bent to fit the diameter of the shaft concerned or a foil lying between the shaft and the top half shell in each bearing, these must be removed. In general, the shaft is additionally secured against displacement in the axial direction by a fabric base laminate back-up ring in the bearing or a wooden block.

However, this is not the only rotor locking arrangement! Demount the rotor shipping braces (packing and spacing rings).

Item (10) mounted as axial securing device, only at the EE bearing.*
Item (20) mounted as antirotation device, at all bearings between shaft and top shell.



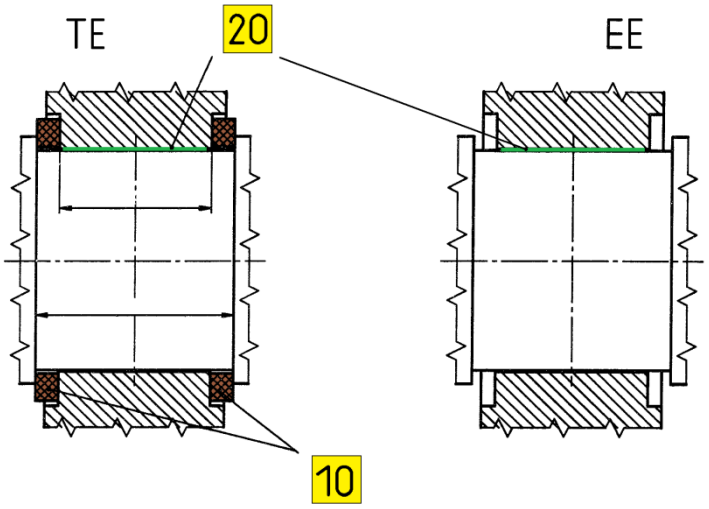


Figure 4.4-10: Rotor transportation precaution (left)

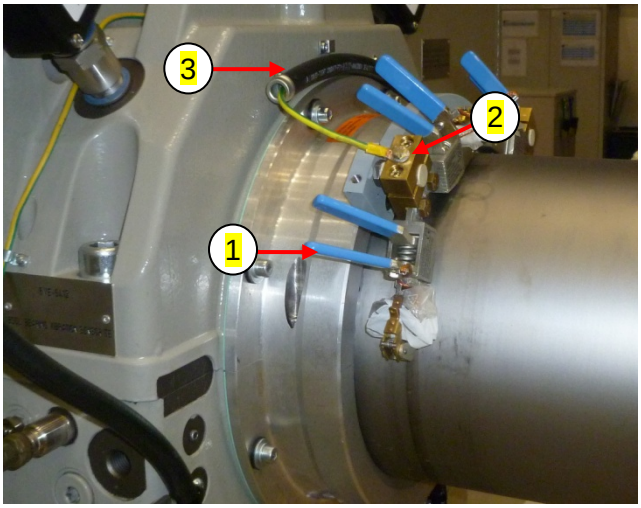
Figure 4.4-11: Rotor transportation precaution mounted in the TE* bearing (middle)

Figure 4.4-12: Rotor transportation precaution mounted in the EE* bearing (right)

	NOTE Protect the rotor surface from damage such as nicks, scratches, and gouges. During erection, never allow the end bell to support the rotor weight.

To remove the rotor shipping precautions, open both bearing covers and bearing shells:

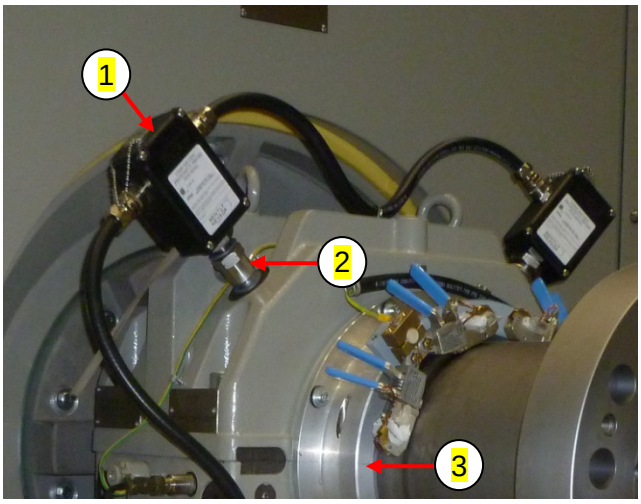
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- **P**ress the handle (1) and demount the four brush holder from the connecting plate (grey) of the labyrinth ring.
- **O**pen the fastening screws (2) and demount the cable shoe from the rotor grounding system.
- **O**pen the clips (3) (if mounted) and demount the protective tube together with the connecting wire from the bearing housing TE*.

Figure 4.4-13: Outer labyrinth ring TE* with rotor grounding system

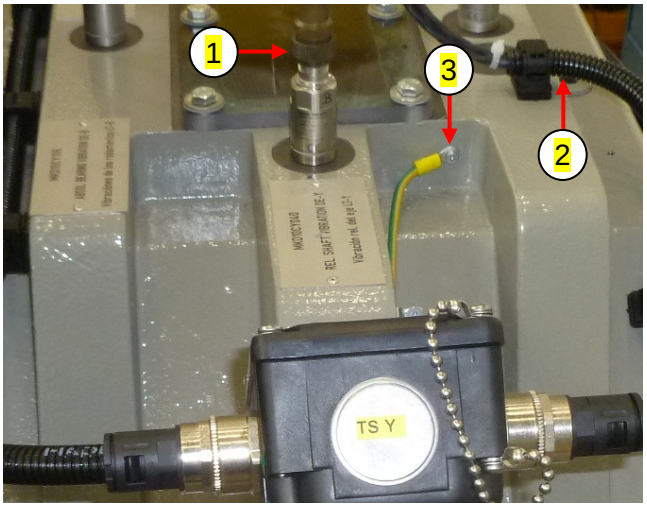
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- **O**pen the shafts vibration sensor housing (1) and disconnect the cables; TE* and EE*.
- **D**ismantle the shaft vibration sensor X and Y (2) from the bearing housing; TE* and EE*.
- **D**ismantle the outer (3) and the inner labyrinth seals from the bearing housing; TE* and EE*.

NOTE: See **Monitoring Vibration** in chapter 13.0.

Figure 4.4-14: Bearing cover with mounted shaft vibration sensors



- **O**pen the screw threads (1) and disconnect the cables from the bearing vibration sensors; TE* and EE*.
- **D**ismantle the cabling (2) of bearing vibration sensors from the bearing housing; TE* and EE*.
- Open the fastening screw (3) and remove the cable for the bearing shell earthing.

NOTE: See **Monitoring Vibration** in chapter 13.0.

Figure 4.4-15: Bearing cover with mounted bearing- and shaft vibration sensors

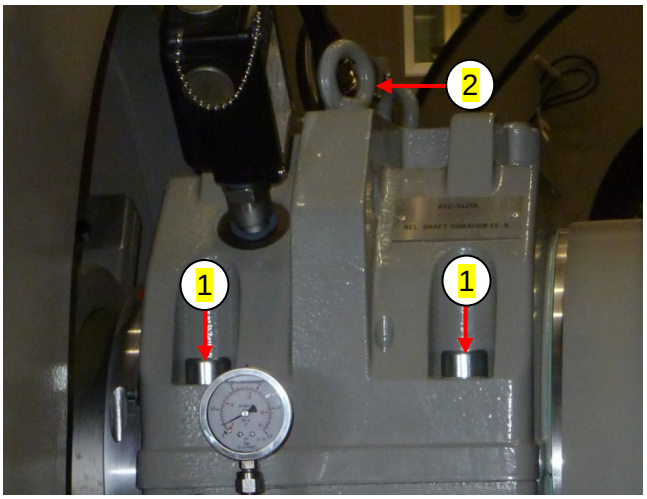


Figure 4.4-16: Fixing screws of bearing cover

- **U**ntie and remove the hexagon socket screws (1) from the bearing cover; TE* and EE*.
- **A**ttach the lifting device for the bearing cover on the lifting points (2).

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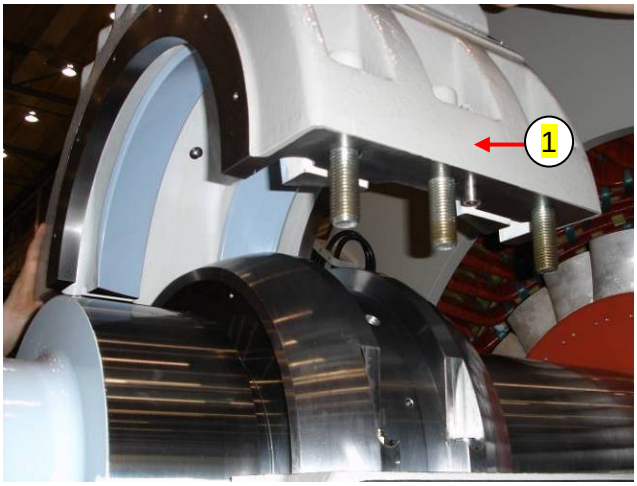


Figure 4.4-17: Lifted bearing cover

- **D**ismantle the bearing covers (1) from the bearing housing; TE* and EE*. Use the two attachment points (eye bolts) on the bearing covers.

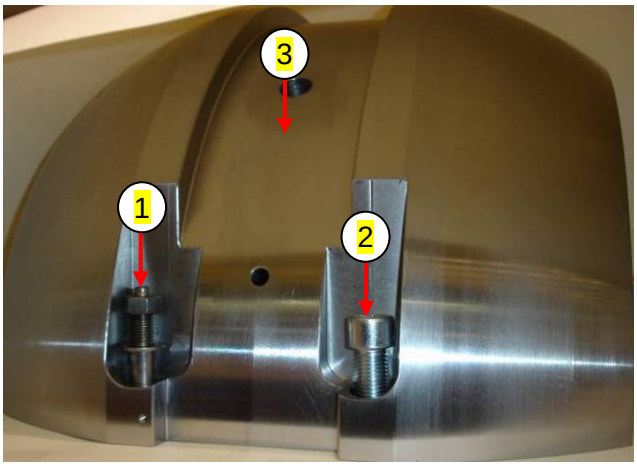
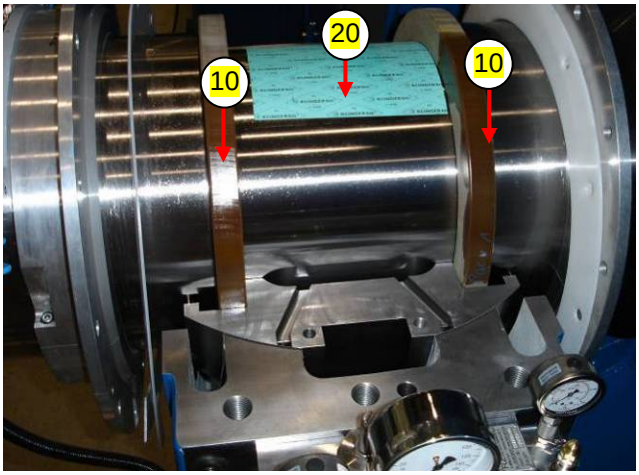


Figure 4.4-18: Demounted upper bearing shell

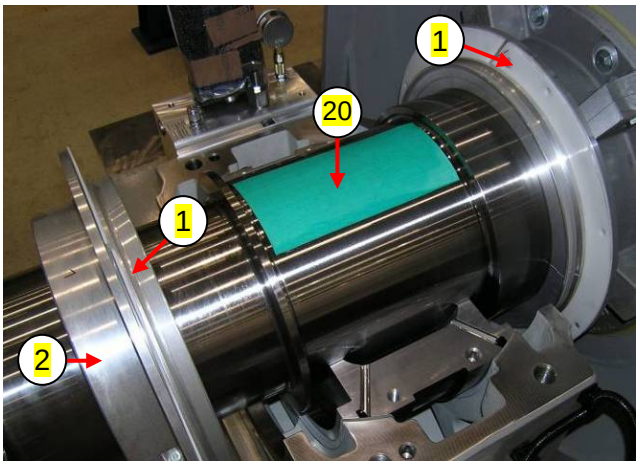
- **L**oosen and remove all taper pins (1) and hexagon screws (2) from the upper bearing shells (3).
- **D**emount the upper bearing shells (3); TE* and EE*.

NOTE: Use two ring bolts M16, for the attachment of the lifting device at the bearing shells.



- **R**emove Item (10), mounted for axial device only at the bearing EE*.
- **R**emove Item (20), antirotation device at the bearing EE*; mounted between shaft and upper bearing shell.

Figure 4.4-19: Mounted axial- and antirotation device



- **R**emove Item (20), antirotation device at the bearing TE*; mounted between shaft and upper bearing shell.

NOTE: The white insulation ring (1) has to be mounted with a uniform layer of sealing compound on both sides, between the rigid labyrinth seals (2) and bearing housings, for oil sealing (the half joint must be on top). See **Bearings**, in chapter 8.0.

Figure 4.4-20: Mounted antirotation device

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4.4.6 Check of the bearing insulation

After removing the rotor shipping precautions, the bearing insulation should be checked.

NOTE

Mounted insulation parts!

Check the bearing insulation between the bearing shells TE* and EE* to their bearing housings. To check the electrical insulation, interrupt the grounding cable of bearing shell TE* on the bearing cover TE*. Rotor grounding brushes are demounted or lifted! Make sure, that both bearing shells TE* and EE*, are electrically insulated. Check the electrical insulation with a suitable measuring instrument e.g. 100-250volt megger. The resistance must be at least ≥500KΩ.

4.5 Alignment of the generator

4.5.1 General

	NOTE The given values in the **Generator Assembly Records**, in chapter 5.0 must be observed. The current values must be recorded in the column “Field erection”.

Through the alignment process, the generator and turbine coupling are to be aligned to each other within the required tolerances. The generator is aligned along the course of the deflection line. In this case, the inductor coupling is arranged with an accuracy of ≤0.03mm radially concentric and axially parallel to the turbine coupling. **If available, follow the instructions and tolerances in the specification for intermediate shaft alignment procedure; they will delivered by the turbine supplier**. The generator base frame must not be grouted until this is the case!

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4.5.2 Procedure of generator alignment

(*See **FV/MP 12-011** – Manufacturing Procedure, in chapter 7.0; **General Handling Guidelines**, in chapter 6.0; DWG **DPPPG-70166125** – Axial and Radial Rotor Clearances, and DWG **DPPPG-70149178** – Generator Outline Drawing, in chapter 17.0)*

During the alignment process, the generator needs to be moved horizontally and vertically with as little distortion as possible. This can be achieved through the following measures:

The lateral generator alignment should be carried out at first. Four Teflon slide plates, covered with antiseize agent, are provided for the movement in a lateral direction at the support positions between the base frame of the generator and the primary bearing plates at the four corners. To move the generator lateral, use hydraulic cylinders shored at steel sections, which are present on the concrete foundation.
The vertical generator alignment is performed when horizontal alignment is complete. Sixteen leveling screws M36*1.5*100mm are provided to allow movements in a vertical direction. The load applied to the leveling screws during tightening should not exceed the maximum tightening torque; see Table 4.5-1 on Page 31.

	NOTE Apply Denso bandages or foam tubes to all leveling screws M36*1.5*100mm to insulate them from the grouting compound to be placed, and to be able and turn them back again after grouting; see Figure 4.5-1 on the next page.

NOTE
The generator must not rest on any of the four primary bearing plates 400*400*20mm when the alignment is complete. The generator is only standing on the sixteen leveling screws M36*1.5*100mm at this time. The four Teflon slide plates on the primary bearing plates are now loose and should be removed.

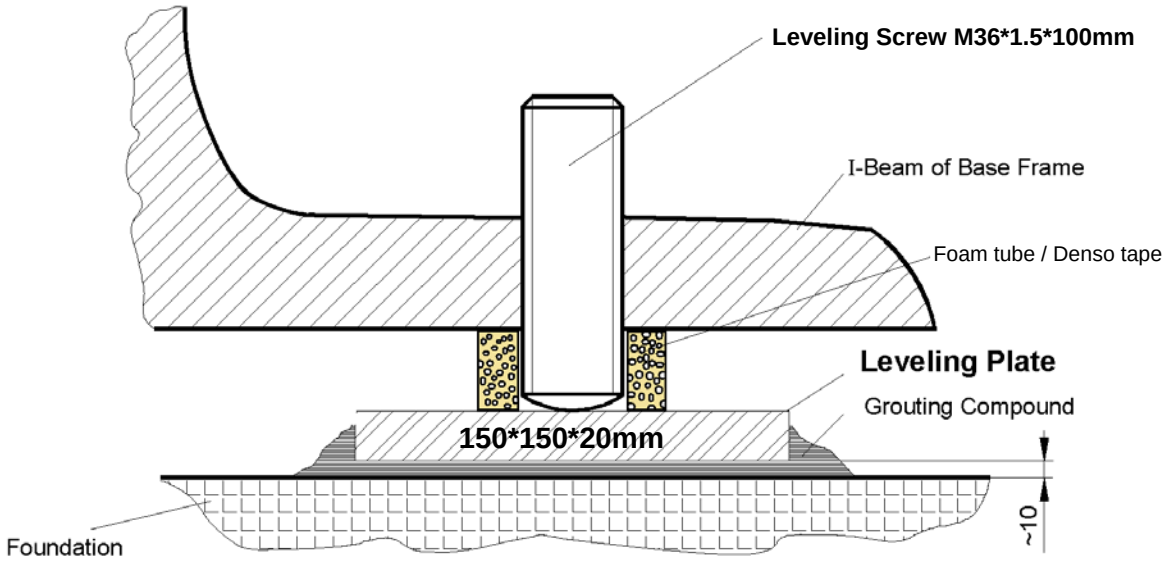


Figure 4.5-1: Leveling plate after aligning of generator

Leveling screws size	M24*1.5*100mm	M30*1.5*100mm	**M36*1.5*100mm**	M42*1.5*100mm
Max. torque during alignment [Nm]	160	330	**580**	940

Table 4.5-1: Allowed maximum tightening torques for different set screw sizes

4.5.3 Preparations of generator alignment

(*See **FV/MP 12-011** – Manufacturing Procedure, in chapter 7.0; DWG **DPPPG-70166125** – Axial and Radial Rotor Clearances, and DWG **DPPPG-70149178** – Generator Outline Drawing, in chapter 17.0)*

Following measurements are taken during the alignment procedure:

- Check the axial and radial clearances of the generator rotor in the required alignment position.
- First check/align the axial position of generator rotor at the bearing housing TE*. Set the axial distance between outer coupling bund and bearing housing TE* (at sealing surface of rigid labyrinth, without white insulation ring; e.g. Teflon). The dimension **A**=2.9mm (thermal expansion of

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the generator rotor) plus dimension **B**=560mm (generator rotor in magnetic center, cold conditions) hast to be adjusted before the generator alignment can start. For the possible thermal expansion of the turbine rotor "axial thrust" add =**X**mm, if necessary. The distance (**X**+**A**+**B**) =**X**mm+560mm+2.9mm; must be in the coupled State between generator coupling and bearing housing TE* (at sealing surface of rigid labyrinth, without insulation ring). The possible axial thrust of the turbine rotor =**X**mm you get from the turbine manufacturer. Note: **A**+**B**=562.9mm.

- For the measurement equipment and the coupling recess (6mm) keep a gap of at least 8 till 10mm when you position the generator rotor in axial position. Note: **A**+**B**=562.9mm-(8 – 10mm)

For example:

If you choose e.g. 8mm, then set the distance of **X**mm+562.9mm-(8mm), between outer coupling bund of rotor and sealing surface of bearing housing TE* (without insulation ring). Move the rotor in axial position, **X**mm+554.9mm, (only inside of bearings). After that, you move the complete base frame of the generator, with the coupling flange 8mm in front of the coupling flange of turbine, (**X**mm= axial turbine trust).

	NOTE For a bigger distance for the measuring device (e.g. 10mm) then you count **X**mm+562.9mm-(10mm). Set the distance of **X**mm+525.9mm, between outer coupling bund and sealing surface of bearing housing TE*. After that, you move the generator, with the coupling flange 10mm in front of the turbine coupling flange, (**X**mm= axial turbine trust).

	CAUTION When you perform the generator alignment with **intermediate shaft** (if available) is it necessary to measure previously the length of the intermediate shaft. Move the rotor (only inside of bearings) in the axial position **X**+**A**+**B**= (**X**mm+562.9mm). After that, you move the base frame of the generator, with rotor coupling flange **Z**mm in front of the turbine coupling flange, (**Z**mm= length of **intermediate shaft**).

	NOTE The dimensions **A** and **B** you will find in the DWG **DPPPG-70166125**.

4.5.4 Installation of intermediate shaft, if available

After the coarse alignment of generator, install the intermediate shaft (if available) between turbine and generator coupling, before you start with the fine alignment of generator. Install the intermediate shaft, by means of using a monorail hoist or a crane.

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NOTE
Before installation of the intermediate shaft, shift only the generator rotor (in the slide bearings) in direction EE*, for enough space between the couplings flanges (recesses). Use superheated steam cylinder oil or (BAL200 Oil) when shifting the rotor in the slide bearings.

4.5.5 Execution of generator alignment

- Moisten the shaft ends and bearing shells with superheated steam cylinder oil for an easily movement of generator rotor; if no shaft lifting oil can be used.
- Install the measuring device on the coupling, consisting of a radial measuring point and two axial measuring points, which require both rotors to be turned in order to make the measurements.
- Perform the coarse coupling alignment of the generator by shifting the complete base frame of the generator. Move the generator during lateral coupling alignment with low-warpage as possible. Use hydraulic cylinders for lateral alignment. During the vertical coupling alignment (e.g. lift or lower of generator with the sixteen leveling screws M36*1.5*100mm) avoid not to operate over the maximum tightening torque of 580Nm.
- Check the generator alignment in four positions (at 12h, 3h, 6h and 9h, when using feeler gauge or gauge blocks for axial measurement), and this on 0°, 90°, 180° and 270° shaft position. The turbine shaft and the generator shaft must rotate together in the same direction and the same angle during the measurement.
- When an intermediate shaft is available; see chapter **4.5.4 Installation of intermediate shaft, if available** on the previous page, install now the intermediate shaft. Measure the gaps between both pairs of clutches; at (turbine / intermediate shaft, and intermediate shaft / generator) at the same time on the same angle. Use a feeler gauge or gauge-blocks for the measurement between the couplings.
- Perform the fine coupling alignment of the generator by shifting the complete base frame of the generator. Move the generator during lateral coupling alignment with low-warpage as possible. Use hydraulic cylinders for lateral alignment. During the vertical coupling alignment (e.g. lift or lower of generator with the sixteen leveling screws M36*1.5*100mm) avoid not to operate over the maximum tightening torque of 580Nm.
- Check the generator alignment in four positions (at 12h, 3h, 6h and 9h, when using feeler gauge or gauge blocks for axial measurement), and this on 0°, 90°, 180° and 270° shaft position. The turbine shaft and the generator shaft must rotate together in the same direction and the same angle during the measurement.
- To rotate the turbine and generator shaft system, use either the shaft lift oil system or highly viscous cylinder oil.

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- Record the alignment values and turn off the lift oil pumps after rotating the shaft system to each measuring position (0°, 90°, 180° and 270°).
- When using viscous cylinder oil, allow for a short time for the shafts to set in the bearings after rotation.
- Hang all sixteen anchor bolts M36*2710 in the middle of the mounting holes of base frame, to enable a re-alignment of the generator, after grouting the sixteen anchor bolts M36*2710.
- Torque the anchor screws M36*2710 to the values listed in Table 4.5-2 paying attention to the corresponding leveling screws M36*1.5*100mm.
- Record the last alignment check including the axial rotor clearance values.

Numbers of leveling screws (M36*1.5*100) per anchor	Partial tightening torques for anchor screws (**M36*2710**) in [Nm]						
	M30	**M36**	**M42**	**M48**	**M52**	**M56**	**M64**
0 – 1	20	30	40	50	60	70	90
2	100	100	200	250	280	320	470

Table 4.5-2: Partial tightening torques for anchor screws, **before grouting!**



NOTE
The allowed tolerance is about 10%; a higher tightening torque is not admissible.

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4.6 Completion of the works on the concrete foundation

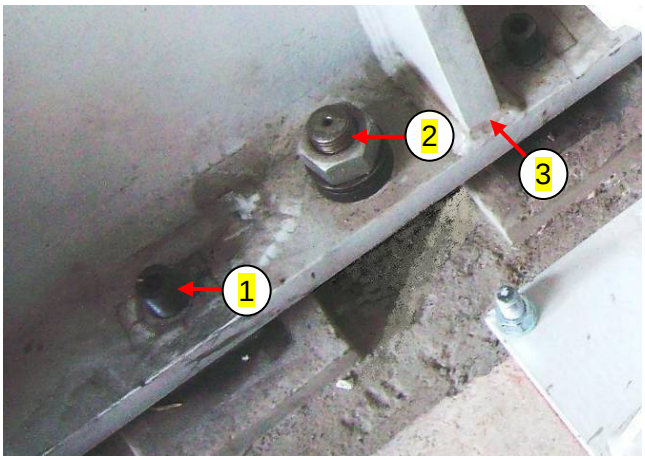
4.6.1 Grouting of the anchor screws M36*2710

(See ***FV/MP 12-010*** *– Manufacturing Procedure, in chapter 7.0, and DWG* ***DPPPG-70148624*** *– Anchoring, in chapter 17.0*)

Remove any dust and sand from the anchor holes. No oil or grease residue must be left. The anchor holes should be watered and be kept humid continuously for not less than **6 hours** before pouring the grouting material. Use suitable means, e.g., compressed air to remove any water accumulated on the anchor holes after watering in order to avoid the formation of cavities. Apply Denso bandages to the leveling screws to isolate them from the grouting compound to be placed, and to be able and turn them back again after grouting.

	NOTE Before the anchor screws are grouted, all anchors must be positioned in the middle of the generator base frame holes. Those still ensure a subsequent adjustment of the generator base frame after the grouting of the anchor screws.

Fill the cast grouting material (not supplied) through the prepared grouting channels only into the anchor holes. Determine and have the necessary quantity of grouting ready according to the volume to be filled. The casting process must not be interrupted. No grouting material must spill. So, the filling process should be stopped in time. After grouting of the sixteen anchor screws M36*2710mm wait **24 hours**.



- **L**eveling screw M36*1.5*100mm (1)
- **A**nchor screw M36*2710mm with washer and nut (2)
- **B**ase frame of the generator (3)

Figure 4.6-1: Anchor screws are grouted; the base frame of the generator not

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4.6.2 Preparation of the pouring of the base frame of the generator

(*See **FV/MP 12-011** – Manufacturing Procedure, in chapter 7.0*)

Remove any dust and sand from the substrate. No oil or grease residue must be left. The grouting area of concrete foundation should be watered and be kept humid continuously for not less than **6 hours** before pouring the grouting material. Use suitable means, e.g., compressed air to remove any water accumulated on the concrete foundation after watering in order to avoid the formation of cavities.





Figure 4.6-2: Prepared auxiliaries for the grouting process (left)

Figure 4.6-3: Prepared grouting process (right)

4.6.3 Check of the generator alignment

Before you fully the base frame shed with concrete (not scope of supply), you must perform a final check of the generator alignment to the turbine. Compare the values measured with those of the installation report or the construction site records. Depending on the results obtained, decide whether to realign the generator before you start with grouting of the base frame.

	NOTE If any realignment is required, follow the instructions given in chapter **4.5 Alignment of the generator** on Page 30.

4.6.4 Grouting of the base frame of the generator

(*See **FV/MP 12-011** – Manufacturing Procedure, in chapter 7.0, DWG **DPPPG-70149178** – Generator Outline Drawing and DWG **DPPPG-70148624** – Anchoring, in chapter 17.0*)

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The grouting height must not be less than **20mm** in every case and must be in level with the upper side of the lower base frame plate, according the DWG **DPPPG-70149178**. Every pouring field needs to be filled without interruption in a single working day. It is absolutely necessary to observe the application life as specified by the grouting material manufacturer.
Make certain that the grouting material is poured in continuously and without interruption as grouting material expansion starts after 15 minutes, approximately. Any interruption in the pouring process may lead to a flow retention effect and thus to dangerous cavities in the grouting layer. When you use mixers, please bear in mind, that this may accelerate the setting process, depending on the material used. The grouting material to water proportion of mixture should be observed as specified by the manufacturer. Do not use concrete vibrators. Always start the grouting process from a narrow side in order to prevent air inclusions. The flow of material may be enhanced when the grouting material is moved by a tamper in the filler stub, or by using sheet metal strips, chains or ropes under the plates. Immediately check whether a sufficient grouting height is achieved along the entire base frame circumference and at any inspection openings.
A separation plate is inserted vertically into the feed hopper when the grouting work is completed. Any excess material is removed and dressed after complete hardening.

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Figure 4.6-4: Grouting of generator base frame (left)

Figure 4.6-5: Grouting height of base frame (right)

4.6.5 Pretension of the anchor screws M36*2710

(*See **FV/MP 12-012** – Manufacturing Procedure, in chapter 7.0*)

The concrete rim between base frame and grouting material formwork should be kept moist to prevent cracking. Do not apply any load to the grouted material unless at least **24 hours** have passed after grouting. The sixteen leveling screws M36*1.5*100mm needs to be turned back by at least one

thread after the complete hardening of the grouting material. After this, preload the anchor screws to the corresponding value; see Table 4.6-1.

Anchor size	Thread pitch	**O**ld concrete foundation at least 3 to 4 years old		**N**ew concrete foundation or steel foundation		Bolt design
Metric	mm	Δl_O in mm/m	M_O in Nm	Δl_N in mm/m	M_N in Nm	
M36	**4**	**0.70**	**850**	**0.95**	**1000**	**DIN**
M42	4.5	0.70	1400	0.95	1800	DIN

Table 4.6-1: Specific anchor screw elongation Δl and corresponding tightening torque M for through-anchors made of CK35

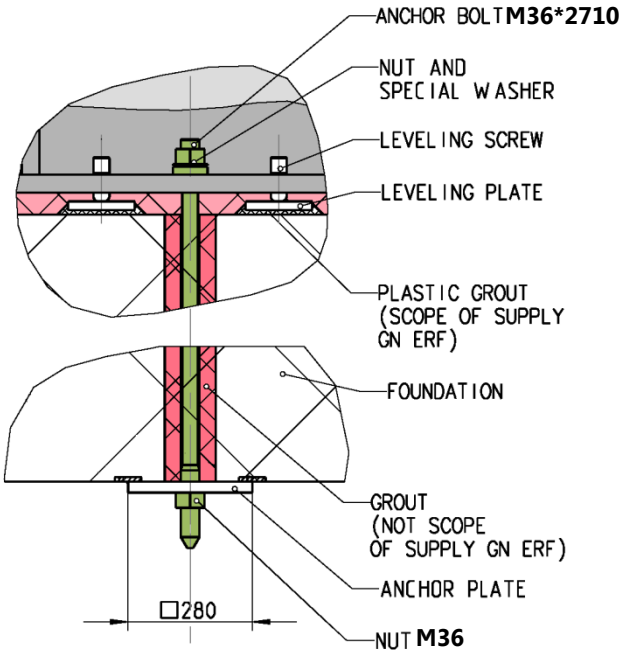




Figure 4.6-6: Detail of generator base frame anchoring (left)

Figure 4.6-7: Hydraulic tool for the pretension of anchor screws (right)

4.6.6 Check of the generator alignment

After applying the anchor screws preload, perform the final check of generator alignment to the turbine. Record the alignment values. If necessary, realign the generator shaft.

NOTE
After the completion of the foundation, any required generator shaft realignment is only possible by changing the position of bearing pedestals; TE* and EE*.

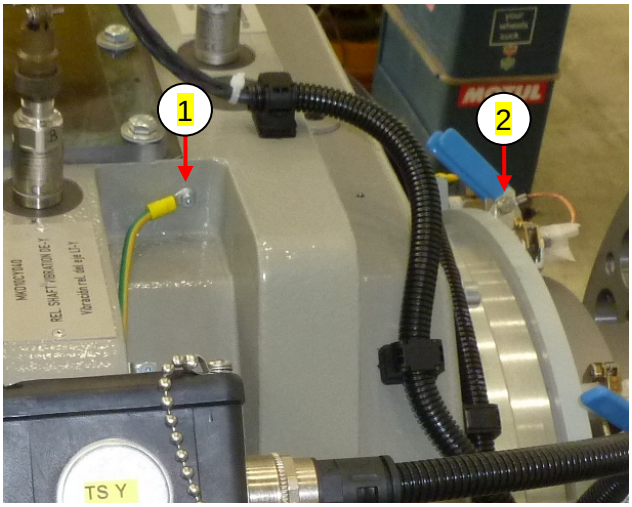
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4.6.7 Check of the bearing insulation

Before coupling of the generator rotor to the turbine, the bearing insulation should be checked.

	NOTE **Mounted insulation parts!** Check the bearing insulation between the bearing shells TE* and EE* to their bearing housings. To check the electrical insulation, interrupt the grounding cable of bearing shell TE* on the bearing cover TE*. Rotor grounding brushes are demounted or lifted! Make sure, that both bearing shells TE* and EE*, are electrically insulated. Check the electrical insulation with a suitable measuring instrument e.g. 100-250volt megger. The resistance must be at least ≥500KΩ.

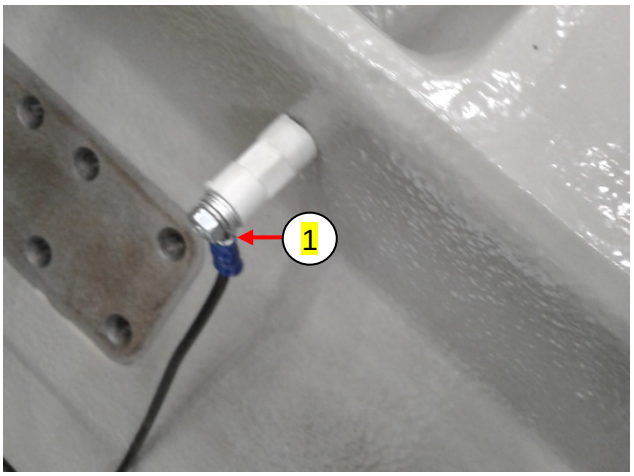
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NOTE: Before start insulation check, disconnect the TE* bearing shell earthing (1).

NOTE: Rotor grounding brushes (2) must be lifted or dismounted for insulation check!

Figure 4.6-8: Bearing cover TE* with grounded bearing shell and rotor grounding brushes



NOTE: Install the grounding wire of the bearing shell EE* on the insulated pin at the bearing cover EE* (1).

Figure 4.6-9: Bearing cover EE* with insulated bearing shell; mounted on isolated pin

4.6.8 Securing of the anchor screws M36*2710

(See *DWG **DPPPG-70148624** – Anchoring, in chapter 17.0*)

Secure the sixteen anchor screws M36*2710mm as required. Secure the anchor screws after pre-tensioning by spot welding between thread of the anchor screws and their nut's M36. For corrosion protection, apply grease, e.g. cup grease, to the projecting end of the anchor screws including the nut after tightening. Molybdenum lubricating varnish is not admissible for corrosion prevention.

4.6.9 Installation of the coupling bolts, standard

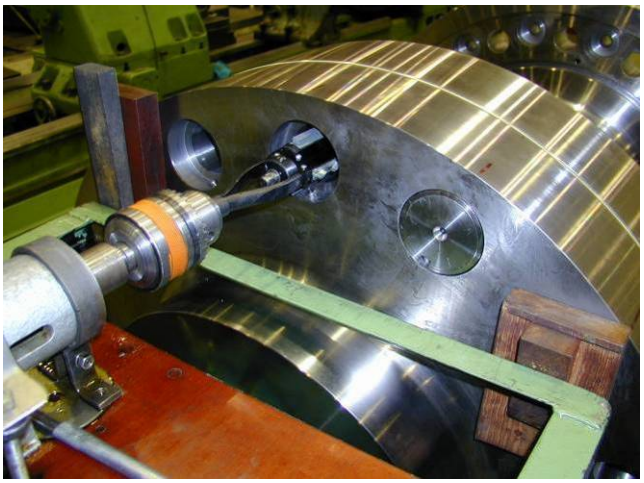
	**NOTE** For mounting and tightening the coupling bolts follow the instruction of turbine manufacturer. Special equipment and tools could be needed for closing of the coupling and tightening of the expansion sleeve bolts. These tasks require specialized knowledge and are carried out only by qualified personnel.

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When the final assembly and alignment control of the generator to the turbine fully described in the installation instructions is completed, the couplings are being prepared for mounting the coupling bolts. Observe the guidelines for the turbine and generator and its specifications.
If it's necessary, for honing the coupling-holes (needed, when using new coupling bolts, in oversize) proceed as follow:

- Center both coupling flanges turbine and generator. If necessary, use two opposite auxiliary bolt made of aluminum (e.g. Ø47.20$^{-0.05}$mm). These auxiliary bolts must remain into the coupling till the boreholes are final honed.
- Tighten the coupling flanges with four opposite auxiliary threaded bolts, washers and nuts.
- Perform a run-out check, if necessary center the coupling flanges to each other and perform the run-out check again.
- Honing the 1st borehole until it is cylindrical and the specified diameter (e.g. Ø47.50$^{+0.03}$mm) and the surface is smooth and fine. Measure and record the diameter of borehole and numbering the borehole in a separate protocol.
- Machine the 1st coupling bolt to the specified diameter (e.g. Ø47.50$^{-0.01}$mm) according the turbine manufacture specifications and to the diameter of the honed borehole. Measure and record the length and diameter of the coupling bolt. Numbering the coupling bolt according the numbering of the borehole (1 of 14). Record the measuring in a separate protocol.
- Mount the 1st coupling bolt into the borehole and tight them with 20% of rated torque.
- Turn the shaft system 180°.

- Honing the 2nd borehole on the opposite side until it is cylindrical and the specified diameter (e.g. Ø47.50$^{+0.03}$mm) and the surface is smooth and fine. Measure and record the diameter of borehole and numbering the borehole in a separate protocol.
- Machine the 2nd coupling bolt to the specified diameter (e.g. Ø47.50$^{-0.01}$mm) according the turbine manufacture specifications and to the diameter of the honed borehole. Measure and record the length and diameter of the coupling bolt. Numbering the coupling bolt according the numbering of the borehole (2 of 14). Record the measuring in a separate protocol.
- Mount the 2nd coupling bolt into the borehole and tight them with 20% of rated torque.
- Perform a run-out check, if necessary center the coupling flanges to each other and perform the run-out check again.
- Perform the honing with all remaining boreholes. Machine the remaining coupling bolts. Measure the length and diameter of all coupling bolts. Numbering all coupling bolts according the numbering of holes (3...14). Record the measuring in a separate protocol.
- Loosen and remove the coupling bolts. Separate the coupling flanges. Deburr and clean the honed boreholes and as well the coupling flanges.
- After cleaning of the boreholes, pull the coupling flanges together again and mount all coupling bolts according their numbers.
- Perform a run-out check, if necessary center the coupling flanges to each other and perform the run-out check again.
- Tighten the coupling bolts in a first round with 50% of the specified tightening torques.
- Perform a run-out check, if necessary center the coupling flanges to each other.
- Tighten the coupling bolts in a second round with 100% of the specified tightening torques.
- Perform a final run-out check after tightening the bolts.



- **H**oning the boreholes with drilling machine and hone ale using special oil fluid.

  NOTE: Honing of the coupling boreholes require specialized knowledge and should carried out only by qualified personnel!

Figure 4.6-10: Honing of the boreholes at turbine and generator couplings

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4.7 Installation of the enclosure, general information

4.7.1 Preparation of the enclosure

(See *DWG **DPPPG-70156650** – Enclosure, in chapter 17.0*)

Demount transportation covers from the roof of enclosure; in the examples are not shown.
Remove the covers (1) for the installation of the high voltage bushings and the flexible links.
If you lift the enclosure, check the gasket (2) (not shown) below of enclosure. If necessary, glue the rubber gasket (25*50mm, green) with PATTEX-PX to the enclosure, before setting the enclosure on the generator base frame.

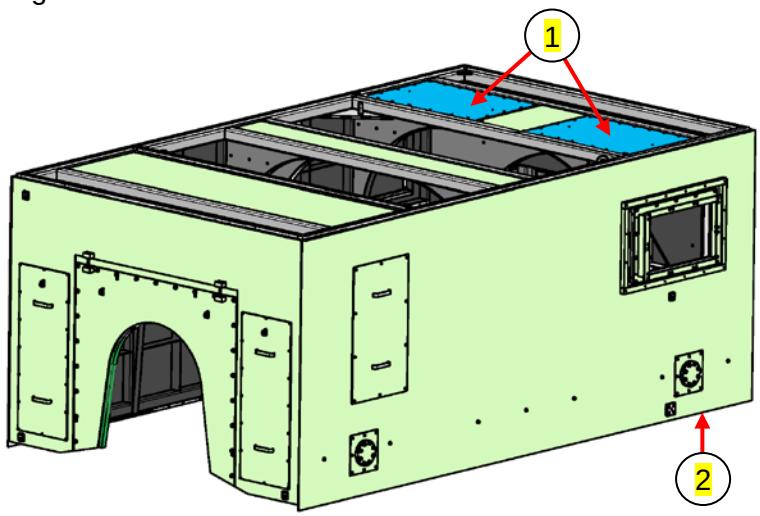


Figure 4.7-1: Enclosure with two covers on the roof

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4.7.2 Lifting and mounting of the enclosure

(See *DWG **DPPPG-70156650** – Enclosure, in chapter 17.0*)

Before installing the enclosure, a final visual inspection should be carried out to detect any foreign material, dirt or damage to the component parts. Check and remove every desiccant bag underneath stator core. Carry out a final inspection inside the generator stator base frame and fill out the check list (in *chapter 16.0*) in Point 4.E. Suspend the enclosure horizontally at the four attachment points, and move it with crane over the generator stator while guiding it. Lower the enclosure while continuously checking all sides. No component part must be touched during lowering until the guide elements are reached.

	NOTE When putting down the enclosure, check the correct fit of all sealing surfaces at the generator base frame and at the casing walls.



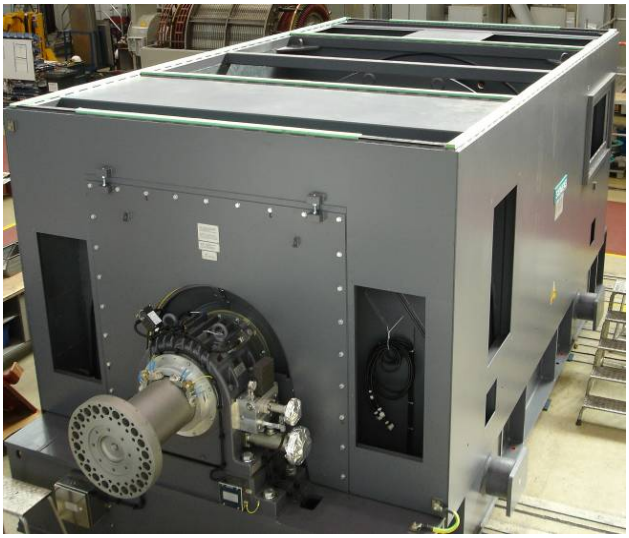


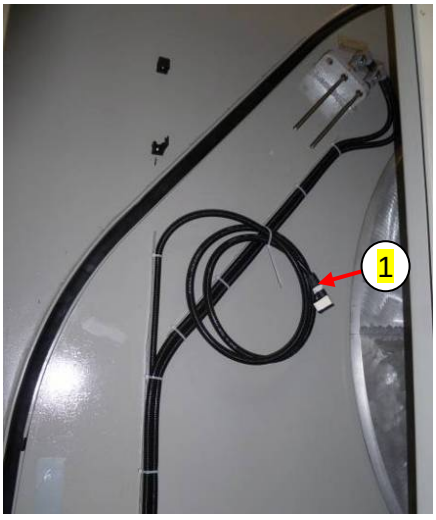
Figure 4.7-2: Enclosure lifted at the attachment points (left)

Figure 4.7-3: Enclosure placed on generator base frame (right)

NOTE

Check additionally for disconnected cables and parts (if necessary, fix them temporary) (1); see Figure 4.7-4.

The four guide elements at the four corners are used to align the enclosure when it is put down on the base frame of the generator; see Figure 4.7-5.



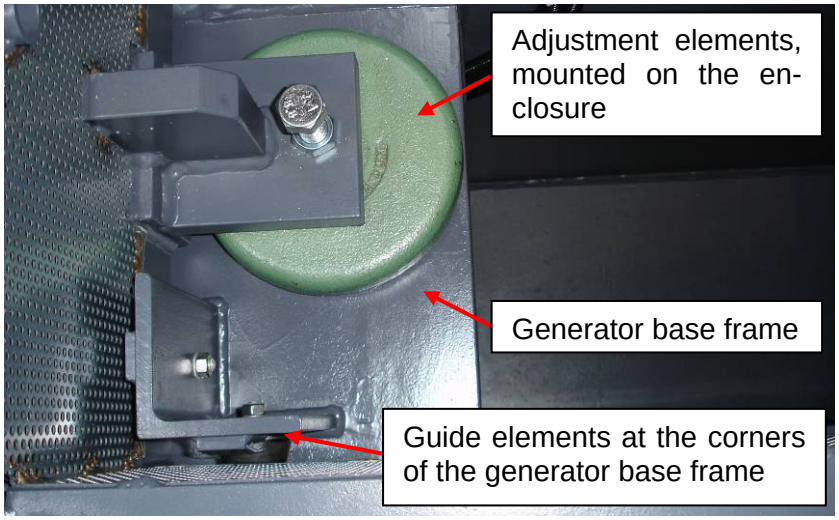


Figure 4.7-4: Temporary fixed sensor cable (left)

Figure 4.7-5: Guide element and adjustment element (right)

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4.8 Installation of the high-voltage bushing

4.8.1 General

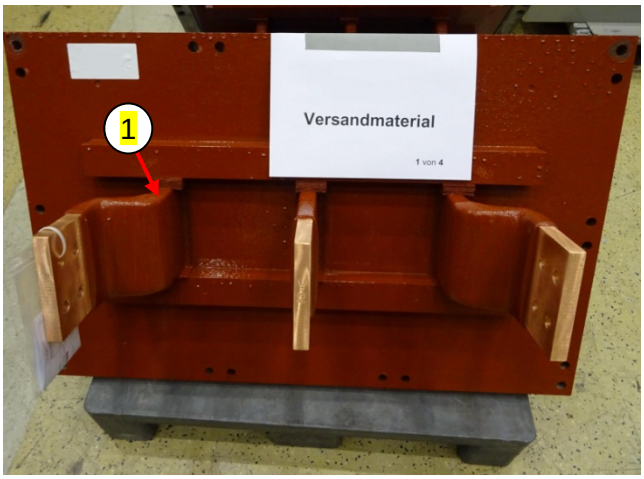
The high-voltage bushing(s), the flexible links, the cubicle(s) and all required mounting parts are supplied by the manufacturing plant. The high-voltage bushing(s) in the enclosure, the flexible links, the cubicle(s) and their mounting parts have been adapted completely and installed on a trial basis at the manufacturing plant before. The flexible links assigned to every phase are completely drilled and marked according to their future assembly positions. Flexible links should be installed using only the compensation pieces (if required) see Figure 4.8-6 on Page 46, screws, nuts and counter nuts, washers, and locking elements supplied by the manufacturing plant. The screw connections should be tightened to the nominal torque values as specified after the final installation of the high-voltage bushing(s).

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4.8.2 Assembly the high-voltage bushing, Neutral and Lineside

(*See DWG **DPPPG-70100790** – Bushings Assembly, and DWG **1-2200-238955** – Assembly Instruction for Flexible Links Installation, in chapter 17.0*)

Lift the high-voltage bushing (1) and install it into the opening, provide for this purpose, in the enclosure. Check the flat rubber gasket, before fitting the high-voltage bushing in place. To install the high-voltage bushing use the fixing screws, washers and locking washer; delivered by the manufacturer. Use the lock washer to secure the fixing screws after finished the installation. After that, connect the flexible links (2) between stator winding and the high-voltage bushing; see also the next chapter **4.8.3**.



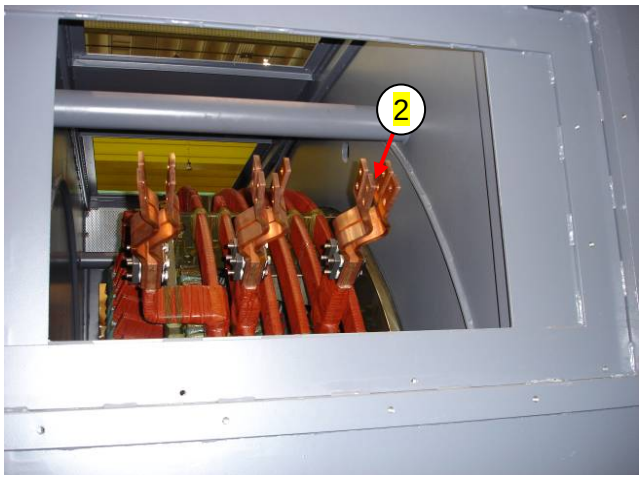


Figure 4.8-1: High-voltage bushing (left)

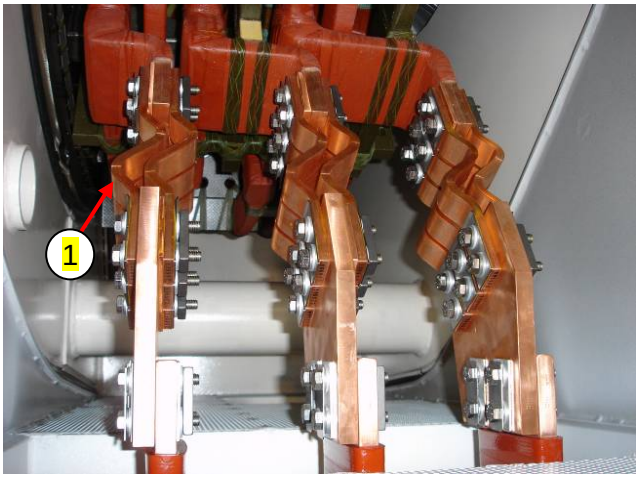
Figure 4.8-2: Stator winding with flexible links, opening in the enclosure (right)

4.8.3 Assembly the flexible links, Neutral and Lineside

(*See DWG **DPPPG-70100790** – Bushings Assembly, and DWG **1-2200-238955** – Assembly Instruction for Flexible Link Installation, in chapter 17.0)*

The flexible links (1) are factory-adapted with regard to the spacing of holes and axial offset. To install the flexible links, use only the screws, nuts and counter nuts, washers, distance elements (2) (copper plates) and locking elements that have been supplied by the manufacturer. Mount the flexible links and distance elements (copper plates) on their phase connection, where they were temporarily connected; see Figure 4.8-4. The screw connections should be tightened to the specified nominal torque after the final installation of the complete terminal board. Secure the lock washer (3) on the high-voltage bushing; see Figure 4.8-5.

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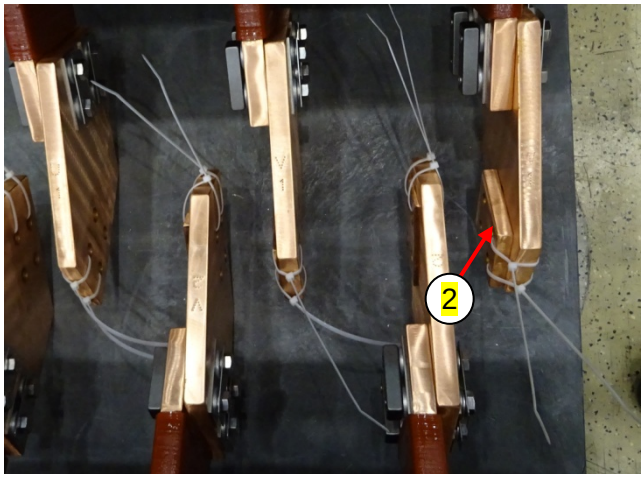


Figure 4.8-3: Flexible links mounted (left)

Figure 4.8-4: Distance elements (copper plates) (right)

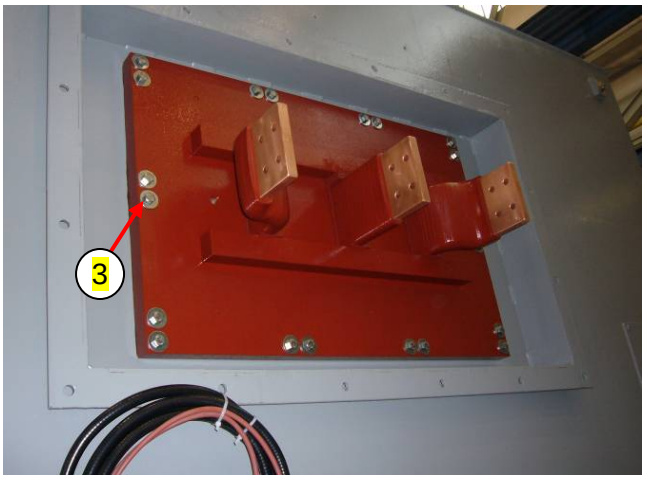


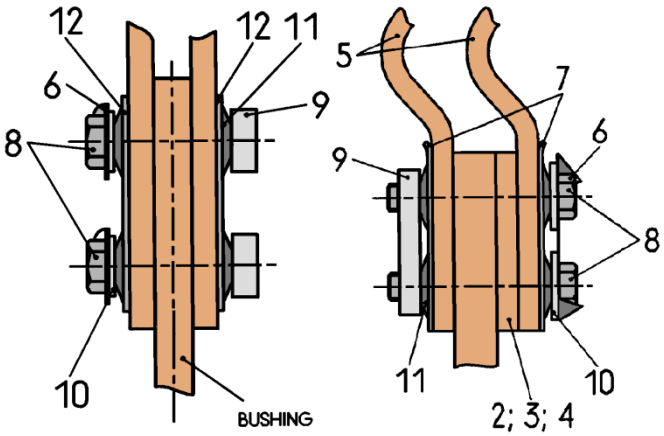
Figure 4.8-5: High-voltage bushing mounted in the enclosure

CAUTION

Make **absolutely certain** that no object can fall down during work in the end-winding cavity!

It is useful to empty all pockets before beginning the works. If any part is lost in spite of all precautions, it must be found **in every case**!!

Fasteners are arranged as shown in the following drawing DWG **DPPPG-70100790** and DWG **1-2200-238955**.



Partlist

Pos.	Description	Bezeichnung
2	Compensation Piece 5	Ausgleichsstück 5mm
3	Compensation Piece 10	Ausgleichsstück 10mm
4	Compensation Piece 15	Ausgleichsstück 15mm
5	Flex Link	Dehnungsband
6	Lock Washer	Sicherungsblech
7	Base Plate	Unterlegscheibe
8	Hexagon Bolt	Sechskantschraube
9	Twinnut	Zwillingsmutter
10	Washer	Scheibe
11	Conical Spring Washer	Spannscheibe
12	Base Plate	Unterlegblech

Figure 4.8-6: Detail for flexible links and connections part list

NOTE

Retighten all screws on phase connection applying a nominal torque of **50Nm** twelve hours after the installation of the output cables! Bend the locking plates only after re-tightening as above!

4.8.4 Installation of both covers over the flexible links at the enclosure

(See *DWG **DPPPG-70156650** – Enclosure, in chapter 17.0*)

After the installation and retightening of the flexible links, mount the two covers (1) over the flexible links on the enclosure. Use for this the previously demounted screws and lock washers.

Example is shown on the next page.

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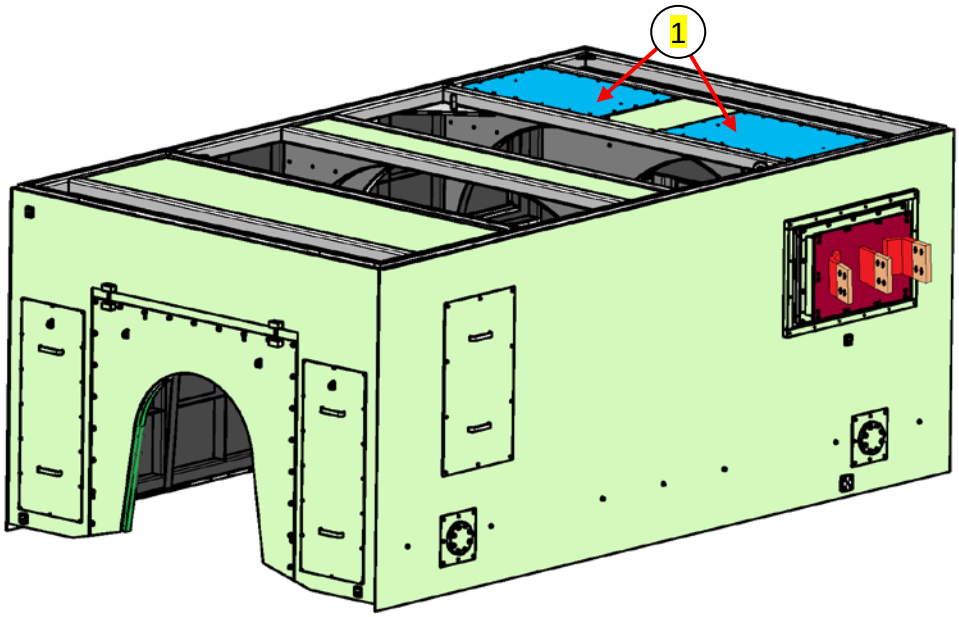


Figure 4.8-7: Enclosure with two covers on the roof, after installation of the flexible links

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4.9 Installation of the cubicles, Neutral and Lineside

4.9.1 Assembly of base frames and the cubicles

(*See DWG **DPPPG-70151867** – Neutral Point Cubicle; DWG **DPPPG-70151868** – Lineside Cubicle, in chapter 9.0, and DWG **DPPPG-70149178** – Generator Outline Drawing, in chapter 17.0)*

The cubicles are factory adapted and has been mounted for testing completely in the manufacturing plant. For the installation use only the delivered unions, bolts, screws and gaskets.

	**NOTE** The cubicles and their steel frameworks will be mounted on the concrete foundation beside the generator foundation!

Install the cubicles with their steel framework beside the generator using the screws and nuts delivered by the manufacturer. Install the two cubicles together with the anti-vibration system (1) next to the generator. Install the non-segregated phase bus ducts (2) (NSPBD) on the respective cubicles. See Figure 4.9-1 and Figure 4.9-2 on Page 49.

Align the complete cubicles together with the bus ducts to the high-voltage bushings and to the flanges on the enclosure. Mark out the position of food plates of anti-vibration system (1) and drill the holes for the anchor bolts HST HILTI M12*140/50mm. The tightening torques of the anchor bolts HST HILTI M12*140/50mm: 60Nm.

If is necessary, remove the cubicles again for drilling the mounting holes in the foundation.

The connecting links are assigned to every phase and completely drilled and marked according to their future assembly positions. Connecting links should be installed using only the screws, nuts and counter nuts, washers and locking washers supplied by the manufacturer.

The screw connections should be tightened to the nominal torque values as specified after the final installation of the complete terminal board. Retighten all screws applying a nominal torque of **50Nm** twelve hours after the installation of the connecting links! Bend the locking plates only after retightening as above!

Install the rubber joint over the bus ducts and connection frames of enclosure and fix each of them with two steel straps (3); see Figure 4.9-1 on Page 49.

For the lifting of the cubicles use the attachment points on the roof!

Examples are shown on the next Page.

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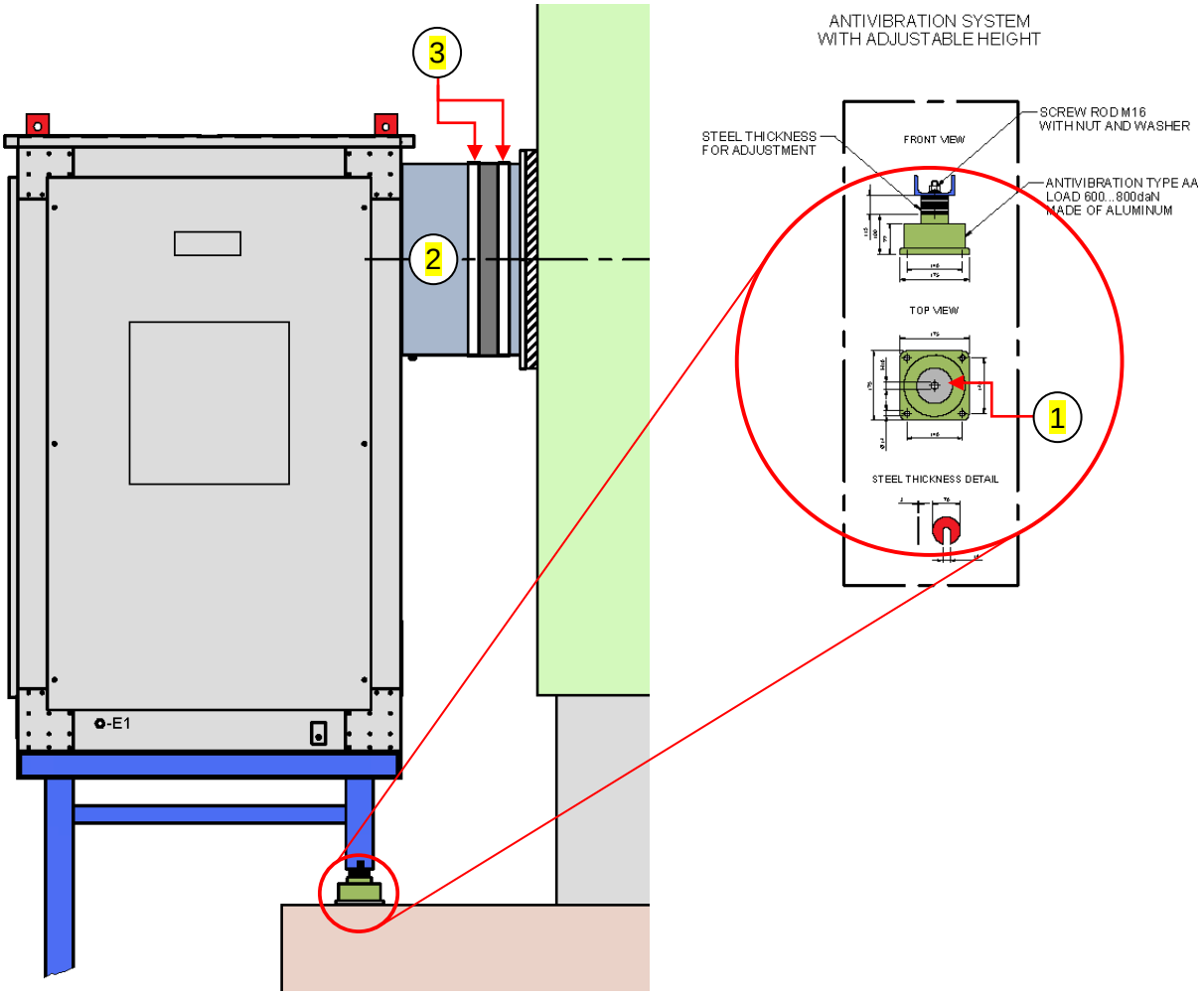


Figure 4.9-1: Mounted Neutral Point Cubicle (left)

Figure 4.9-2: Details of the foot plates of anti-vibration system (right)

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4.10 Installation of the bearings, general information

4.10.1 Mounting the bearing shells and bearing covers

(See ***Installation and Operating Instructions for Slide Bearings****, in chapter 8.0; DWG* ***DPPPG-70158485*** *– TE* Bearing; DWG* ***DPPPG-70153217*** *– EE* Bearing, and DWG* ***DPPPG-00001060*** *– Tightening Torques, in chapter 17.0*)

Fitting of lower bearing shell:

- Apply some lubricant to the spherical seating in the bottom half of the bearing housing and on the working surfaces of the shaft. Use the same type of lubricant as indicated for bearing operation (see type plate).
- Place the lower bearing shell on the working surface of shaft. Turn the lower bearing shell in the bottom part of bearing housing, with the joint plane of both halves in true alignment.

If the lower bearing shell does not turn easily, readjust the lower bearing shell or lift the shaft correctly. Lower the shaft till it sits on the lower bearing shell.

Fitting of upper bearing shell:

- Apply some lubricant on the working surfaces of shaft. Use the same type of lubricant as indicated for bearing operation (see type plate).
- Check if the engraved numbers on the lower bearing shell corresponds with the engraved number on the upper bearing shell.
- Place the upper bearing shell on the shaft; both engraved numbers should be on the same side.

	**NOTICE** An incorrectly placed shell could jam the shaft thus leading to the damage of both, shaft and bearing.

Bearing size GTW	28
Tightening torques [Nm]	70

Table 4.10-1: Tightening torques for bearing shells

Assembly the bearing cover:

- Check the true alignment of the parting joint of the lower bearing shell to the parting joint of the bottom part of bearing housing.
- The isolated positioning pin in the bearing cover fits in the corresponding positioning pin hole in the upper bearing shell.
- Check if the engraved numbers on the bearing cover and the engraved numbers on the bearing housing correspond.

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- Clean the surface of the parting joint on the bearing cover and bearing housing.
- Apply a uniform layer of sealing compound over the whole surface of the parting joint of the bearing housing, (*Note the manufacturer's instructions for the processing of such products and the information under 4.7-1004-0002 "General Handling Guidelines", in chapter 6.0*).

	NOTICE Please observe the instructions for the use of sealing compound.	

- Lower the bearing cover vertically on the bearing housing. The engraved numbers should be on the same side of the bearing housing.
- Gently hit the bearing cover with a nylon hammer, thus ensuring the alignment of the spherical seating.
- Insert the socket screws/nuts with washers and tighten them crosswise by using the correct torque values. *See also Bearings, in chapter 8.0.*

Bearing size GTW	28
Tightening torques [Nm]	340

Table 4.10-2: Tightening torques for bearing cover

	NOTE **Mounted insulation parts!** Make sure, that both bearing shells TE* and EE*, are electrically insulated. Check the electrical insulation with a suitable measuring instrument e.g. 100-250volt megger. The resistance must be at least ≥500KΩ.

4.10.2 Installation of the rigid labyrinth seals, Type 20 and 22

- Check if the engraved numbers on the bottom half of the rigid labyrinth seal correspond.
- Clean
  - The flange surface of top and bottom half of rigid labyrinth seal
  - The joint plane of top and bottom half of rigid labyrinth seal
  - The flange surface of bearing housing
- Apply a uniform layer of sealing compound on the joint plane of the bottom half of the rigid labyrinth seal, (*Note the manufacturer's instructions for the processing of such products and the information under 4.7-1004-0002 General Handling Guidelines, in chapter 6.0*)

	NOTICE Please observe the instructions for the use of sealing compound.	

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- Place the top half of the rigid labyrinth seal on the shaft and press lightly the bottom half of the rigid labyrinth seals from below against it. Insert and tighten the screws of the parting joints to the rated torque: **10Nm**; see also the manufacturing description in chapter 11.0.
- Before assembling of the rigid labyrinth seal at the bearing housing place the insulation ring at the surface of the mounting flanges. Make sure the cut edge is upwards (12h on top).
- Apply a uniform thin layer of sealing compound on both side of the insulation ring and push the rigid labyrinth seal together with the insulation ring lightly at the bearing housing. The cut edge of the insulation ring must be on 12h (top), (*Note the manufacturer's instructions for the processing of such products and the information under 4.7-1004-0002 General Handling Guidelines, in chapter 6.0).*

	NOTICE Please observe the instructions for the use of sealing compound.	

- Place in parallel alignment the horizontal joint of the rigid labyrinth seal and the parting joint of the bearing housing. Press the rigid labyrinth seal lightly from below against the shaft. Adjust the rigid labyrinth seal in such a way that the side clearance “f” between the shaft and the rigid labyrinth seal at both joint planes (left/right) has the same figure.
- Insert and tighten the screws with insulation washer and insulation tubes by using the correct toque values: **20Nm**; see also the manufacturing description in chapter 8.0.

	NOTE **Mounted insulation parts!** Make sure, that all four rigid labyrinth seals, TE* and EE*, are electrically insulated. Check the electrical insulation with a suitable measuring instrument e.g. 100-250volt megger. The resistance must be at least ≥500KΩ.

4.10.3 Corrosion protection on bearings for longer standstill periods

If you want to protect the bearing mounted on an installation against corrosion proceed as follows:

- Dismantle the bearing.
- Clean the bearing.
- Paint or spray the top half and the bottom half of the shell and the shaft with Tectyl 511.
- Assemble the bearing.
- Close all connection holes with screw plugs.
- Seal the gaps between
  - Shaft seal and shaft
  - Shaft seal and housing

  by using a self-adhesive, permanent tape.

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- Spray some anti-corrosive such as Tectyl 511 or VALVOLINE into the bearing.
- Put a bag dessicant (silicate gel) inside. The dessicant absorbs the humidity and prevents the formation of condensation water inside the bearing.

In case the standstill period is longer than ½ Year:

- Repeat the preservation procedures.
- Put a new bag of dessicant into the bearing.

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4.11 Completion the works for the assembling of mounted parts

4.11.1 Check and adjust the alignment of the air guide rings, on TE* and EE*

(*See **Generator Assembly Records**, in chapter 5.0 and DWG **DPPPG-70166125** – Axial and Radial Rotor Clearances, in chapter 17.0*)

	NOTE During the assembly the given values in **Generator Assembly Records** in chapter 5.0 must be observed. The current values must be recorded in the column “Field erection”.

- Open the front cover of manhole of enclosure for access to the area with air guide rings.
- Check and adjust the required radial air gap (1) (on 12h, 3h, 6 and 9h) between the fan and the air guide ring (2), on TE* and EE*.
- If necessary, align the complete air guide ring (2) for realigning of air gap (1).
- To do this, open the six nuts M30*2mm (3) at the screws connections and adjust the air guide ring with the two adjustment screws (4) on the bottom of the front wall.

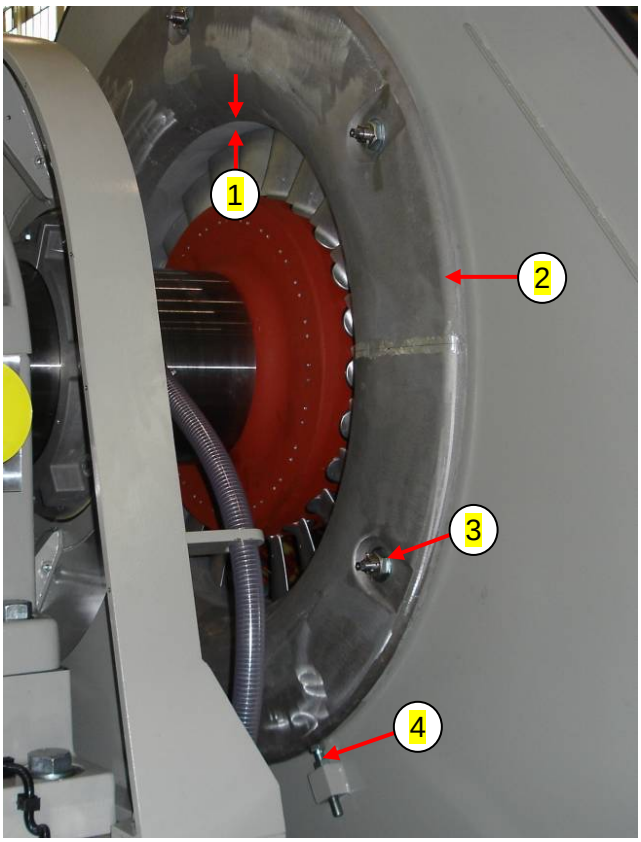


Figure 4.11-1: Air guide ring mounted (left)

- **S**et the radial air gap, in vertical and horizontal position, on the values descript in **Generator Assembly Records**, in chapter 5.0.
- **T**hen tighten and lock the nuts (**6x**) M30*2.0mm (3) with the lock washer (5).
- **L**ock the crowned sleeve with cotter pin (6).

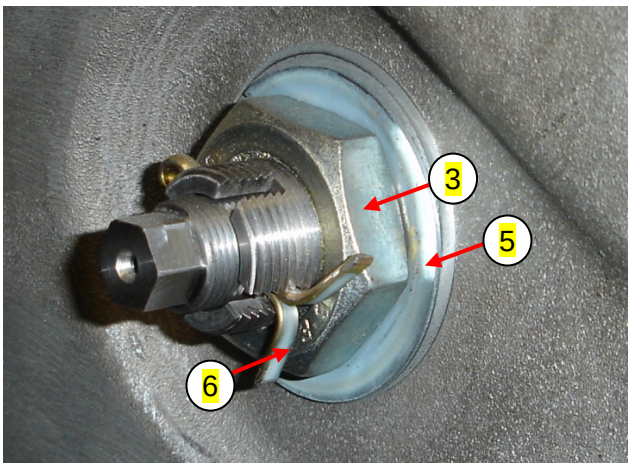


Figure 4.11-2: Screw connection in detail (right)

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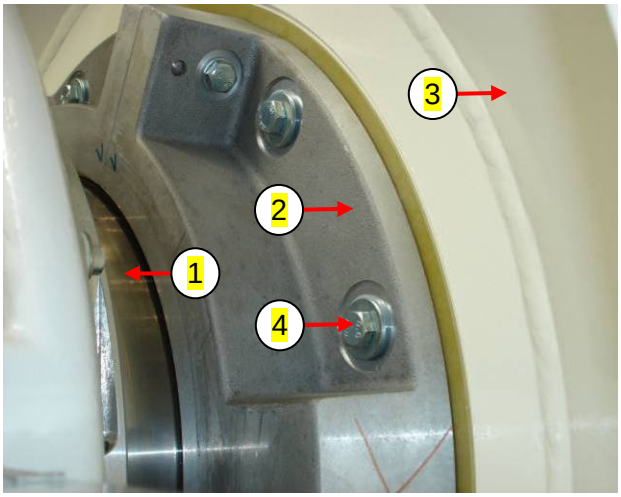
4.11.2 Check and adjust the alignment of the outer air seals, on TE* and EE*

(*See **Generator Assembly Records**, in chapter 5.0 and DWG **DPPPG-70166125** – Axial and Radial Rotor Clearances, in chapter 17.0*)

	NOTE During the assembly the given values in **Generator Assembly Records** in chapter 5.0 must be observed. The current values must be recorded in the column “Field erection”.

- Check and adjust the required radial air gap on (12h, 3h, 6 and 9h), between the shaft (1) and the outer air seals (2) on TE* and EE*. For realigning of the air gap (if necessary) align the complete outer air seal as one part.
- Untie the twelve mounting screws M10*50mm (4) and then align the outer air seals where required.
- After the realignment tighten the twelve mounting screws M10*55mm (4) again.

	NOTE **Mounted insulation parts!** Make sure that the outer air seals on both shaft bushings TE* and EE* are electrically insulated. Check the electrical insulation with a suitable measuring instrument e.g. 100-250volt megger. The resistance must be at least ≥500KΩ.



- **I**nsulation pieces are mounted underneath the outer air seals (2) and boltings (4).

  NOTE: The outer air seal can be located behind an additional cover plate, which is mounted at the shaft bushing!
- **C**heck the connecting of the air sealing hoses to the outer air seals.
- **F**ill out the **Generator Assembly Records**, in chapter 5.0.

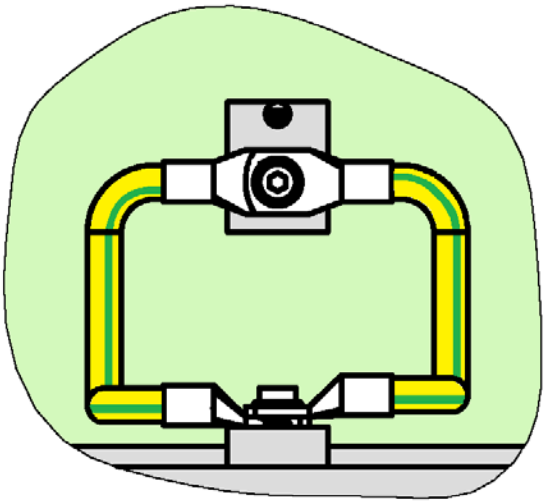
Figure 4.11-3: Outer air seal, mounted on the shaft bushing

4.11.3 Mounting the grounding connections

(*See DWG **DPPPG-70067569** – Grounding Connections, in chapter 17.0*)

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Install the grounding connections on the specified points between the generator base frame and the mounted parts, (acoustic enclosure, cooler unit) using the delivered screws and washers.



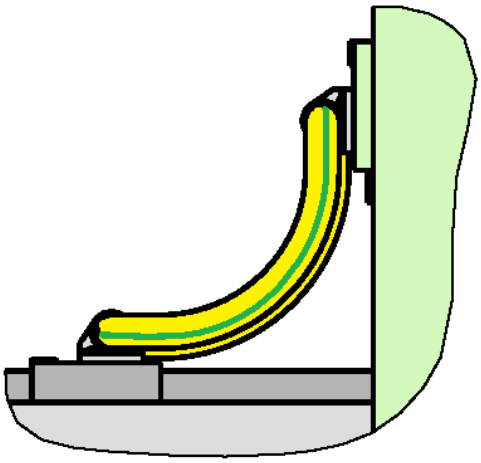


Figure 4.11-4: Detail of grounding connections, front view to the enclosure (left)

Figure 4.11-5: Detail of grounding connections, side view to the enclosure (right)

	NOTE Only after installation of the cooler unit is it possible to install the ground connections between enclosure and cooler unit; see chapter **4.14.1 Installation of the grounding connections on the cooler unit** on Page 68.

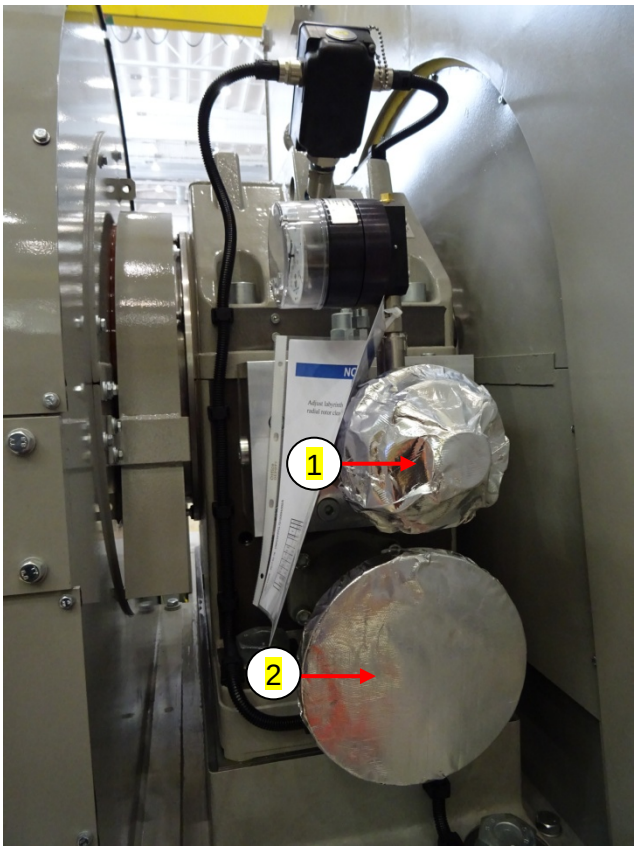


Figure 4.11-6: Grounding connection; mounted on cooler unit

4.11.4 Mounting the oil pipes to the bearing pedestals, on TE* and EE*

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To install the oil pipes, use the gaskets and screw connections delivered by the manufacturer. All oil pipes and connections should be cleaned thoroughly, and be aligned and mounted without any torque. Connecting flanges for the oil supply (1) and the oil outlet (2) are mounted on the bearing pedestals at TE* and EE*.



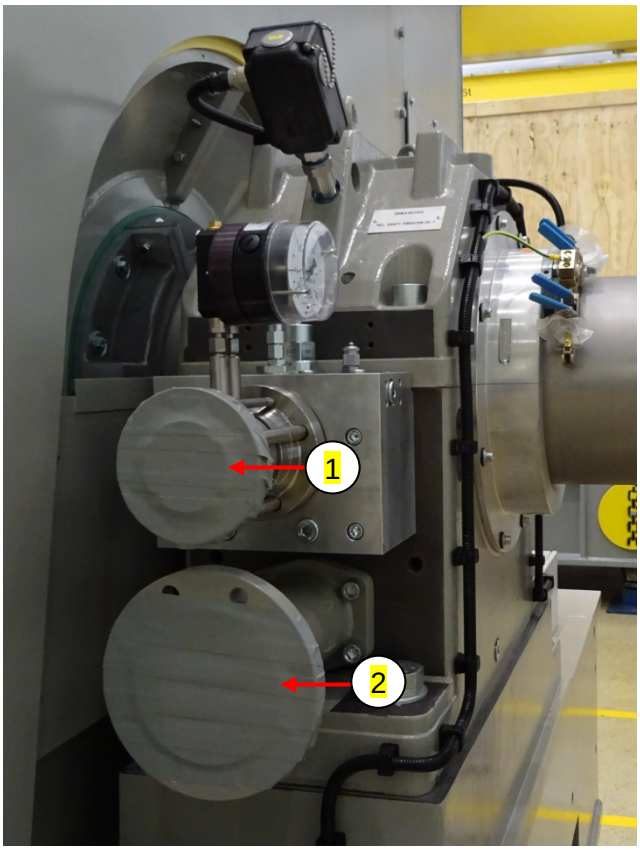


Figure 4.11-7: Oil flanges on the bearing pedestal EE* (left)

Figure 4.11-8: Oil flanges on the bearing pedestal TE* (right)

NOTICE

Check all screw connections of the oil pipes for tightness and tighten them according to the manufacturer's instructions. The oil pipes must be adapted and aligned during assembly. The strain on the connection point must be relieved by a suitable device.

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4.12 Oil flushing, general information

4.12.1 General

The trouble-free operation of the oil circuits requires the proper and complete assembly of all component parts provided as specified in the drawings furnished by the manufactures of the machine components connected to the oil system. In addition, the entire oil system needs to be cleaned thorough after its completion.

This cleaning action is intended to remove any residual contamination which may have entered the pipe work during assembly. The assembly and cleaning of the oil systems for the generator and their drive systems requires specialist knowledge and particular care. Observe the applicable rules and regulations for occupational safety, fire protection, and environmental protection during oil flushing and when working with oil or oil-moistened component parts.

Before starting oil flushing operations, make certain that operational fire-fighting equipment is readily at hand. Keep access free both in the area around generator and its prime mover, and along all escape and rescue. Accordingly, oil flushing should only be performed by instructed expert assembly personnel routes.

After completing the assembly of the lubricating and lift oil pipeline systems, the circuits should be subjected to a cleaning procedure which, as a general rule, should performed at operating temperature and by using the operating fluid. The cleaning process should cover all tanks, oil coolers, pipes, flexible tubes, fittings, and all other component parts which belong to the system. The corresponding filters should be installed upstream of the bearing connections and upstream of the collecting basin in the return line. Filters should be dimensioned such that there is no major impact on the desired high oil flow speed within the circuit. The filter elements should be replaceable in order to allow the adaptation of the filter stages to the progress of cleaning. Corresponding auxiliary ports, adapted fittings, etc. should be used to install the filters in the oil circuits. Bypass lines with a corresponding cross-section can be used to keep the flushing process running when the filters are being cleaned. If no bypass lines are available for switching over, the oil pumps should be turned off and protected against unintentional energizing during filter cleaning. It is not allowed to close any stop valves in the oil return system while the pumps are operating. Any flexible tubing or flexible connecting elements used must be capable of withstanding the operating pressures and operating temperatures. Prior to oil flushing, take all precautions needed to prevent any escape of leaking or projected oil. Check all flanges and seals in the oil circuit before the pumps are switched on. The bottom parts of the outer multi-lip sealing rings at the bearing casings should be installed to avoid any escape of projecting oil. The maximum possible flushing oil quantity can be set for every bearing using the corresponding bearing oil throttle valve installed in the circuit.

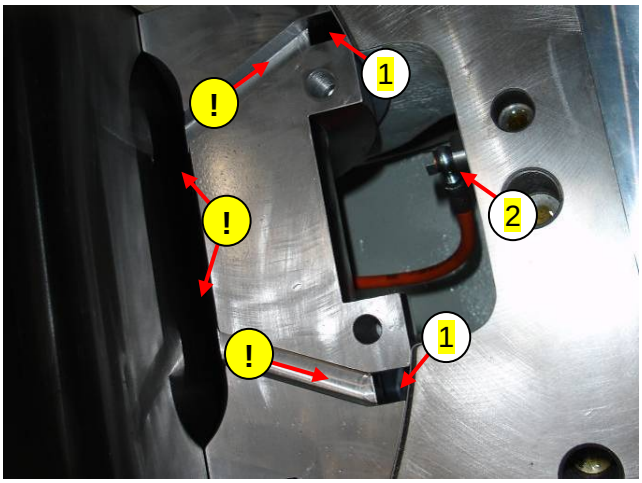
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4.12.2 Treatment of the bearing chambers

The generator's bearings and bearing chambers will be delivered ready for operation and in a clean condition. Cleaning by oil flushing is not necessary. For this reason, bypass lines are laid to shunt the bearing ports before oil flushing is started. Bearings and bearing chambers which need to be cleaned for unforeseen reasons should be included in the oil circuit at the original connecting ports.
After the completion of the flushing process, remove any dirt accumulation from the bearing chambers. This should be done carefully using rags consisting of lint free material (do not use cotton waste). Do not mix any cleaning agent used with the oil. No residue whatsoever should remain in the bearing casing. Bearings and bearing chambers should be subjected to a thorough visual inspection after cleaning.

4.12.3 Preparation of the lubricating oil system for oil flushing

If no bypass lines can be installed, make certain that the top bearing shells are removed, and provisional oil drain lines are installed at the inlet openings of the bottom shells. The installation should be carried out such that the flushing oil flow will not go between shaft and bottom shell. The connecting hoses within the bearing casings are mounted but not connected to the bearing shells such that these are included in the flushing process.



- **O**il inlet openings (1) on lower bearing shell. These openings have to be covered with adequate measures (e.g. a cover with reconnection; not scope of Siemens), so that the flushing oil flow will not go between shaft (**!**) and lower shell (**!**). The flushing oil should flow freely, into the inner bearing pedestal. Do this measures on the bearing pedestal TE* and EE*.

  NOTE: The openings are on both sides of the bearing shells!
- **C**onnect the hose for the hydrostatic first on the lower bearing shell and then on the bearing pedestal (2).

Figure 4.12-1: Open bearing pedestal with lower bearing shell

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4.12.4 Flushing oil

Operator and oil supplier are responsible for providing the oil to be used for flushing in accordance with the oil specifications defined by the generator supplier. This should be coordinated with the turbine supplier if necessary.
The following procedures are possible:

Use the same oil grade for flushing and operation. When flushing is complete, an oil examination is carried out to decide whether the flushing oil volume can be used as oil for operation after reprocessing by the oil supplier.
Use oil intended for flushing only right from the outset. The properties of this oil are tuned to this particular application purpose mainly with regard to viscosity. This oil should be removed completely after the flushing process, and be replaced by new operating oil. The properties of operating oil and flushing oil must be matched.

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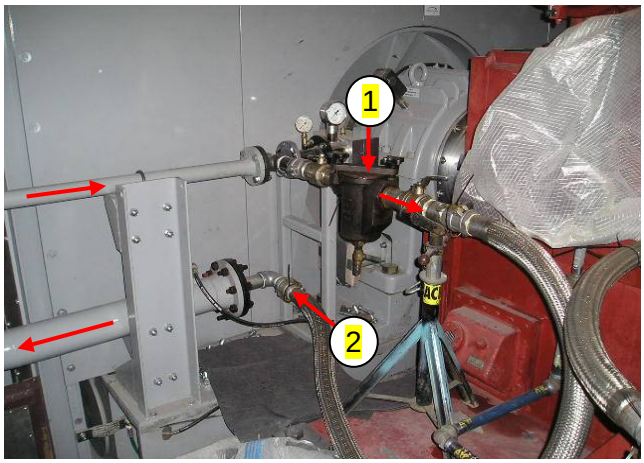
4.12.5 Flushing process

The oil flow speed should be as high as possible, and the maximum temperature should be limited to 80 °C in the oil circuit pipelines during the flushing process.
The flushing process can be carried out along the whole line system and simultaneously in the entire bearing oil pipe work, and in all pressure-oil pipelines belonging to the hydraulic shaft lift-oil system. If the oil flow speed drops excessively in the whole line system, parallel branches may be flushed locally one after the other by installing isolating valves.
The oil temperature should not be increased during the first few hours. The heavier particles will be entrained by the higher oil density and by the higher oil speed brought about as coarser filters are used. Oil temperature should be increased to a maximum of 80 °C after the installation of finer filters.
During the flushing process, the oil lines should be tapped continuously to remove the dirt particles stuck at the inside pipe walls. The feed pumps should be switched on and off repeatedly in order to generate a surging flow.
During flushing, the screens located both upstream of the bearings and in the return line should be checked for dirt accumulation, and be cleaned if necessary. Filters should be cleaned more often, and be replaced by finer filters, depending on the dirt volume and on the grain sizes found. Do not finish the flushing process unless no dirt has been found even in the finest filters and screens during an extended period of time.
All filters and screens should be removed and cleaned as a general rule after the completion of every flushing process. The filters and screens removed before the flushing process should either be reinstalled or be replaced by the filters and screens belonging to the original line equipment.

Remove all bypass lines, orifice plates, blind flanges and any filters installed in addition. Connect the ports of the shaft lifting devices to the bearing blocks, and check for leakage. Check the proper fitting of the bearing ports. Finally, assemble all bearings, bearing covers, collar rings, and flanges such that they are ready for operation.

Proceed with care when completing work on the oil system and on the bearings, and take the corresponding precautions to prevent any new contamination.

After completing work on the oil system, clear all pipes, flanges, and ports externally, and then carry out a system pressure and leak test.



- **F**ilter (1) in bypass lines (2) for oil flushing.
- **T**he flushing oil flow direct from oil supply line over the filter to oil return line.

Figure 4.12-2: Oil flushing without bearing

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4.13 Completion of the works for the assembling of the bearings, if necessary

4.13.1 Remove the bypass pipes after oil flushing, if previously mounted for flushing

The following steps are only required, when the oil flushing was performed with bypass pipes.

After oil flushing, proceed as follows to finish the assembling of the bearing pedestals:

- Disassemble the bypass oil pipes;
- Disassemble the sealings of the oil inlet to the bearing pedestals;
- Reassemble all previously dismounted oil pipes;
- Reassemble (if necessary) previously dismounted armatures to the oil supply;
- Reassemble (only if available) the oil pipes for the oil mist evacuation on the pedestal cover of the bearings;
- Check the oil system for leaks;

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4.13.2 Cleaning the bearing shells and bearing pedestals, if necessary

(See *DWG **DPPPG-70166125** – Axial and Radial Rotor Clearances, in chapter 17.0)*

The following steps are required only when no bypass lines have been laid around the bearing pedestals during the oil flushing. See also chapter **4.10.1 Mounting the bearing shells and bearing cover** and **4.10.2 Installation of the rigid labyrinth seals, Type 20 and 22**.

After the oil flushing, proceed as follows to finish the assembly of the bearing pedestals:

- Remove the bearing bottom shells;
- Final cleaning of bearing shells and bearing pedestal;
- Assemble the bearing bottom shells;
- Install the bearing metal temperature measuring points, and check their function;
- Connect the lift-oil tubing to the bearing shells, and carry out a leak test;
- Install and sealing the bearing covers and rigid labyrinth seals;
- Adjust the air gap values on rigid labyrinth seals as per DWG **DPPPG-70166125***;*

4.13.3 Mounting the sensors of the shafts vibration monitoring

(*See also **Monitoring Vibration**, in chapter 13.0, and DWG **DPPPG-70152441** – Wiring Diagrams, in chapter 14.0)*

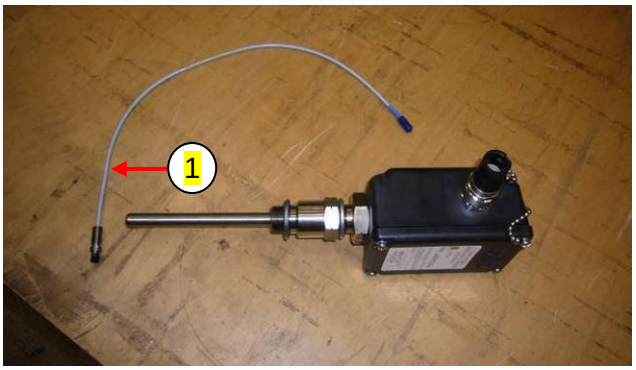




Figure 4.13-1: Sensor probe with coaxial cable (1) (left)

Figure 4.13-2: Probe sleeve (2) with housing (3) (right)



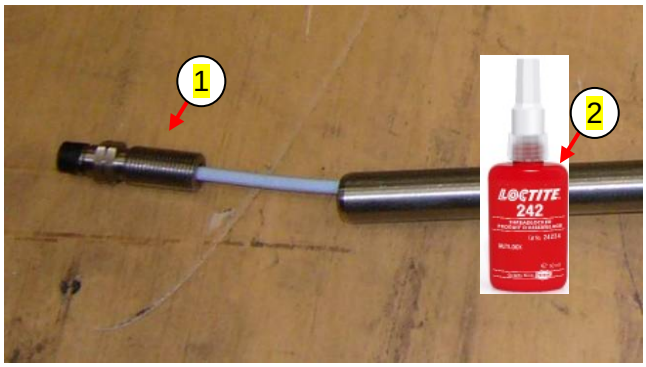


Figure 4.13-3: Coaxial cable guided through the probe sleeve (left)

Figure 4.13-4: Sensor probe (1) mounted with liquid sealant (2) e.g. LOCTITE 242 (right)



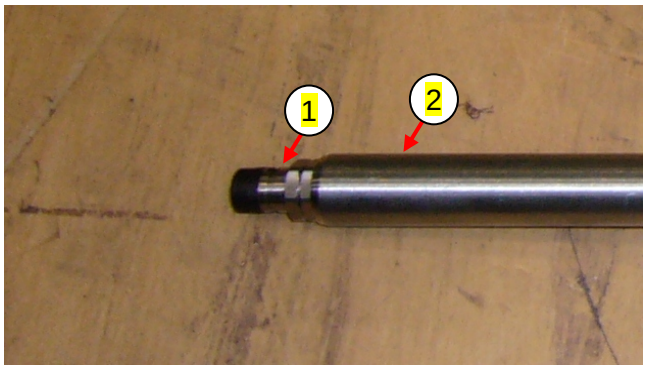
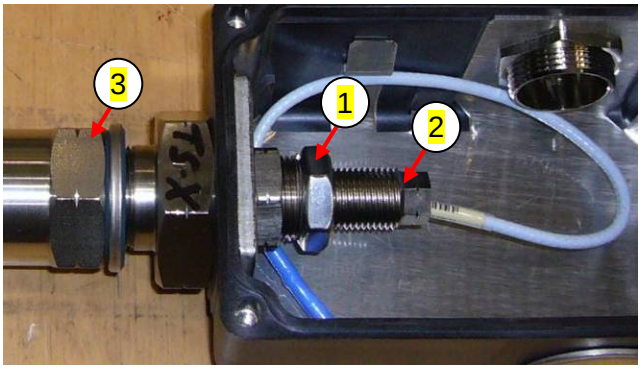


Figure 4.13-5: Sensor probe with coaxial cable mounted (left)

Figure 4.13-6: Sensor probe (1) mounted in the probe sleeve (2) in details (right)

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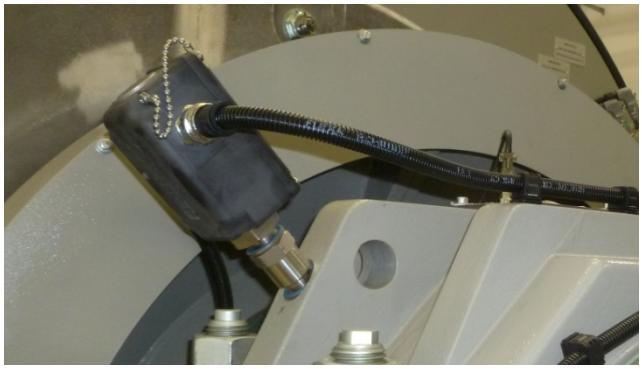
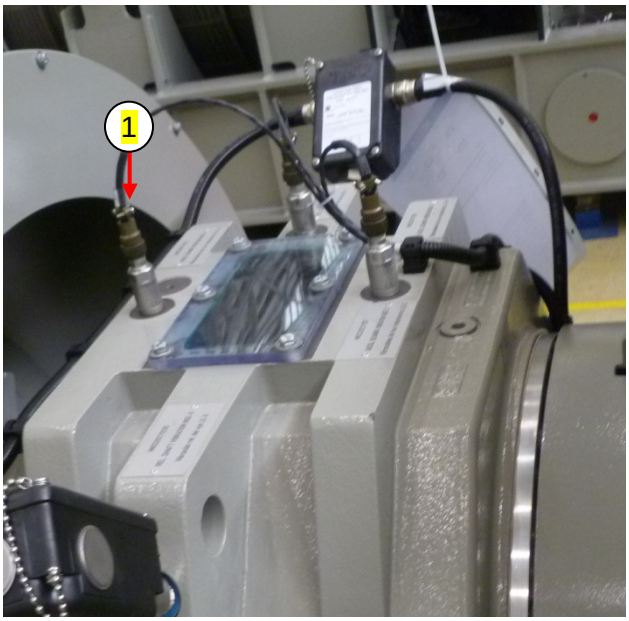


Figure 4.13-7: Sleeve holder (1), locknut (2) for probe sleeve (3) with existing wrench flat (left)

Figure 4.13-8: Vibration sensor mounted in the bearing cover (right)

4.13.4 Mounting the sensors of the bearing vibration monitoring

(*See also **Monitoring Vibration**, in chapter 13.0 and DWG **DPPPG-70152441** – Wiring Diagrams, in chapter 14.0)*



- Install and check the cable connection (1) to the sensor probe.

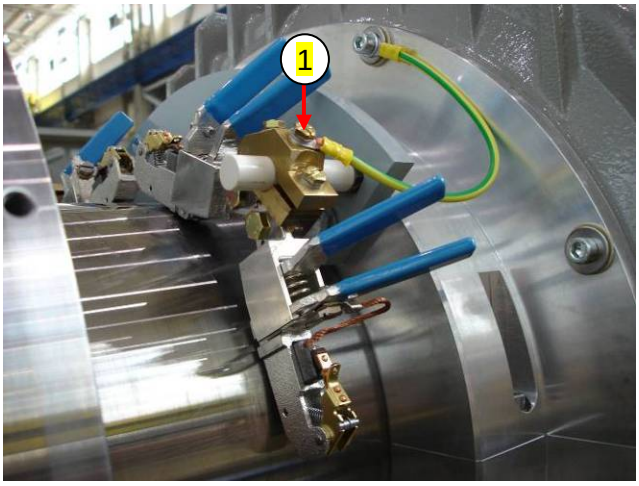
  NOTE: See **Monitoring Vibration**, in chapter 13.0.

Figure 4.13-9: Example of mounted and connected baering vibration sensors

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4.13.5 Mounting the carbon brushes in the rotor grounding system

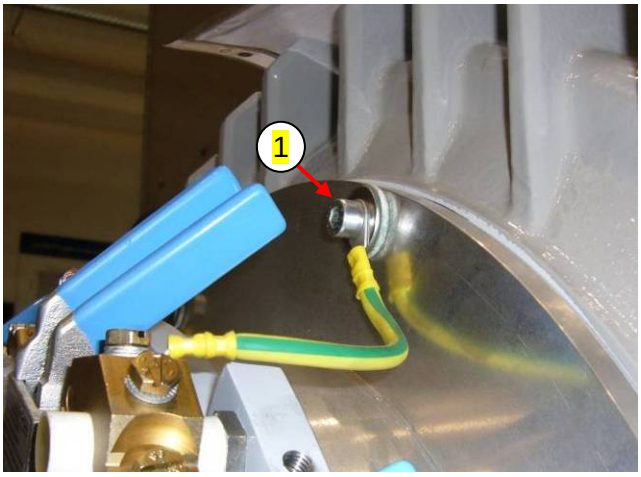
(See *DWG* **DPPPG-*70167687*** *– Assembly Earth Brush, in chapter 17.0)*



- **C**heck the rotor grounding system.
- **C**heck the wiring connection (1).
- **C**heck the correct shape of brushes, to the surface of shaft.

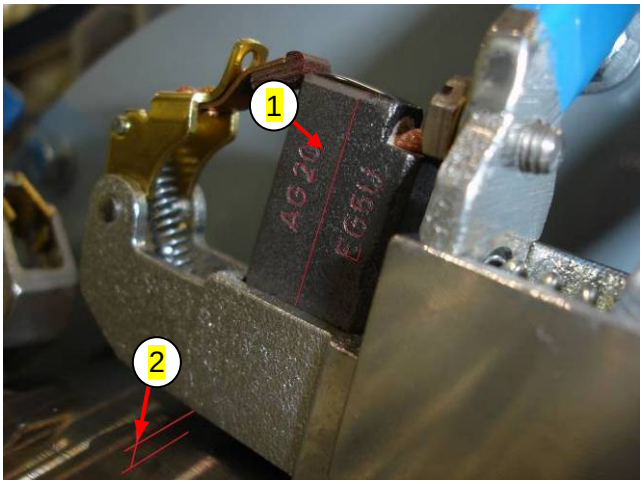
NOTE: Remove the packing material from the transportation protection. Insert the (**4x**) carbon brushes.

Figure 4.13-10: Rotor grounding system with carbon brushes mounted



NOTE: Wiring connection (1) must be insulated from rigid labyrinth seal, but on earth potential of the of pedestal housing.

Figure 4.13-11: Wiring of the rotor grounding system



NOTE: Check the correct fit of carbon brushes (1) to the direction of rotation of shaft.

NOTE: Check the correct adjusted distance (2) between brush holder and shaft, approx. 2–3mm!

Figure 4.13-12: Carbon brush of the rotor grounding system in details

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4.14 Installation of the cooler unit

*(See **Cooling System** in chapter 10.0; DWG **DPPPG-70156503** – Cooler Cover General Drawing, and DWG **DPPPG-70156504** – Cooler Cover, in chapter 17.0)*

The installation of the cooler unit is carried out when all work on the generator is completed, after the enclosure of the generator has been installed. Thoroughly clean the assembling surfaces both on top of the enclosure, and underneath the cooler unit. Remove transportation covers on the roof of enclosure; see Figure 4.14-3 on Page 67. Check the correct fit of the sealing rubber; if necessary renew the gluing of the rubber, see Figure 4.14-4 on Page 67. For gluing use PATTEX-PX.
Hang the cooler unit horizontally at the four attachment points; see Figure 4.14-5 on Page 67, and lift the cooler unit with the crane over the enclosure. During lifting the cooler unit the cooler unit should be led by two ropes. Lower the cooler unit on the enclosure while continuously checking all sides. The assembly guide pins are used to align the cooler unit when it is put down on the enclosure. Then install all cables and plugs to the sensors of the water leakage monitoring system; see Figure 4.14-8 on Page 67 and Figure 4.14-9 on Page 68.

	NOTE After putting down the cooler unit completely, check the correct fit of all supporting surfaces and of the sealing elements. Proceed with the required care during all work in the area of the cooling elements. Avoid touching the cooler fins with tools.

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To be transported in installation system position with 4-strand chain

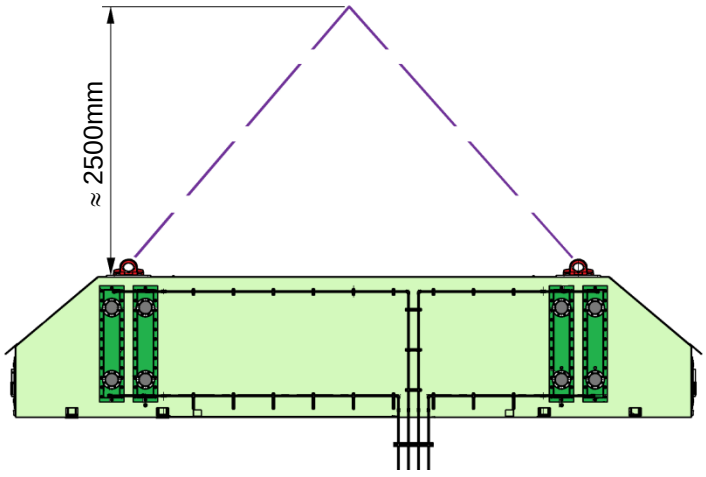


Figure 4.14-1: Transport instructions, longitudinal (left)

Transport instructions for cooler units for the generator **SGen5-100A-2P 92-30**

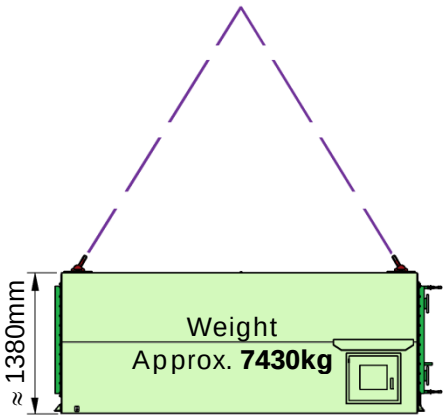
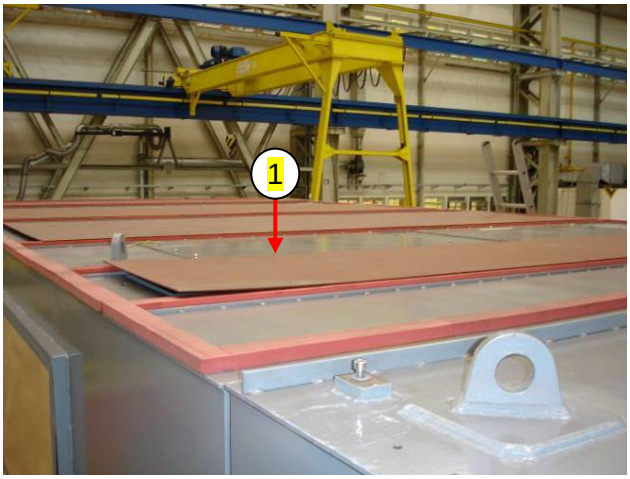


Figure 4.14-2: Transport instructions, cross (right)



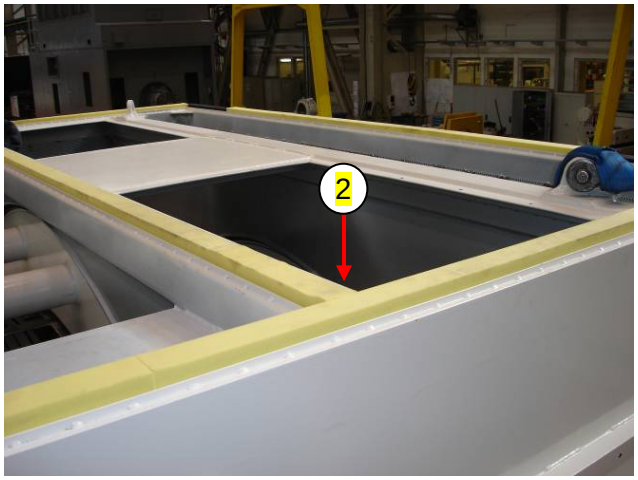
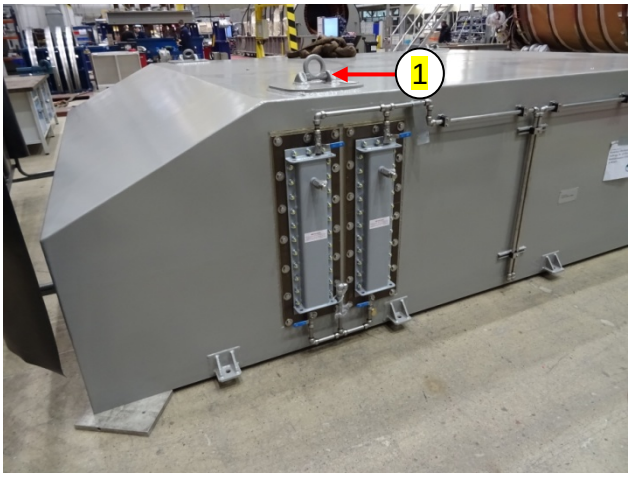


Figure 4.14-3: Transport cover (1); mounted on enclosure, have to be removed (left)

Figure 4.14-4: Sealing rubber (2); mounted on the enclosure (right)

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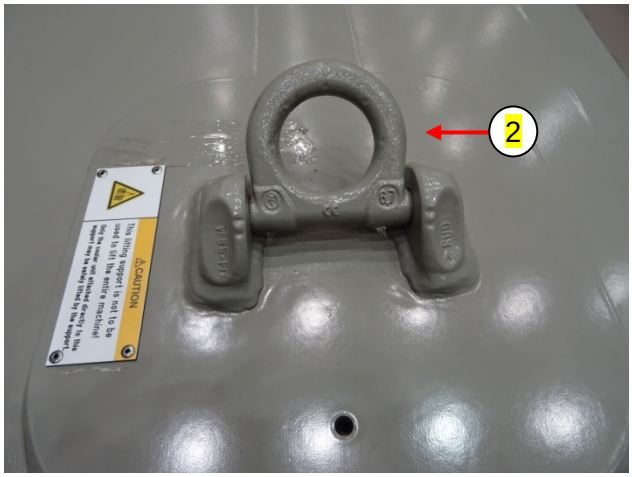
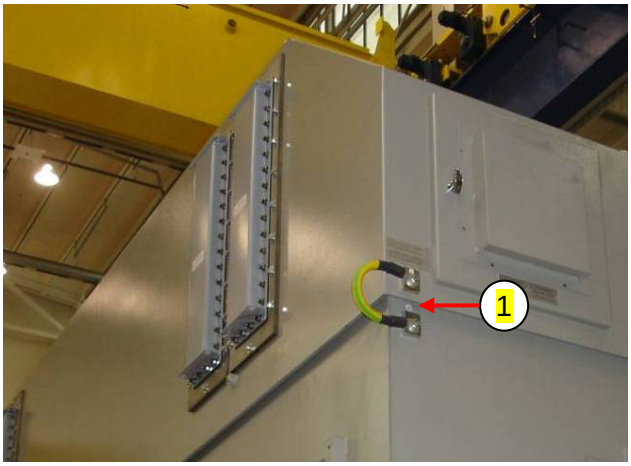


Figure 4.14-5: Attachment points (1) on the cooler unit (left)

Figure 4.14-6: Detail of attachment point (2) on the cooler unit (right)



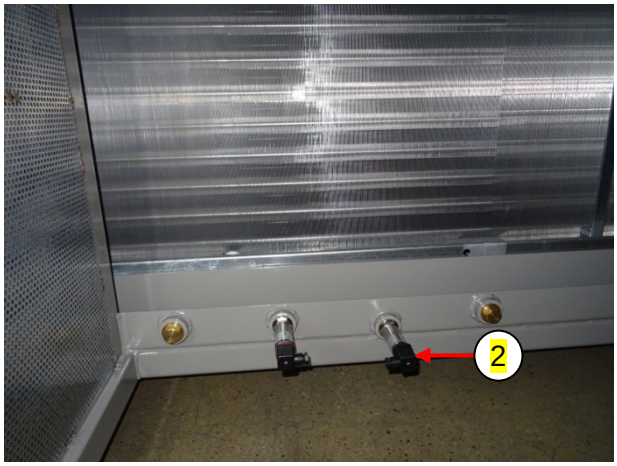
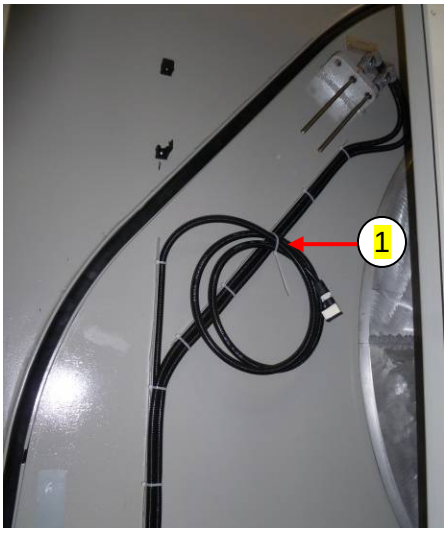


Figure 4.14-7: Grounding wire (1); mounted (left)

Figure 4.14-8: Water leakage sensors (2); mounted below the cooling element (right)

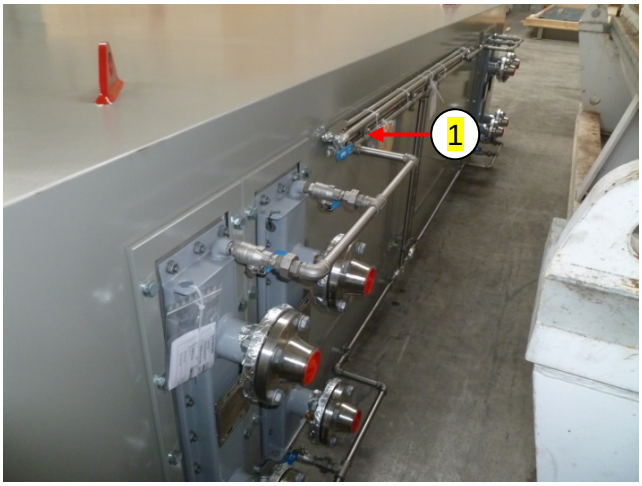


- **A**fter the installation of the cooler unit connect the sensor cable (1); see Figure 4.14-9, to the water leakage sensors (2); see Figure 4.14-8.
  If necessary, use the openings through the manholes.

  NOTE: To prevent crushing of the electric cable (e.g. water leakage sensors) in setting up the cooler unit, you temporarily tie the cables!

Figure 4.14-9: Example of a temporary tied sensor cable (1) on the generator wall

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- **I**nstall the venting and draining pipes (1) on the cooler unit and on the enclosure of the generator; if delivered.

Figure 4.14-10: Cooler unit with venting and draining pipes (1)

4.14.1 Installation of the grounding connections on the cooler unit

(*See DWG **DPPPG-70067569** – Grounding Connections, in chapter 17.0*)

Install the ground connections on the cooler unit using the delivered screws and washers. Install the grounding connections also between mounted parts of the same design group (e.g. additional cover EE*).

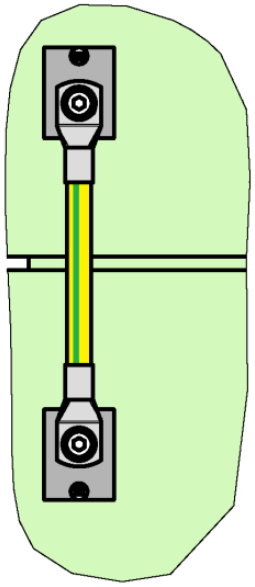
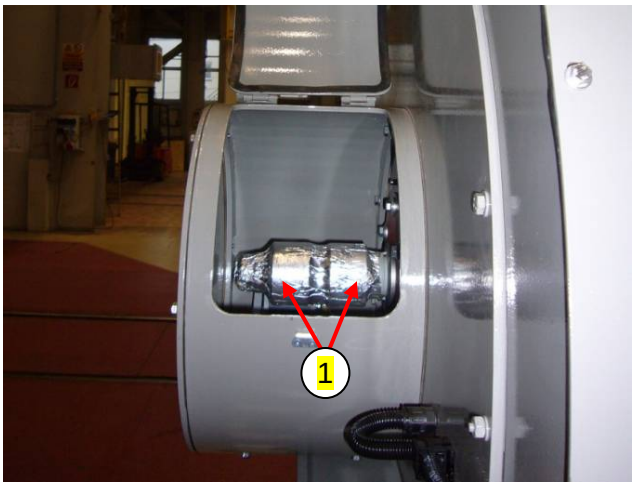


Figure 4.14-11: Details of ground connections on the cooler unit

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4.15 Completion the works for the assembly of the excitation system

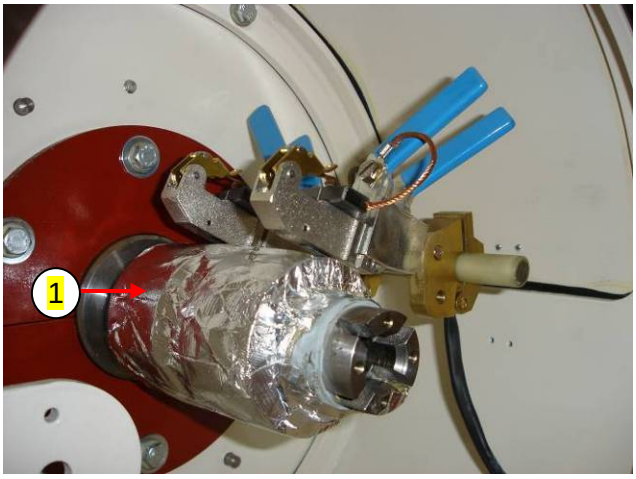
The rotor ground fault detection system is installed on the end of the exciter rotor, inside the exciter machine. Check the rotor ground fault detection system for possible transport protection and remove it (if it's present).



- **E**xciter machines with ground fault detection systems have protecting and packing materials on slip rings (1) and maybe on carbon brushes.

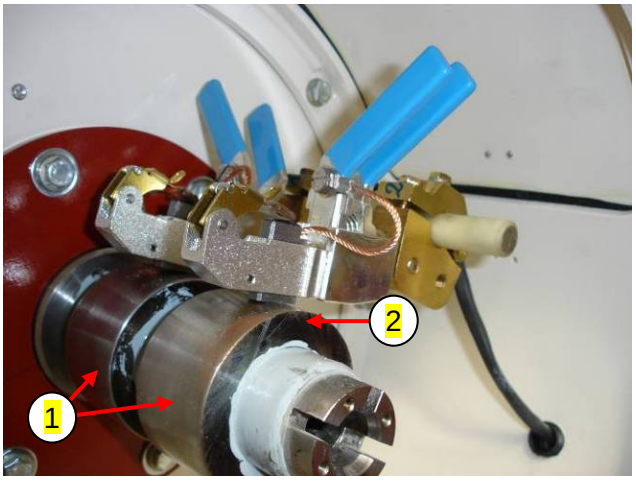
  NOTE: Those packing material is only for transportation and warehousing of the generator!

Figure 4.15-1: Slip rings of ground fault detection system on the end of exciter machine



NOTE: Remove the packing (1) before operation the generator!

Figure 4.15-2: Slip rings of the ground fault detection system with packing materials



- **T**he slip rings (1) of the ground fault detection system must be cleaned before operation the generator.

NOTE: Check the correct fit of carbon brushes to the direction of rotation of shaft.

NOTE: Check the correct adjusted distance (2), between brush holders and slip rings, approx. 2–3mm!

Figure 4.15-3: Ground fault detection system, clean and functional

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4.16 Final check before start up

The following items must be checked before starting up the plant:

	**⚠ WARNING** All foreign objects and in particular metallic objects must be removed from the generator as otherwise they can give rise to extreme dangers. All foreign matter must be removed from the casing.

1. Complete all necessary installation and alignment work.
2. Ensure that the windings are free of dirt and moisture. If the insulation test shows that the windings are not dry enough, then the machine must be dried.
3. Check that all electrical connections are tight. Ensure that the spacing between conductors and grounded parts are according to specifications.
4. Ensure that the bearing lubrication system is clean and working properly.
5. Ensure that the venting ducts are free of all obstructions. Check again that all temporary covers have been removed.
6. Ensure that nobody is in or on the generator.
7. Check the Grounding Connections.
8. Fill out the check list, in chapter 16.0.
9. Check the rotor grounding system.

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1 Recommended nominal tightening torques for bus bar boltings

NOTE:

Use table data only if there are no special values given by the neutral point/line side cubicles' supplier.

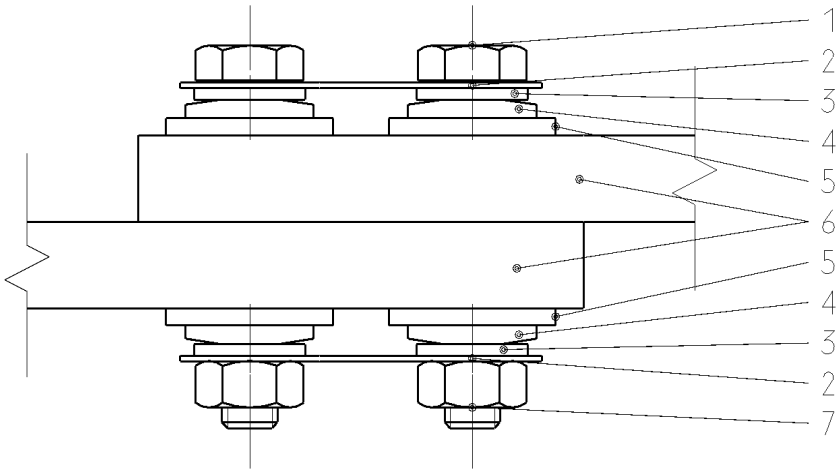
Table data are valid for DC and AC up to 60 Hz. Screws and nuts have to be made of austenitic steel (e.g. A2-70 or A4-70), all other connecting and locking elements should be made of nonmagnetic material as well.

Thread size	Indoor	Indoor & outdoor
	Lubricant: Oil or grease	Lubricant: MoS_2
	Tightening torque [Nm]	Tightening torque [Nm]
M4	1,5	2
M5	2,5	3
M6	4,5	5,5
M8	10	15
M10	20	30
M12	40	60
M16	80	120

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2 Connection bus bar – bus bar, version 1

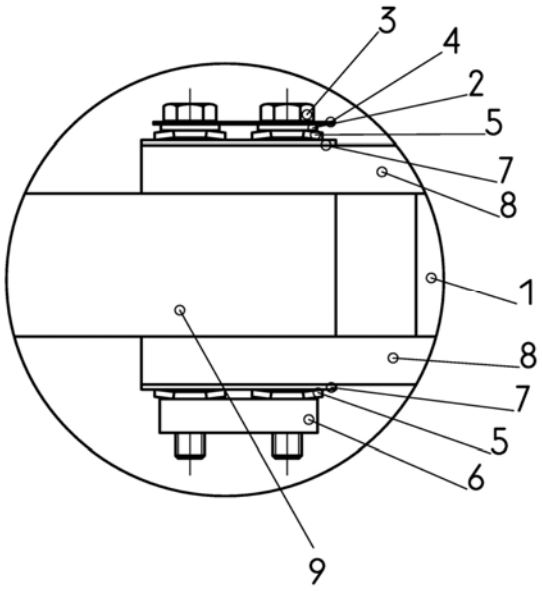
(Principal drawing, for details see Installation Manual, chapter Drawings)



1 Hexagon screw
2 Double-locking plate
3 Tab washer DIN 125
4 Clamping disk DIN 6796
5 Tab washer DIN 9021
6 Bus bars
7 Hexagon nut

3 Connection bus bar – bus bar, version 2

(Principal drawing, for details see Installation Manual, chapter Drawings)

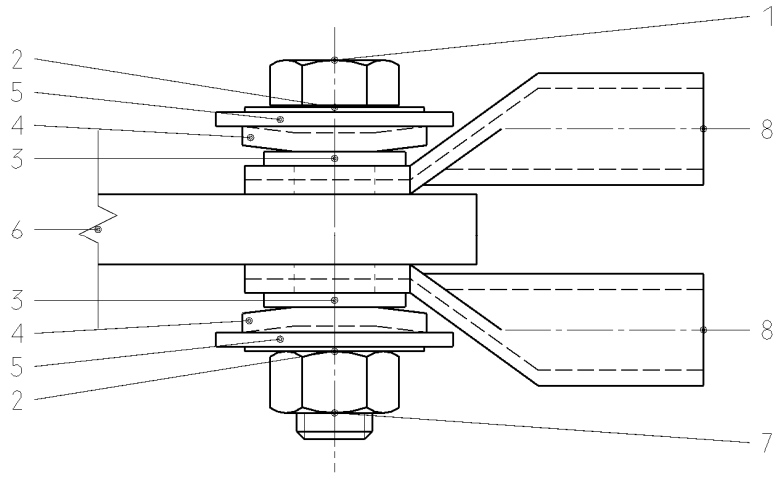


1 Bus bar
2 Tab washer ISO7090
3 Hexagon screw
4 Double-locking plate
5 Clamping disk DIN 6796
6 Twin nut
7 Steel sheet
8 Connecting piece
9 Feed-through bar

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4 Connection cable bus bar – terminal lugs, version 1

(Principal drawing, for details see Installation Manual, chapter Drawings)

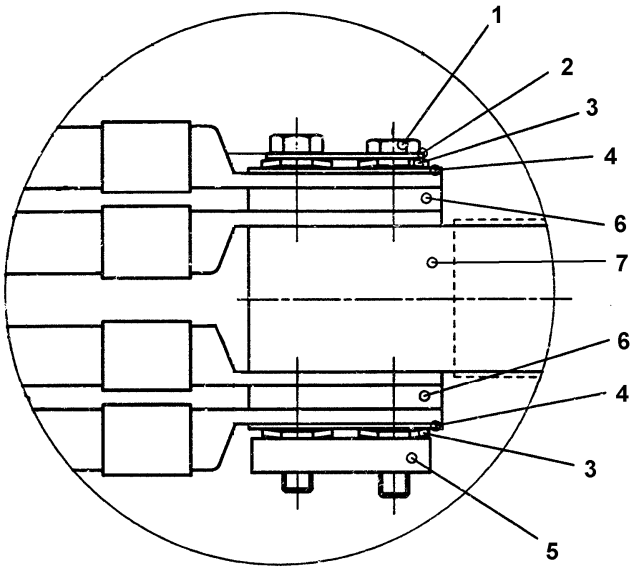


1 Hexagon screw
2 Double-locking plate
3 Tab washer DIN 125
4 Clamping disk DIN 6796
5 Tab washer DIN 9021
6 Bus bar
7 Hexagon nut
8 Cable lug

two terminal lugs arranged on each bus bar side

5 Connection cable bus bar – terminal lugs, version 2

(Principal drawing, for details see Installation Manual, chapter Drawings)



1 Hexagon screw
2 Double-locking plate
3 Clamping disk DIN 6796
4 Steel sheet
5 Twin nut
6 Plate
7 Bus bar

two terminal lugs arranged on each bus bar side

After final assembly, the bolt heads are secured by bending up the double-locking plates.

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Measuring Charts

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Auftr.-Nr.: Order-No.:	3000018595	**Kennwort:** Code word:	Vilnius Biomass / A-902720 / EG000367		
Zeichn.-Nr.: Drawing-No.:	DPPPG-70166125 "A"	**Baugr.-Nr.:** Group-No.:	SFA0000	**Typ:** Type:	SGen5-100A-2P 092-30
Material-Nr.: Material-No.:	OMAT00570194	**F-Auftrag:** Shop order:	5000562285	**Id.-Nr.:** Id.-No.:	31129867

Generator - Montageprotokolle

Generator assembly records

Turbogeneratoren

Turbogenerators

Kennwort: Code Word:	Vilnius Biomass / A-902720 / EG000367
Auftrags-Nr.: Order No.:	3000018595
Serial-Nr.Ständer/Generator: Serial No. Stator/Generator:	31129867
Serial-Nr. Läufer: Serial No. Rotor:	31149061
Typ: Type:	SGen5-100A-2P 092-30
Abteilung: Department:	ERF MF FAS
Datum: Date:	2018-11-16
Bearbeiter: Reviewer:	M. Held
Gegenzeichnung: Counter Signature:	Saitz Dirk ..... Digital unterschrieben von Saitz Dirk DN: serialNumber=Z0008FDR, givenName=Dirk, sn=Saitz, o=Siemens, cn=Saitz Dirk Datum: 2018.11.22 08:54:19 +01'00'

Nach Abschluss der Inbetriebsetzung des Generators eine Kopie des kompletten Werksmontageprotokolles an Siemens ERF QM zurücksenden.

Please send back the shop assemble protocol to Siemens ERF QM, when the generator has past the initual start-up.

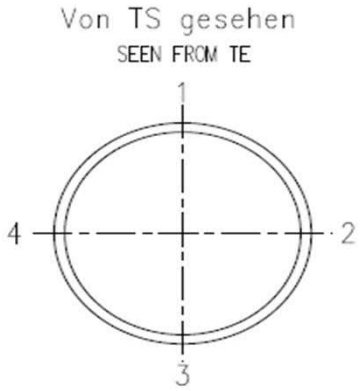
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Material-Nr.: Material-No.:	OMAT00570194	**F-Auftrag:** Shop order:	5000562285	**Id.-Nr.:** Id.-No.:	31129867

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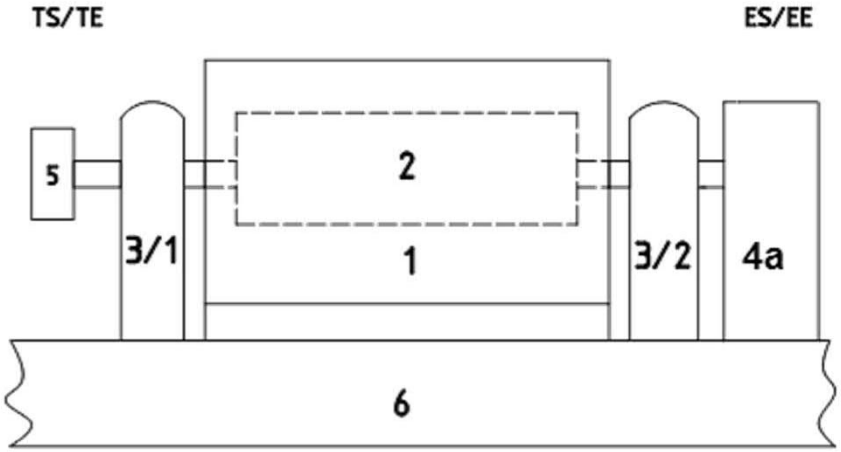
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Generatormontage / assembly of the generator	
Inhaltsverzeichnis / Table of Content	2
Information / relevant information	3
Isolationsprüfung Anbauteile / Insulation tests mounted parts	4
radiale und axiale Ausrichtung / radial and axial alignment	5
Wellenabdichtung Haube / shaft seal cover	6
Lager TS / Bearing TE	7
Lager ES / Bearing EE	8
radiale & axiale Ausrichtung Erreger / radial and axial alignment exciter	9

Generelle Ansicht / General view



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ERF0317B_SFA0000_3000018595_018826

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Zeichn.-Nr.: Drawing-No.:	DPPPG-70166125 "A"	**Baugr.-Nr.:** Group-No.:	SFA0000	**Typ:** Type:	SGen5-100A-2P 092-30
Material-Nr.: Material-No.:	OMAT00570194	**F-Auftrag:** Shop order:	5000562285	**Id.-Nr.:** Id.-No.:	31129867



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2 = #
3/1 = #
3/2 = #
4a = #
5 = #
6 = #

Sämtliche Maße sind in mm eingetragen und sämtliche radiale Ausrichtwerte und Radialspiele sind von TS gesehen eingetragen.

All measures are given in mm and all recorded alignment values and radial clearances are seen from TE.

mit dem Generator wurde ein Probelauf durchgeführt
test run performed with generator

☑ **Ja** Yes ☐ **Nein** No

Werksmontage
shop erection

Transportsicherung eingebaut
shipping protection mounted

☑ **Ja** Yes ☐ **Nein** No

Unterschrift: signature:
Datum: date: 13.11.2018

Weidhaas/Szymanski

Saitz Dirk

Digital unterschrieben von Saitz Dirk
DN: serialNumber=Z0008FDR, givenName=Dirk, sn=Saitz, o=Siemens, cn=Saitz Dirk
Datum: 2018.11.22 08:55:33 +01'00'

Aussenmontage
field erection

Transportsicherung entfernt
shipping protection removed

☐ **Ja** Yes ☐ **Nein** No

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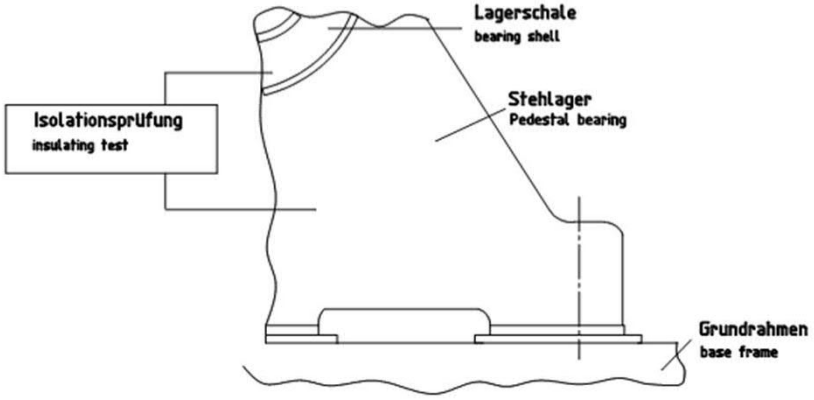
*** Die im Folgenden benannten Abweichungen haben keine Auswirkung auf die Funktion des Generators und wurden durch den Hersteller (Siemens Erfurt) toleriert.**

* The following deviations have no impact on operation and functionality of the generator and are tolerated by the manufacturer.

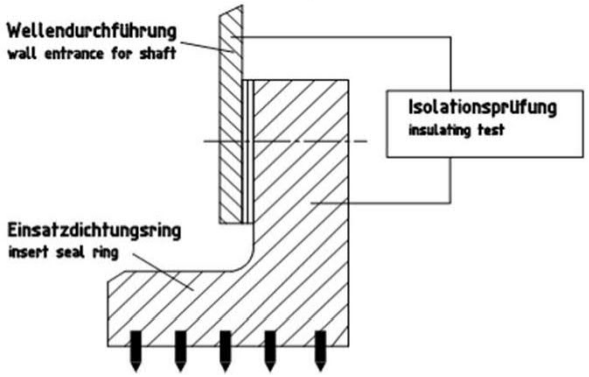
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Material-Nr.: Material-No.:	OMAT00570194	**F-Auftrag:** Shop order:	5000562285	**Id.-Nr.:** Id.-No.:	31129867

(1) Stehlager-Grundrahmen/pedestal bearing-base frame
ohne Wellenberührung mit angeflanschten Rohrleitungen/without shaft contact with flanget pipes



(2) Wellendurchführung Einsatzdichtungsring
wall entrance insert seal ring



Isolationsprüfung mit 250 V gemessen (DIN 31692-4) / insulation test with 250 V

Maß-Nr. measure-No.			Soll [MΩ] nominal	Ist [MΩ] actual	Unterschrift / Datum Signature / date
Werksmontage shop erection	(1)	TS / TE	≥ 0,5	2900	Gertler
		ES / EE		2900	Gertler
	(2)	TS / TE	≥ 0,5	2900	Gertler
		ES / EE		2900	Gertler
Außenmontage field erection	(1)	TS / TE	≥ 0,5		
		ES / EE			
	(2)	TS / TE	≥ 0,5		
		ES / EE			

Luftabstände - Stromdurchführung gegen Gehäuse Air gap distances - bushing against casing (WFU 2.01)		Soll [mm] nominal	Ist [mm] actual	Unterschrift / Datum Signature / date
Werksmontage shop erection	blanke Leiter gegen Eisen oder gegeneinander bare conductors against iron or against each other	≥ 115	120	Zerbst

* Abweichung (Seite 3) / deviation (page 3)

Abteilung: Department: MF FAS
Prüfer / Datum: Inspector / Date: siehe oben / see above
Gegenzeichnung: Countersignature: Saitz Dirk

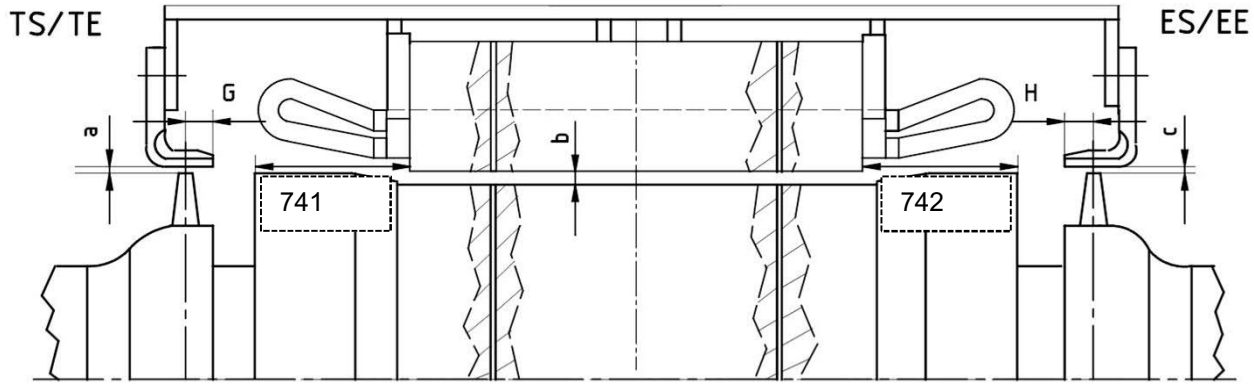
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Datum: 2018.11.22 08:57:58 +01'00'

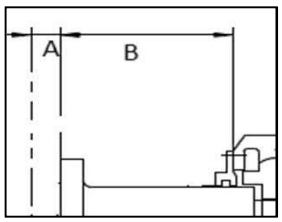
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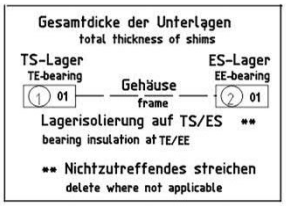
Turbogeneratoren
Prüfprotokoll
Turbogenerators
Inspection Data Sheet

Generatormontage 2pol
radiale und axiale Ausrichtung
Generator assembly 2 pole
radial and axial alignment

Auftr.-Nr.: Order-No.:	3000018595	**Kennwort:** Code word:	Vilnius Biomass / A-902720 / EG000367		
Zeichn.-Nr.: Drawing-No.:	DPPPG-70166125 "A"	**Baugr.-Nr.:** Group-No.:	SFA0000	**Typ:** Type:	SGen5-100A-2P 092-30
Material-Nr.: Material-No.:	OMAT00570194	**F-Auftrag:** Shop order:	5000562285	**Id.-Nr.:** Id.-No.:	31129867







Kontrollmaß/Referenced dimension:

Abstand zwischen Kappe bis zum ersten Luftschlitz Ständer, siehe Skizze [ ]
distance between retaining ring to the first gas passage of stator core, see sketch [ ]

Maß-Nr. measure-No.			Lage position	Soll [mm] nominal	Werksmontage / shop erection Ist / actual [mm]		Sign / date	Außenmontage / field erection Ist / actual [mm]		Sign / date
	1	TS	Bleche / Shims	⁄	3,8		Saitz			
	2	ES	Bleche / Shims	⁄	4,5		Saitz			
	A	1	oben / top	2,9	⁄		Saitz			
	B	1	oben / top	560	560,5		Saitz			
	G	1	oben / top	65 ±5	65		Billert			
	G	2	rechts / right	65 ±5	66		Billert			
	G	3	unten / bottom	65 ±5	66		Billert			
	G	4	links / left	65 ±5	65		Billert			
	H	1	oben / top	65 ±5	63		Billert			
	H	2	rechts / right	65 ±5	64		Billert			
	H	3	unten / bottom	65 ±5	64		Billert			
	H	4	links / left	65 ±5	63		Billert			
	a	1	oben / top	2,3 ±0,5	2,8		Billert			
	a	2	rechts / right	2,3 ±0,5	2,4		Billert			
	a	3	unten / bottom	2,3 ±0,5	2,2		Billert			
	a	4	links / left	2,3 ±0,5	2,5		Billert			
					TS/TE	ES/EE		TS/TE	ES/EE	
	b	1	oben / top	46 ±2,3	45,9	46,1	Held			
	b	2	rechts / right	46 ±2,3	46,4	46,3	Held			
	b	3	unten / bottom	46 ±2,3	46,0	45,9	Held			
	b	4	links / left	46 ±2,3	45,6	45,7	Held			
	c	1	oben / top	2,3 ±0,5	2,6		Billert			
	c	2	rechts / right	2,3 ±0,5	2,2		Billert			
	c	3	unten / bottom	2,3 ±0,5	2,5		Billert			
	c	4	links / left	2,3 ±0,5	2,4		Billert			
Luftführungsring TS/ES gesichert Air baffle ring TE/EE secured					☑ Ja/yes ☐ nein/no			☐ Ja/yes ☐ nein/no		

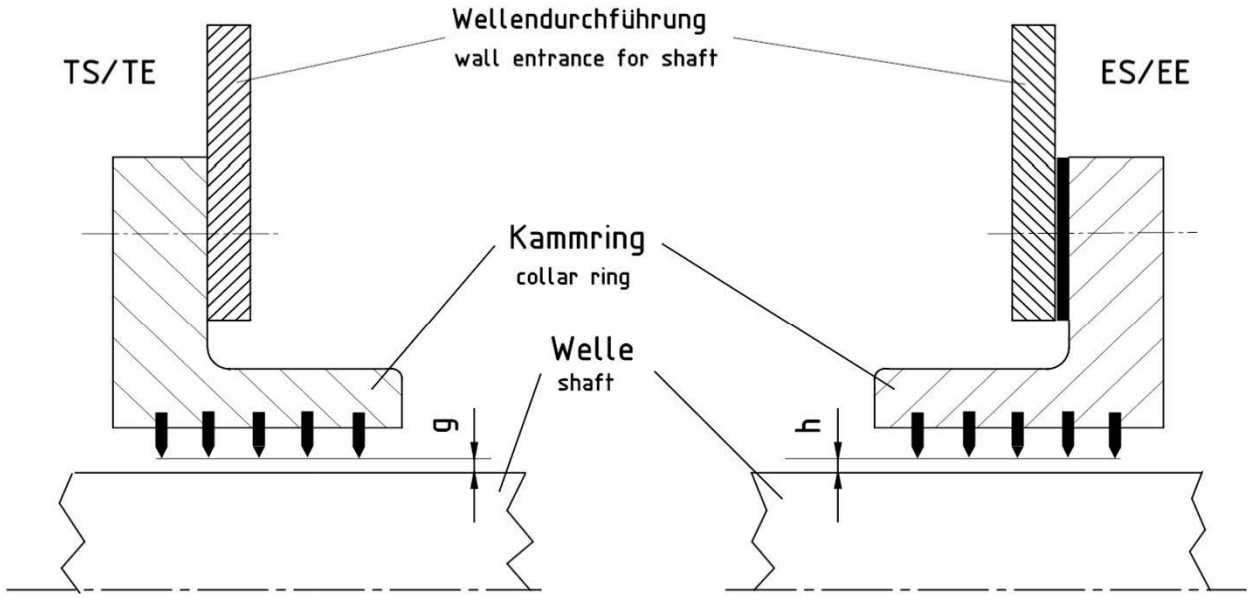
* Abweichung (Seite 3) / deviation (page 3)

Abteilung: Department: MF FAS
Prüfer / Datum: Inspector / Date: siehe oben / see above
Gegenzeichnung: Countersignature: Saitz Dirk

Digital unterschrieben von Saitz Dirk
DN: serialNumber=Z0008FDR, givenName=Dirk, sn=Saitz, o=Siemens, cn=Saitz Dirk
Datum: 2018.11.22 08:58:37 +01'00'

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Auftr.-Nr.: Order-No.:	3000018595	**Kennwort:** Code word:	Vilnius Biomass / A-902720 / EG000367		
Zeichn.-Nr.: Drawing-No.:	DPPPG-70166125 "A"	**Baugr.-Nr.:** Group-No.:	SFA0000	**Typ:** Type:	SGen5-100A-2P 092-30
Material-Nr.: Material-No.:	OMAT00570194	**F-Auftrag:** Shop order:	5000562285	**Id.-Nr.:** Id.-No.:	31129867

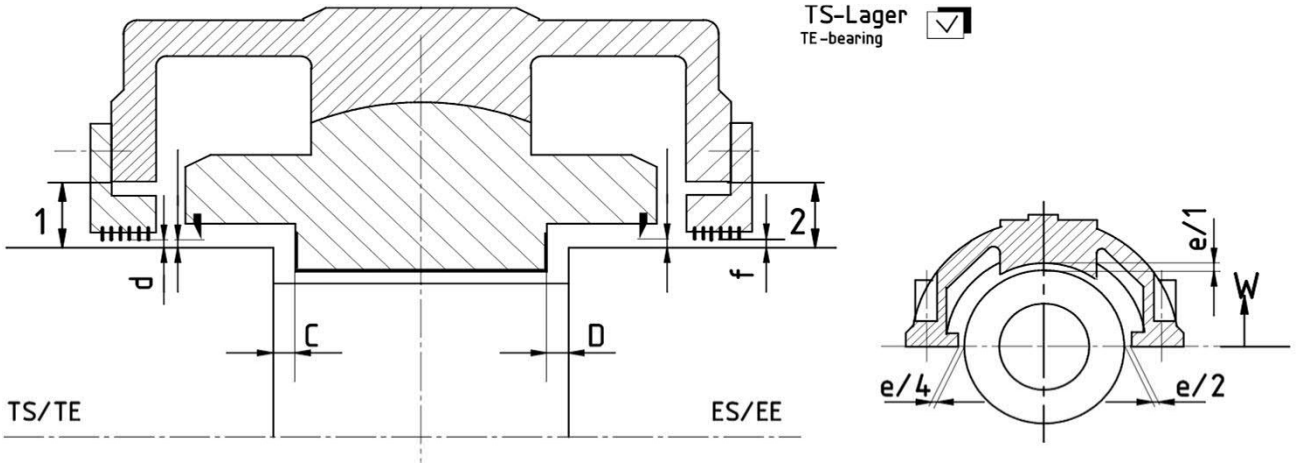


Maß-Nr. measure-No.			Lage position	Soll [mm] nominal	Werksmontage / shop erection Ist / actual [mm]	Sign / date	Außenmontage / field erection Ist / actual [mm]	Sign / date
	g	1	oben / top	0,35 - 0,65	0,50	Gertler		
	g	2	rechts / right	0,20 - 0,35	0,25	Gertler		
	g	3	unten / bottom	0,05	0,05	Gertler		
	g	4	links / left	0,20 - 0,35	0,25	Gertler		
	h	1	oben / top	0,35 - 0,65	0,50	Gertler		
	h	2	rechts / right	0,20 - 0,35	0,25	Gertler		
	h	3	unten / bottom	0,05	0,05	Gertler		
	h	4	links / left	0,20 - 0,35	0,25	Gertler		

* Abweichung (Seite 3) / deviation (page 3)

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ERF0317B_SFA0000_3000018595_018826

Auftr.-Nr.: Order-No.:	3000018595	**Kennwort:** Code word:	Vilnius Biomass / A-902720 / EG000367		
Zeichn.-Nr.: Drawing-No.:	DPPPG-70166125 "A"	**Baugr.-Nr.:** Group-No.:	SFA0000	**Typ:** Type:	SGen5-100A-2P 092-30
Material-Nr.: Material-No.:	OMAT00570194	**F-Auftrag:** Shop order:	5000562285	**Id.-Nr.:** Id.-No.:	31129867



Sichtkontrolle des Lagers nach dem Probelauf durchgefürt:
Visual control of the sleeve bearing after the test run performed: ☑ Ja / yes ☐ kein Probelauf / no test run

Maß-Nr. measure-No.			Lage position	Soll [mm] nominal		Werksmontage / shop erection Ist / actual [mm]		Sign / date	Außenmontage / field erection Ist / actual [mm]		Sign / date
1 zu / to 2		1	oben / top	≤ 0,4		0,0		Held			
		2	rechts / right	≤ 0,4		0,1		Held			
		3	unten / bottom	≤ 0,4		0,4		Held			
		4	links / left	≤ 0,4		0,4		Held			
	C	2	rechts / right	35 ±1		34,99		Held			
	C	4	links / left	35 ±1		34,98		Held			
	D	2	rechts / right	35 ±1		35,00		Held			
	D	4	links / left	35 ±1		35,02		Held			
				Blech[1] sheet	Dichtung seal	Blech[1] sheet	Dichtung seal		Blech[1] sheet	Dichtung seal	
	d	1	oben / top	0,2-0,9	0,13 - 0,27		0,18	Held			
	d	2	rechts / right	0,1-0,5	0,06 - 0,14		0,09	Held			
	d	3	unten / bottom	0,00	0,00		0,00	Held			
	d	4	links / left	0,1-0,5	0,06 - 0,14		0,09	Held			
	e	1	oben / top	0,35 - 0,41		0,44		Held			
	e	2	rechts / right	0,46 - 0,54		0,46		Held			
	e	3	unten / bottom	0,00		0,00		Held			
	e	4	links / left	0,46 - 0,54		0,46		Held			
				Blech[1] sheet	Dichtung seal	Blech[1] sheet	Dichtung seal		Blech[1] sheet	Dichtung seal	
	f	1	oben / top	0,2-0,9	0,13 - 0,27		0,15	Held			
	f	2	rechts / right	0,1-0,5	0,06 - 0,14		0,07	Held			
	f	3	unten / bottom	0,00	0,00		0,00	Held			
	f	4	links / left	0,1-0,5	0,06 - 0,14		0,07	Held			
Funktionsprüfung hydrostatische Wellenanhebung (nach Maßbildtext) Functional test hydrostatic shaft-lifting (acc. to dimensional drawing text)											
Aushebedruck / Lifting pressure				≤ 118bar + 10%		130		Held			
Haltedruck / Holding pressure				≤ 77bar + 10%		85		Held			
Ist-Höhe / Actual height				n.a.		0,11		Held			

[1] Messing-Blech zur Umlenkung Ölfluss (wenn verbaut) /
brass sheet for guiding oil flow (if applied)

* Abweichung (Seite 3) / deviation (page 3)

Abteilung: Department: MF FAS
Prüfer / Datum: Inspector / Date: siehe oben / see above
Gegenzeichnung: Countersignature: Saitz Dirk

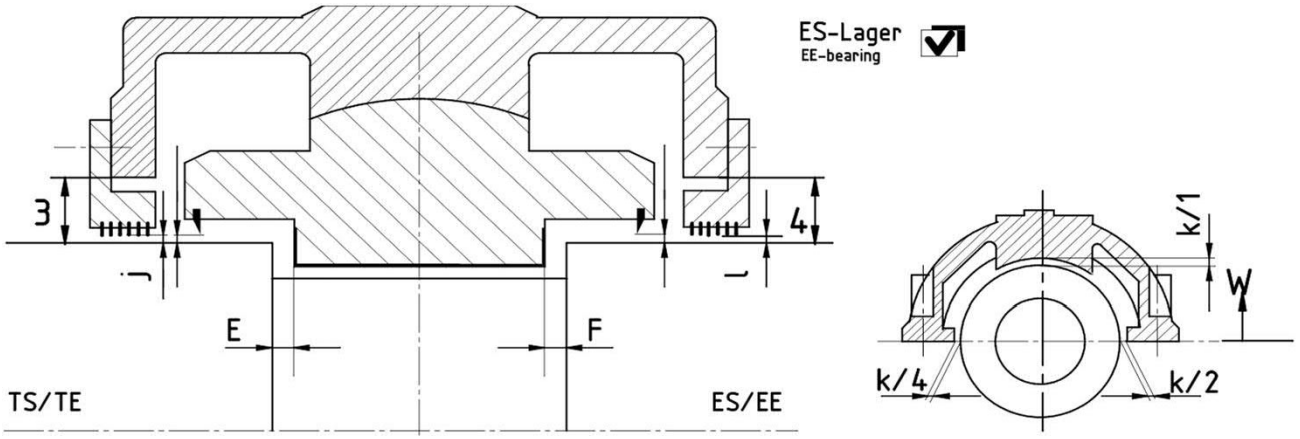
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Datum: 2018.11.22 09:00:03 +01'00'

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Turbogeneratoren
Prüfprotokoll
Turbogenerators
Inspection Data Sheet

Generatormontage 2pol
Lager ES
Generator assembly 2 pole
Bearing EE

Auftr.-Nr.: Order-No.:	3000018595	**Kennwort:** Code word:	Vilnius Biomass / A-902720 / EG000367		
Zeichn.-Nr.: Drawing-No.:	DPPPG-70166125 "A"	**Baugr.-Nr.:** Group-No.:	SFA0000	**Typ:** Type:	SGen5-100A-2P 092-30
Material-Nr.: Material-No.:	OMAT00570194	**F-Auftrag:** Shop order:	5000562285	**Id.-Nr.:** Id.-No.:	31129867



Sichtkontrolle des Lagers nach dem Probelauf durchgefürt:
Visual control of the sleeve bearing after the test run performed: ☑ Ja / yes ☐ kein Probelauf / no test run

Maß-Nr. measure-No.			Lage position	Soll [mm] nominal		Werksmontage / shop erection Ist / actual [mm]		Sign / date	Außenmontage / field erection Ist / actual [mm]		Sign / date
3 zu / to 4		1	oben / top	≤ 0,4		0,1		Held			
		2	rechts / right	≤ 0,4		0,0		Held			
		3	unten / bottom	≤ 0,4		0,0		Held			
		4	links / left	≤ 0,4		0,0		Held			
	E	2	rechts / right	35 ±1		35,01		Held			
	E	4	links / left	35 ±1		35,03		Held			
	F	2	rechts / right	35 ±1		34,94		Held			
	F	4	links / left	35 ±1		34,96		Held			
				Blech[1] sheet	Dichtung seal	Blech[1] sheet	Dichtung seal		Blech[1] sheet	Dichtung seal	
	j	1	oben / top	0,2-0,9	0,13 - 0,27		0,15	Held			
	j	2	rechts / right	0,1-0,5	0,06 - 0,14		0,07	Held			
	j	3	unten / bottom	0,00	0,00		0,00	Held			
	j	4	links / left	0,1-0,5	0,06 - 0,14		0,07	Held			
	k	1	oben / top	0,35 - 0,41		0,41		Held			
	k	2	rechts / right	0,46 - 0,54		0,46		Held			
	k	3	unten / bottom	0,00		0,00		Held			
	k	4	links / left	0,46 - 0,54		0,46		Held			
				Blech[1] sheet	Dichtung seal	Blech[1] sheet	Dichtung seal		Blech[1] sheet	Dichtung seal	
	l	1	oben / top	0,2-0,9	0,13 - 0,27		0,13	Held			
	l	2	rechts / right	0,1-0,5	0,06 - 0,14		0,06	Held			
	l	3	unten / bottom	0,00	0,00		0,00	Held			
	l	4	links / left	0,1-0,5	0,06 - 0,14		0,06	Held			
Funktionsprüfung hydrostatische Wellenanhebung (nach Maßbildtext) Functional test hydrostatic shaft-lifting (acc. to dimensional drawing text)											
Aushebedruck / Lifting pressure				≤ 118bar + 10%		130		Held			
Haltedruck / Holding pressure				≤ 77bar + 10%		85		Held			
Ist-Höhe / Actual height				n.a.		0,12		Held			

[1] Messing-Blech zur Umlenkung Ölfluss (wenn verbaut) /
brass sheet for guiding oil flow (if applied)

* Abweichung (Seite 3) / deviation (page 3)

Abteilung: Department: MF FAS
Prüfer / Datum: Inspector / Date: siehe oben / see above
Gegenzeichnung: Countersignature: Saitz Dirk

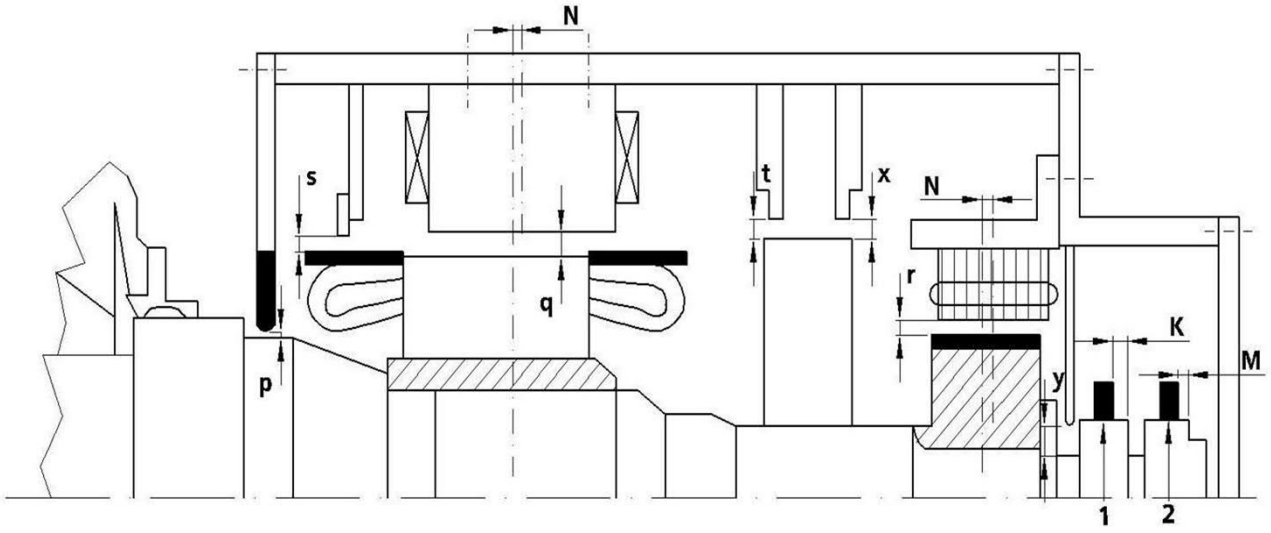
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Turbogeneratoren
Prüfprotokoll
Turbogenerators
Inspection Data Sheet

Generatormontage 2pol
radiale & axiale Ausrichtung Erreger
Generator assembly 2 pole
radial and axial alignment exciter

Auftr.-Nr.: Order-No.:	3000018595	**Kennwort:** Code word:	Vilnius Biomass / A-902720 / EG000367		
Zeichn.-Nr.: Drawing-No.:	DPPPG-70166125 "A"	**Baugr.-Nr.:** Group-No.:	SFA0000	**Typ:** Type:	SGen5-100A-2P 092-30
Material-Nr.: Material-No.:	OMAT00570194	**F-Auftrag:** Shop order:	5000562285	**Id.-Nr.:** Id.-No.:	31129867



Maß-Nr. measure-No.			Lage position	Soll [mm] nominal	Werksmontage / shop erection Ist / actual [mm]	Sign / date	Außenmontage / field erection Ist / actual [mm]	Sign / date
	K		oben / top	25,5 ±1	25	Billert		
	M		oben / top	25,5 ±1	25	Billert		
	N		oben / top	2,8 ±1	3,0	Billert		
	p	1	oben / top	0,5 ±0,2	0,6	Billert		
	p	2	rechts / right	0,5 ±0,2	0,4	Billert		
	p	3	unten / bottom	0,5 ±0,2	0,4	Billert		
	p	4	links / left	0,5 ±0,2	0,4	Billert		
	q	1	oben / top	8 ±0,5	8,1	Billert		
	q	2	rechts / right	8 ±0,5	7,9	Billert		
	q	3	unten / bottom	8 ±0,5	7,6	Billert		
	q	4	links / left	8 ±0,5	7,7	Billert		
	r	1	oben / top	2,5 ±0,3	2,5	Billert		
	r	2	rechts / right	2,5 ±0,3	2,4	Billert		
	r	3	unten / bottom	2,5 ±0,3	2,4	Billert		
	r	4	links / left	2,5 ±0,3	2,4	Billert		
	s	1	oben / top	8 ±2	10	Billert		
	s	2	rechts / right	8 ±2	9	Billert		
	s	3	unten / bottom	8 ±2	10	Billert		
	s	4	links / left	8 ±2	8	Billert		
	t	1	oben / top	1 ±0,2	1,1	Billert		
	t	2	rechts / right	1 ±0,2	1,0	Billert		
	t	3	unten / bottom	1 ±0,2	0,9	Billert		
	t	4	links / left	1 ±0,2	1,0	Billert		
	x	1	oben / top	1 ±0,2	1,1	Billert		
	x	2	rechts / right	1 ±0,2	1,0	Billert		
	x	3	unten / bottom	1 ±0,2	1,0	Billert		
	x	4	links / left	1 ±0,2	1,0	Billert		
	y		1 2	0,5 ±0,2	0,5 0,4	Billert		
	y		3 4	0,5 ±0,2	0,4 0,4	Billert		
run out	1		oben / top	≤ 0,05	0,05	Billert		
run out	2		oben / top	≤ 0,05	0,05	Billert		
Beilageblech / shim plate				⁒	5,5	Billert		

* Abweichung (Seite 3) / deviation (page 3)

Abteilung: Department: MF FAS
Prüfer / Datum: Inspector / Date: siehe oben / see above
Gegenzeichnung: Countersignature: Saitz Dirk

Digital unterschrieben von Saitz Dirk
DN: serialNumber=Z0008FDR, givenName=Dirk, sn=Saitz, o=Siemens, cn=Saitz Dirk
Datum: 2018.11.22 09:01:52 +01'00'

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General Handling Guidelines

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Siemens AG
Energy Sector

1. Transport

1.1 General

Have the goods transported to the site only by experience forwarding agents. Transportation remains exclusively the responsibility of the forwarding agents. Erection personnel of Siemens AG may act only in an advisory and supervisory capacity.
Exercise great care and caution when moving the equipment to and at the site. Use equipment of appropriate design and carrying capacity.

NOTE:

Machines on anti-vibration mountings should be transported in such a way that the shock-absorbing capacity of the mountings is not impaired.

1.2. Packing

The packing's are designed according to the Packaging Guidelines and the Siemens Generator Packaging Instruction FV 1000043e. The bottom of the case consists entirely of boards. The side walls and the lid consist of plywood, sometimes partly of metal. In each of two opposite side walls there is a ventilation opening, which is closed from the outside with a screwed ventilation plate. For transport inside Germany and other European countries' cases are used which do not have any vent openings.

The machine parts are completely enveloped in foil wrappings whose seams are welded to make an air-tight seal. All sharp corners and edges are padded to prevent the wrapping from ripping.

NOTE:

The sealed wrappings should not be opened en route or during handling. The customs authorities and forwarding agents should therefore be informed in good time of the forthcoming arrival of such consignments and arrangements be made with the customs official to have the goods inspected on the site itself.



Fig. 1 Generator packing (examples)

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Bags with an adequate quantity of desiccant are suspended inside the sealed wrapping to absorb any vapour penetrating through the wrapping.

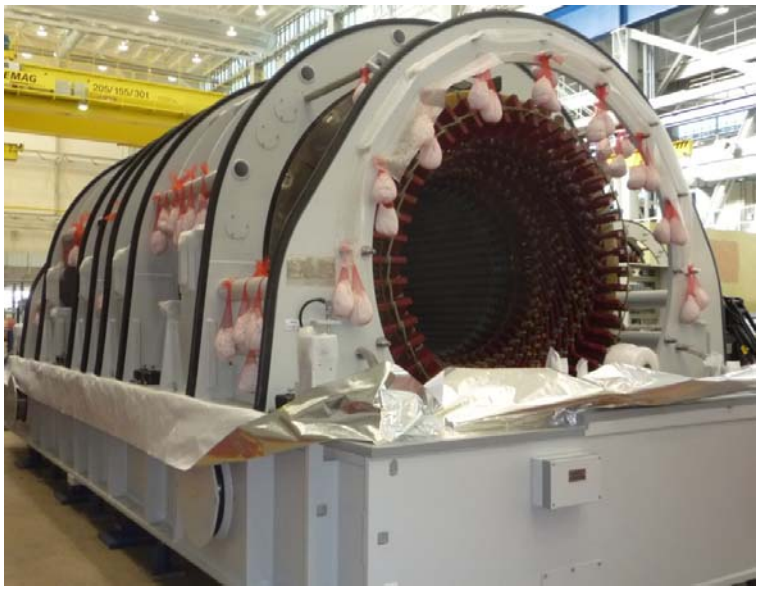
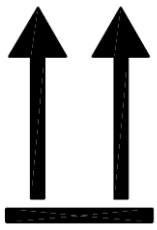


Fig. 2 Arrangement of the desiccant (example)

The cases are marked with instructions for safe handling and proper storage.

Handling Symbols:
The following symbols acc. to DIN ISO 7000 are used for the despatch of non-dangerous goods. It is essential that these be observed.

Our customers also specify other symbols in addition to those shown below. Attention should be paid to these as well.

			
This way up	Fragile; handle with care	Keep away from moisture	Sling here
			
Keep away from heat	Centre of gravity	Use no hooks	Storage limits

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1.3 Loading and Unloading of Heavy Parts

When loading and unloading heavy parts - particularly if they are moved by winches, presses and crowbars, etc. - the truck should be braced underneath by props or jacks to prevent its loading surface from caving in or canting (caused by truck suspension). Brakes of truck must be applied. Heavy parts should be secured so that they cannot move or shift when handled. Steel ropes should be cushioned with wooden blocks to prevent them from rubbing against the cases or biting into them.



⚠ WARNING

Suspended load. Falling loads or uncontrolled swinging load may cause injury to persons.

Keep safe distance. Place barriers if necessary.

Only use specified load attachment points. Only use suitable lifting equipment. The lifting equipment must be in good condition and have a sufficient load carrying capacity.

When lifting heavy cases with winches, jacks and crowbars etc., place the hoisting gear under the hoisting points.

Loading of lifting members:
During manoeuvring and transporting of heavy components, it is important that the forces acting on the wire ropes are in line with the lifting lugs (Fig 3 and Fig. 4).

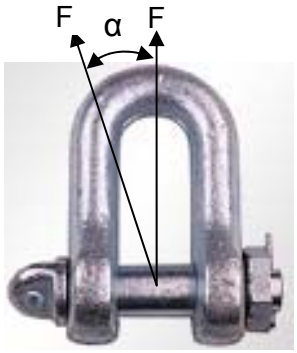


Fig. 3 Angular offset not allowable

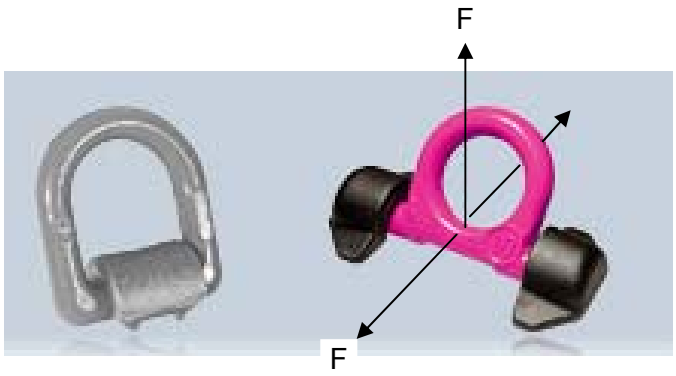


Fig. 4 Angular offset allowable up to 90°

On no account may there be any angular offset between line of force and lifting lug when shackles and hooks are used, as this will give rise to forces which could be many times greater than the permissible load. Lifting beams or wire rope spreaders may be used to prevent angular offset of forces. Further load lifting members comprise load shackles or lifting eyes welded to individual components (Fig. 5 and Fig. 6).

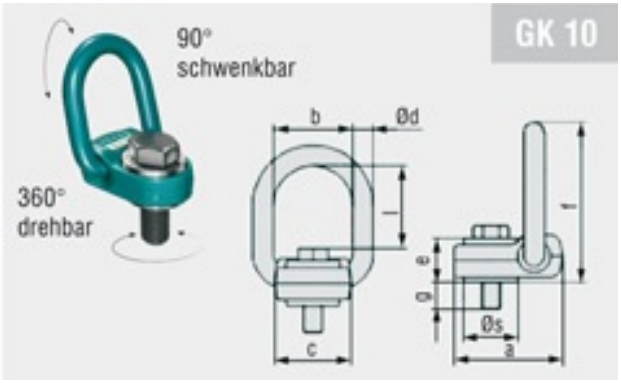


Fig. 5 Load shackle

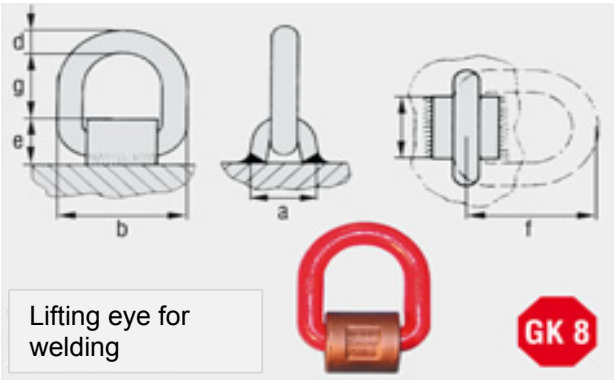


Fig. 6 Lifting eye

The load-carrying capacity for these lifting aids is to be given in tons at the lifting lug.

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Lifting Devices on Heavy Components:
To facilitate proper handling and compliance with all applicable accident prevention regulations, heavy components are fitted with lifting devices, the use of which is mandatory for transport to the site and during inspection/assembly.



⚠ WARNING

Suspended load. Falling loads or uncontrolled swinging load may cause injury to persons.

Re-check all bolts on the lifting attachments and shackles directly before lifting the component.

Before each transport, the weights of the components must be taken from the shipping lists, the drawings, or the inscriptions on the components as the basis for selection of the correct lifting aids (shackles, ropes etc.) to be used.
Care must be taken to ensure that the wire ropes do not pass directly over sharp edges. If this cannot be avoided, squared timber, boards or pipe halves should be used to protect the wire attachment ropes and machined surfaces from damage (Fig. 7).
Due to the weight of these components, it is imperative that shackles and wire ropes be used correctly.





Pipe half protection edge and rope guide

Fig. 7 Protection of sharp edges to prevent damage to and by wire ropes

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2. Receipt



NOTE:

Leave the wooden cover and the rest of the packing on the machine as long as possible.

Inspection after Receipt:

Immediately after receipt of the goods, the case should be examined all round for any signs of damage. If it is damaged, remove the lid or several boards so that the contents can be seen. If the contents are sealed, do not damage the plastic sheeting while doing this.

When unpacking a consignment which is damaged - or presumed to be so - store the contents in a dry place or repack them. It is important that the consignment be examined immediately to determine both the extent and cause of the damage and also the person or persons responsible for it.

In line with rail and road forwarding practice, the carrier should be notified immediately and invited to draw up a joint statement of damage. This is imperative for indemnification and lodging a claim with the insurance company. It is always advisable to photograph serious damage.

3. Storage

3.1 General

Contact Siemens for information or answer to questions on preservation or storage.

Machines or machine parts packed only for overland transport are provided with desiccant for 6 months outside storage, all oversee packages for 12 months. Any period of storage exceeding 12 months is referred to as long-term storage. In such cases, more desiccant is necessary.

NOTE:

The sealed wrappings should not be opened during storage time.

Components in storage must be inspected at monthly intervals. Any damage or changes in the colour of humidity indicators must be recorded by the responsible personnel.

Storage must not impair the function or the quality of the goods. A storage area should be selected which offers maximum protection against moisture (floods), dirt and trespassing. Pay attention to the carrying capacity of the floor.

NOTICE

Stacking of heavy goods may cause damages at packaging and component.

Avoid stacking heavy goods one on top of the other.

3.2 Humidity Indicator Check

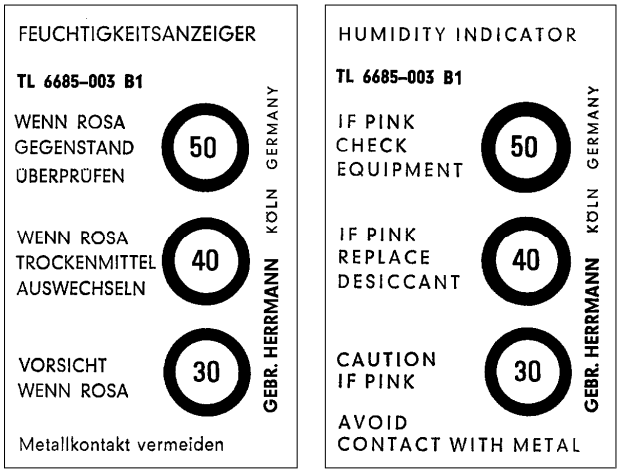
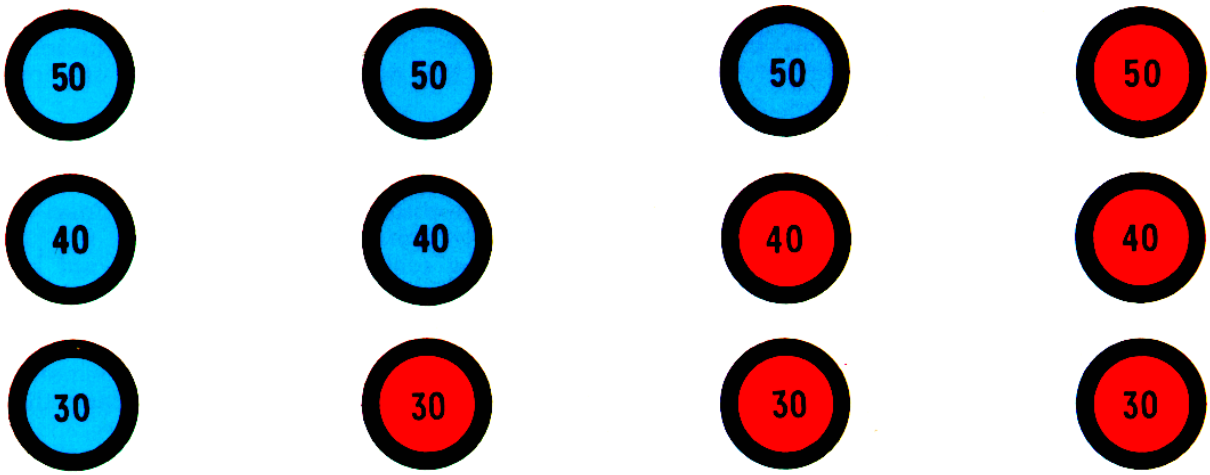




Fig. 8 Humidity indicator

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The degree of humidity inside the sealed wrapping is indicated by humidity indicators (Fig.9) in four stages:



Relative humidity less than 30%

Relative humidity higher than 30%

Relative humidity higher than 40%

Relative humidity higher than 50%

Fig. 9 Humidity indicator at various degrees of humidity

The humidity indicators are automatically reconditioned.

The cases have openings in them that enable the contents to be checked and the desiccant to be replaced. The covers that close off these openings are marked: Open here to check desiccant. The covers on these openings should be opened and the indicator checked as soon as the shipment arrives at its place of destination. Repeat the checks every four weeks.

3.3 Measures to Be Taken in Case of Humidity or Damaged Sealing Wrapping

If the indicator has turned red or should damage to the sealing wrapping be noticed, remove the contents and store them dry and protected against weather influences. If this procedure cannot be adopted, insert bags with new or reconditioned desiccant in the wrapping. Patch the wrapping with tape or - if possible - weld it.

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Note! All machined surfaces of machine parts as well as small parts, if any, such as screws, bolts, keys, feather-keys, set pins, etc. are provided with an anti corrosion coating in the works.
Carefully remove this anti-corrosion coating before starting erection.

Anti-Corrosion Coating on Metal Surfaces
Wash off the anti-corrosion coating on the machined surfaces of machine parts and of small parts, if any, using kerosene or a similar agent. If Perchlorethylen is used, dry surfaces thoroughly after washing and then apply a thin film of oil, otherwise the surfaces may rust. Soften thick anti-corrosion coatings with kerosene and push them off with a hardwood board (approx. 10 x 10 x 1 cm).

Important! Do not use metal tools for removing the anti-corrosion coatings, such as scrapers, putty knives or sheet-steel strips.

Anti-Corrosion Coatings on Threads
Remove anti-corrosion coatings in tapped holes of machine parts and on threads of screws, bolts, taper pins, etc. by re-cutting the threads with the corresponding tapping tool or thread cutter. Blow out re-tapped holes with dry compressed air.
Tools used for re-cutting must be of the same type and size as those used in the works where the machined parts were manufactured. The dimensions of the external and internal threads are shown in the drawings.

Burrs and Pressure Marks
Inspect machine parts, fixing and locking elements, etc. for the presence of burrs and pressure marks and remove these, if any, with a fine file.
Use an oil stone for smoothing finish-machined surfaces.
Important! Always use a spoon or flat scraper for removing burrs and pressure marks from bearing metal surfaces (Fig. 1).

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1 Flat scraper
2 Spoon scraper

Fig. 1
Special tools

Cleaning of Machine Parts Immediately before Erection is Started
When the anti-corrosion coating has been removed from unpainted metal surfaces, fixing and locking elements wash those parts again in kerosene and dry them carefully.
Remove rust spots by speedily moving soapstone over the surface, smoothing it in such a way that elevations at the edges of the corrosion spot are flattened.

Important! Use only non-lining rags for cleaning, preferably leather.
Blow out blind tapped holes, recesses, chambers, ducts and pipes with dry compressed air and subsequently clean them with an industrial vacuum cleaner.

Paint Coatings
Clean damaged areas of the coating with a wire brush and emery cloth to remove any dirt and rust.
The areas to be touched up must be free from oil and grease. Apply only the supplied repair-varnish (Pure colour-varnish and hardener)!

Tightening Bolted Joints

Correct tightening of bolted joints is a major factor if the joint is to function reliably and safely. For example, non-uniform tightening of the bolts of a multi-bolt joint leads to uneven load distribution and buckling of the parts.

The tightening torques given in the table in fig. 1 is only valid when the following conditions are fulfilled:

- Machine parts are of steel or cast iron.
- Strength class of steel bolts is as quoted.
- Nuts are also of steel or cast iron.
- No separate tightening torques for the bolted joints is given on the respective drawing or in the installation description.

Thread size	**Maximum tightening torque in Nm**					
	Lubricated with oil (μ = 0,18)			**Greased with Molykote (μ = 0,1)**		
	Quality acc. to ISO 898 - 1					
	5.6	**8.8**	**10.9**	**5.6**	**8.8**	**10.9**
M8	11	24	34	8,6	18,4	25,9
M10	23	49	69	17,4	37	52
M12	40	85	119	29,9	63,7	89,6
M14	64	136	191	47,6	101,6	142,9
M16	100	212	299	73,8	157	221
M18	135	289	406	101	216	304
M20	195	416	585	144	308	433
M22	267	571	803	196	418	588
M24	336	716	1008	248	530	745
M27	508	1083	1522	371	791	1112
M30*	683	1457	2048	501	1069	1504
M36**	1199	2557	3596	876	1869	2628
M42***	1933	4124	5800	1408	3003	4224

- * for sleeve bearing size EG...18 (RENK)
- ** for sleeve bearing size EG...22 (RENK)
- *** for sleeve bearing size EG...28, 35 (RENK)

Fig. 1
Maximum tightening torques for torque spanners

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The tightening torques required can be applied and checked by one of the methods described in Fig. 2. The threads must be able to engage easily, therefore make sure they are not damaged, clean the thread and seating surfaces thoroughly and lubricate them with beef dripping, grease or Molykote 1000. Other lubricants must not be used for bolted joints. If unsuitable lubricants are used, the coefficient of friction might be too small and the threads could be stripped.

Magnitude in Nm	Tightening torque applied with	checked with
up to 300	spanner ring spanner	torque spanner, but only if expressly stipulated
300 - 700	ring spanner impact wrench	torque spanner (fig. 3)
700 - 2500	impact-ring spanner and sledged hammer or chain tackle block (fig. 4)	dynamometer (fig. 5)
>2500	High-torque wrench (fig. 6) (transmission gears)	Torque spanner supplied (fig. 7)

Fig. 2
Tightening torque

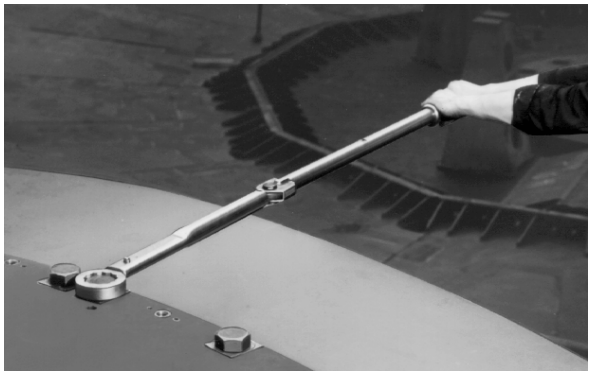


Fig. 3
Checking the tightening torque with torque spanner

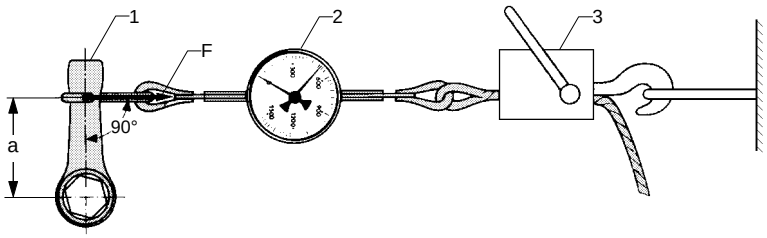


Fig. 4
Applying and checking the tightening torque with an impact-ring spanner

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Fig. 5
Dynamometer



Fig. 6
Tightening a bolted joint with a high-torque wrench and with pump



Fig 7
High-torque wrench with torque spanner



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If no torque spanners or other measuring devices are available, the torque applied or the lever arm required for
It can be calculated roughly using the following formula:

$M_A = F \cdot a$

F = Tightening force in N
a = Lever arm in m
M_A = Tightening torque in Nm

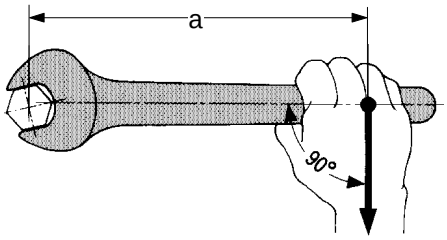
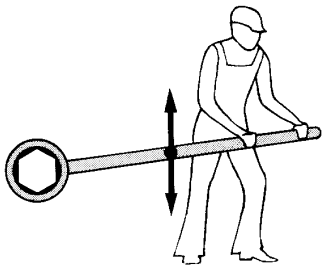


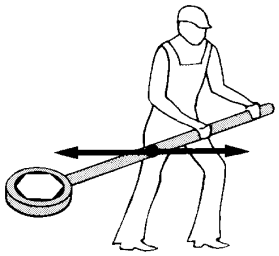
Fig. 8
Applying and checking the tightening torque with muscle power and not a torque spanner

The tightening force F, if applied by muscle power, is greatly dependent on the body weight G of the fitter and the positive direction of force with respect to the surface on which the fitter is standing.
The lever arm a is the vertical distance from the point where the positive tightening force is applied to the bolt axis.



F ≈ 10 x G in N
G = Body weight in kg

Fig. 9
Effective muscle power vertical to the surface the fitter is standing on



F ≈ 10 x G in N
G = Body weight in kg

Fig. 10
Effective muscle power horizontal to the surface the fitter is standing on

If the effective tightening force is vertical to the surface the fitter is standing on (Fig. 9), a force corresponding to the body weight can be applied for a long time. If the effective tightening force is parallel to the surface the fitter is standing on (Fig. 10), 50% of the body weight can be applied as force.

Example 1:
The tightening torque required for a M30 bolt of strength class 6.9 is 1070 Nm.
How long must the lever arm "a" be if the effective tightening force is vertical to the surface the fitter is standing on (Fig. 9)?

Body weight of the fitter
G = 75 kg

Tightening force
F ≈ 10 x G ≈ 10 x 75 =
F ≈ 750 N

Tightening torque
$M_A = F \cdot a$

Lever arm

$$a = \frac{M_A}{F} = \frac{1070}{750}$$

$$a \approx 1{,}4\,m$$

If several fitters are tightening the bolt, the torques applied by each individual fitter are added together.

Example 2:
Two fitters are tightening a bolt simultaneously with the help of a spanner extension. What is the tightening torque if the fitters are standing next to each other as shown in the sketch?

$G_1 = 70$ kg
$G_2 = 85$ kg
$a_1 = 1{,}8$ m
$a_2 = 2{,}1$ m
$F_1 \approx 5 \cdot 70 \approx 350$ N
$F_2 \approx 5 \cdot 85 \approx 425$ N
$M_{A1} \approx F_1 \cdot a_1 \approx 630$ Nm
$M_{A2} \approx F_2 \cdot a_2 \approx 893$ Nm
Total tightening torque $M_A = M_{A1} + M_{A2} = 1523$ Nm

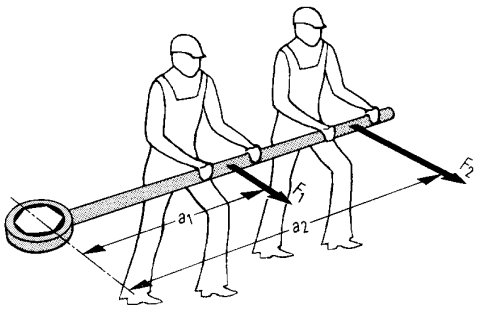


Fig. 11
Sketch of example

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Tectyl 506



Application

Tectyl 506 is an anti-corrosion agent used for protecting machine parts exposed to corrosion, e.g. shafts, couplings, tools and other devices, as well as machined castings and forgings.
Anti-corrosion protection is particularly important for parts that are to be sent overseas and to tropical regions, and for the storage of parts outdoors.

Properties

Marketed as	Light-brown liquid solvent carrier
Thinner	White spirit
Yield	6 to 8 m^2/litre, depending on the nature of the surface (shape, coarseness and porosity of the surface)
Density	0.88 kg/dm^3
Drying period	1 to 2 hours, at ambient temperature agent becomes waxy and dry to the touch
Temperature constancy	-40 to +100°C
Duration of Protection	**Up to 2 years, depending on the thickness of the film and on the wear and exposure to which the part is subjected**
Transparency	The inscription on metal parts remains legible

Tectyl does not affect the hands even after long contact. They should be washed with ordinary cleansing paste and warm water.

Application of Anti-Corrosion Agent

Clean and dry the surfaces to be protected, carefully removing fingerprints and grease. Tectyl should not be heated, but be applied at ambient temperature.

Method of application:
- Brushing
- Spraying
- Dipping

Brushing

Apply Tectyl uniformly with a clean, soft paintbrush. It is not absolutely necessary to apply several coats.
If the surface is coarse, paint Tectyl well into the pores and furrows. Coat all bare parts properly.

Spraying

The Lichtenberg spray gun Type LM 54n is for small quantities suitable. The Valvoline spray set, which can be connected direct to the drum, may be used for larger quantities

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Dipping

Small parts can be protected by dipping them into Tectyl.
Note! In the case of parts to be stored outdoors or shipped by sea, a thick even layer is to be applied. The dried Tectyl coat is **not** immune to blows or scratches. Attention should be paid to this point when handling or transporting parts.

Removal of Coat

Soften with paraffin for 3 minutes and wipe off with a rag. Volatile solvents (petrol, Perchlorethylen) are less suitable for this purpose, since they evaporate too quickly. Flammability
Due attention should be paid to the flammability of thinners and solvents.

Manufacturer

Valvoline Öl-Gesellschaft mbH, Hamburg, Federal Republic of Germany

MOLYKOTE Paste G-n plus



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General Remarks

Molykote Paste G-n plus is a universal erection compound. It is used for the friction reduction between metallic surfaces subjected to high pressures and temperatures, e.g. when reaming drilled holes, drawing in retaining bolts, and driving in wedges, and for reducing the coefficient of friction of the brake linings of vertical hydroelectric power generators.

Molykote Paste G-n plus is not permitted for screwed connections!
The use of Molykote 1000 is recommended for screwed connections (see Molykote 1000 below and "Bolt tightening torques").

Treating machine parts with Molykote Paste G-n plus leads to the formation of a durable surface film that protects against wear even when they are subjected to heavy stresses: It also prevents rubbing, seizing, and metal-to-metal contact.
In the case of force fits without drive-type fastenings, spring collar clamping elements, etc.; the transmittable torque is reduced because of the low coefficients of friction and Molykote Paste G-n plus must not be applied.

Molykote Paste G-n plus is used to finish friction surfaces, i.e. it should be rubbed on to form a thin lubricating film.
Note! Do **not** mix Molykote Paste G-n plus with oil or grease.

Properties

Molykote Paste G-n plus is chemically highly stable, hinders corrosion, is highly resistant to ageing and does not resinify.
Temperature range: -25 to +200°C with unimpeded exposure to air

Directions for Use

Do not use an excessive amount of Molykote Paste G-n plus as with grease or oil lubricants, but apply it thinly and uniformly.
Immediately before joining parts, clean metallic surfaces. Remove lubricants with Perchlorethylen or a similar agent. Then rub a thin layer of paste vigorously into the metallic surfaces in all directions, using a leather cloth. Remove any excess. If the nature of the stress helps the film to spread itself (e.g. bushings, toothed racks etc.), it is sufficient to spread the paste in a thin layer.

Use Perchlorethylen or a similar agent removing carefully Molykote Paste that has been accidentally deposited on electrically insulating areas, otherwise creepage or even flashover may occur.

Manufacturer

Dow Corning GmbH, München, Federal Republic of Germany

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Hylomar SQ 32/M



Application

Hylomar SQ 32/M is a viscous, permanently plastic sealing agent based on polyester urethane. It is used to seal covers on oil sumps, bearing housings, hydrogen-cooled generators and to seal the casings of pumps for mineral oil products.

Properties

Hylomar SQ 32/M remains plastic within a temperature range of - 50°C to +200°C. It is non-flammable, and after evaporation of the solvent non-poisonous and antitoxic. If large quantities are used, adopt the same precautionary measures as for Perchlorethylen.

Hylomar SQ 32/M is resistant to all oils and lubricants, synthetic oils, all fuels for turbine, piston and rotating piston engines, cutting and drilling oils, air and gases. Hylomar remains elastic, and the sealed surfaces can be separated and then rejoined to form a perfect seal without applying a fresh coat of Hylomar. If stored at room temperature, Hylomar remains fit for use indefinitely.

Directions for Use

Carefully clean the parts (surfaces) to be sealed with Perchlorethylen before applying Hylomar.
Apply Hylomar with a stiff brush; Hylomar can even be used on vertical or overhead surfaces. The quantity used will be approximately 22 mg/cm^2

Coating both surfaces to be sealed ensures the elimination of air pockets. Wait approximately 10 minutes between coating and assembly to allow the volatile constituents to evaporate. This period may, however, be of unlimited duration. After preparing the seal, tighten the connecting bolts to the specified load and further tighten after allowing a short time for tension compensation.
To clean dismantled seals, merely wipe with a non-fibrous rag soaked in Perchlorethylen. There is no need to clean the surfaces sealed with Hylomar if measures are taken to ensure that they are not contaminated by foreign bodies, and they can be joined together again without difficulty.

Suppliers

Deutschland
Marston Oelchemie GmbH
Zülpich

Australien
Payen, Byrne and Blackford Pty. Ltd.
Eagle Farm, Queensland 4007

England
Marston Lubricants Ltd.
Liverpool

Curil T



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Application

Curil T is a non hardening sealing compound resistant to high temperatures. It forms an excellent seal where abnormally high internal pressures exist even at extreme temperatures. Curil T is specially designed for finely machined sealing surfaces. It is especially suitable for gear units, turbines, generators, pipe threads etc.

Properties

Cure time	5 to 10 minutes approximately; unaffected by extensive curing time
Temperature range	from –40°C to +250°C
Delivery state	soft paste-like
Operating state	tough paste-like

Directions for Use

Surfaces receiving the sealant should be cleaned from grease and dirt. Apply thin layer by brush or other suitable means.

Manufacturer

Elring Klinger GmbH, Dettingen/Erms, Federal Republic of Germany

Before beginning erection of the machine carefully check all foundation dimensions. Any inaccuracies found can still be corrected at this stage. Refer to the final dimension drawings of the foundation and machine.
When checking the dimensions, pay particular attention to the position of the holes for the anchor bolts or rag bolts for the soleplates or base frame and the penetrations for pipe work, ventilation ducting, electric cables, etc. for their accuracy in relation to the machine axes.
These measurements should be taken after the machine axes have been set out.

Measuring Instruments

Precision level and tripod
Hose level
Spirit level
Internal micrometer 25 - 50 mm
Straight edges (2 and 4 m long)
Steel tape measure 15 m
Plumb bobs

Accessories

1 roll steel wire approx. 0.3 mm dia.
2 m round steel bar 20 mm dia. (U-irons)
1 m flat steel strip approx. 50 x 20 mm

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1 Precision level and tripod
2 Spirit level
3 internal micrometer
4 Hose level

Fig. 1
Measuring instruments

Cleaning and Preparing the Foundation

To avoid any accidents ring the foundation pit with ropes or other barriers.
Before commencing installation roughen the bearing faces and side faces of the recesses in the foundation with a pneumatic hammer and chisel so that the grouting concrete poured later will bind well with the foundation. Remove any loose material adhering to the foundation. Sweep down the surface and clean out the holes in the foundation, burning out any wood if necessary.
Any steel reinforcement rods projecting sufficiently to cause interference with the base frame or soleplates should be bent back.
Should it be necessary to burn them off, the prior approval of the construction company responsible for the foundation must be obtained.

Setting out the Reference Points

The machine axes must be marked out in both the vertical and horizontal planes by geometrically-ascertained reference points on the foundation or on the walls of the machine house in the form of grouted plates or U-irons (Fig. 2).

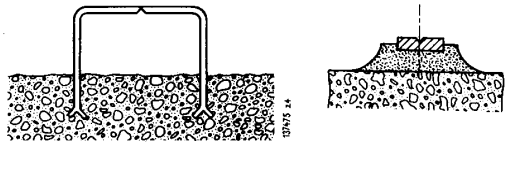
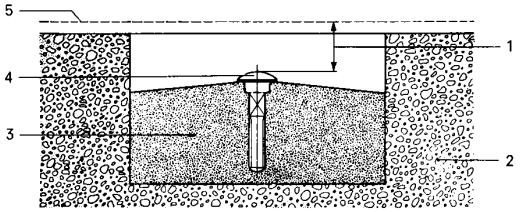


Fig. 2
Reference points for the machine axes



1 Vertical clearance
2 Foundation
3 Grout
4 Reference point
5 Upper surface of soleplate

Fig. 3
Determining elevation reference points

In preparation for determining the levels of the machine axes, grout dome-head rivets or bolts in prepared holes adjacent to the machine foundation (Fig. 3). Using the precision level (Fig. 1) measure the elevation of the tips of the rivets or bolts referred to the datum level and record the readings.
The elevations of the machine axes and the surface of the soleplates or base frame are measured from these elevation reference points. Use a suitable measuring instrument such as a precision level to measure the vertical distance from the elevation reference point to the machine axes and surface of the soleplates or base frame.

Laying out the Machine Axes

The position of the machine axes on the foundation can be established from either the geometrically ascertained reference points or another machine which has already been installed.
When using **the reference points,** mark, the longitudinal and transverse axes on the U-irons or plates with V-notches. String 0.3 mm dia. steel wire weighted at the ends between the V-notches and transfer the position of the axis onto the foundation surface by means of plumb bobs suspended from the wires (Fig. 4 and 5).



Fig. 4 Plumb bob

Plumb bob to determine the benchmark for the long axis.

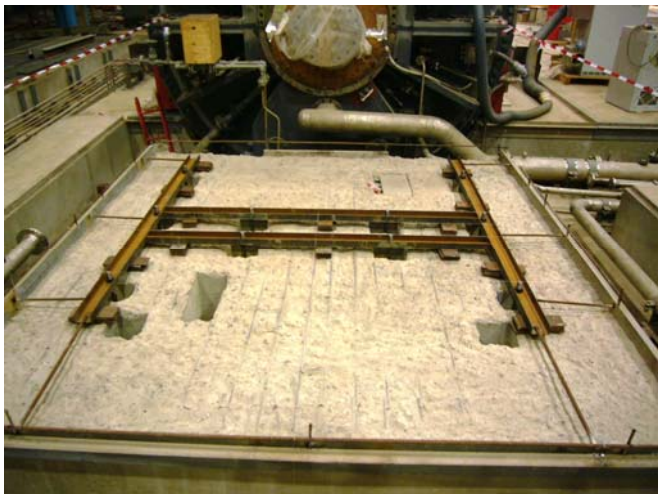
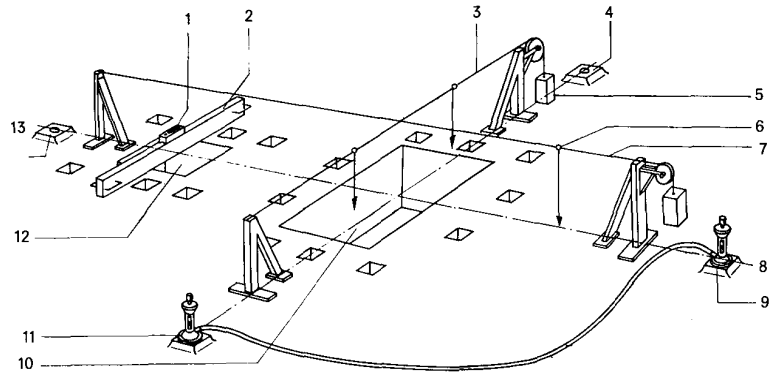


Fig. 5 U-iron

U-shape and tension wires to mark the longitudinal and transverse axis.

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It is also possible to use struts (Fig. 6) to set up taut steel wires at the actual elevation and position of the shaft axes of the machines over the whole length and breadth of the foundation. The alignment of the taut wires is also based on the geometrically-ascertained bench marks on the machine house walls.



1 Spirit level
2 Straight edge
3 Transverse axis wire
4 Reference point
5 Tensioning weight
6 Plumb bob
7 Longitudinal axis wire
8 Reference point
9 Hose level
10 Foundation
11 Reference point
12 Foundation
13 Reference point

Fig. 6
Method of setting out the machine axes on the foundation

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At one end, attach the wire to the strut and at the opposite end pass it over a pulley or rounded corner and suspend a weight from it so that there is as little sag as possible. Then, at the middle point of the stator, set up a similar taut wire at right angles to the first in the same manner. Use steel tape measures, straight edges, plumb bobs, etc. to take vertical measurements from the wires.



Fig. 7
Foundation will be checked by Precision level and tripod

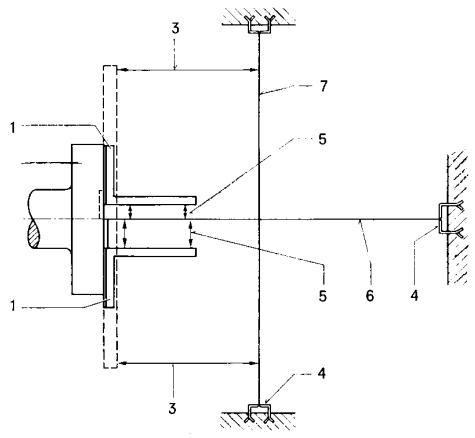


1 Longitudinal axis wire

Fig. 8
Axis wire attached to coupling of a previously aligned driving or driven shaft

From the centre of the aligned coupling set up a taut wire on the longitudinal axis to a fixed point (e.g. U-iron) at the same elevation as the centre of the coupling.
Place a try square 1 (Fig. 9) horizontally against the coupling face level with the machine axis and secure it at about 50 mm from the longitudinal axis wire. Then adjust the position of the wire at the fixed point until it is parallel to the try square. Measure the parallel position with an inside micrometer and check it with another try square placed at 180°. When the final position has been established, make a V-notch in the U-iron for the wire.

Next, set up a second taut wire on the transverse axis of the machine. Attach a straight edge horizontally to the coupling flange in order to check the alignment. Measure the distances between the wire and the ends of the straight edge as shown in Fig. 9. The dimensions will be found in the dimension drawing.



1 Try square
2 Coupling
3 To be measured for machine transverse axis
4 U-iron
5 To be measured for machine longitudinal axis
6 Longitudinal axis wire
7 Transverse axis wire

Fig. 9
Aligning the axis wires to an aligned driving or driven shaft
(Both coupling flanges with pre-and return are shown)

Checking the Foundation

Mark out the longitudinal and transverse axes of the machine on the foundation from the taut wires using plumb bobs.
Check the dimensions and positions of the foundation, foundation penetrations and anchor bolt holes in relation to the machine axes according to the data given in the dimension drawing and/or foundation drawing.

Note! Any deviations from the foundation drawings must be recorded. The client or relevant construction company should be informed and to the foundation reworking where necessary.

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Note
These instructions show generally applicable assembly operations. Please see also the binding drawings and other instructions.

Introduction
The many years of experience gained in the operation of turbine-generator units for power generation have clearly indicated the necessity to explain the most important of the multi-faceted problems involved in the erection and maintenance of these units in a condensed form.
In the following an attempt is made to present the host of problems and all notable aspects connected with the alignment of turbine-generator units to the reader in a simple fashion.
Last but not least, these explanations are aimed at affording those entrusted with erection and maintenance the opportune to assess correctly any deficiencies arising and to overcome them by means of purposeful corrective measures involving the least amount of time.
The very last remark deserves particular mention in that operators endeavour to limit turbine-generator unit downtimes to the unavoidable minimum for obvious economic reasons.

Alignment
What parts are actually aligned? Expressed in simple terms, these are firstly the rotating shafts relative to each other and secondly the stationary parts relative to the shafts. The necessity to align the stationary parts exactly relative to the shafts follows from the following basic requirements:

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The need for maximum operational reliability for the turbine-generator unit with regard to possible closing-up of clearances.
One result of the desire for optimum utilization of the heat potential in steam turbines has been the minimization of leakage steam losses at the seals between the blade stages and at the shaft seals. This basic requirement must in any case be satisfied irrespective of the individual design (reaction or impulse system with more or less reaction) and, in present-day practice, a designer can no longer ignore this requirement when establishing clearances.
This results in a radial clearance in the parts in question which, on the one hand, satisfies the requirement for maximum thermal efficiency and, on the other hand, guarantees an adequate reserve against radial closing-up of clearances during the normal mode of operation.
With regard to the erection of steam turbines, particular importance is attributed to the last aspect, in as much as it must be assured that the given diameter clearance is distributed concentrically relative to the shaft. This means that stationary parts, such as the inner casing, stationary blade carrier, shaft seals etc., are aligned concentrically relative to the shaft. Only when these basic erection requirements have been satisfied can it be assured that the sealing elements will not rub the moving parts when the degree of thermal expansion varies, as is known to be the case during start-up and shut-down, i.e. during transient conditions.
Equal importance is attributed to axial alignment of the stationary parts relative to the shafts. The axial clearances specified by the designer, hot in the blading and in the shaft seals, should be adjusted during erection and major inspections of steam turbines.
It is easy to understand that during operation varying degrees of expansion can occur in the axial direction, firstly because the materials used have different expansion coefficients and secondly due to different material temperatures. The effects of operation can lead to considerable reductions of the preset axial clearance.
Given that the above-mentioned alignment requirements are an important factor in the operational reliability of a turbine, the same alignment measures as required within the blade portions and shaft seals are also to be applied in the alignment of all centre-turned parts, for example within the bearing housings, Fig. 1.
This applies especially to the bearing housing seal rings and the parts which serve to accommodate the axial and radial bearings.
Above we have explained the necessity of aligning the stationary parts as concentrically as possible and with as high a measure of axial accuracy as possible, relative to the shafts. Completely different criteria apply to the alignment of the shafts, i.e. the rotating parts, relative to each other, Fig. 1.

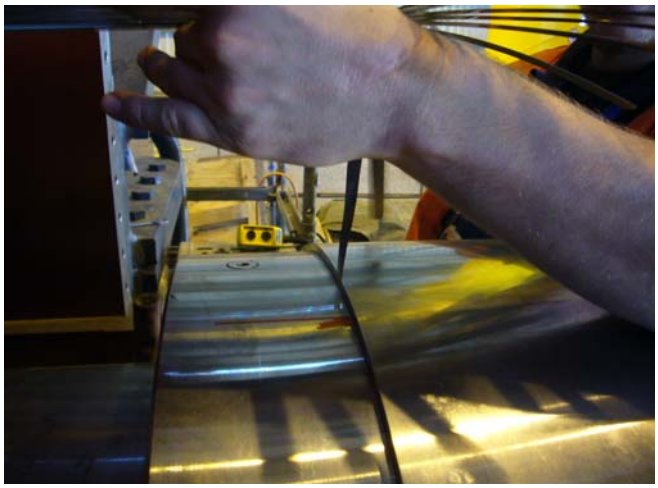


Fig. 1
Alignment of Generator and Turbine Shafts

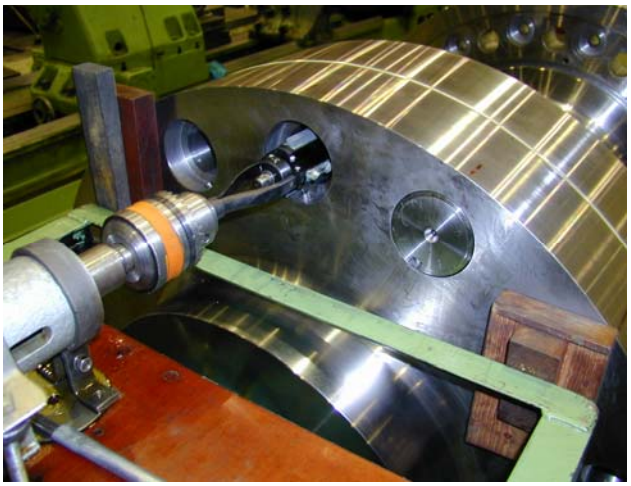


Fig. 2
Honing of Coupling after Shafts Alignment

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The main points here are as follows:
It is required that the coupling used to connect the shafts assembly is free of stresses and moments. The objective must thus be the absence of cyclic bending stress in the coupling planes when coupling shafts are turning and the absence of radial offset of the shafts, which would cause crank-like movements.
Obviously the undesired effect first mentioned, namely that of cyclic bending stress, can lead to malfunctions particularly in cases where shrunk-on coupling flanges have been used. If the cyclic bending stress constantly exceeds permissible levels, this might well cause the coupling flange to loosen. The second undesired effect mentioned, namely, crank-like movement of the shafts, would result in additional dynamic loads on the adjacent journal bearings. It is known that these bearings serve to take up not only the given static forces but also, to a great extent, the dynamic forces resulting on the one hand from the inherent imbalance and on the other from additional unbalanced masses. The ability of a bearing to take up loads is, however, limited by the admissible figure for the load per unit area and the mechanical vibrations resulting from additional unbalanced loads. In this context we speak of the mechanical running behavior of a turbine, or running.

All the above-mentioned criteria underline the indispensable requirement for maximum precision in the alignment of shafts relative to each other.

Role Played by the Shaft Deflection Curve in Alignment Operations
A shaft which is supported at each end will have a certain degree of sag owing to its dead weight. The extent of this sag is essentially determined by the weight, the diameter and the distance between the bearings supporting the shaft. The centre line of a shaft supported in such a manner can therefore no longer be regarded as a true straight line but will assume a more or less curved shape relative to the theoretical centre line depending on the influences described. The actual centre line is termed the shaft deflection curve. It is a fact that this deflection curve remains the same even when the turbine set is running, which in turn means that allowance must be made for the shape of the deflection curves during erection of a turbine-generator unit.

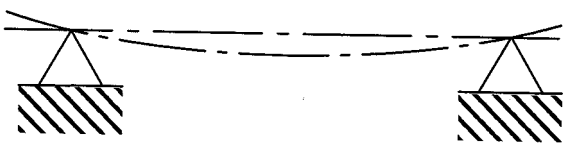


Fig. 3
Deflection Curves of a Generator-Shaft

It is not difficult to comprehend that in the case of projecting shaft ends, for example, the deflection curve of these ends will assume a shape approximating that of the deflection curve between the bearings.



Fig. 4
Deflection Curves of a Turbine-Generator Unit

This is the natural result of the weight factor. Obviously when a shaft sags stresses are produced and the restoring forces originating from these stresses limit the shaft sag. In turbine-generator units, these natural stresses are accepted as inevitable. Additional stresses as a result of misalignment must, however, are avoided at all costs. To satisfy this requirement during erection and maintenance of turbine-generator units, a coupling check must be employed to assure optimum alignment of the shafts relative to each other.

Coupling Check

With the aid of a coupling check, it is possible to align the journal bearings so that the deflection curve of a shaft assembly is continuous. One major precondition in performing a coupling check is that the bearings supporting the shafts to be measured should be spaced in the same way as in later operation. Without doubt, the optimum method of achieving this is to place the shafts in their intended bearings. The true continuous bending line can be achieved in a really straight- forward manner only if this essential precondition is satisfied. If auxiliary supports are used, suitable allowance must be made at all events for impairment of the deflection curve due to changed bearing spans.

The standard coupling check covers firstly the radial position and secondly the axial position of two adjacent coupling flanges relative to each other. Normally the measurement is taken radially on the circumference of the adjacent coupling flanges, with the axial measurement being taken on the outermost diameter of the inner axial surfaces of the coupling. The measurement itself is taken with the aid of dial gauges or micrometers, or else with a measuring jig firmly mounted on the coupling flange and using a feeler gauge.

To eliminate as far as possible the influence of any axial or radial run outs present in the coupling plane, it is imperative that the two shafts be turned in the same direction and by the same amount when the measurement is taken. Since a measurement is normally taken in the two main planes, vertically and horizontally, at the top and bottom as well as on the left and right-hand sides in each case, the shafts should also be turned through 90° in each case. The observer's position for the fixing of the measuring points should always be at the front of the turbine-generator unit to enable unambiguous definition of the terms front, rear, left-hand, right-hand, top and bottom. Furthermore, the point at which the measuring equipment is to be applied must be clearly defined in accordance with these criteria.

Whereas radial measurements are taken once only each time the shafts are turned through 90°, axial measurements should be taken on at least two measuring points which lie directly opposite each other every time the shafts are turned through 90°, thus giving a total of 8 axial measurement values with the shafts being turned through a total of 360°.

Of course, axial measurements can also be taken at all four points of the measuring plane for each radial measurement. The need to take measurements simultaneously at the measuring points lying opposite each other arises from the fact that when the shaft is turned, slight axial displacements may occur which would considerably falsify the axial measurement if it were taken at only one point. The exact axial measurement is derived from the arithmetic mean of the measurements at the same point.

Whereas the radial coupling check establishes the radial misalignment of two shafts relative to each other, the radial coupling check provides information on how the shaft deflection curves run relative to each other, or on the size of the gap between the coupling flanges, Fig. 5. In this connection, please note that there is a considerable difference between a gap between two couplings and the axial run out of one coupling.

During turbine operation, a gap remains at the same point whereas, if the coupling has axial run out, the gap will rotate with the shaft.

The gap and axial run out would, in fact, only be visible in the theoretical uncoupled state of two shafts.

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The gap causes the additional cyclic bending stress, already mentioned at the beginning, in the coupling itself as the coupled shafts rotate. Axial run out, on the other hand, exerts, on top of this, additional dynamic loads on the adjacent journal bearings which manifest themselves as crank-like movements. These simple considerations are among the more important reasons for the imperative need to ensure that the coupling plane does not end up with run out after manufacture.



Fig. 5
Gap between LP Shafts

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Assuming that the above requirement has been satisfied and also that the coupling flanges are circular within the standard tolerances, the measuring result already indicates whether or not the measurement taken is correct, This is the case if in the radial check in both planes the sums (1) of the two measurements taken at directly opposite points are the same. Almost the same criteria apply to the axial check if measurements are taken at four points in each case.
The dimensional tolerance should not exceed 0.03mm in total.

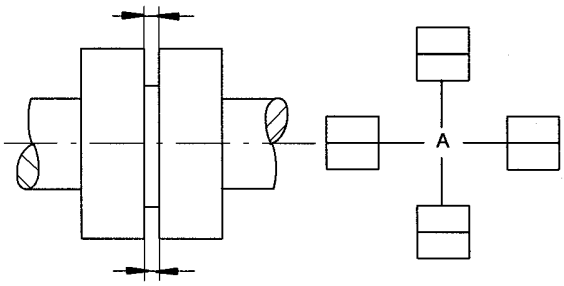


Fig. 6
Representation of Gap with Coordinate System

Alignment of Shafts in the Case of Initial Installation

The shape of the deflection curve, as shown in Fig. 3, demonstrates that the maximum elevations in each case are to be found at the beginning and end of a shaft assembly.
In the case of all turbines, the base frames with permanently-attached bearing housings are leveled in accordance with the calculated deflection curve, and secured.
Once this has been established, it is possible to achieve the most exact horizontal position possible of the turbine- generator unit.
The chosen approach for alignment calls for the installation of a multiple-casing turbine-generator unit to be actually started from a part in the middle of the unit. The starting point for establishing the deflection curve is the horizontal zero point.
Actual alignment is then effected by aligning the supporting component parts of the middle section of the turbine set horizontally, i.e. at the same height.
This assures that the associated shaft lies dead level. When this requirement has been satisfied, the shaft of the next section of the turbine is inserted in its assigned bearings, which have already been installed. At this point the first coupling check is performed in the plane of the shafts to be coupled.

After suitable evaluation, the coupling measurement gives the adjustment required in both planes (horizontal and vertical) at the bearings of the shaft last inserted. As a rule evaluation should be performed completely at the outset, so that both the axial and the radial adjustments can be carried out in one operation. The following example illustrates the manner in which such an operation is performed.



Fig. 7
Radial and Axial Check by Means of a Dial Indicators between Coupling

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If this procedure is followed, only two measurements need be taken to check each coupling plane. Whereas the first measurement is used to determine the existing position of the shafts relative to one another, the second measurement has to be evaluated on completion of adjustment to check that the shafts are now correctly in position, Fig. 7.

Four-Bearing Turboset

The following schematic diagram representing two shafts in the four-bearing arrangement shows each shaft separately supported by two bearings, with alignment of the turbine shaft having already been completed.

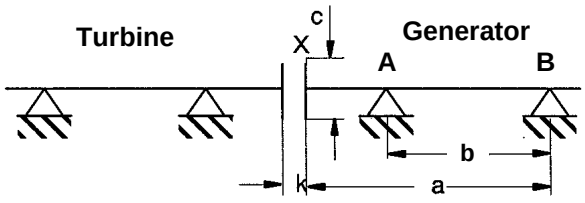


Fig. 8
Alignment of a Four-Bearing Turboset

The requirement now is for the generator shaft to be adjusted in one operation in accordance with the coupling measurement. A measuring device and a feeler gauge were used for performing the measurement in the manner shown in the diagram (Fig. 10) below.
The Dimensions for **A**; **B**; **a**; **b** and **c** you will find in the DWG “Rotor Shaft Data for Calculation” into the chapter drawings in the installation manual.

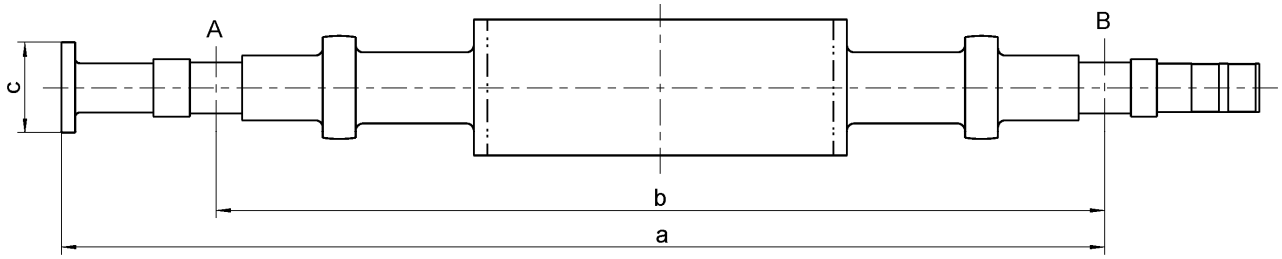


Fig. 9
Data for the rotor shaft

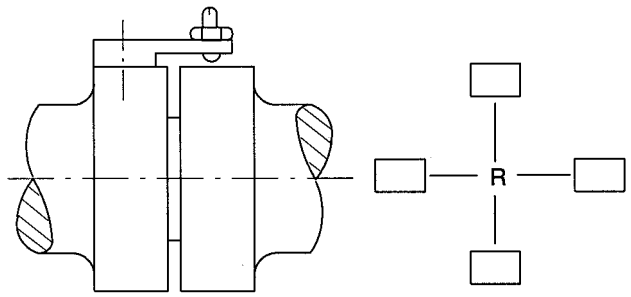


Fig. 10
Radial Check Using a Measuring Jig and Feeler Gauge

A system of coordinates is drawn for better representation of the individual measuring points, and the measured values are entered, with due regard to the orientation convention mentioned earlier.
The radial check is carried out in one turn of the shafts over the entire circumference with a rotation of 360°. A developed drawing for each plane is comparable with a natural sine curve.
This representation shows that the actual radial adjustment of the shaft to be aligned, relative to the shaft already aligned, measures half the difference of the measured values from opposite points.

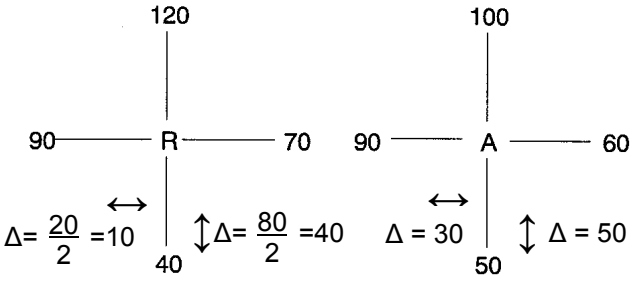


Fig.11
Hypothetical Measured Values Entered in the System of Coordinates, and Adjustments Determined There from (Δ)

In the example taken, let the shaft dimensions be as follows: **a** = 3.600mm **b** = 3.000mm **c** = 500mm.

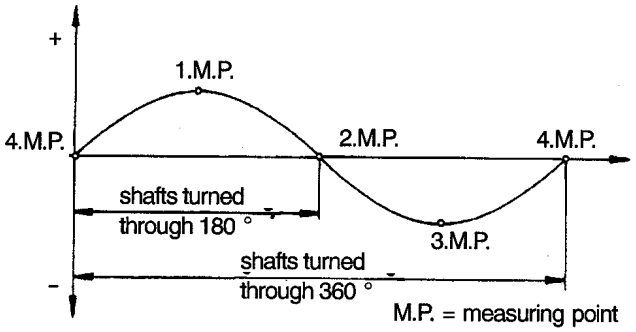


Fig.12
Sine Curve for one Plane

The measurement of the axial gap should always be based on the dimension of the smallest coupling diameter of a turbine-generator unit.
The entries shown below were determined from the coupling check for this example.

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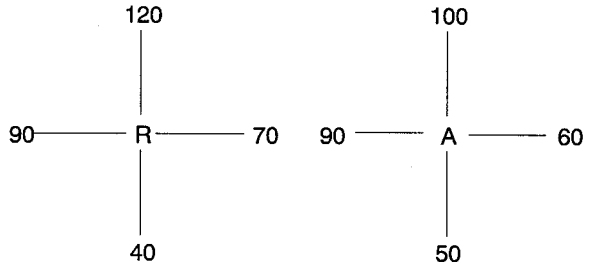


Fig. 13
Example of Shaft Measurements Taken

The result of the radial coupling check is that the generator shaft would have to be adjusted at bearing planes **A** and **B** to raise it 0.4mm and move it 0.1mm to the left. Precise alignment in the radial direction would then have been achieved. As has already been mentioned a number of times, however, realignment is to be performed in one operation after evaluation of the radial and axial measured values. It thus suffices to indicate the radial adjustment by means of directional arrows together with the degree of adjustment necessary. It is the best to set this out as follows:

Bearing plane	**A**	**B**
Radial Adjustment	↑ 0,40 ← 0,10	↑ 0,40 ← 0,10

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Evaluation of the axial gap values and adjustments resulting there from for the bearing housing positions are performed as follows:
If an imaginary fulcrum, designated **X** in the diagram of the shafts, is assumed to exist at the end of the smaller coupling diameter, then according to the bent lever laws the following simple relations result:

$$\frac{k}{c} = \frac{B}{a} \qquad \frac{k}{c} = \frac{A}{a-b}$$

$$B = \frac{k \cdot a}{c} \qquad A = \frac{k \cdot (a-b)}{c}$$

For k the gap value determined in each case is to be substituted. This is the simple difference between the measured values in the two planes.
The degrees of adjustment thus determined are in turn represented by means of directional arrows together with the adjustment dimensions themselves.
The example taken, with respect to the upper gap, gives the following dimension for **A**:

$$A = k \cdot \frac{(a-b)}{c} = 0.50 \cdot \frac{(3600-3000)}{500} = 0.6 \text{ mm}$$

For ***B***:

$$B = \frac{k \cdot c}{c} = \frac{0.50 \cdot 3600}{500} = 3.6 \text{ mm}$$

This means that **A** must be raised 0.6mm and **B** 3.6mm. This alignment would eliminate the upper gap. The same calculation procedures apply to the lateral gap, which according to the coupling diagram measures 0.3mm on the left-hand side. It then follows that:

$$A = k \cdot \frac{(a-b)}{c} = 0.3 \cdot \frac{(3600-3000)}{500} = 0.36 \text{ mm}$$

$$B = \frac{k \cdot c}{c} = 0.3 \cdot \frac{3600}{500} = 2.16 \text{ mm}$$

To eliminate this gap, bearing **A** must be adjusted 0.36mm, and bearing **B** 2.16mm, to the left.
All the adjustments made to correct the displacement are now tabulated according to magnitude and direction and the true degree of adjustment of the bearing plane in both directions is obtained by geometric addition.

Bearing	**A**	**B**
radial adjustment	↑ 0.40 ← 0.10	↑ 0.40 ← 0.10
axial adjustment	↑ 0.60 ← 0.36	↑ 3.60 ← 2.16
total adjustment	↑ 1.00 ← 0.46	↑ 4.00 ← 2.26

Fig. 14
Table for Shaft Measurement Example

The result shows that, in the example taken, bearing **A** when viewed from the front must be raised 1.0mm and moved 0.46mm to the left. Bearing **B** must be raised 4.0mm and moved 2.26mm to the left.
When this has been carried out, another coupling check must be performed to confirm the accuracy of the first measurement and adjustments. In the radial direction the two shafts will then be aligned absolutely concentrically relative to each other, and no gap will be present.
The sums of the opposite values in the coordinate system (horizontal and vertical) must be just about the same both for axial and radial measurement if there is no axial run out in either of the coupling halves.

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Realignment of the Shafts on the Occasion of Major Overhauls
Major overhauls are performed on the turbine-generator unit at intervals of varying lengths which are determined in the majority of cases by local conditions or else by the views of the insurers. In addition to general inspection, cleaning and repair of the individual parts, the entire turbine-generator unit is realigned.
This is because experience has shown that during operation factors arise which have a more or less serious and permanent adverse effect on the alignment. These factors can be attributed either to changes in the foundation or else to changes in the bearings themselves.
There is still some doubt as to the origins of these factors. In recent years extensive level measurements have been taken at foundations which have no doubt led to certain conclusions. However, it is still impossible to make a general conclusive statement as to origins of shaft displacements.
It is advisable to start a major inspection with a coupling check along the entire shaft assembly. This normally shows at what point major displacements have occurs. When establishing the realignment measures to be taken, it is often necessary to proceed from the fact that both shafts will have to be adjusted.
The sketch below illustrates such a displacement in what is known as a Four-Bearing Turboset.
In the coupling example shown above Fig 8-13, bearings **B**, and **A** have shifted into a lower position. Adjustment in this case should therefore be limited to only these two bearings. This is verified if there is an upper axial gap at the coupling adjacent to bearings **A**, and **B**. When calculating the degree of adjustment, no attention should initially be paid to radial displacement in the coupling planes being considered.

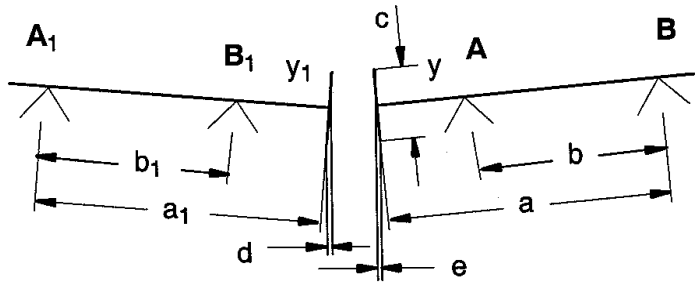


Fig. 15
Sketch of the Displacement in a Four-Bearing Turboset

The overall gap, in Fig 15 can then be divided into two individual gaps **d** and **e**, which are derived from the proportions of the shaft dimensions and the bearing spans, i.e. in the example in question the individual gaps **d** and **e** are in the same ratio as the distances **a**1 and **a** respectively.

$$\frac{d}{e} = \frac{a}{a_1}$$

This relation explains the direct dependence of the semi- gap magnitude on the distances of the bearings from the coupling plane. The following relations are now obtained for the magnitudes of the adjustments at **B**, and **A**:
As already stated, the sum of the semi-gap is equal to the overall gap:

$$d + e = k$$

The amounts **y**1 and **y** are first determined, these being the amounts by which the coupling flanges would have to be adjusted to eliminate the existing gap. To determine the degree of adjustment, the following applies:

$$\frac{d}{c} = \frac{y_1}{a_1} \qquad y_1 = \frac{d \cdot a_1}{c}$$

Referred to bearing plane **B**1, the degree of adjustment at this point is:

$$\frac{B_1}{b_1} = \frac{y_1}{a_1} \qquad y_1 = \frac{d \cdot b_1}{c} \qquad B_1 = \frac{y_1 \cdot b_1}{a_1}$$

To eliminate the gap contribution in question, the following applies:

$$\frac{e}{c} = \frac{y}{a} \qquad y = \frac{a \cdot e}{c}$$

Accordingly the degree of adjustment for **A** must be:

$$\frac{A}{b} = \frac{y}{a} \qquad A = \frac{b \cdot y}{a} \qquad A = \frac{e \cdot b}{c}$$

With this assumption, bearings **A**1 and **B** naturally continue to be fixed fulcrums. In the example in question, rising of bearings **B**1 and **A** would lower the opposite couplings. This would produce a gap in the lower part of these couplings. The radial position of these couplings could well change such that, due to the lowering, the coupling flanges adjacent to bearings **A**1 and **B** may take up eccentric positions relative to the mating coupling flanges.
Radial checks, with corresponding adjustments should only be made if preceding adjustments have had the effect of eliminating large gaps. This demonstrates that a series of checks and adjustments are necessary during major overhauls to obtain satisfactory alignment values.
From what has been said, it can be seen that it is absolutely necessary in the case of multi-shaft assemblies to gain a general idea of the effects the adjustments will have on the positions of adjacent couplings before such adjustments are actually made. In practice, when carrying out realignment one will simply have to find compromises that will lead to a near- optimum state of alignment.

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It goes without saying that the same amount of care has to be devoted to radial alignment of the shafts relative to each other as to the elimination, described above, of any gaps which have occurred.

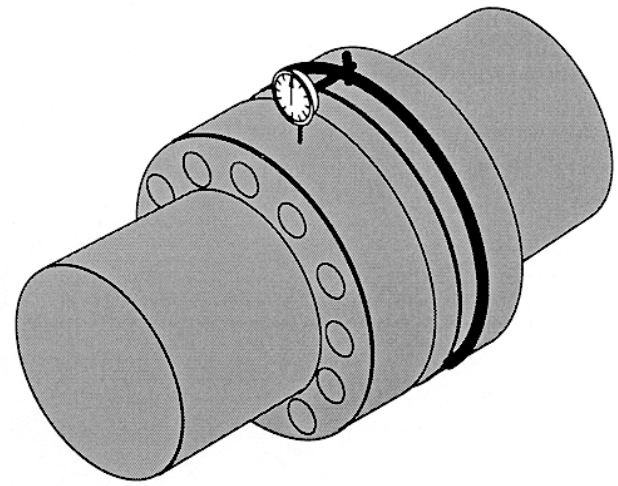


Fig. 16
Check Performed at Couplings

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As the description of matters in the case of initial installations already shows, the correction measures undertaken should lead to simultaneous elimination of axial gaps, i.e. only one operation should be required for the final adjustment of the bearings during a major inspection.
It is not possible to cover every conceivable case of shaft displacement in this description. The intention is rather just to explain how any misalignment can be detected and then eliminated in the shortest possible time and with the least amount of effort.

The account of the method of calculation illustrates among other things that, given enough thought, it is possible to perform realignments with just a few operations even during major inspections, and that it is not necessary to use the time- consuming trial-and-error method when aligning couplings. As a general rule, it should be pointed out that radial adjustments, when made in the same direction and by equal amounts, do not have any effect on the axial gap at the coupling, but that adjustment of the gap, on the other hand, may very well also alter the radial position of the couplings.
This is always the case if, to eliminate a gap, a bearing plane is taken as the fulcrum.
On no account should these aspects be ignored when realignments are being carried out.

Centering of the Shafts Relative to Each Other

Even if it has been ascertained by means of the coupling checks employed on the turbine-generator units that, with the aid of the aligned journal bearings, the deflection curve of the shaft line is the proper one, this measure alone does not guarantee smooth mechanical running behavior. It must also be ensured that the coupled shafts are perfectly centered relative to each other. In the majority of cases this is assured by the centering device provided, which is located with a projection and a recess respectively at the faces of the coupling halves. The highest requirements with regard to quality are to be set for this centering device, i.e. the greatest tolerance in the centricity relative to the shaft axes should not exceed 0.01mm.
If, for example, the radial displacement of two shafts relative to each other is 0.04mm, this measurement may still be admissible with reference to the coupling check. If, however, both shafts are coupled with this degree of displacement, a run out of 0.08mm is produced which is not acceptable under any circumstances.
With turbines of older designs, in particular HP turbines, spacers were frequently fitted to compensate for axial displacement encountered during erection. In these cases the centering devices are fitted at the spacers and coupling flanges. It is easy to understand that what are known as double centering devices can be particularly critical points with regard to inaccuracies.

Furthermore there are cases where mechanically produced centering devices are dispensed with and where coupling fittings bolts are used as the means of centering. These versions are, however, seldom seen. In these cases, of course, greater importance is attached to the bolting of the coupling. The requirement with respect to quality for the manufacture of the centering devices does not only extend to the centering clearance. Only the smallest possible clearance will ensure firstly that coupling is effected absolutely within the minimum tolerance and without run out and secondly, in the event of load surges or short-circuit moments (changes in torque) during turbine operation, that the radial position of the shafts relative to each other will be preserved and the mechanical running behavior remain the same.
Whenever practicable, the centering devices should be inspected to see that they have been correctly manufactured before alignment of the shafts is started.
Where the projection and recess have been turned in the coupling flanges direct, the centering clearance is to be checked by simple measurement. A check should also be carried out with the shafts mated. This is done by placing the shafts to be coupled in their bearings and drawing the couplings together axially without excessive force. While one of the two shafts is then slowly raised the clearance in the centering device can be measured by means of a dial gauge.
The maximum tolerance is to be taken as 0.02mm. If this is exceeded the centering devices must be re-machined.

When coupling spacers are used, the procedure is as follows: Once the spacers are fitted, the couplings are again drawn together axially without excessive force. The actual clearance can be measured with the aid of a dial gauge mounted on one of the coupling flanges if the spacer is then moved upwards and downwards. Proper centricity of a centering ledge relative to the shaft axis can be checked when a single shaft has been placed in the bearing. The centering ledges can then be measured with the aid of a dial gauge as the shaft is turned through 360°. The aforementioned tolerance of 0.02mm should not be exceeded.

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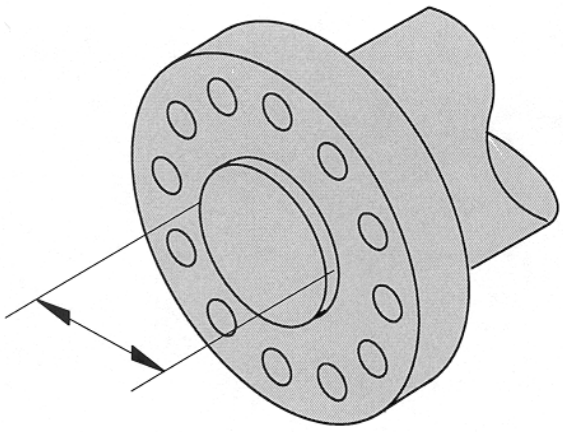


Fig. 17
Checking the Centering Fit before Installation

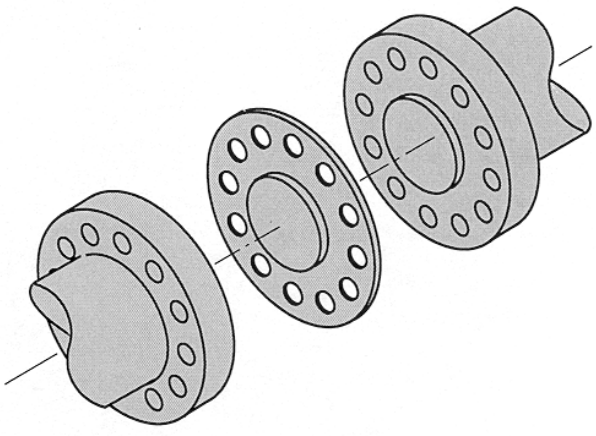


Fig. 18
Coupling with Spacer

During manufacture, transport and installation of the generator, the insulation of the rotor winding may have been exposed to moisture which would reduce the insulation resistance of the winding. The insulation resistance should therefore be measured prior to initial startup, after prolonged shutdowns and after work on the windings. During installation it should be measured on a weekly basis. If required, the generator should be dried until a sufficient insulation resistance is obtained.

1 Required Insulation Resistance of Rotor Winding

The insulation resistance should amount to ≥1 megohm at 40 °C (104 °F).

At winding temperatures other than 40 °C, a correction can be made using the curve shown in fig. 1.

2 Measurement of Insulation Resistance

Prior to each measurement, the generator must be de-excited and any static charges removed by grounding the winding.

The insulation resistance should be measured between one slip-ring being in contact to the rotor winding and the slip-ring being in contact to the generator shaft, using a megger with a maximum voltage of 250 V. This voltage will present no danger to any of the devices in the excitation circuit. The duration of the test should be at least two minutes.

The measuring brush for ground monitoring should not be in contact with the slip-ring when measuring.

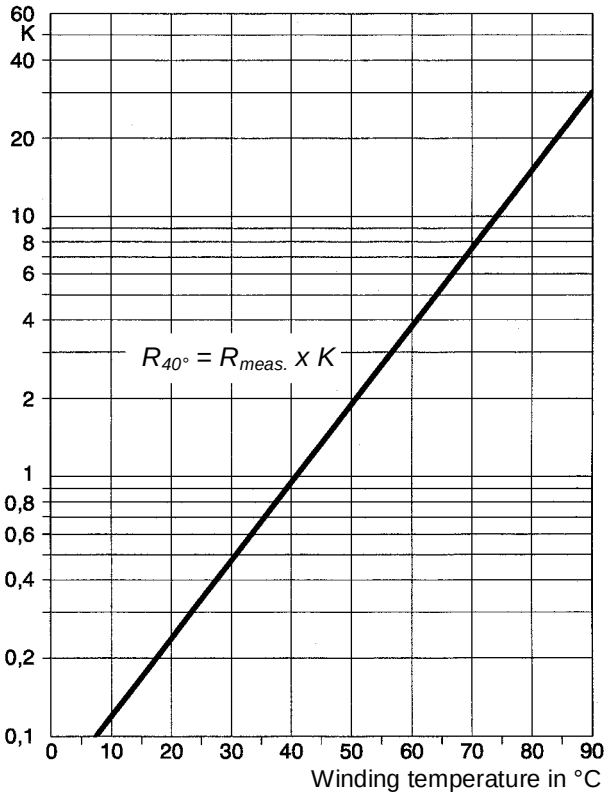


Fig. 1: Correction curve for insulation resistance measured (R_{meas}) to a temperature of 40 °C

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During manufacture, transport and installation of the generator, the insulation of the stator winding may have been exposed to moisture which would reduce the insulation resistance of the windings. The insulation resistance should therefore be measured prior to initial startup, after prolonged shutdowns and after work on the windings. During installation it should be measured on a weekly basis. If required, the generator should be dried until a sufficient insulation resistance is obtained.

1 Required Insulation Resistance of Stator Winding

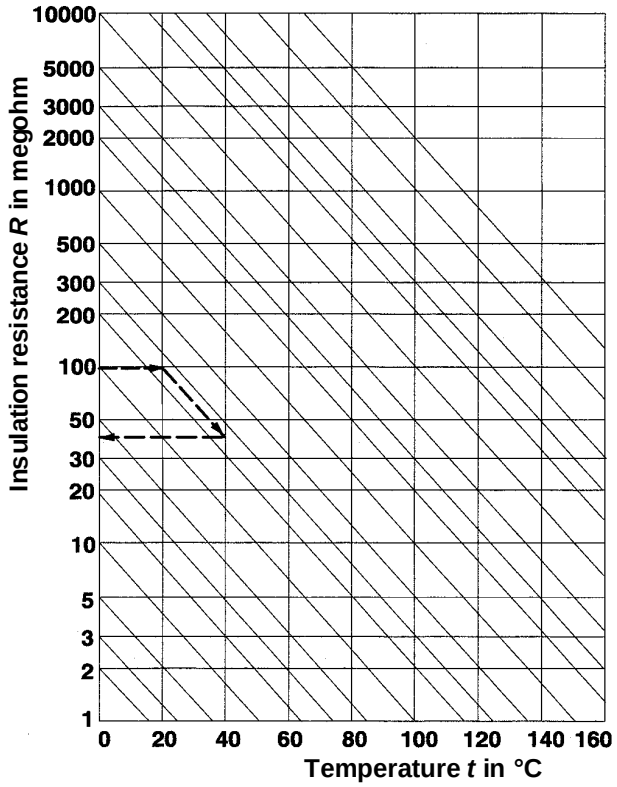


Fig. 1: Diagram for correction of insulation resistance measured to a temperature of 40 °C

The insulation resistance measured is dependent on the temperature. To permit a proper assessment, a correction to an agreed reference temperature (formerly 75 °C,167 °F) must be made.

An insulation resistance of 1 megohm per each kilovolt of rated voltage at 75 °C (167 °F) is normally attainable without any difficulties.

New international standards specify an insulation resistance of not less than 1 megohm per each kilovolt of rated generator voltage at 40 °C (104 °F).

A correction of the insulation resistance measured at the winding temperature prevailing during the measurement to the above reference temperature can be made using the diagram in fig. 1.

If the insulation resistance measured is lower than the specified minimum value, the neutral connections must be separated and the insulation resistances of the individual winding phases measured. During the test, the other two phases which are not involved should be grounded. If the insulation resistances of the individual phases are likewise lower than the required limit value, drying of the windings will be indispensable. Great differences in the insulation resistance values are indicative of local contaminations, e.g. insulators in bus duct or terminal-bushings. If practicable, additional connections should be separated. If this measure does not result in an improvement, it is recommended to obtain the services of a specialist from the manufacturer's works.

2 Measurement of Insulation Resistance

Prior to each measurement, the generator must be de-excited and any static charges removed by grounding the windings. The windings should also be grounded after each measurement for the duration of the recharging period.

The insulation resistance of the stator is measured between the winding copper and the stator core.

The measurement should be made with a megger giving a scale reading of not less than 1000 megohm. The megger voltage should be not less than 1000 V, but may amount to up to 5000 V. The insulation resistance should be reached after one minute.

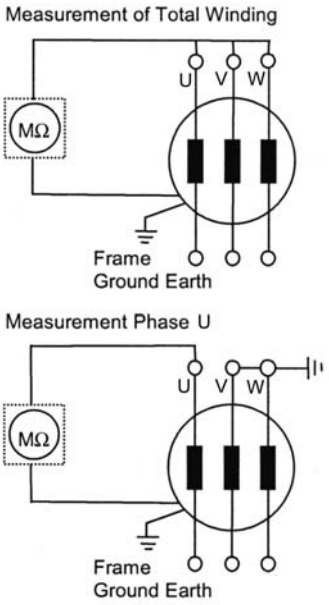


Fig. 2: Test circuit of Insulation Resistant Measurement

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1 General

Any reduction of the insulation resistance during transport, erection or a prolonged shutdown is mostly caused by the formation of a moisture film on the surface of the insulation. To prevent any damage to the insulation, the insulation resistance of the stator and rotor windings should be checked prior to running the unit at rated voltage [1], [2]. In the event of an insufficient insulation resistance being detected, a drying procedure is to be performed until a sufficient insulation resistance has been obtained.

2 Dry-Out Using a Space Heater

If the space heater is in operation, the temperature in the generator interior is maintained at a value slightly above ambient temperature. This prevents the formation of a moisture film on the surface of the stator and rotor windings, in case the temperature falls short of the dew point.

3 Dry-Out by Direct Current

If the generator dry-out cannot be performed by means of the space heaters, the following procedure should be employed:

For the direct-current dry-out, suitable d.c. sources, such as welding converters, should be available. When it is intended to employ several welding converters for drying, care should be taken that the converters have approximately the same characteristics. A direct-current dry-out of the stator can be performed already before the rotor is inserted. However, if the rotor is in the frame, it should be turned during the drying procedure. It will have to be ensured for interconnection of the three phases that the magnetic fields set up in the stator winding balance each other. When no suitable measures are taken in this respect, the turning gear may be destroyed owing to the large forces effective between stator and rotor. The connection of the stator winding for balancing the magnetic fields is shown in the illustrations.

Sources supplying a current amounting to about 1/4 to 1/3 of the rated generator current suffice for drying the stator winding with direct current. The voltage required is very low and may be approximately 5 to 15 V. A winding temperature of 75 °C (167 °F) should not be exceeded. As in normal operation, the winding temperature is measured through the resistance temperature detectors embedded in the slots. A sufficient exchange of the air within the generator housing should be ensured during the drying period. This can be effected by opening all connections and inspection holes. It is advisable to accelerate the exchange of the generator air by means of blowers or with clean compressed-air. The steady-state winding temperature of 75 °C (167 °F) should be reached not earlier than after six hours. The stator should thus be heated slowly by gradually raising the d.c. current and continuous supervision of the slot temperatures.

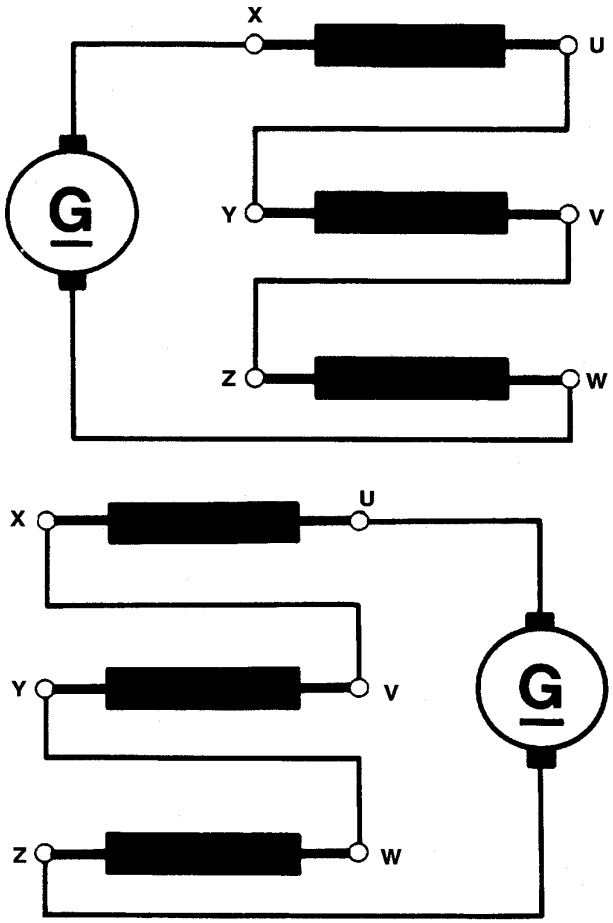


Fig. 1 Stator Winding Connections for Dry-Out by Direct Current

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SIEMENS

Rotor Removal and Installation Using Crane

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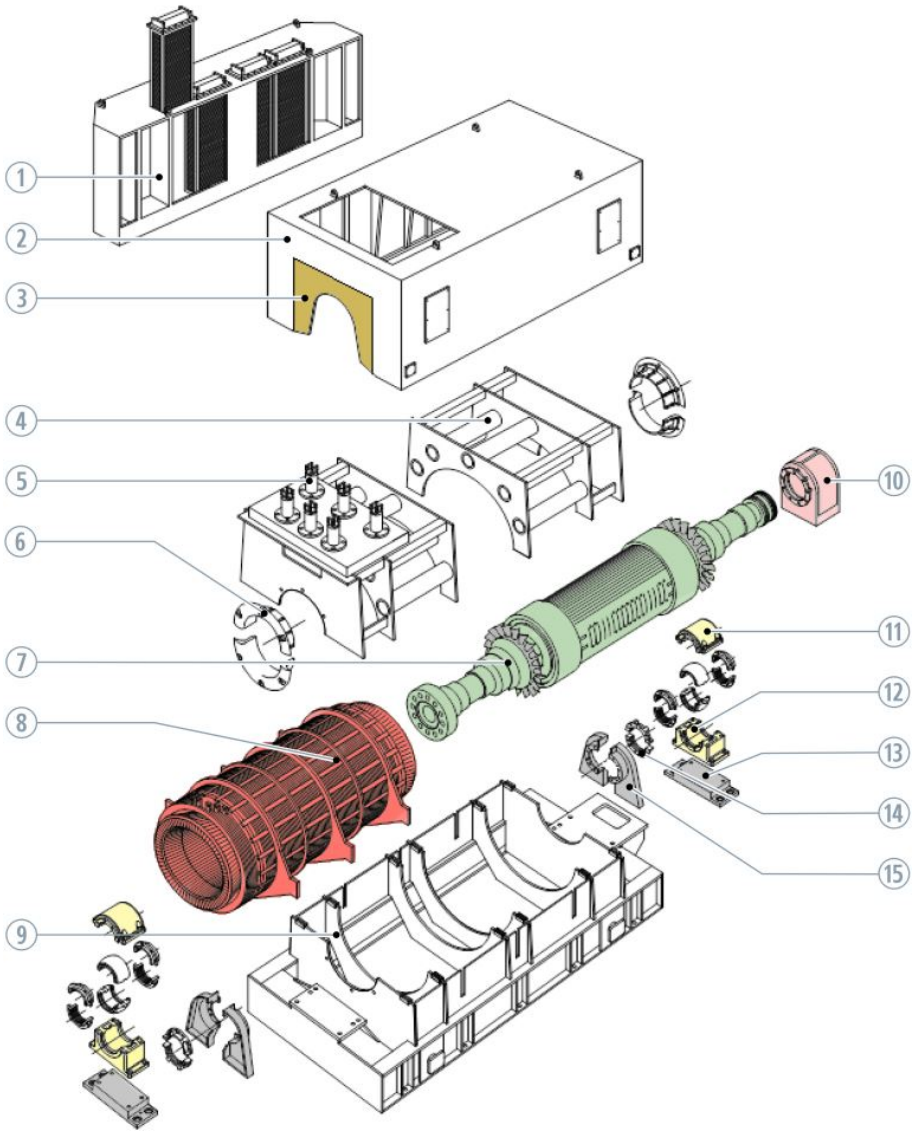
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1 Preliminary Remarks

This description explains how to remove the rotor from a two-pole generator. Depending on the actual design, certain details might be different from those included in this description. Because of this, it is necessary to contact the manufacturer in order to obtain further information. The generator views in figs. 1 and 2 show an example of a generator with laterally arranged cooling units, exciter machine and outbound lines on top.

Fig. 1: Two-pole generator, exploded view



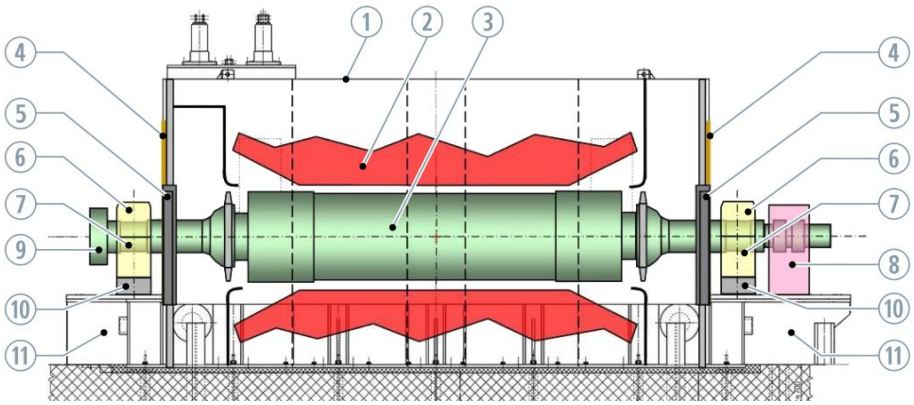
TE
Turbine end

EE
Exciter end

1 Cooler
2 Cover
3 End wall segment
4 Upper air guide
5 Outbound lines
6 Air baffle ring
7 Rotor
8 Inner stator with core
9 Base frame
10 Exciter set
11 Bearing pedestal, cover
12 Bearing pedestal, base
13 Intermediate frame
14 Labyrinth ring
15 Shaft bushing

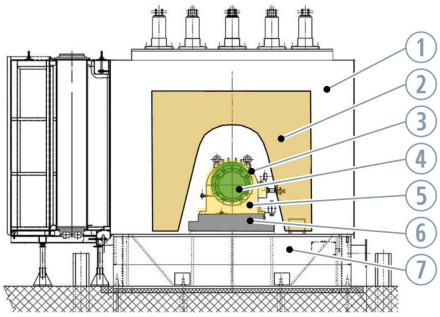
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Fig. 2: Two-pole generator, longitudinal section



1 Cover
2 Stator
3 Rotor
4 End wall segment
5 Shaft bushing
6 Bearing pedestal, cover
7 Bearing pedestal, base
8 Exciter set
9 Turbine coupling
10 Intermediate frame
11 Base frame

Fig. 3: View on TE



1 Cover
2 End wall segment
3 Bearing pedestal, cover
4 Rotor
5 Bearing pedestal, base
6 Intermediate frame
7 Base frame

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Safety precautions

- **Only skilled personnel are authorized to perform any disassembly or assembly work on the generator.** The accident prevention regulations applicable on the construction site must be complied with.
- The valid safety regulations must be observed when working on platforms.
- Lifting equipment and hitching gear must be of a size and strength adequate for the required loads. Round slings must be used as hitching gears.
- Suitable measures must be used to secure the rotor against unintended movements during every step, as well as after the rotor is in its resting position after having been removed.
- Removed parts must be safely stored outside marked walkways. They must be stored in such a way that it is impossible for the parts to unintentionally change position or topple over.
- Do not store any tools or component parts in the area of base frame and generator windings.
- Suitable aids or materials (e.g., foil) must be used to protect uncovered openings from soiling and to prevent foreign particles from entering them.

- Openings must be adequately marked and blocked in line with operator protection requirements.

Equipment required

The following items are included in the standard scope of supply from Siemens (see *Special Tools*):

- 1 Sliding plate
- 2 Sliding shoes
- 1 Sliding pedestal
- 2 Set-down troughs
- 2 Rubber plates
- 1 Adapter plate (optionally)
- Sliding grease

The generator operator has to provide:

- Gantry crane and hitching gears (sling equipment for jacking the rotor)
- Chain or rope hoists
- Securing devices
- Foil
- Wire reels
- Water level
- Height-leveling supports

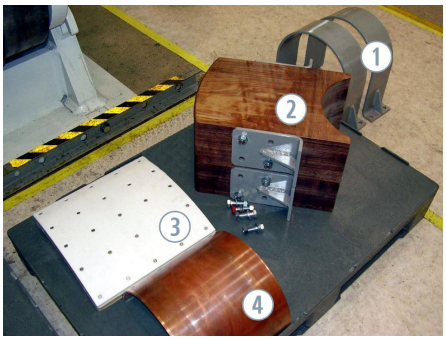
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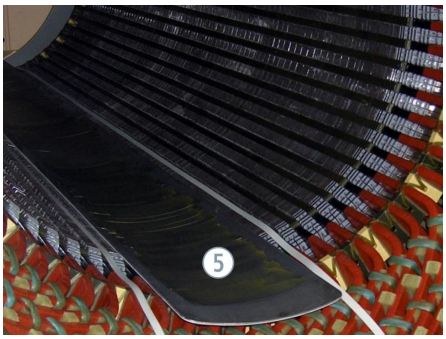
The standard scope of supply for the generator may not include all the tools and equipment mentioned in this description. The agreed scope of supply must be checked. If necessary, various parts, tools, and equipment may have to be ordered separately.

Special tools

Fig. 4 shows a section of the special tools used for removing rotors. The brackets (1) that can be seen in the background are mounted on the base of the sliding pedestal (2) with hexagonal bolts (also see fig. 14, page 12). The sliding pedestal is placed near or next to the bearing area (dependent on the clamp diameter on the on the sliding pedestal) facing the center of the generator. The copper shim is inserted in between, in order to protect the bearing area.

Fig. 4: Some of the special tools for removing the rotor





1 Sliding pedestal, U-brackets
2 Sliding pedestal, base
3 Sliding shoe
4 Copper shim
5 Sliding plate

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2 Rotor Removal

Overview

The rotor removal process is divided into the following steps:

1. Preparatory work, especially the disassembly of peripheral devices
2. Disengaging the rotor on the turbine end
3. Inserting the sliding plate
4. Removing the intermediate frame on the turbine end
5. Removing the TE bearing cover and the top bearing shell
6. Removing the lower bearing pedestal section and the lower bearing shell on the turbine end
7. Assembling the sliding pedestal on the turbine end
8. Preparations on exciter end for pulling out the rotor
9. Travelling out the rotor
10. Placing the exciter end of the rotor on a set-down trough and suitable underlays
11. Suspending the rotor horizontally
12. Putting down the rotor onto both set-down troughs in the final position

2.1 Preparatory Work

Preparation

The **transportation safety devices and safety tools** delivered with the generator must be prepared when starting work.

Depending on the actual generator design, the **cooling elements** and the **sound-absorbing hood** may have to be removed as part of the dismantling procedure. Loosen all cable couplers before lifting off the sound-absorbing hood without fail.



NOTICE

- During all crane work, make sure that the hitching gears are not placed on the rotor retaining rings, on the bearing points, or in the area of the sealing surfaces.

Work steps

The remaining work steps must be carried out in the following order:

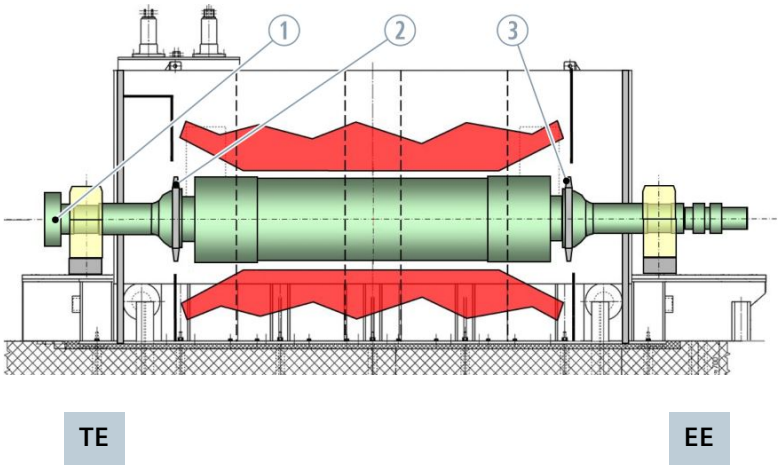
1. Align the **rotor coupling** vertically (transport position marking 0 or 12 on the coupling must face upwards).
2. Remove the **exciter** or the **static excitation device** (slip ring housing, connecting cables, plug-in brush holder, and brush yoke).
3. Remove the TE and EE **front wall segments**.
4. Remove the **labyrinth rings** and the upper TE and EE **shaft bushings.**
5. Remove all **bearing pedestal connections** (oil flanges, cables, shaft vibration pickups, etc.).
6. Mark and remove the TE and EE **air baffle rings.**
7. Remove all **tightness rings**, **vibration detectors** and **temperature sensors** at the TE or EE bearing pedestals.

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NOTICE

- If any oil leaks from the bearings during the work being carried out, use adequate means to capture it.
- After opening, the bearings must be immediately protected from mechanical damage with suitable measures (e.g., covering).

Fig. 5: After preparatory works have finished



1 TE coupling half
2 TE fan blades
3 EE fan blades

2.2 Disengaging the Rotor on the Turbine End

The rotor must be disengaged on the turbine end.

Coupling

Jack apart the TE coupling half from the coupling recess with the help of the original clamping bolts. While jacking apart the half couplings, observe the maximum axial clearance values as specified in the dimensional drawing on "Axial and radial rotor clearances".

NOTICE

- Only jack apart until the coupling overhang is located at a maximum distance of 10 mm outside the coupling face. A bigger distance between the half couplings will impede rotor later lifting in the area of cap / toothed end packets.

Fan blades

It might be necessary to remove the fan blades on both rotor ends as preparation for the following step. The fan blades must be removed if the fan's diameter is greater than the inner diameter of the rotor retaining ring or if there is a danger that the fan blades will interfere with the housing.

NOTICE

- The fan blade ends should be bandaged using soft protective material to protect the threads before they are placed down.

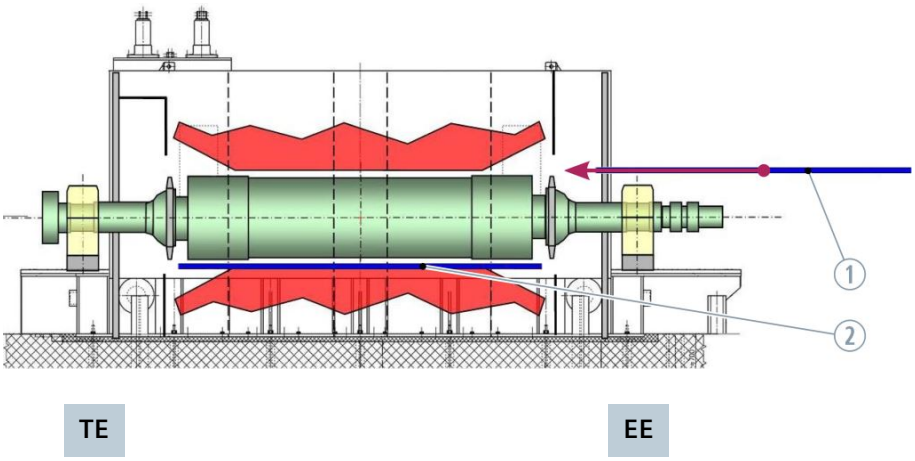
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2.3 Inserting the Sliding Plate

Work steps

1. Clean the sliding plate, apply a thin film of sliding grease to the inner side, and wrap it in sheeting.
2. Slide in the plate, covered in foil, through the generator gap between the rotor and stator, above the EE bearing (fig. 6).
3. Place the plate centrally underneath the rotor by guiding it manually on both sides. The sliding plate's required final position is shown in fig. 4, right side, and in fig. 6.
4. After this, the foil between the rotor and the sliding plate must be removed.

Fig. 6: Inserting the sliding plate



1 Sliding plate, inserting position
2 Sliding plate, final position

NOTICE

Risk of damaging the rotor and stator.

▶ Insert the sliding plate very carefully.

2.4 Removing the Intermediate Frame on Turbine End

Work steps

1. Release the TE bearing's intermediate frame from the base frame. To do this, remove the bearing pedestal bolts and alignment pins from the base frame.
2. Attach the hitching gear to the rotor shaft near the bearing (not to the suspension eyelets!).
3. Lift the bearing a few millimeters with the intermediate frame and shaft still attached to it (fig. 7, I).

⚠ WARNING

Danger of injury from heavy loads falling.

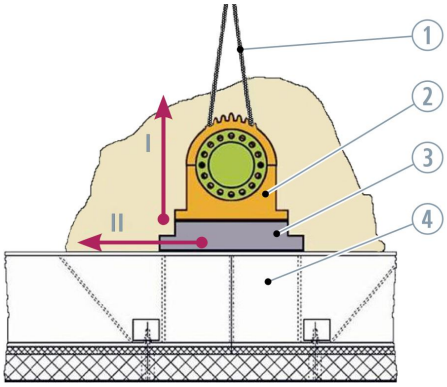
▶ The rotor must NOT be suspended from the suspension eyelets on the bearing cover. These are only for lifting up the bearing pedestal or bearing.

4. Place thin rolls (welding wires) underneath the intermediate frame. These rolls are used as aids for transportation. Alternatively, a lubricated sliding pad may be used.

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5. Once these aids have been positioned, lower the bearing together with the intermediate frame.
6. Release now the intermediate frame from the bottom part of the TE bearing pedestal. Remove the screws and dowel pins.
7. Lift the rotor with the crane until the intermediate frame can move freely.
8. Pull out the intermediate frame from the side and store it safely (fig. 7, II).

Fig. 7: Removing the intermediate frame – view on TE

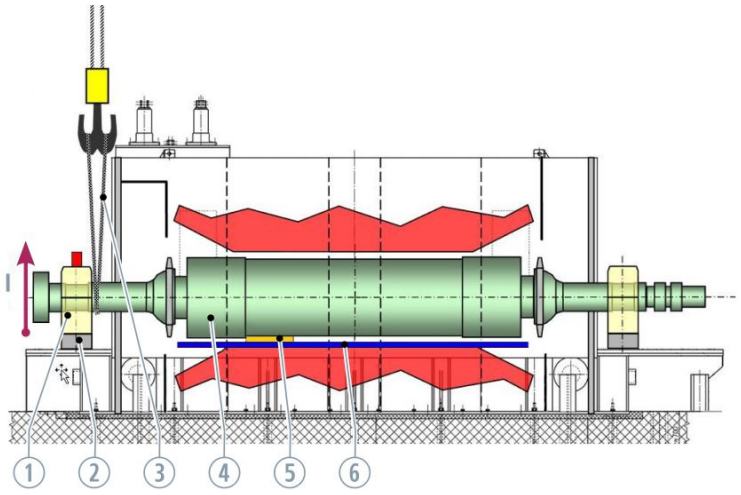


1 Hitching gear attached to the rotor
2 Bearing pedestal
3 Intermediate frame in installation position
4 Base frame

I Lifting the rotor and bearing pedestal
II Pulling out the intermediate frame

9. Insert the sliding shoe between the centrally aligned sliding plate and the rotor, flush with the edge of the retaining ring (fig. 8).

Fig. 8: Removing the TE intermediate frame



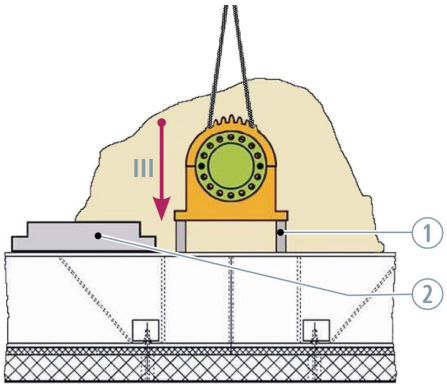
1 Bearing pedestal
2 TE intermediate frame
3 Hitching gear attached to the rotor
4 Rotor retaining ring
5 Sliding shoe
6 Sliding plate

I Lifting the rotor and bearing pedestal to pull out the intermediate frame

10. Once the sliding shoe has been positioned, lower the rotor until it is bearing on the sliding shoe.
11. Finally, the TE bearing is supported with the help of height-adjustable elements (fig. 9).

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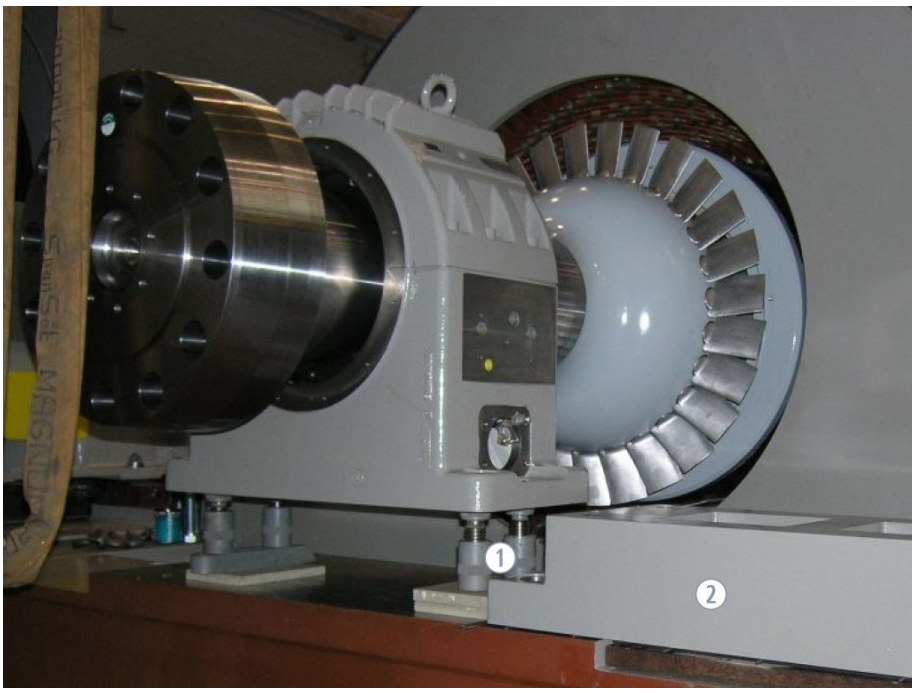
Fig. 9: View on TE, Lowering the rotor



1 Supports adjustable in height
2 Intermediate frame in parking position

III Lowering the rotor until it is resting on the sliding pad and bearing is resting on bearing supports

Fig. 10: Turbine end with bearing resting on bearing supports



1 Supports adjustable in height
2 Intermediate frame in parking position

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2.5 Removing the TE Bearing Cover and the Top Bearing Shell

Work steps

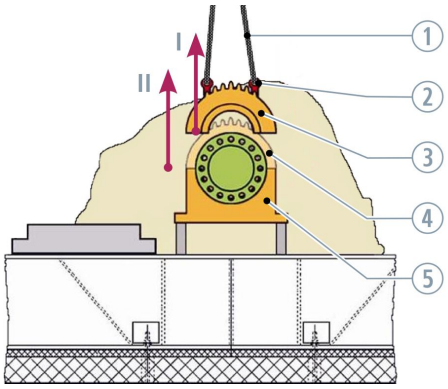
1. Disassemble completely the TE bearing cover's threaded connection.
2. Attach the hitching gear to the bearing cover's eyelets and carefully lift off the bearing cover (fig. 11, I).
3. Place the bearing cover in its resting position with the crane or, alternatively, a hydraulic jack. Put it down safely on a suitable soft support pad (wood, rubber, or similar). Remove the slinging ropes.

NOTICE

- If a hydraulic jack is used instead of a crane, the jack must be placed underneath the coupling or between the bearing pedestal and the coupling. Insert suitable material for shaft protection between shaft and jack (e.g., copper or aluminum sheets).

4. Unscrew the bearing shell's screw couplings. After this, remove at first the measuring cable for the bearing insulation monitoring system and then the top bearing shell (fig. 11, II).
5. Pack up the bearing shell and store it safely.

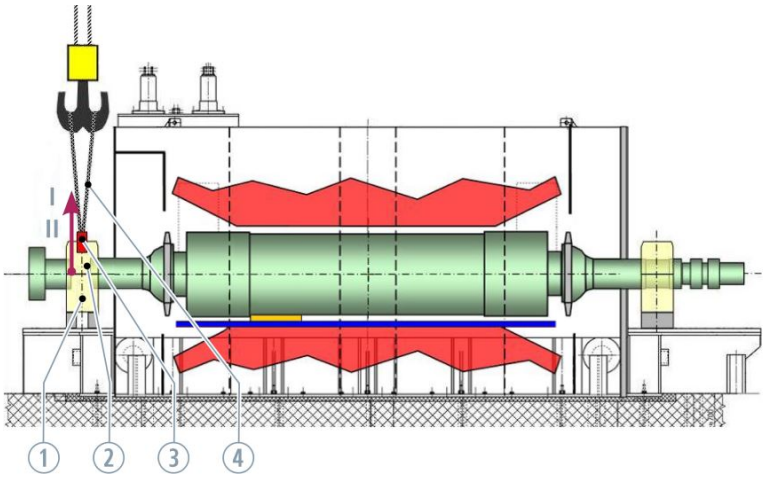
Fig. 11: Removing the TE bearing cover and the top bearing shell – View on TE



1 Hitching gear attached to bearing suspension eyelets
2 Bearing suspension eyelets
3 Bearing pedestal, cover
4 Top bearing shell
5 Bearing pedestal, base, with lower bearing shell

I Removing the bearing cover
II Removing the top bearing shell

Fig. 12: Removing the TE bearing cover and the top bearing shell



1 Bearing pedestal, base
2 Bearing pedestal, cover
3 Bearing suspension eyelets
4 Hitching gear attached to bearing suspension eyelets

I Removing the bearing cover
II Removing the top bearing shell

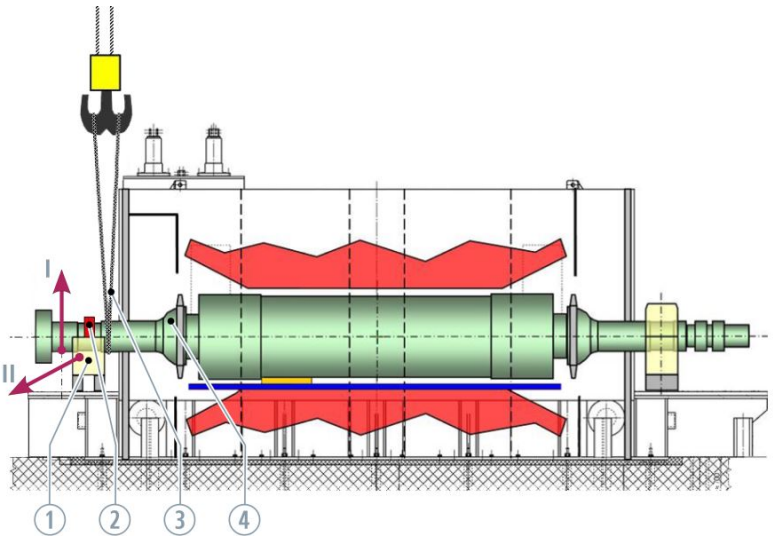
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2.6 Removing the TE Lower Bearing Pedestal Section and the Lower Bearing Shell

Work steps

1. Attach the hitching gears in the immediate vicinity of the bearing pedestal. If there is sufficient space, attach the gears on the side facing the fan hub (fig. 13).

Fig. 13: Removing the TE lower bearing pedestal section and the lower bearing shell



1 Bearing pedestal, base
2 Eye bolts fixed on the bearing pedestal base
3 Hitching gear attached to rotor
4 Fan hub

I Lifting the TE rotor shaft
II Removing the TE lower bearing pedestal section and the lower bearing shell

2. Remove the high-pressure hose and the oil line for the jacking oil (if any) that are located underneath the bearing shell. Remove the grounding cable.

3. Lift the shaft on the turbine end by 0.1 to 0.3 mm.

4. Once the shaft is lifted, swivel out the lower bearing shell.

5. After this, attach two eye bolts to the bottom of the TE bearing pedestal, diagonally opposite to each other.

6. Lower the rotor until it rests on the sliding shoe.

7. Attach the hitching gears to the eyelets. After this, remove the height-adjustable supports.

8. Lower the bearing pedestal base section, remove it sideways and store it safely.

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2.7 Assembling the Sliding Pedestal on the Turbine End

Work steps

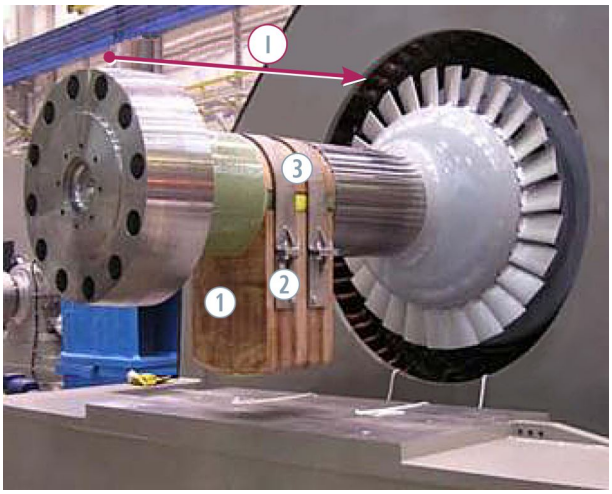
1. Assemble the **sliding pedestal** on the TE bearing point (fig. 14) (or next to it).

NOTICE

- In order to ensure that the bearing is protected, the assembly process must be carried out only while using the copper shims included in the scope of supply.
- It is necessary to assemble the sliding pedestal perpendicularly to the rotor axis. Use a water level to check the horizontal alignment.

2. Lower the rotor until it rests on the sliding shoe.
3. Remove the hitching gears and crane on turbine end.

Fig. 14: Sliding pedestal assembled on turbine end bearing point



1 Sliding pedestal
2 U-brackets
3 Copper shims

I Removal direction

2.8 Preparations on Exciter End for Pulling out the Rotor

Equipment required

- Bearing transportation securing device
- Rope hoist or chain hoist
- Adapter plate (optionally)

Normally, the rotor will be travelled out by pulling it from the exciter end. Alternatively, if there is not sufficient space for pulling, the rotor can be moved in direction to exciter end applying hydraulic jacks or equivalent tools on the turbine end.

The following steps describe the preparations on exciter end for the pulling procedure.

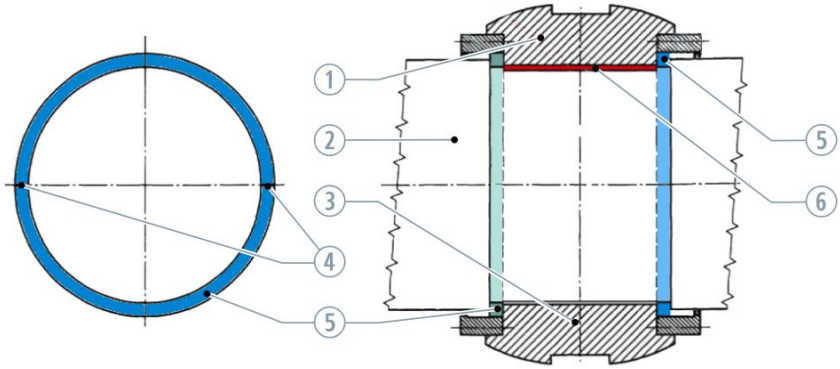
To pull out the rotor, a rope sling is attached either **to the EE bearing pedestal** or, alternatively, **to an adapter plate**.

Work steps

1. If the rope sling will be attached to the EE bearing pedestal, lock at first the bearing using the **transportation securing device** (fig. 15).
   If the rope sling will be attached to an adapter plate, mount this at first to the rotor exciter end (fig. 16).

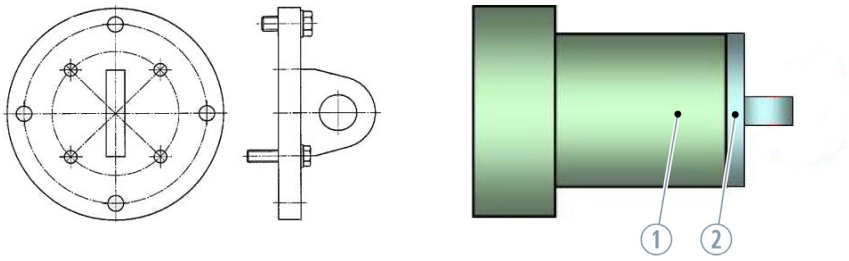
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Fig. 15: Bearing transportation securing



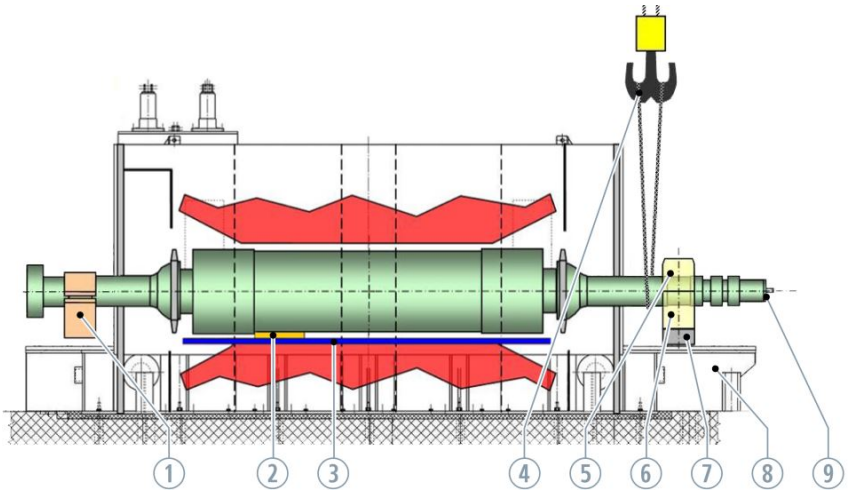
1 Top bearing shell
2 Rotor
3 Lower bearing shell
4 Separating joint
5 Axial retaining ring(divided)
6 Anti-rotation locks (shim between the shaft and the upper bearing shell in both bearings)

Fig. 16: Adapter plate, schematic diagram and mounted on exciter end



1 Rotor exciter end
2 Adapter plate with eyelet

Fig. 17: Rotor resting on the sliding shoe, with exciter end suspended from the crane and adapter plate mounted



1 Sliding pedestal on TE
2 Sliding shoe
3 Sliding plate
4 Gantry crane with hitching gears attached to EE
5 EE bearing pedestal, cover
6 EE bearing pedestal, base
7 EE intermediate frame
8 Base frame
9 Adapter plate

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2. Attach now the rope sling to the EE bearing pedestal (fig. 18) or to the adapter plate (fig. 19).

NOTICE

- No attachment points other than the points specified for attaching the axial pull mechanism must be used. In particular, no forces must be exerted on the slip rings while removing the rotor. This also applies to the fan blades if they have been left on the rotor due to there being enough space available.

3. As the pull mechanism use **a rope hoist or a chain hoist**, which is attached to an appropriate and sufficiently stable anchor point.
4. Before starting to pull out the rotor, remove the bolts and pins which fix the EE intermediate frame onto the base frame.
5. Attach the crane to the rotor's exciter end, next to the bearing point, using suitable hitching gears (round slings). If the space available allows, attach the hitching gear between bearing and fan.
6. The rotor must be carefully lifted until the EE bearing is no longer bearing a load.

2.9 Travelling out the Rotor

Requirements for moving the rotor

Preparing steps that have already been carried out:

- ✓ The EE bearing was fixed using the transportation securing device, in order to transmit the axial tensile force onto the rotor.
- ✓ The EE intermediate frame was loosened from the base frame.
- ✓ The rotor was lifted until the EE bearing was no longer bearing a load.
- ✓ On the turbine end, the rotor is still bearing against the sliding shoe.
- ✓ The rope hoist (or chain hoist) is connected to the bearing (EE bearing pedestal or adapter plate) and a fixed point by a rope sling (or chain).

Pulling force

The force required to pull out the rotor is equal to the frictional force that must be overcome.

- The frictional force can be approximated with $F_R = \mu \times F_N$.
- Normal force $F_N = F_G = m \times g$
- **m:** shaft mass, can be gathered from the dimensional drawing text
- **g:** gravitational acceleration (g = 9,81 m/s2)
- **μ:** coefficient of static friction for steel–teflon + sliding grease (μ ≈ 0.1)

If this value for μ is used for the calculation, the result obtained is approximately the **maximum force** that the attachment point of the chain or wire rope used to pull out the rotor must hold. A suitable anchor point must be selected according to this information. Since the sliding plate is lubricated, the coefficient of friction will decrease significantly as soon as the rotor is moving.

NOTICE

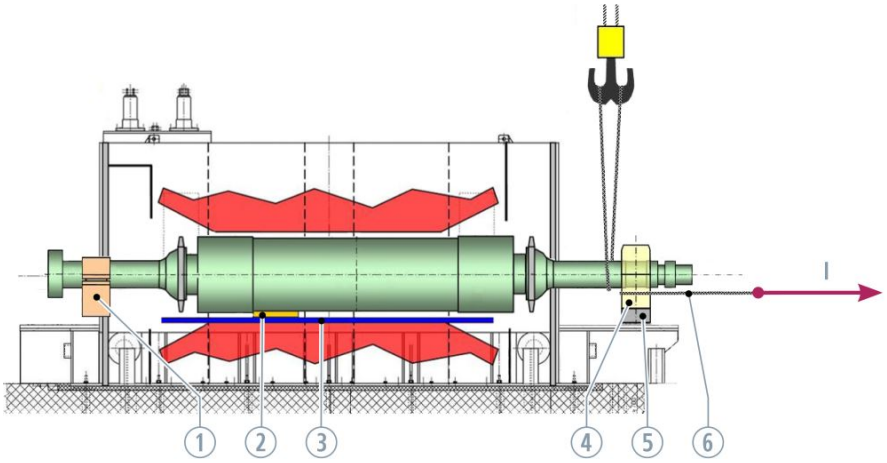
- It is absolutely necessary to ensure that the applied tensile forces act solely in an axial direction. Avoid any oblique or a skew pulling. Do not use the crane to carry out any axial pulling movements!
- The rotor and stator components must not come into contact with each other while the rotor is being removed.

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Work steps

1. Start to pull out the rotor from the stator by exerting an axial pull while continuously guiding the crane (figs. 18 and 19).

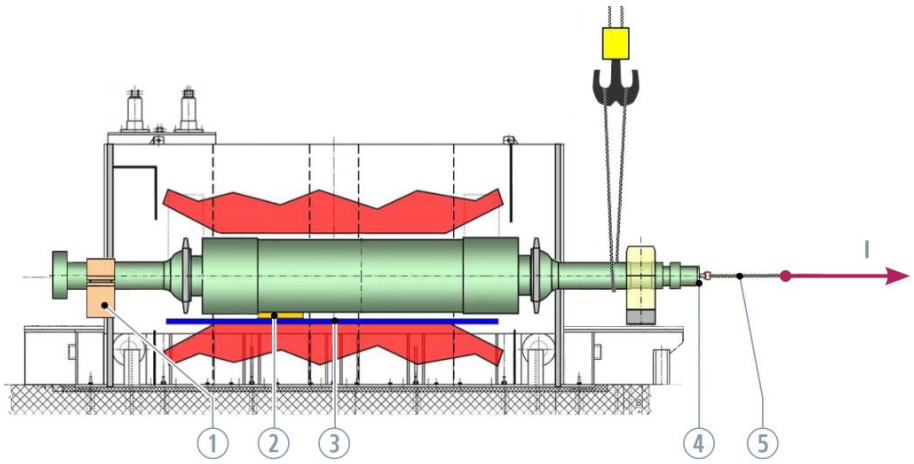
Fig. 18: Alternative 1 – Rope is attached to the bearing-pedestal base



1 Sliding pedestal
2 Sliding shoe
3 Sliding plate
4 EE bearing pedestal, base
5 EE intermediate frame
6 Rope hoist
I Pulling direction

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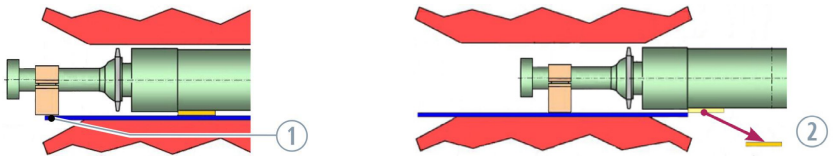
Fig. 19: Alternative 2 – Rope is attached to the adapter plate



1 Sliding pedestal
2 Sliding shoe
3 Sliding plate
4 Adapter plate
5 Rope hoist
I Pulling direction

2. Continue to pull out the rotor until the sliding pedestal comes into contact with the sliding plate (fig. 20, 1).

Fig. 20: Other stages in the rotor removal process



1 Sliding pedestal comes into contact with the sliding plate
2 Removing the sliding shoe

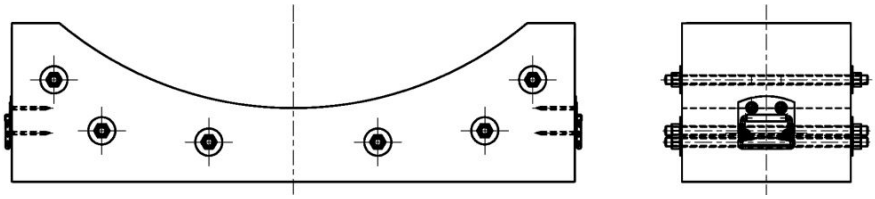
3. When continuing the process, the sliding shoe will reach the leading edge of the sliding plate on the exciter end. Remove the sliding shoe (fig. 20, 2).

2.10 Placing the Rotor Exciter End on the Set-down Trough

Work steps

1. Continue to move out the rotor until its attachment position (geometrical center of the rotor) is located outside the stator and the attachment area is freely accessible (see fig. 22).
2. Place a **set-down trough** (fig. 21) near the EE retaining ring, centrally under the rotor body (not under the retaining ring). The height difference in relation to the hall floor must be compensated for with stable **pad elements** (height-levelling supports). The support trough and pad elements must be placed in such a way that the required hitching-gear rope spread for the following crane work can be achieved.

Fig. 21: Set-down trough, schematic diagram



3. As soon as the position described above has been reached, place the rotor body down on the trough (fig. 22). Put the rotor down in such a way that a safe resting position is maintained that completely prevents any subsequent sliding or settling movements from occurring after the crane is removed.

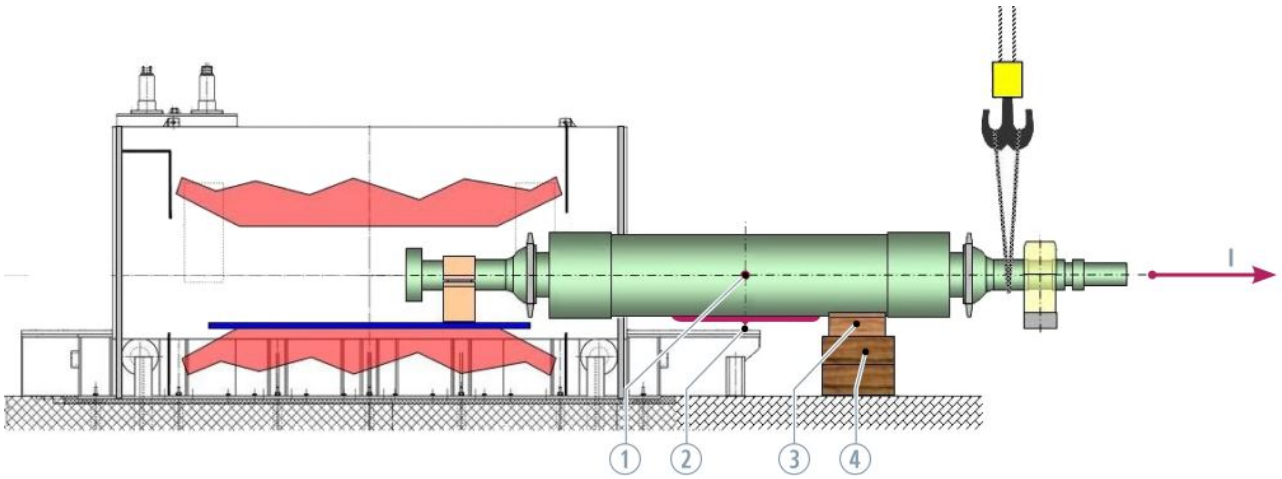


Fig. 22: Placing the rotor exciter end on the set-down trough

1 Geometrical center of the rotor
2 Attachment area
3 Set-down trough
4 Pad elements
I Pulling direction

4. Remove the aids used for axially pulling the rotor.

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2.11 Suspending the Rotor Horizontally

NOTICE

If the rotor is not suspended horizontally, this reduces the clearance in the air gap required when the rotor is pulled out. This creates a risk of the rotor contacting the stator.

Due to the large mass of the rotor, this contact will most probably result in heavy damage.

- Suspend the rotor horizontally and balance it with great care.
- Position the crane exactly vertically above the center of the rotor.

Any sudden braking or accelerating movements by the crane can cause uncontrollable rotor movements, which in turn can lead to damage to the stator and/or rotor.

- It is absolutely essential to ensure that the rotor is pulled out as evenly as possible.

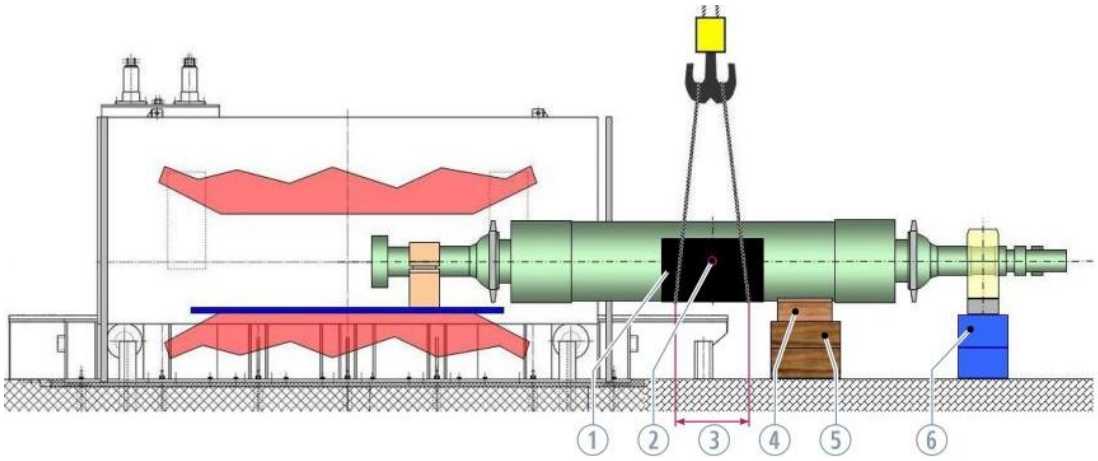
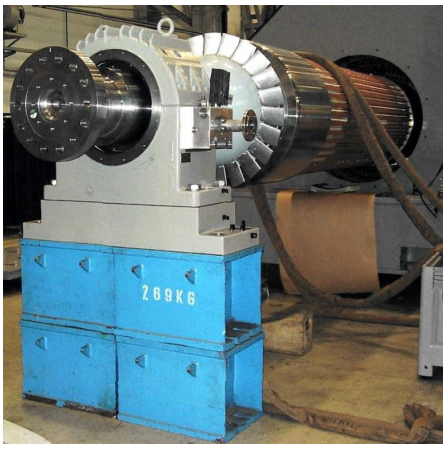


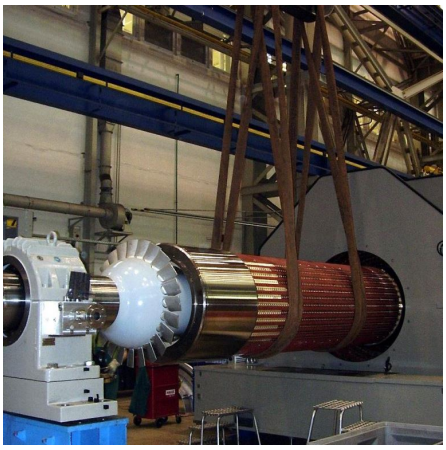
Fig. 23: Rotor suspended horizontally

1 Rubber pad
2 Geometrical center of the rotor
3 Rope spreading min. 600 mm
4 Set-down trough
5 Pad elements
6 Alternative support elements

Fig. 24: Suspending the rotor, detailed views



Supporting the EE bearing pedestal by alternative support elements



Sufficient rope spreading

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Work steps

1. Support the EE bearing pedestal by alternative support elements.
2. Place the hitching gears for the crane approximately in the geometrical center of the rotor. The attachment points must be separated by a minimum of 600 mm.
   Sling the rotor in such a way that it is hanging in a horizontal position after being lifted (please observe the bearing weight). Use a water level in order to ensure that a perfectly horizontal position is achieved.
   Monitor the rotor's position by observing, from both bearing points, how the rotor lifts off during the crane lifting operation.
3. Lift both ends off their supports at the same time.
4. In order to be able to perform necessary corrections, put the rotor down again in the same position. The correction is made by moving the slings by a few centimeters. Repeat this procedure until the rotor is in a perfectly horizontal position.
5. As long as the rotor is still in the proximity of the stator, carefully guide the rotor ends by hand. This way, small displacements can be corrected.
6. Remove set-down trough, pad elements and alternative supports.

2.12 Putting down the Rotor onto the Final Position

Work steps

1. Remove the rotor completely.
2. Once removed, put the rotor safely down on the two set-down troughs or in a shipping crate.

NOTICE

- Do not support the rotor on the retaining rings, the slip rings or the fan blades (if these were left on the rotor). These components must neither be used for support nor securing purposes.

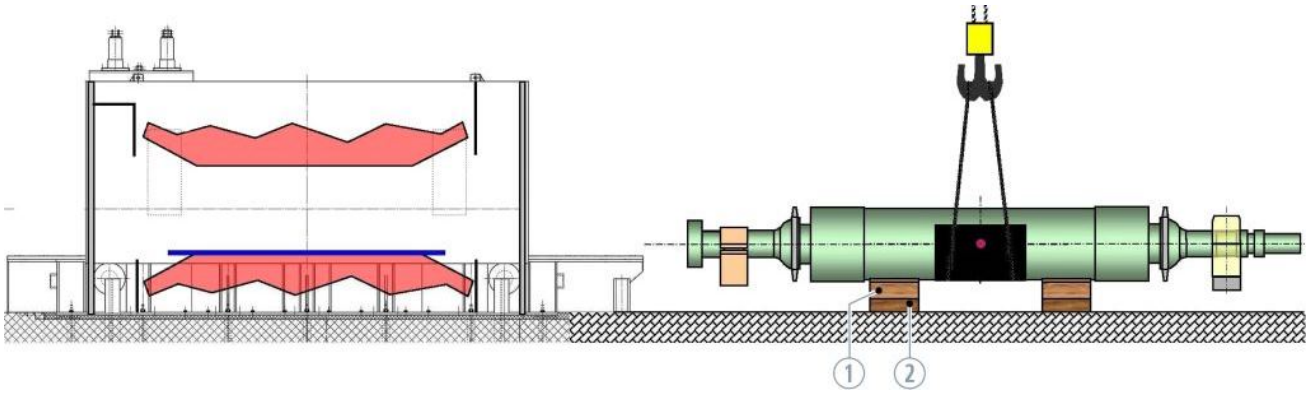


Fig. 25: Rotor put onto its final position

1 Set-down trough
2 Pad elements

3. Once all work is done, inspect visually all gaps and openings.
   Moreover, ensure once again that all removed parts are safely stored.
4. If it becomes necessary to disassemble the EE bearing, the procedure to be followed is the same as that for disassembling the bearing on the turbine side.

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3 Rotor Installation

Preparation

Before the rotor installation make sure that

- ✓ all installation equipment (see page 4) is prepared,
- ✓ the rotor has been placed on two set-down troughs,
- ✓ the sliding pedestal is mounted on the rotor's turbine end,
- ✓ the sliding plate, greased on the inner side, is placed inside the stator core.

Work steps

In order to install the rotor, follow the steps described in chapter 2 for rotor removal in changed order:

1. Assemble adapter plate on turbine end (optionally).
2. Suspend rotor horizontally (hitching gears in central position).
3. Insert rotor turbine end with sliding pedestal into stator core, put down sliding pedestal on greased sliding plate and place rotor exciter end on set-down trough and support elements.
4. Attach rope sling to sliding pedestal or adapter plate, the other end to a rope hoist.
5. Displace hitching gears from rotor center to exciter end, remove set-down trough and support elements.
6. Pull in rotor into the stator applying the rope hoist. While doing this, place sliding shoe between rotor and sliding plate, behind TE rotor cap.
7. When rotor has reached final position, displace hitching gears from exciter end to turbine end.
8. Remove sliding pedestal.
9. Assemble lower bearing pedestal section and lower bearing shell on turbine end.
10. Assemble TE bearing cover and top bearing shell.
11. Assemble TE intermediate frame.
12. Remove sliding shoe pulling it from exciter end with small ropes attached beforehand. If necessary, lift rotor.
13. Remove sliding plate, remove adapter plate.
14. Engage rotor on turbine end.
15. Align rotor coupling vertically, then do finishing work as described in chapter 2.1 *Preparatory Work* (page 5), but in reverse order.

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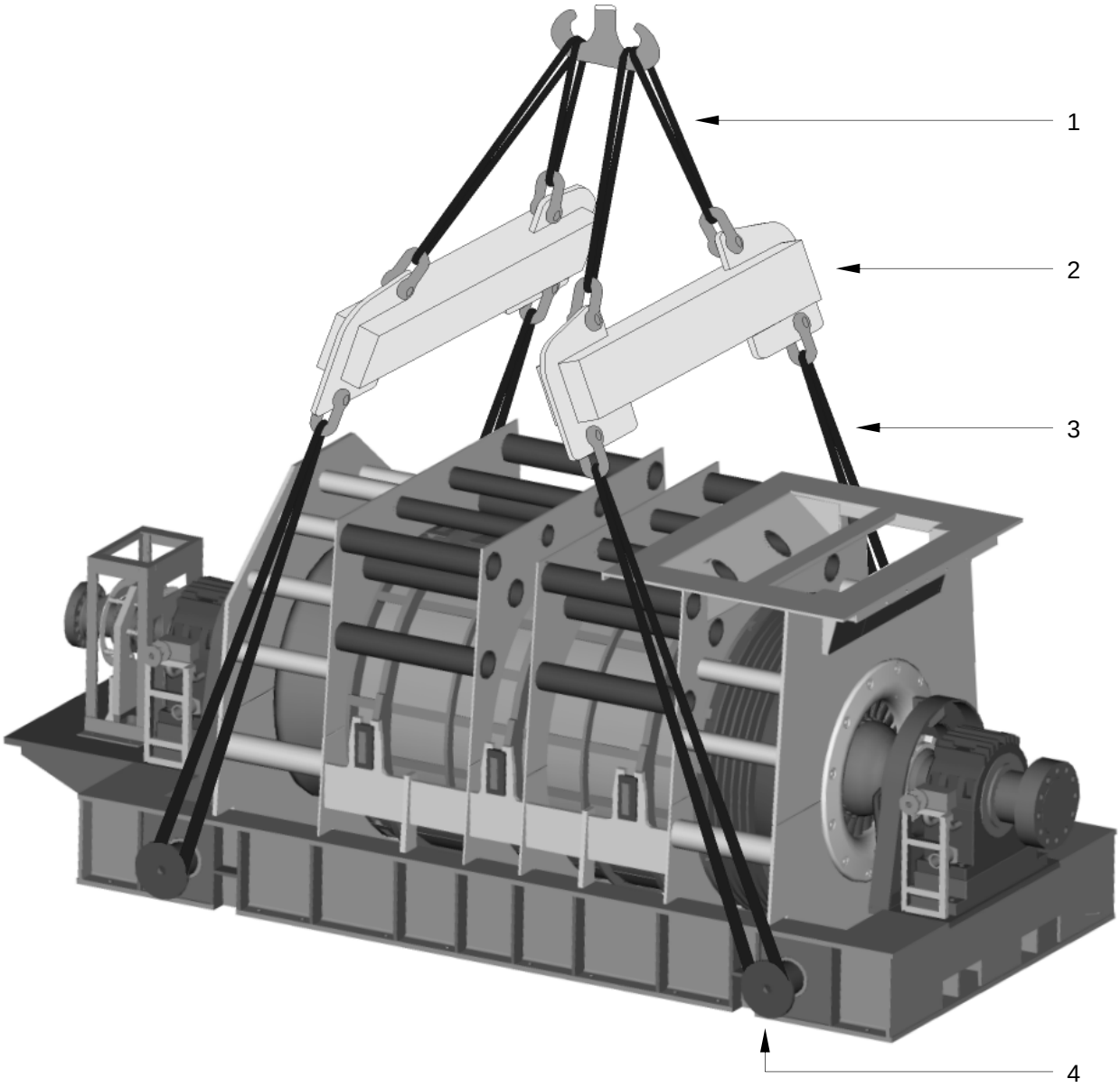
Notice:

Support and lift the generator parts only at the bollards of base frame.

Only use the appropriated lifting equipment (lifting beams / round slings).

The lifting equipment must be in good condition and have a sufficient load carrying capacity.

Only use qualified and experienced staff for attaching loads or instructing crane operators.



1 Round sling (short)
2 Lifting beam
3 Round sling (long)
4 Bollard at base frame

Fig. 1 Attaching the generator

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The delivered special wrench is required for mounting, dismounting, and axial adjusting of the air baffle ring.

It consists of two wrenches [items (6) and (8)] and four parallel pins [item (7)]. It is required for axial adjusting by turning the screw collars [item (3)].

For mounting or dismounting of the air baffle ring only one wrench [item (8)] is required to tighten or loosen the hexagon nuts [item (2)].

Before axial adjusting or dismounting of the air baffle ring the cotter pins have to be removed. After axial adjusting or mounting of the air baffle ring **new** cotter pins have to be inserted. One set of new cotter pins is included.

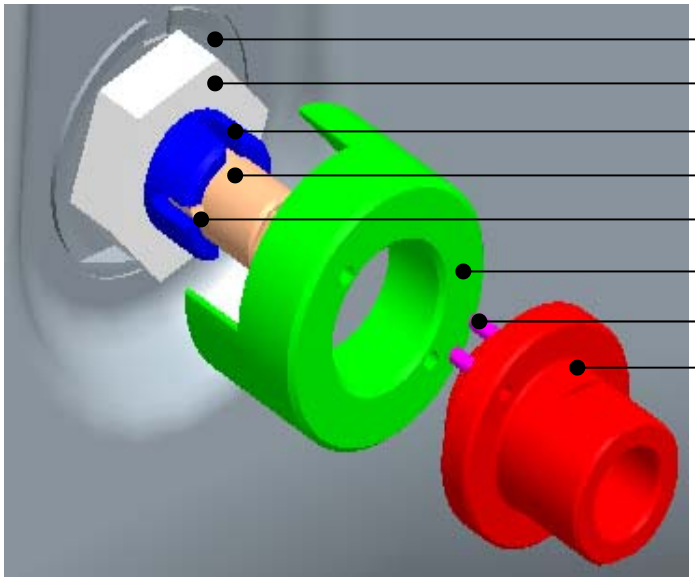


Fig. 1: Special wrench

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Notice:
Screwed connections at air baffle ring (see Fig. 1) are not secured with delivery. Align the radial clearance according to shop assembly record at site. Therefore open the nut (item 170). Align the axial clearance according to shop assembly record at site. Therefore adjust castellated screw collar (item 160). After alignment look the castellated screw collars with new splint (item 130). Tighten nut (item 170) and lock it up with tab washer (item 140) after alignment.

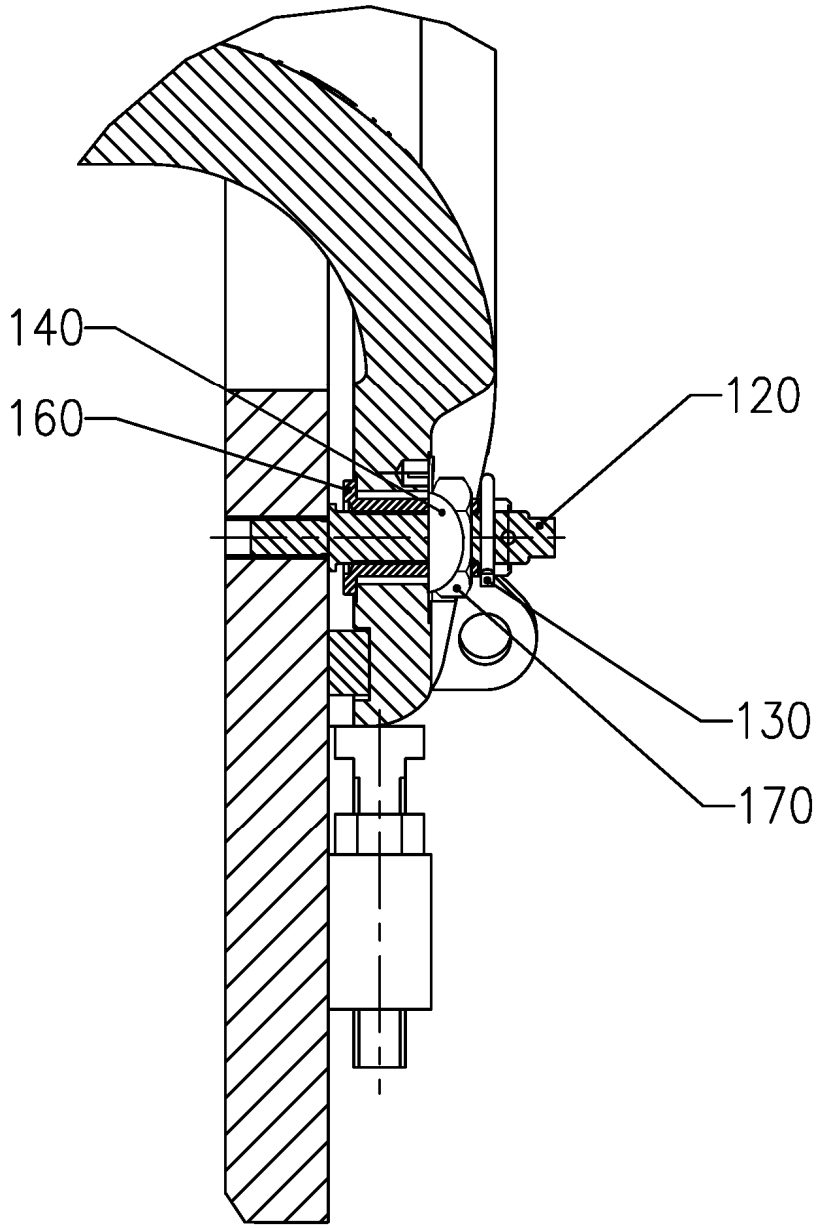


Fig. 1

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Attention:
The blower blades are locked with a socked head screw (**1**), a plate (**2**) and Loctite 243 (cement).
For disassembly of the blades remove screw (**1**) and plate (**2**).
For assembly of the blades lock plate (**2**) witch screw (**1**). Apply Loctite 243 on screw (**1**) and tighten it with tightening torque 10Nm.

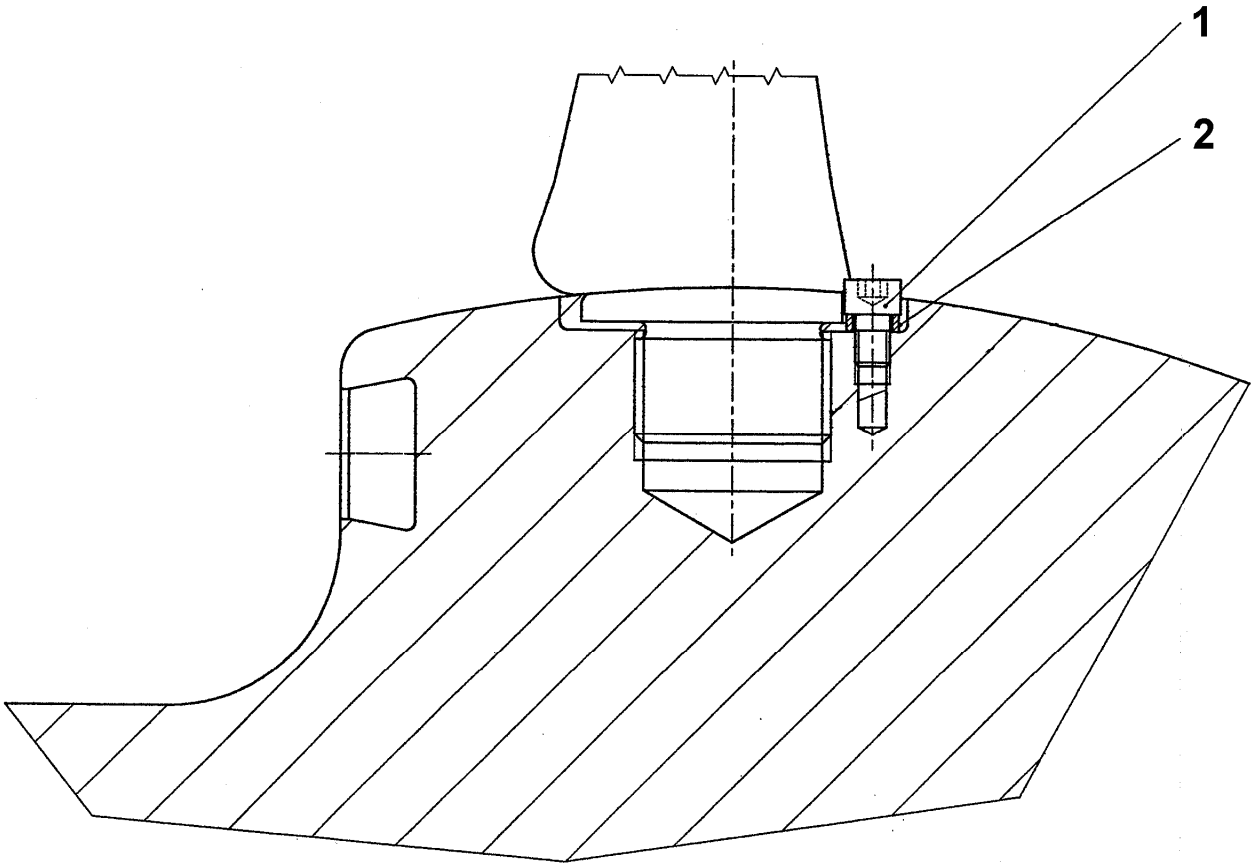


Fig. 1

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1 Recommended nominal tightening torques for bus bar boltings

NOTE:

Use table data only if there are no special values given by the neutral point/line side cubicles' supplier.

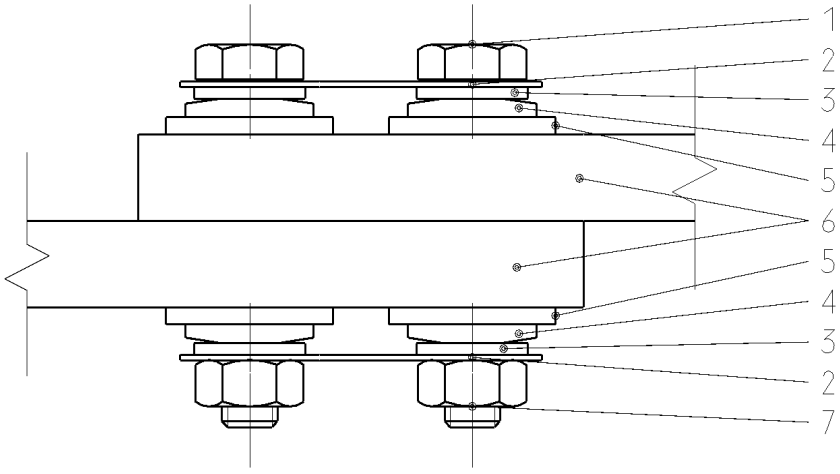
Table data are valid for DC and AC up to 60 Hz. Screws and nuts have to be made of austenitic steel (e.g. A2-70 or A4-70), all other connecting and locking elements should be made of nonmagnetic material as well.

Thread size	Indoor	Indoor & outdoor
	Lubricant: Oil or grease	Lubricant: MoS_2
	Tightening torque [Nm]	Tightening torque [Nm]
M4	1,5	2
M5	2,5	3
M6	4,5	5,5
M8	10	15
M10	20	30
M12	40	60
M16	80	120

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2 Connection bus bar – bus bar, version 1

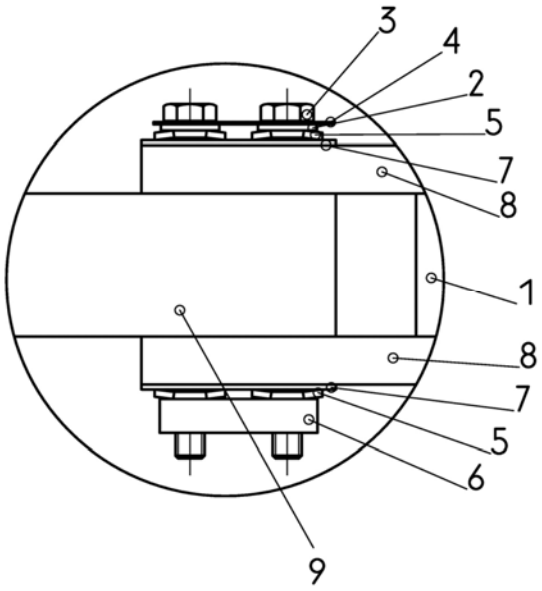
(Principal drawing, for details see Installation Manual, chapter Drawings)



1 Hexagon screw
2 Double-locking plate
3 Tab washer DIN 125
4 Clamping disk DIN 6796
5 Tab washer DIN 9021
6 Bus bars
7 Hexagon nut

3 Connection bus bar – bus bar, version 2

(Principal drawing, for details see Installation Manual, chapter Drawings)

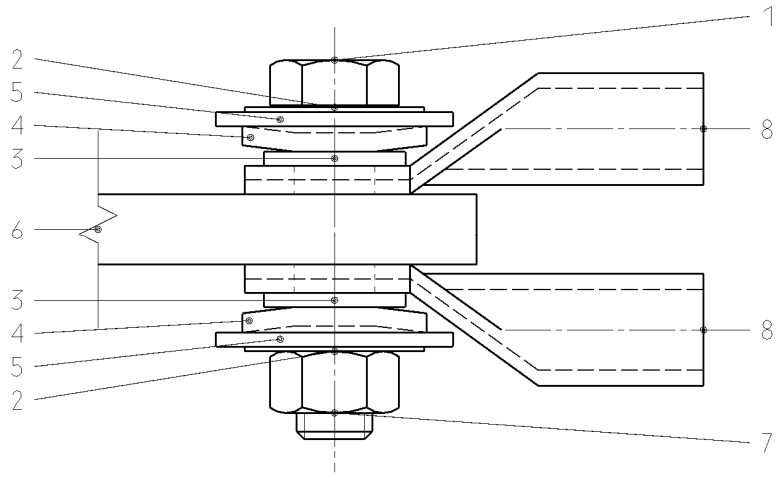


1 Bus bar
2 Tab washer ISO7090
3 Hexagon screw
4 Double-locking plate
5 Clamping disk DIN 6796
6 Twin nut
7 Steel sheet
8 Connecting piece
9 Feed-through bar

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4 Connection cable bus bar – terminal lugs, version 1

(Principal drawing, for details see Installation Manual, chapter Drawings)

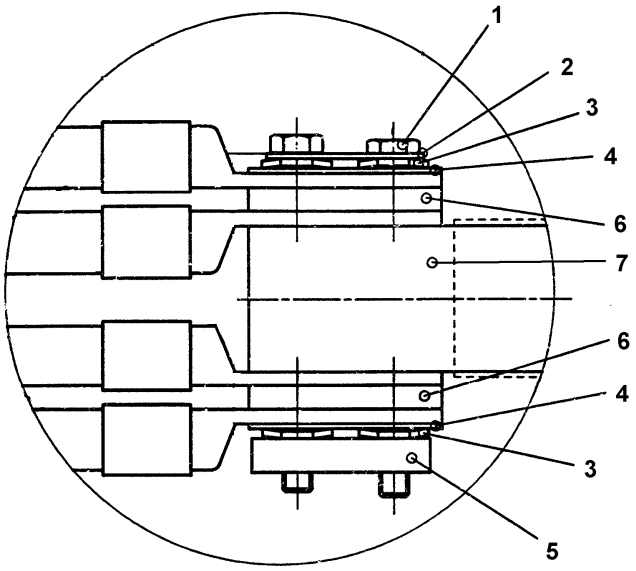


1 Hexagon screw
2 Double-locking plate
3 Tab washer DIN 125
4 Clamping disk DIN 6796
5 Tab washer DIN 9021
6 Bus bar
7 Hexagon nut
8 Cable lug

two terminal lugs arranged on each bus bar side

5 Connection cable bus bar – terminal lugs, version 2

(Principal drawing, for details see Installation Manual, chapter Drawings)



1 Hexagon screw
2 Double-locking plate
3 Clamping disk DIN 6796
4 Steel sheet
5 Twin nut
6 Plate
7 Bus bar

two terminal lugs arranged on each bus bar side

After final assembly, the bolt heads are secured by bending up the double-locking plates.

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The check whether an alignment correction is required on the generator during the first installation should be made after foundation grouting and anchor bolts tightening, but before peripheral components such as pipes and cables are mounted.
The following steps must be performed after foundation grouting whenever an alignment correction of the generator rotor to the turbine rotor is necessary:

1.0 Preparation for Alignment

1.1 Registration and Recording of Actual Conditions

- Check all foundation bolts to the corresponding torque
(See Installation Manual)

Anchor size	Thread pitch	Old concrete foundation (at least 3 to 4 years)		New concrete foundation or steel foundation		Bolt design
	mm	Δl_O in mm/m	M_O in Nm	Δl_N in mm/m	M_N in Nm	
M36	4	0.70	850	0.95	1000	DIN
M42	4.5	0.70	1400	0.95	1800	DIN
M48	5	0.70	2000	0.95	2700	DIN
M52	5	0.70	2600	0.95	3500	DIN

Table 1-1: Maximum tightening torques for different types of foundation and different anchor sizes

- Check both the radial and the axial coupling alignment

The expansion or contraction to be expected because of temperature changes must be taken into account for radial alignment whenever the generator is coupled to a driven machine which has an operating temperature that differs considerably from the installation temperature.

The rotor must allow free rotation without touching neither stator, or brush carrier, or similar parts. Pour clean machinery oil into the oil distribution grooves in the bottom part bearing shells. Switch the oil pressure relief to ON, if any, and rotate the rotor for one turn.



CAUTION
Coupling alignment must be performed without oil pressure relief.

If possible, rotate the rotor manually; otherwise use either a crane, or a hydraulic jack. To avoid measuring errors during alignment, rotate at the opposite shaft end if possible. When using a crane, sling two ropes with several turns around the shaft such that the rotor is turned in the direction of rotation when the ropes are pulled. Hang one loop each on an auxiliary bolt covered with copper or pressboard to the left and to the right of the coupling, and hang the other loops on the crane hook.



CAUTION
Do not allow the rope to unwind up to the end. Do not use this procedure when the oil pressure relief is switched ON.

Ropes must be dimensioned at least to such a value that they could lift half the rotor weight.
If there is a good oil film on the shaft, the rotor may also be turned using a hydraulic jack applied to an auxiliary bolt of the coupling.

- Check all air gaps on the sealing labyrinths and air guide baffle rings of generator

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1.2 Calculation of the Modifications Required and Further Action

Calculate the resulting positional changes of the bearing blocks in accordance with the indications given on the Alignment of Turbine - Generator, in the Manual, Part 1.
A decision on how to proceed further should be taken on the basis of a comparison between the values calculated and the maximum permissible air-gap deviations of the rotor to the stator core. If the calculated positional changes exceed the tolerances of the stator air gap, a decision should be taken on whether to modify the foundation, or relocate turbine and generator rotor.

NOTE

Air gaps according to the drawing on "Axial and radial rotor clearances" Drawing no.: *DPPPG-70166125*. All measurements seen from TE*.

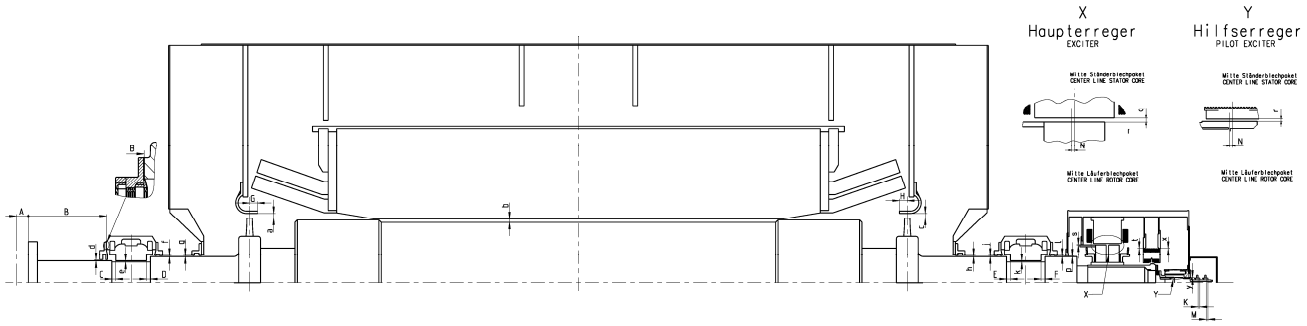


Figure 2-1: Axial and Radial Rotor Clearances

Maß DIM.	Sollmaß SPEC. DIM.	zul. Toleranz ALLOW. TOLERANCE +	−
A	2,9		
B	560		
C	35,0	1	1
D	35,0	1	1
E	35,0	1	1
F	35,0	1	1
G	65	5	5
H	65	5	5
K	25,5	1	1
M	25,5	1	1
N	2,8	1	1

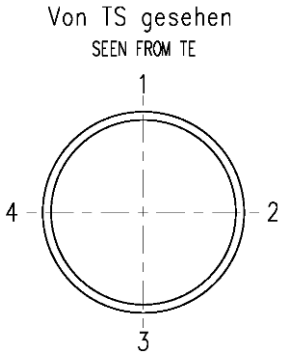


Figure 2-2: Axial Clearances

Maß DIM.	Sollmaß SPEC. DIM.	zul. Toleranz ALLOW. TOLERANCE +	−
a	2,3	0,5	0,5
b	46	2,3	2,3
c	2,3	0,5	0,5
p	0,5	0,2	0,2
q	8	0,5	0,5
r	2,5	0,3	0,3
s	8	2	2
t	1	0,2	0,2
x	1	0,2	0,2
y	0,5	0,2	0,2

Maß DIM. / Messpunkt MEAS. POINT	1 max.	1 min.	2 max.	2 min.	3 max.	3 min.	4 max.	4 min.
d	0,27	0,13	0,14	0,06	0,00	0,00	0,14	0,06
e	0,41	0,35	0,54	0,46	0,00	0,00	0,54	0,46
f	0,27	0,13	0,14	0,06	0,00	0,00	0,14	0,06
g	0,65	0,35	0,35	0,20	0,05	0,05	0,35	0,20
h	0,65	0,35	0,35	0,20	0,05	0,05	0,35	0,20
j	0,27	0,13	0,14	0,06	0,00	0,00	0,14	0,06
k	0,41	0,35	0,54	0,46	0,00	0,00	0,54	0,46
l	0,27	0,13	0,14	0,06	0,00	0,00	0,14	0,06

Figure 2-3: Radial Clearances

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If it is possible to correct the coupling alignment within the permissible tolerances, proceed as follows:

- Disassemble and mark positions of air sealing labyrinths, bearing labyrinths and earthing brushes TE / EE
- Compare the required positional changes on the bearing blocks with the air gaps of the air guide baffle rings TE / EE; disassemble the rings if necessary

	NOTE **The air guide baffle rings can be re-adjusted correspondingly after loosening the screwed connections and setting the adjusting screws.**

For installation and alignment:

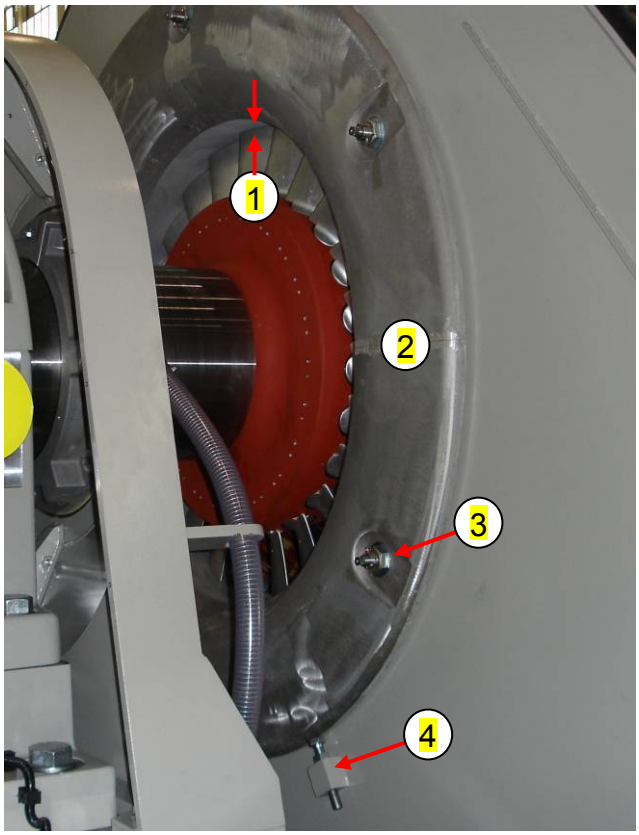


Figure 2-4: Air Baffle Ring mounted

For adjustment the air gap (1) setup the complete air guide ring (2).

First, open the 6 nuts (3) M30*2.0. Second, adjust the air guide ring with the two adjustment screws (4) on the bottom of front wall. Set the air gap around, in vertical and horizontal position on equal values.

Final, tighten and lock the 6 nuts (3) M30*2.0 with the lock washers.

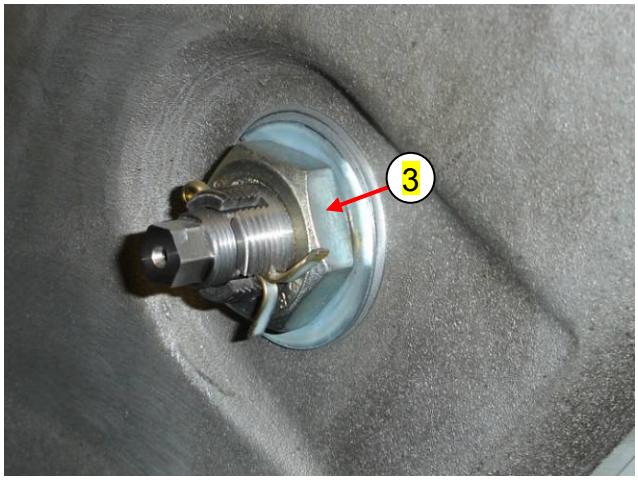


Figure 2-5: Detail Fixing Screw

	CAUTION **Take appropriate precautions to prevent overturning and falling when disassembling all screwed connections.**

- Disassemble the bearing block holding-down bolts, and loosen or remove the dowel pins
- Disassemble oil inlet and drain flanges

	CAUTION **Make certain that you have removed the oil filling in the bearing blocks beforehand.**

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- Disassemble all vibration pick-ups
- Install dial indicators to detect vertical and horizontal shaft movements during alignment correction
- Disassemble the bearing covers and the top bearing shells
- Install the bearing transport securing devices or one Cautasit shim each on the shaft top side to the following allowances: 0.5 - 1mm thick x bearing length x ¼ of shaft circumference

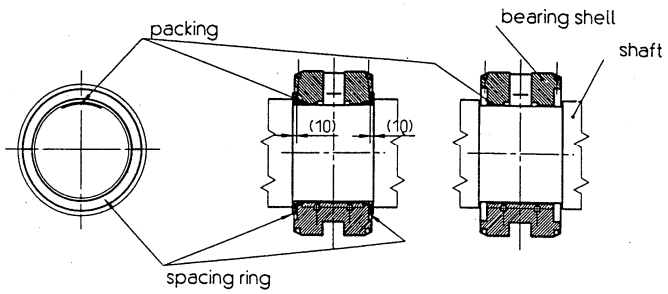


Figure 2-6: Rotor securing precaution

	CAUTION **Do not turn the rotor using the bearing transport securing device or the shims!**

- Install both bearing top shells and bearing covers.
- Support an appropriate oil pressure jack in a central position under the shaft in the area between the bearing block and the fan hub, or between bearing block and exciter.

2.0 Rotor Alignment

Alignment work should be carried out separately for every bearing block, and be checked subsequently by radial and axial distance measurements on the coupling.
Before starting the lifting process proper, re-adjust all dial indicators once again, and check the required freedom of motion of the rotor including the bearing blocks.
The lifting process must be checked continuously on the lifting device's oil pressure gauge, and on the dial indicators.
Maximum TE and EE lift should be smaller than the existing air gaps of the air baffle rings or of the exciter. Check for the indications on “axial and radial rotor float”.
Reliefs lift of between 0.5 - 1.5 mm is recommended to replace shims for height correction.

	CAUTION **When replacing the shims, make certain that uniform modifications are made at all points of support. Ensure cleanliness when installing the shims.** **Remove any foreign materials and dirt particles on a wide area before.**

The lateral movement can be achieved using an appropriate and stable reinforcing rod in the bearing block holding-down bolt holes.
If any thrust block is available by the sides of the bearing blocks, you can also use jacking screws, oil pressure jacks, or pressing screws.

	CAUTION **Before applying any levers, use protective shims made of aluminum, copper or similar materials to protect the threads in the bearing block mounting holes.**

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After correction, the hydraulic jack must be lowered slowly.
Subsequently, fasten all holding-down bolts of the bearing blocks, remove the shims or bearing safety devices, and perform repeated radial and axial measurements on the coupling.

	CAUTION **Make certain that clean turbine oil is fed to the bearing when turning the rotor. This oil can be poured onto the bearings continuously while turning. The oil drain should be mounted before, or appropriate measures should be taken to catch the oil that will be running off.**

Depending on the results obtained by the check measurement on the coupling, the entire process should be repeated starting with item 1.2 and until the required alignment quality is achieved.
After completing work on the rotor, re-align the exciter stator according to the positional change of the EE bearing block.
This requires the following work steps:

- Remove all holding-down bolts
- Remove all shaft packings (done under item 1.2, should be checked again now)
- Check the air gaps for freedom of motion
- Hang the lifting equipment located above the exciter with the slings being extended correspondingly into the stator suspension shackle.
- Lift the stator while continuously checking the readout on the dial indicators installed beforehand.
- Place compensating shims under the stator foot to correct the height.

The lateral movement can be achieved using an appropriate and stable reinforcing rod in the stator foot holding-down bolt holes.
If thrust blocks are available by the sides of the exciter, you can also use jacking screws, oil pressure jacks, or pressing screws.

	CAUTION **Before applying any levers, use protective shims made of aluminum, copper or similar materials to protect the threads in the foot mounting holes.**

After correction, the lifting equipment must be lowered slowly.
Subsequently, fasten all holding-down bolts of the stator foot, and measure the air gaps at 4 measuring points on the laminated core, or on the seal faces toward the housing. As a reference, you can use the initial values as determined by dimensional data recording under section 1.1 on the seal faces toward the housing before rotor alignment.

	NOTE **Make certain that the alignment quality of air gap is ensured as per drawing "Axial and radial rotor clearances" drawing no.: *DPPPG-70166125.***

After completing all alignment corrections, finish-ream all dowel pin holes without offset, and install all labyrinths, air baffle rings, and screwed connections in accordance with manufacturer instructions.

All modifications to the original positions of rotor and exciter stator should be recorded and included in the life-cycle dossier.

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Manufacturing Specifications

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SIEMENS	Unterlagenart / Document type **Fertigungsvorschrift** **Manufacturing procedure**	Nr./No.: **FV/MP 12-011** Datum/Date:2013-08-07 Revision: 3 Herausgeber/Issued by: E F PR GN EN ERF GD 1

Titel/Title

Verankern und Vergießen des Generatorgrundrahmens
Anchoring and Grouting of the Generator Base Frame

Prozessfähigkeit:	vorläufig ☐	endgültig ☒

Seite: 1 von 16 Anlagen:

Handhabung: offen / open

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Verteiler: EN ERF, ERF OM2

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Generatorenwerk Erfurt

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1 Allgemeines

Verantwortlich für Inhalt und Änderungsdienst dieser FV ist die Abteilung Konstruktion des Siemens AG – Generatorenwerkes Erfurt.

1.1 Änderungsmitteilung

Revision	Datum	Änderungsinhalt
1	2001-06-28	Erste Ausgabe
2	2009-04-16	Zweisprachige Ausgabe
3	2013-08-07	Kapitel 3.2.3 überarbeitet

1.2 Zweck

Die Fertigungsvorschrift beschreibt die notwendigen Arbeitsabläufe und Maßnahmen zum Einbau und Verguss von Generatorgrundrahmen auf Beton-fundamenten entsprechend den technischen Anforderungen.

1.3 Geltungsbereich

Siemens AG
Energy Sector
Power Generation
Generatorenwerk Erfurt

2 Verantwortung und Zuständigkeiten

Für die Einhaltung dieser Fertigungsvorschrift ist das Montagepersonal im Kraftwerk zuständig.

1 General

The Design Department of the Siemens AG Generator Plant Erfurt is responsible for the content and revision service of this manufacturing procedure.

1.1 Technical Modification Report

Revision	Date	Alteration contents
1	2001-06-28	First Edition
2	2009-04-16	Bilingual Edition
3	2013-08-07	Chapter 3.2.3 changed

1.2 Purpose

The Manufacturing Specification describes the necessary work sequences and measures for the anchoring and grouting of generator base frames on concrete foundations according to the technical requirements.

1.3 Scope of Validity

Siemens AG
Energy Sector
Power Generation
Generator Plant Erfurt

2 Responsibility and Competences

The field assembly personnel is responsible fort he observance of this manufacturing specification.

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3 Prozessbeschreibung

3.1 Informationen zum Generator

3.1.1 Zeichnungsunterlagen

- Generatormaßbild
- Generatormaßbildtext
- Verankerungszeichnung

3.1.2 Ausrichthilfen

Für die Baustellenmontage werden folgende Ausrichthilfen bereitgestellt:

- Am Grundrahmen sind Auflageplatten angeschweißt. Außerdem werden Erstauflageplatten und Gleitplatten (Teflonplatten) geliefert, um das horizontale Ausrichten des Generators ohne Kranhilfe zu erleichtern.
- Zur vertikalen Ausrichtung des Generators dienen Ausrichtschrauben, die sich in unmittelbarer Nähe der Ankerschrauben befinden.
- Der Ist-Zustand der Generatorausrichtung auf dem Werksprüffeld ist im Werksmontageprotokoll festgehalten.

3.2 Vorbereitung der Generatoraufstellung

3.2.1 Vorbereitung des Betonfundaments

Vor dem Beginn der Montagearbeiten wird das Fundament auf seine Maßhaltigkeit überprüft.

Zur Sicherung ausreichender Vergussmaterialhaftung muss durch Öl oder Fett verunreinigter Beton genügend tief abgestemmt werden. Die Grundrahmen- unterseite muss ebenfalls öl- und fettfrei sein. Eine Farbgrundierung kann erhalten bleiben.

3 Process Description

3.1 Generator Information

3.1.1 Drawings

- Generator Dimension Drawing
- Generator Dimension Drawing Text
- Anchoring Drawing

3.1.2 Alignment Aids

For the field erection, the following alignment aids will be provided:

- Supporting plates, welded to the base frame. In order to facilitate horizontal generator alignment without a crane, primary bearing plates and Teflon plates will be provided as well.
- Levelling screws, located directly beside the anchor bolts, will be provided for the vertical alignment of the generator.
- The alignment of the generator, as measured at the manufacturer's testing station, will be specified in the Manufacturer's Installation Report.

3.2 Preparation for Generator Installation

3.2.1 Preparation of the Concrete Foundation

Check the dimensional accuracy of the foundation before starting any installation work.

Caution: In order to ensure sufficient adherence of the grouting compound, be sure to chisel off soiled concrete properly. The underside of the base frame needs to be free from oil and grease as well. Any priming coat may remain as it is.

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3.2.2 Legen der Erstauflage- und Ausrichtplatten

Siehe Anlage 1!

Die vier Erstauflageplatten werden unterhalb der an den Eckpunkten des Grundrahmens angeschweißten Platten höhengleich und waagerecht mit Vergussmaterial ausgerichtet (Anlage 1, Abb. 1).

Dazu wird die Position der Erstauflageplatten auf dem Fundament angezeichnet (siehe Verankerungszeichnung). Alle Erstauflageplatten werden nun in Vergussmörtel (z.B. Pagel V14/10 – Lieferumfang Siemens) gelegt. Dabei müssen die oberen (geschlichteten) Flächen waagerecht auf einheitlicher Höhe liegen.

Die Höhenposition wird nach einer vom Montagepersonal anzubringenden Messmarke oder einer vorhandenen Maschine, an die der Generator angebaut wird, und dem aus der Verankerungszeichnung ersichtlichen Maß bestimmt. Die Platten dürfen frühestens nach 24 Stunden Abbindezeit belastet werden (vergleiche Spezifikation des Vergussmaterial-Herstellers).

Dann sind die übrigen Auflageflächen für die Ausrichtplatten der Einstellschrauben des Grundrahmens auf dem Fundament anzuzeichnen und die Ausrichtplatten in Vergussmörtel entsprechend Verankerungszeichnung zu legen (Anlage 1, Abb. 2). Die Ausrichtplatten dürfen im Allgemeinen frühestens nach 24 Stunden belastet werden (vergleiche Spezifikation des Vergussmaterial-Herstellers).

Im gesamten Vergussbereich muss der Abstand zwischen Betonoberfläche und Grundrahmenunterkante größer als 20 mm (Vergusshöhe) sein. Falls erforderlich, ist der Beton abzuarbeiten.

3.2.2 Laying of Primary Bearing and Leveling Plates

Refer to attachment 1!

Using grouting compound, align the four primary bearing plates horizontally and at equal heights under the plates welded onto the corners of the base frame (Attachment 1, Fig. 1).

For this purpose, mark the position of the primary bearing plates on the foundation (see anchoring drawing). Then set all the primary bearing plates into the grouting compound (e.g. Pagel V14/10 – supplied by Siemens). Make sure the upper (smooth) surfaces are horizontal and at the same height.

The relevant height is to be determined both on the basis of a measuring mark to be made by the personnel performing the installation or an existing machine to which the generator is to be attached, and the dimension specified in the anchoring drawing. Do not subject the plates to any load until after a 24-hour setting period (cf. grouting compound manufacturer's specification).

As a next step, mark the other seating surfaces for the leveling plates of the base frame leveling screws on the foundation and set the leveling plates into the grouting compound, as shown in anchoring drawing (Attachment 1, Fig. 2). Generally, the leveling plates must not be subjected to any load until 24 hours later, at the earliest (cf. grouting compound manufacturer's specification).

Be sure to keep a minimum distance of 20 mm (grouting height) between the upper concrete surface and the bottom edge of the base frame over the entire grouting area. Chisel off the concrete, if necessary.

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3.2.3 Aufteilung und Einschalung der Gießflächen

Die zu untergießende Fläche wird so in einzelne Abschnitte unterteilt, dass die Fließrichtung des Vergussmaterials eindeutig bestimmt ist. Die Größe der Einzelvergussfelder muss abhängig von der Pumpenleistung festgelegt werden. Nur so kann die Verarbeitungszeit des Vergussmaterials eingehalten werden. Die einzelnen Abschnitte werden dazu vor dem Aufsetzen des Grundrahmens mit wasserabweisendem dauerelastischem Schaumstoff (z.B. Etafoam) ausreichend breit eingeteilt. Die Abtrennung der einzelnen Felder wird so dicht gestaltet, dass kein Vergussmaterial in andere Felder austreten kann. Der Schaumstoff ist bauseits beizustellen.

Bei beengten Platzverhältnissen wird vorab eine verlorene Schalung angebracht. Zur Kontrolle des Vergussniveaus ist diese verlorene Schalung in einem Abstand von mindestens 25 mm zur Grundrahmenwand zu montieren. Die Dichtheit der verlorenen Schalung wird ggf. durch Schwallwasser optisch geprüft.

Das Vergießen hat vollflächig zu erfolgen (Blockfundament).

3.2.3 Subdivision and Shuttering of Grouting Segments

Subdivide the area to be grouted in individual segments, so that the direction of flow of the grouting compound is clearly determined. The dimensions of the individual grouting segments should be determined dependent on the pump capacity. Only thus the processing time specified for the grouting compound can be observed. So, before putting the base frame in place, mark off the various segments wide enough, using water-repellent, permanently elastic foamed plastic, such as Etafoam. Be sure to keep the individual segments so tightly separated from each other that no grouting compound can leak into other segments. The foamed plastic is to be provided by the building contractor.

If space is restricted, permanent shuttering needs to be installed beforehand. Mount such formwork at a minimum distance of 25 mm from the base frame wall, so that the grouting height can be checked. If necessary, visually check the tightness of the permanent formwork, using flash water.

The grouting has to be done holohedral (foundation block; no wall footing).

Bei Grundrahmen mit gerippter Bodenfläche können die Hohlräume zwischen den Rippen nicht restlos ausgefüllt werden; wichtig ist aber, dass alle tragenden Grundrahmenflächen, auch die diversen breiten Querträger, komplett untergossen werden.

Eine Ausnahme bilden Generatoren mit Ausleitung nach unten. Der bei dieser Ausführung nicht zu vergießende Bereich ist dem Maßbild sowie der Verankerungszeichnung zu entnehmen.

In case of base frame with finned bottom area the hollow spaces between the rips cannot be filled completely, but it is important that all supporting base frame areas including the flat traversal girder are complete grouted.

Generators with current lead on the bottom side are the exception. The bare foundation area of this design is shown in the Dimensional Drawing and in the anchoring drawing.

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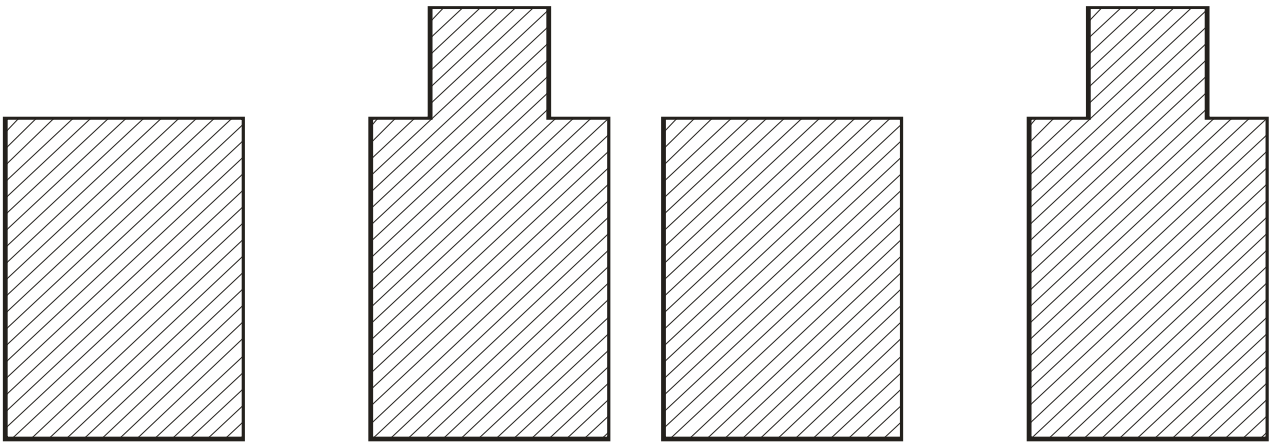


Abb. 1: Auszugießende Flächen bei den unterschiedlichen Grundrahmentypen

Fig. 1: Areas of the Different Base Frame Types to Be Grouted

3.3 Generator ausrichten und aufstellen

3.3.1 Generator auf dem Fundament absetzen

Ein verzugsarmes Absetzen auf dem Fundament ist Vorbedingung für eine gute Montage. Dies soll mit folgenden Maßnahmen erreicht werden:

- Beim Absetzen des Grundrahmens auf die Auflageplatten dürfen die Ausrichtschrauben noch nicht auf den Ausrichtplatten aufsetzen.
- Der Generator wird nur auf die vier vorbereiteten Stellen, Auflageplatten A1 bis A4 (dies sind die an der Unterseite des Grundrahmens angeschweißten schlichtgefrästen Platten – Abb. 2), abgesetzt.
- Auf jede Erstauflageplatte (Fundament) wird zur Erleichterung des Ausrichtens eine mit Gleitmittel gefettete Teflon-Gleitplatte gelegt (Anl., Abb. 1).

3.3 Generator Alignment and Installation

3.3.1 Placement of Generator on Foundation

Placement on the foundation with as little distortion as possible is indispensable for proper installation. This can be achieved by the following measures:

- Make sure that the leveling screws do not yet rest on the leveling plates when the base frame is being placed on the primary bearing plates.
- Deposit the generator only on four specially prepared areas, i.e., supporting plates A1 to A4. (These are the finish-milled plates welded to the base frame underside – Fig. 2).
- To facilitate the alignment, place a greased Teflon plate on each primary bearing plate (Att. 1, Fig. 1).

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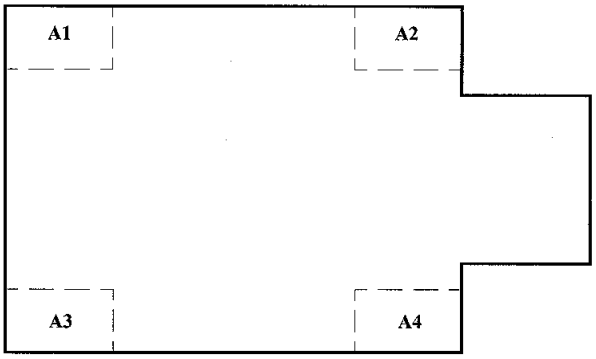


Abb. 2: Kennzeichnung der Auflageplatten am Grundrahmen (Draufsicht)

- Die Auflageplatten sind im Werk höhengleich zur Achsmitte gefertigt und angeschweißt worden. Das Ist-Maß von Achsmitte bis Oberkante der Erstauflageplatten wird in das Montageprotokoll eingetragen.

Das Gewinde der Ausrichtschrauben wird mit Gleitmittel eingestrichen; anschließend werden die Ausrichtschrauben so weit eingedreht, dass diese etwa 5 mm von der Grundrahmenunterseite hervorstehen.
Der Generator kann jetzt verzugsarm auf den vorbereiteten Erstauflageplatten abgesetzt werden.

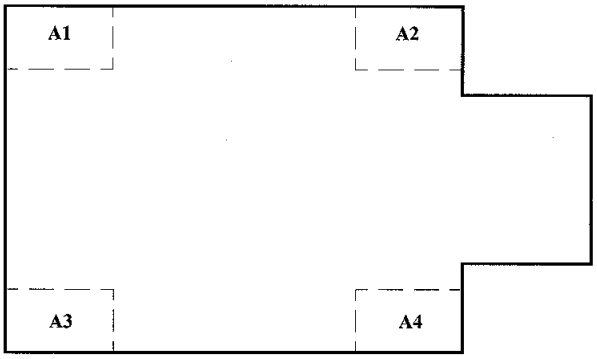


Fig. 2: Marking of Supporting Plates on Base Frame (Plan View)

- In the manufacturer's plant, the supporting plates are welded on and prepared in such a way that they are of equal height in relation to the centre of the axis. The actual distance measured between the centre of the axis and the upper edge of the primary bearing plates is to be recorded in the Installation Report.

Apply an antiseize to the thread of the leveling screws. Then put these screws in place and turn them until they protrude about 5 mm from the base frame lower edge.
The generator can now be deposited on the prepared supporting plates in an almost distortion-free manner.

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3.3.2 Generatorausrichtung

Ziel des Ausrichtvorganges ist es, die Generator- und Turbinenkupplung innerhalb der geforderten Toleranzen zueinander auszurichten.

Das Vergießen des Generators darf erst erfolgen, wenn dies realisiert ist!

Beim Ausrichten muss der Generator sowohl horizontal als auch vertikal möglichst verzugsarm bewegt werden, was durch folgende Maßnahmen erleichtert werden soll:

1. Zuerst ist die horizontale Ausrichtung vorzunehmen. Für Bewegungen in horizontaler Richtung sind an den vier Auflagestellen zwischen Grundrahmen und den Erstauflageplatten mit Gleitmittel versehene Teflongleitplatten vorgesehen. Der Generator ist dabei mittels Hydraulikzylindern zu bewegen, die sich an im Fundament eingegossenen Stahlprofilen abstützen.
2. Nach Abschluss der horizontalen Ausrichtung erfolgt die vertikale Ausrichtung. Für Bewegungen in vertikaler Richtung sind die sogenannten Ausrichtschrauben vorgesehen. Diese Schrauben sind beim Anziehen gewichtsmäßig so zu entlasten, dass das maximale Anzugsmoment (Tab. 1) nicht überschritten wird. Ferner ist darauf zu achten, die Ausrichtschrauben mit dem gleichen, nicht zu großen Drehwinkel zu drehen, damit der Generator parallel angehoben und nicht verzogen wird.

3.3.2 Generator Alignment

Through the alignment process, the generator and turbine couplings are to be aligned to each other within the required tolerances.

The generator must not be grouted until this is the case!

During the alignment process, the generator block needs to be moved horizontally and vertically with as little distortion as possible. This can be achieved through the following measures:

1. First of all, the horizontal alignment is to be carried out. For horizontal movements, greased Teflon plates are to be used on the four seating surfaces between the base frame and the primary bearingplates. The generator is to be moved during this by means of hydraulic cylinders which support on steel profiles grouted in the foundation.
2. After conclusion of horizontal alignment, the vertical alignment is to be carried out. The so-called leveling screws are provided for vertical movements. Unload the leveling screws during tightening so, that the maximum tightening torque (Table 1) will not be exceeded. Keep an eye on it that the leveling screws are turned with the same, not too steep angle of rotation to prevent them from being overloaded and to ensure that the generator is lifted in a parallel fashion, without any distortion.

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Nach Abschluss des Ausrichtens darf der Generator auf keiner der vier Erstauflageflächen mehr aufliegen. Die nunmehr losen Teflongleitplatten der Erstauflageflächen werden entfernt. Der Generator ruht jetzt ausgerichtet ausschließlich auf den Ausrichtschrauben.

When the alignment operation is completed, the generator must no longer rest on any of the four primary bearing plates. Remove the now loose Teflon plates from the primary bearing plates. Properly aligned, the generator only rests on the leveling screws now.

Schrauben-größe	M 24x1,5	M 30x1,5	M 36x1,5	M 42x1,5
Maximales Anzugs-moment	160 Nm	330 Nm	580 Nm	940 Nm

Tab. 1: Ausrichtschrauben - Anzugsmoment

Screw Size	M 24x1,5	M 30x1,5	M 36x1,5	M 42x1,5
Max. Tightening Torque	160 Nm	330 Nm	580 Nm	940 Nm

Tab. 1: Leveling Screws - Tightening Torque

Die Ausrichtschrauben werden nun mit Densobinden gegen das einzubringende Vergussmaterial isoliert, um sie nach dem Verguss zurückdrehen zu können.

Then apply Denso jacketing to insulate the leveling screws in order to be able to turn these back after grouting.

3.3.3 Montage der Fundamentanker

Die Montage der Ankerschrauben ist gemäß den Angaben in FV 12-010 bzw. 12-024 auszuführen.

3.3.3 Anchor Bolt Mounting

The anchor bolts are to be mounted as described in MS 12-010 or 12-024 respectively.

3.4 Vergießen der Fundamentanker

Vor dem Vergießen des Grundrahmens muss der Verguss der Fundamentanker nach FV 12-010 bzw. 12-024 erfolgen.

3.4 Grouting of Anchor Bolts

Be sure to grout the anchor bolts, as described in MS 12-010 or 12-024 respectively, before grouting the generator base frame.

3.5 Untergießen des Grundrahmens

3.5.1 Vorbereitungen

Durch die Unterteilung der zu untergießenden Flächen des Generators in kleine mittlere und große Felder, sind unterschiedliche Bauhilfsmaßnahmen für den korrekten Verguss des Vergussmaterials erforderlich.

Der ausgerichtete Grundrahmen muss zum Untergießen eingeschalt werden. Unter Umständen sind verlorene Schalungen vorzusehen.

3.5 Base Frame Grouting

3.5.1 Preparatory Operations

As a consequence of subdividing the generator areas to be grouted into small, medium-size and large segments, a number of auxiliary construction operations are required to ensure that the grouting compound is correctly poured.

For the purpose of grouting, the aligned base frame has to be shuttered. Permanent formwork may have to be

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Die Verschalungen werden nach den örtlichen Gegebenheiten aus geeigneten Materialien angefertigt und ausreichend befestigt. Die Schalbretter werden mit einem Mittel eingestrichen, welches das Haften des Vergussmittels am Holz verhindert.
Damit das flüssige Vergussmaterial nicht entweichen kann, dichtet man die Verschalung mit Styropor gut ab. Grundsätzlich ist vor dem Vergießen die Dichtigkeit der gesamten Verschalung zu überprüfen.
Das aufzufüllende Volumen je Gießfeld und die daraus resultierende Menge des benötigten Vergussmaterials werden anhand der Angaben des Vergussmittelherstellers berechnet.

used, if necessary.
Taking into account the local situation, the shuttering should be made of appropriate material and should be sufficiently fastened. Apply an appropriate agent over the shuttering boards to prevent the grouting compound from adhering to the wood.
To ensure that the liquid grouting compound cannot escape, properly seal the formwork with polystyrene. Do not forget to check the entire formwork for tightness before grouting.
For each grouting segment, calculate the volume to be filled in and the resultant amount of grouting compound required, using the data supplied by the manufacturer.

3.5.2 Ausrichtkontrolle

Vor dem Untergießen des Grundrahmens wird eine Ausrichtkontrolle vorgenommen. Die Messwerte werden mit dem Montageprotokoll bzw. mit den Baustellenaufschreibungen verglichen.
Je nach Ergebnis ist ggf. über nachträgliches Richten des Grundrahmens zu entscheiden. Beim Nachrichten ist Punkt 3.2 zu beachten.

3.5.2 Alignment Check

Carry out an alignment check before starting to grout the base frame. Compare the values measured with those of the Installation Report or the construction site records. Depending on the results obtained, decide whether to realign the base frame. If any realignment is required, follow the instructions given in Item 3.2.

3.5.3 Vorbereitung des Gießfelduntergrundes

Der Untergrund wird von Staub und Sand befreit. Öl- und Fettrückstände dürfen nicht vorhanden sein. Das Fundament ist mindestens 6 Stunden vor Aufbringung des Vergussmaterials zu wässern und ständig feucht zu halten (siehe auch Vorschriften des Vergussmaterialherstellers).
Aufstehendes Wasser auf dem vorgewässerten Fundament wird vor dem Verguss durch geeignete Mittel, z.B. Druckluft entfernt, um die Bildung von Hohlräumen zu verhindern.

3.5.3 Preparation of Ground under Grouting Area

Clear the ground of dust and sand. Be sure to remove any oil and grease residue. Water the foundation at least 6 hours before applying the grouting compound and keep the foundation constantly wet (see also the instructions issued by the grouting compound manufacturer).
Before starting the grouting process, use appropriate means, such as compressed air, to remove any water accumulated on the watered foundation. This is required in order to prevent cavities from forming.

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3.5.4 Vergussmaterial

Das Vergussmaterial muss in Zusammensetzung und Eigenschaften den vereinbarten bzw. übergebenen Vorschriften und Spezifikationen entsprechen (nicht schrumpfend, z.B. Pagel V1/50, siehe Angaben in FV 12-010 bzw. 12-024). Die Vorschriften des Vergussmaterialherstellers werden durch diese Richtlinie nicht aufgehoben.

3.5.4 Grouting Compound

As far as its composition and characteristics are concerned, the grouting compound must meet the instructions and specifications agreed or furnished (non-shrinking, e.g. Pagel V1/50, see specification in MS 12-010 or 12-024 resp.). This provision does not render void any of the instructions issued by the manufacturer of the grouting compound.

3.5.5 Vergießvorgang

- Die Verwendung einer Mischpumpe für den Vergießvorgang hat sich in der Praxis bewährt.
- Jedes Gießfeld wird ohne Unterbrechung in einem Arbeitsgang vergossen.
- Die Verarbeitungszeit muss je nach Spezifikation des Vergussmittelherstellers unbedingt eingehalten werden. Es ist auf eine kontinuierliche Einfüllung des Vergussmaterials ohne Unterbrechung zu achten, da nach ca. 15 min die Quellung des eingefüllten Materials beginnt. Die Unterbrechung des Einfüllvorgangs kann zu einem Fließstau des Materials und damit zu gefährlichen Hohlräumen im Unterguss führen.
- Werden Mischer eingesetzt, so muss beachtet werden, dass es je nach verwendetem Material zu einem schnelleren Abbindevorgang kommen kann.
- Das Mischverhältnis Vergussmaterial/Wasser muss den Herstellerspezifikationen entsprechen.
- Betonrüttler dürfen nicht eingesetzt werden.
- Das Untergießen erfolgt grundsätzlich von einer schmalen Seite, damit keine Lufteinschlüsse entstehen. Durch die Bewegung des Vergussmaterials im Einfüllstutzen mittels Stampfer und unter den Platten mittels

3.5.5 Grouting Process

- As experience shows, it's advisable to use a mixer pump.
- Fill up each grouting segment in one operation, without any interruption.
- Be sure to adhere to the processing time specified by the grouting compound manufacturer. Fill in the grouting material continuously, without any interruptions, because the filled-in material starts to expand after approximately 15 minutes. Interrupting the filling operation may entail a compound back-up and thus create dangerous cavities in the grout.
- If mixers are used, take into consideration that an accelerated setting may occur, depending on the material used.
- Be sure to observe the grouting compound/water mixing ratio specified by the manufacturer.
- Do not use any concrete vibrators.
- To avoid any air entrainment, always start the filling operation from the narrow side. The flow of the grouting compound can be improved by agitating the compound in the filler stub with the help of a tamper. Using sheet-metal strips, chains or ropes, the

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Blechstreifen, Ketten oder Seilen, kann das Fließen des Materials gefördert werden.

- Die ausreichende Vergusshöhe wird am gesamten Umfang des Grundrahmens und an etwaigen Kontrollöffnungen überprüft.
- Nach Abschluss der Vergussarbeiten wird ein Schottblech senkrecht in den Einfülltrichter gesteckt. Die Oberstände werden nach dem Aushärten entfernt.

same effect can be achieved under the plates.

- Check the correct filling height along the entire length of the base frame and at existing inspection holes.
- When the grouting operations are finished, vertically insert a metal retaining plate into the filler stub. Remove any projecting compound after it has fully set.

3.5.6 Abschlussarbeiten und Ausrichtprotokoll

Der Randbeton zwischen Grundrahmen und Verschalung des Vergussmaterials ist gegen Rissbildung feucht zu halten.

Das Ausschalen und Belasten des Vergusses darf frühestens 24 Stunden nach Einbringung erfolgen.

Nach dem Aushärten des Vergussmaterials werden die Ausrichtschrauben entfernt.

Anschließend werden die Ankerschrauben mit dem entsprechenden Wert vorgespannt (Richtlinie: FV 12-012 bzw. 12-025).

Nach Aufbringung der Ankervorspannung erfolgt die abschließende Ausrichtkontrolle der Anlage. Die Ausrichtwerte sind zu protokollieren.

Sollte sich bei der Überprüfung der Generatorausrichtung herausstellen, dass an der Ausrichtung noch Veränderungen vorzunehmen sind, so muss dies durch Entfernen oder Einfügen von Beilagen unter den Generatorlagerböcken erfolgen.

3.5.6 Concluding Operations and Alignment Report

To prevent the concrete along the edge between the base frame and the grouting formwork from cracking, keep it wet.

The grouting compound may not be subjected to any loads and the formwork may not be removed until 24 hours after the grouting operation.

Remove the leveling screws as soon as the grouting compound has fully set.

Then, pre stress the anchor bolts to the proper value. (see Manufacturing Specification MS 12-012 or 12-025 resp.).

After pre stressing the anchor bolts, perform a final alignment check of the installation. Record the alignment values obtained.

Should such generator alignment check reveal that further alignment modifications are required, carry them out by removing shims from the generator pillow blocks or inserting them under the pillow blocks.

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4 Mitgeltende Unterlagen

FV 12-010	Einbau und Verguss von Durchgangsankern in Betonfundamenten
FV 12-012	Vorspannung von Durchgangsankern und Messen der Schraubenlängung
FV 12-024	Einbau und Verguss von Blockankern in Betonfundamenten
FV 12-025	Vorspannung von Blockankern und Messen der Schraubenlängung

4 Other Applicable Documents

MS 12-010	Installation and Grouting of Trough-Anchor Bolts in Concrete Foundations
MS 12-012	Trough-Anchor Bolts Prestressing and Bolt Elongation Measurement
MS 12-024	Installation and Grouting of Non-Through Anchor Bolts in Concrete Foundations
MS 12-025	Non-Trough Anchor Bolts Pestressing and Elongation Measurement

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Anlage 1: Abbildungen
Appendix 1: Figures

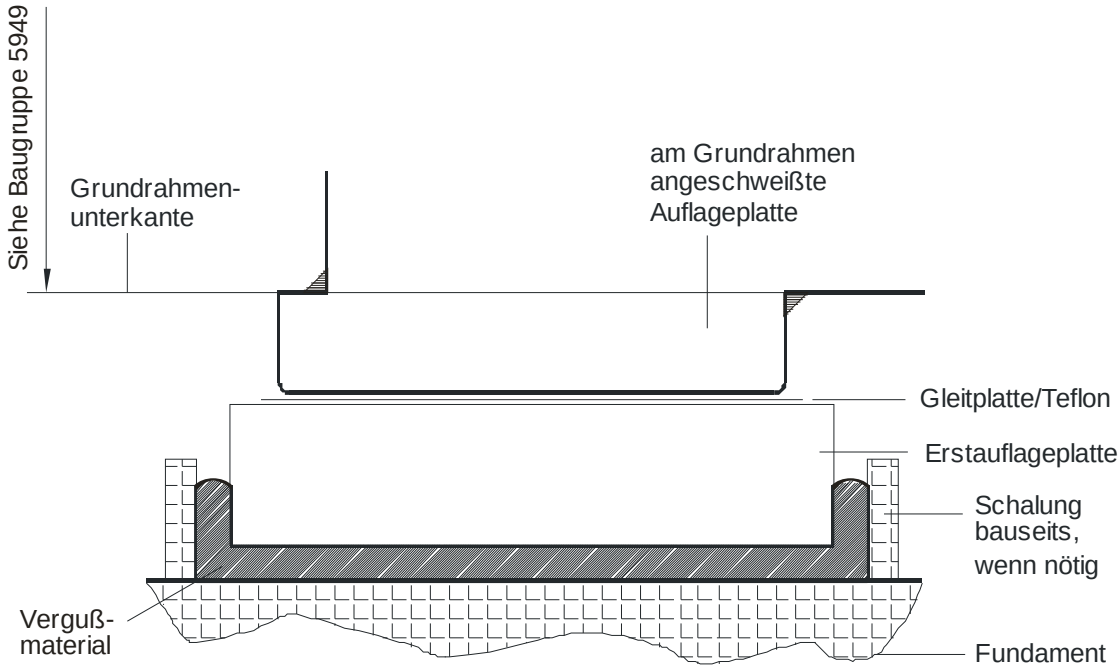


Abb. 1 Erstauflageplatte mit Gleitfolie (Anordnung und Lage der Erstauflageplatten und Ausrichtplatten siehe Generatormaßbild und BG 5949)

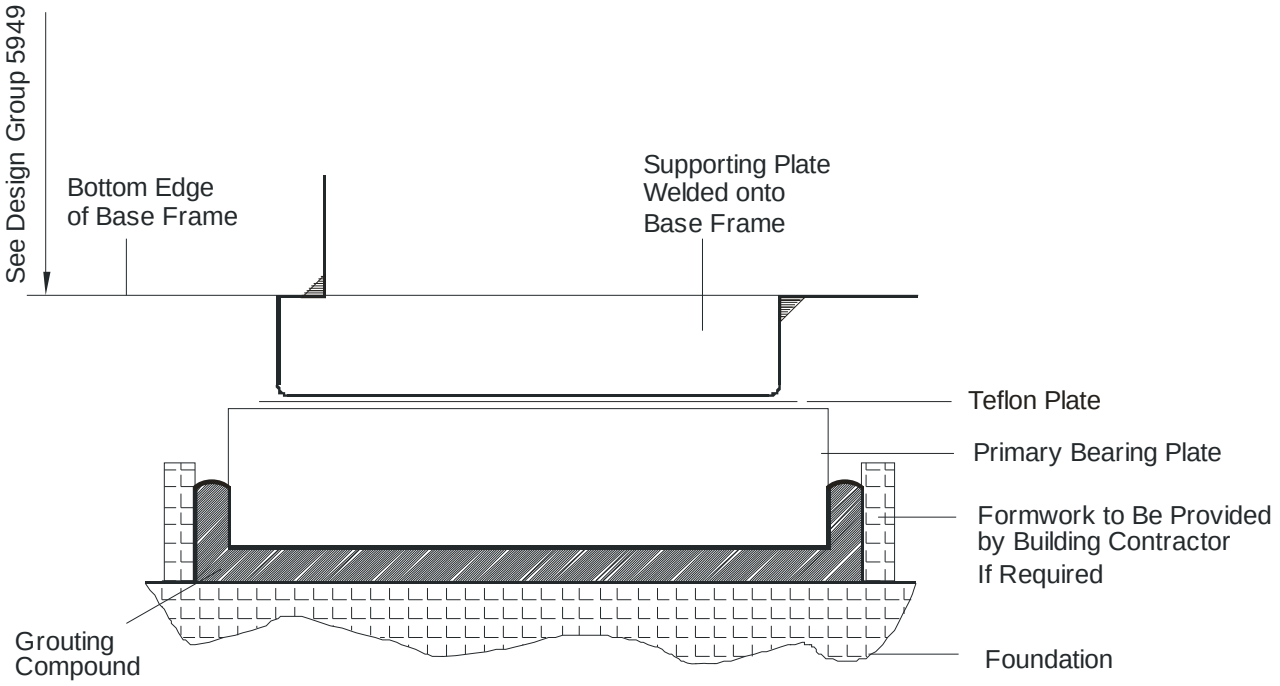


Fig. 1 Primary Bearing Plate with Teflon Plate (for Layout and Position of Primary bearing Plates and Leveling plates, see Generator Dimension Drawing and DG 5949)

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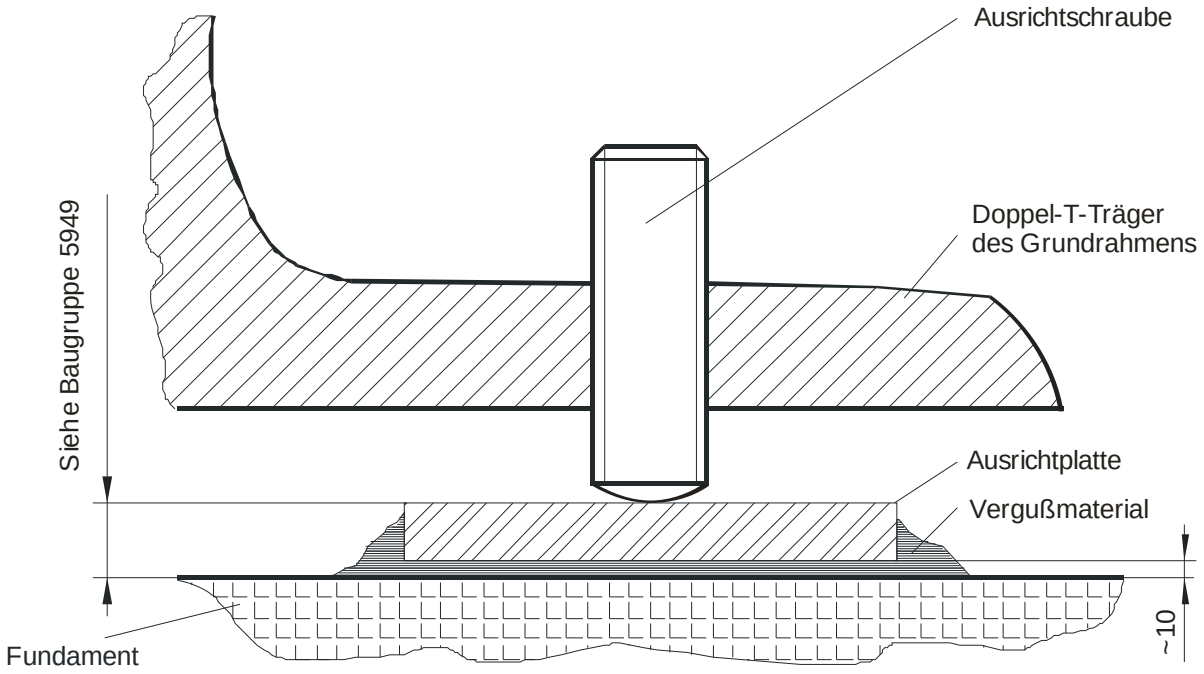


Abb. 2: Ausrichtschraube und Ausrichtplatte

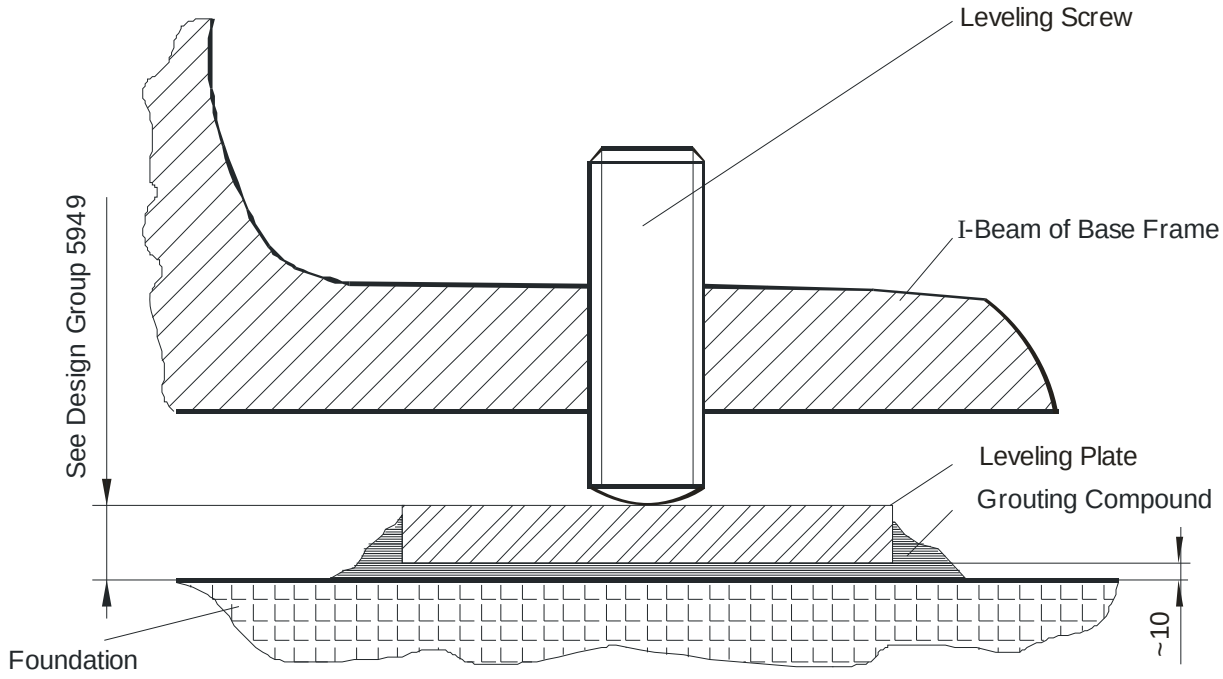


Fig. 2: Leveling Screw and Leveling Plate

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SIEMENS	Unterlagenart / Document type **Fertigungsvorschrift** **Manufacturing Procedure**	Nr./No.: **FV/MP 12-010** Datum/Date: 2009-04-10 Revision: 2 Herausgeber/Issued by: E F PR GN ERF EN 1

Titel/Title

Einbau und Verguss von Durchgangsankern in Betonfundamenten
Installation and Grouting of Through-Anchor Bolts in Concrete Foundations

Anlagen/Appendices:
Handhabung/Handling: offen / open

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1 Allgemeines

Verantwortlich für Inhalt und Änderungsdienst dieser FV ist Siemens AG – Generatorenwerk Erfurt, Abteilung TEK.

1.1 Änderungsmitteilung

Revision	Datum	Änderungsinhalt
1	2001-06-28	Erste Ausgabe
2	2009-04-10	Zweisprachige Ausgabe

1.2 Zweck

Die Fertigungsvorschrift beschreibt die notwendigen Arbeitsabläufe und Maßnahmen zum Einbau und Verguss von Durchgangsankern in Betonfundamenten entsprechend den technischen Anforderungen.

1.3 Geltungsbereich

Siemens AG Energy Sector
Elektrische Generatoren
Generatorenwerk Erfurt

1.4 Abkürzungen und Begriffe

TEK	**T**echnische **K**onstruktion
FV	**F**ertigungs**v**orschrift
EK	**E**in**k**auf
AZ	**A**uftrags**z**entrum
QM	**Q**ualitäts**m**anagement

1 General

Siemens Corporation – Erfurt Generator Works – TD Department is responsible for the content and revision service of this MS.

1.1 Technical Modification Report

Revision	Date	Alteration contents
1	2001-06-28	First Edition
2	2009-04-10	Bilingual Edition

1.2 Purpose

The Manufacturing Specification describes the necessary work sequences and measures for the installation and grouting of through-anchor bolts in concrete foundations acc. to the technical requirements.

1.3 Scope of Validity

Siemens AG Energy Sector
Electrical Generators
Generator Plant Erfurt

1.4 Abbreviations

TD	**T**echnical **D**esign
MS	**M**anufacturing **S**pecification
PD	**P**urchasing **D**epartment
AC	**A**ssignment **c**entre
QM	**Q**uality **M**anagement

Diese Unterlage unterliegt den Handhabungsvorgaben wie auf der Titelseite angegeben.
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2 Verantwortung und Zuständigkeiten

Für die Einhaltung dieser Fertigungsvorschrift ist das Montagepersonal im Kraftwerk zuständig.

2 Responsibility and Competences

The field assembly personnel is responsible for the observance of this manufacturing specification.

3 Prozessbeschreibung

3.1 Zeichnungsunterlagen

- Generatormaßbild (BG 0110)
- Generatormaßbild Text (BG 0111)
- Verankerung (BG 5949)

3.2 Hinweise

Das Montageverbrauchsmaterial zum Einbau der Anker wird durch Siemens in ausreichender Menge bereitgestellt. Dabei ist das Material zum Verguss der Ankerschraubenlöcher und des Grundrahmens nicht eingeschlossen.
Die Ankerschraubenvorspannung wird in der Fertigungsvorschrift FV 12-012 beschrieben.

3.3 Vorbereitung des Betonfundamentes

Vor Beginn der Montagearbeiten müssen Fundament und Ankerlöcher auf Einhaltung der Maße geprüft werden.
Als Hilfe zum Ausgießen der Ankerschraubenlöcher nach der Ankerschraubenmontage ist ein geeigneter Gießkanal zu schaffen. Dieser muss so beschaffen sein, dass die Vergussmasse nur die Ankerlöcher füllt und der übrige Bereich unvergossen bleibt.

3 Process Description

3.1 Drawings

- Generator Dimension Drawing (DG 0110)
- Text of Generator Dimension Drawing (DG 0111)
- Anchorage (DG 5949)

3.2 Remarks

Siemens will provide sufficient expendable material for the installation of anchors. Not included, however, will be the material required for anchor hole and base frame grouting.
For the anchor bolt prestressing procedure, refer to Manufacturing Specification MS 12-012.

3.3 Preparation of the Concrete Foundation

Be sure to check the foundation and anchor holes for dimensional accuracy before starting the installation process.
To facilitate the grouting of anchor holes once the anchor bolts are mounted, create an appropriate grouting channel. This channel should be made in such a way that the grouting compound will exclusively fill up the anchor holes, with the other area left unfilled.

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3.4 Vorbehandlung der Ankerschrauben

Die Ankerschrauben sind werksseitig konserviert. Der Anstrich der Gewinde ist zu entfernen.
Um die Federeigenschaften der Schraube zu gewährleisten und die Möglichkeit des späteren Nachziehens zu erhalten, darf die Vergussmasse nicht am Schraubenschaft abbinden oder ins Muttergewinde eindringen. Dazu sind die Ankerschrauben zweifach mit Bitumenbinde, z.B. Densobinde, in folgender Weise zu umwickeln:

wenn Freistiche vorhandenen sind

Freistiche bis auf Gewindedurchmesser umwickeln,

wenn der Schaftdurchmesser größer als der Gewindedurchmesser ist

Gewinde (und Freistiche) am unteren Ende bis zur künftigen Position der Mutter und am oberen Ende bis ca. 50 mm über der endgültigen Vergusshöhe beidseitig bis auf Schaftdurchmesser umwickeln,

Schaft einschließlich Gewinde über die gesamte Länge zweifach umwickeln (unteres Ende: künftige Position der Mutter, oberes Ende: ca. 50 mm über endgültiger Vergusshöhe).
Die Wicklung ist so auszuführen, dass sich die Binde beim Aufdrehen der Mutter nicht abhebt oder in das Gewinde hineinzieht.

Die Gewinde, die für das spätere Spannen der Ankerschrauben verwendet werden, sind mit Gleitmittel (z.B. Graphitpaste oder MoS_2) dick einzustreichen. Bei Verwendung von Hubzylindern zum Spannen der Ankerschrauben sind keine Gleitmittel einzusetzen.

3.4 Preparatory Treatment of Anchor Bolts

The anchor bolts are supplied with a protective film on them, which needs to be removed from the thread.
In order to preserve the elastic properties of the bolts and to make it possible for them to be tightened, the grouting compound must not set on the bolt shaft or penetrate into the thread of the nuts. For that purpose, wrap two layers of bituminous jacketing (e.g. Denso Jacketing) around the anchor bolts in the following way:

if there are relief grooves

wrap bituminous jacketing around the relief grooves, up to the thread,

if the shaft diameter is larger than the thread diameter

Wrap bituminous jacketing around the thread (and relief grooves) on the lower shaft end up to the future position of the nut and on the upper shaft end up to about 50 mm over the final grouting height,

Wrap two layers of bituminous jacketing over the entire length of the shaft including the thread (from the future position of the nut on the lower shaft end up to about 50 mm over the final grouting height on the upper shaft end).
The wrapping should be executed in such a way that the jacketing will not come off or be pulled into the thread when the nut is screwed on.

Apply a thick layer of an antiseizing compound, such as graphite paste or MoS_2, to the threads used for the following anchor bolts stressing. If lifting cylinders are used for stressing, antiseizing agent is not to be applied.

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3.5 Einbau der Ankerschrauben

Die Montage der Ankerschrauben erfolgt nach dem Aufsetzen des Grundrahmens auf das Fundament.
Ankerschrauben zur Verschraubung an der Grundrahmenaußenseite sind von unten zu montieren. Dazu werden sie von unten durch das Fundament hindurch in den Grundrahmen eingeführt und nach Aufsetzen von Kugelausgleichsscheiben und Muttern eingehängt. Ankerschrauben zur Verschraubung an der Grundrahmeninnenseite können mit aufgesetzten Kugelausgleichsscheiben und Muttern alternativ auch von oben eingehangen werden. Anschließend werden an den unteren Enden Muttern und Ankerscheiben aufgesetzt (Abb. 1).

3.5 Installation of Anchor Bolts

The anchor bolts are assembled after setting down the base frame onto the foundation. Anchor bolts screwed to the base frame outside are assembled from below. To do that, insert them from below through the concrete foundation and the base frame, mount spherical washers and nuts and hang them up to the base frame.

Anchor bolts screwed to the base frame inside can also be hung up from above after providing spherical washers and nuts. Afterwards complete them with nuts and anchor plates on the lower ends (Fig. 1).

3.6 Montage der Ankerplatten

Die verwendeten Ankerschraubenmuttern müssen auf dem gesamten Umfang tragen. Große Schiefstellungen der Mutternstirnseite zum Gewinde sind bereits beim Andrehen an Taumelbewegungen der Ankerplatte zu erkennen. Solche Muttern sind nachzubessern.
Die Umwicklung der Ankerschrauben mit Bitumenbinde muss soweit reichen, dass beim Andrehen der unteren Muttern ein Wulst aufgeschoben wird (Abb. 2). Ist dies nicht der Fall, muss ein genügender Bereich nachgewickelt werden.
Die Ankerplatte muss vollflächig tragend sein, damit die durch die Schraubenvorspannung entstehende Druckspannung vom Beton auch langfristig unter Betriebsbedingungen ertragen wird.
Insbesondere vorspringende Kanten oder Steine sind zu entfernen, da diese zu einem geringeren Flächentraganteil führen, was die Zerstörung des Betons und den Verlust der Schraubenvorspannung bewirken kann.

3.6 Mounting of Anchor Plates

The nuts used must support the load applied over their entire contact surface. Any significant skewness of the nut face as against the thread can easily be recognized by tumbling motions of the anchor plate occurring when the nut is screwed on.
The bituminous jacketing of the anchor bolts must reach so far up that a roll is created when the nuts at the bottom are screwed on (Fig. 2). If this is not the case, be sure to rewrap a sufficiently large area.
The anchor plate must carry the load over its entire surface, so that the compressive stress resulting from the pretensioned bolts can be borne by the concrete for long time periods under normal operating conditions.
Remove projecting edges or stones, in particular, because these may lead to a reduced bearing surface, which in turn might entail the destruction of the concrete and result in loss of bolt prestress.

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Die Betonauflageflächen der Ankerplatten müssen von losen Bestandteilen und ggf. von gering haftenden Zementschlämmen befreit sowie staub-, fett- und ölfrei sein.

Gegebenenfalls müssen die Auflageflächen der Ankerplatten mit einem geeigneten Mörtel (z.B. Pagel V14/10) ausgeglichen werden.

All loose matter and any poorly adhering cement grout, as well as dust, grease and oil need to be removed from the concrete seating surfaces for the anchor plates.

To obtain even seating surfaces for the anchor plates, a suitable mortar (such as Pagel V14/10) may have to be applied.

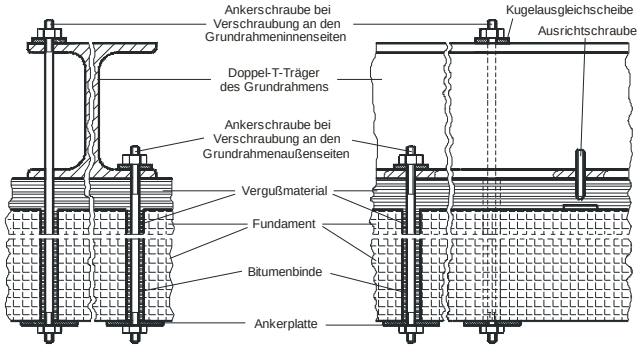


Abb. 1: Mit Ankerschrauben verschraubter Doppel-T-Träger des Grundrahmens

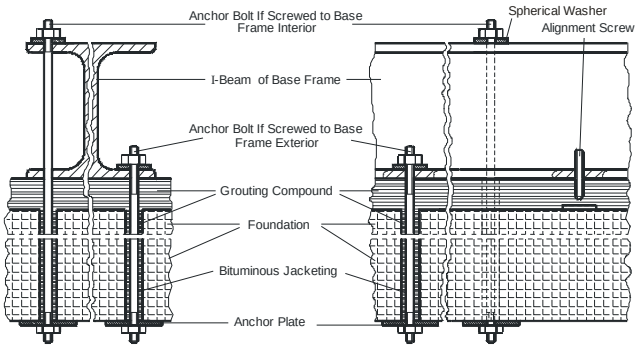


Fig. 1: Double-T-Beam of Base Frame Fixed by Anchor Bolts

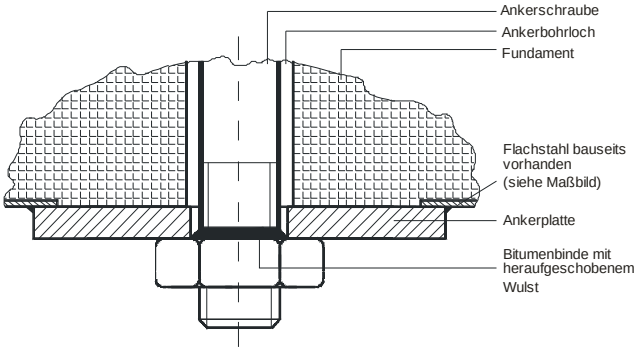


Abb. 2: Unterer Teil der eingebauten Ankerschraube (oberer Teil analog)

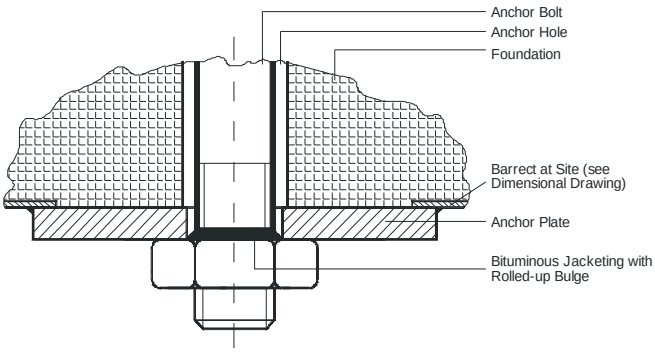


Fig. 2: Lower Portion of the Installed Anchor Bolt (upper portion analogously)

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Die Ankerschrauben sind unter Beachtung der Anzahl der jeweils zugehörigen Ausrichtschrauben mit den in Tabelle 1 angegebenen Werten anzuziehen.

Anzahl der Ausricht-schrauben	M 30	M 36	M 42	M 48	M 52	M 56	M 64
1	20 Nm	30 Nm	40 Nm	50 Nm	60 Nm	70 Nm	90 Nm
2	100 Nm	100 Nm	200 Nm	250 Nm	280 Nm	320 Nm	470 Nm

Tab. 1: Teilanzugsmomente für Ankerschrauben (Sechskantmutter)

Die Toleranzen liegen dabei bei 10%. Höhere Anzugsmomente sind unzulässig, da dadurch die Ausrichtung beeinträchtigt werden kann.

Torque the anchor bolts to the values listed in Table 1, paying attention to the corresponding alignment screws.

Number of Alignment Screws	M 30	M 36	M 42	M 48	M 52	M 56	M 64
1	20 Nm	30 Nm	40 Nm	50 Nm	60 Nm	70 Nm	90 Nm
2	100 Nm	100 Nm	200 Nm	250 Nm	280 Nm	320 Nm	470 Nm

Tab. 1: Partial Tightening Torques for Anchor Bolts (Hexagon Nuts)

The effective tolerance is 10 %. Higher tightening torques are not allowed, as they may adversely affect the alignment.

3.7 Füllen der Ankerlöcher

Nach der Montage der Ankerplatten sind die Ankerlöcher mit fließfähigem Vergussmaterial (z.B. Pagel V1/50 oder gleichwertiges, siehe Tab. 2) zu füllen (Vergussmaterial wird nicht durch Siemens geliefert).

Typ	Pagel V1/50
Körnung in mm	0 - 5
Vergusshöhe ca. in mm	20 -100
Enddruckfestigkeit in N/mm^2	104
Endbiegezugfestigkeit in N/mm^2	11,9
Quellmaß in Vol.%	+1,0
Verbrauch in kg/m^3	2000

Tab. 2: Eigenschaften des zu verwendenden Vergussmaterials

3.7 Filling of Anchor Holes

Once the anchor plates are mounted, the anchor holes need to be filled with a pourable grouting compound (e.g. Pagel V 1/50 or equivalent; see Table 2; the grouting compound will not be supplied by Siemens).

Type	Pagel V1/50
Particle size in mm	0 - 5
Grouting height (approx.) in mm	20 -100
Final compressive strength in N/mm^2	104
Final bending strength in N/mm^2	11,9
Swell ratio in % by Vol.	+1,0
Consumption in kg/m^3	2000

Tab. 2: Characteristics of the Grouting Material to Be Used

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Als Hilfe zum Ausgießen der Ankerschraubenlöcher wird ein geeigneter Gießkanal in Form eines in Beton geschnittenen oder beim Betonguss eingelassenen Kanals geschaffen. Alternativ kann auch ein geeignet geformter Kanal aus Holz oder Blech verwendet werden. Der Kanal muss so beschaffen sein, dass die Vergussmasse ausschließlich das Ankerloch füllt, der übrige Bereich jedoch unvergossen bleibt.

Sind die Gießkanäle in Beton eingelassen, so ist zur Fließverbesserung die Einlage einer Folie zu empfehlen bzw. bestehen die Kanäle aus Rillen im Beton, so sind diese vorzuwässern.

Das benötigte Vergussmaterial ist entsprechend dem einzubringenden Volumen in ausreichender Menge zu mischen. Der Füllvorgang muss so gestaltet werden, dass keine Unterbrechungen entstehen und das Vergussmaterial nicht überläuft. Die Verwendung einer Mischpumpe hat sich hierbei bewährt.

Um ein Abbinden des Materials in den Ankerlöchern zu gewährleisten, darf der Unterguss des Grundrahmens frühestens nach 24 h erfolgen.

To facilitate the grouting of anchor holes once the anchor bolts are mounted, cut an appropriate grouting channel into the concrete or leave such a channel when pouring in the concrete. Alternatively, use a suitably shaped channel made of wood or sheet metal. The channel must be made in such a way that the grouting compound will exclusively fill up the anchor holes; the other area must not be covered by the grout.

If the concrete possesses grouting channels, a plastic sheet should be placed inside the channel for improved fluidity. If the channels are grooves cut into the concrete, they need to be watered prior to the grouting process.

Based on the volume required, mix a sufficient amount of the relevant grouting compound. Once started, do not interrupt the grouting operation and be sure to prevent any grouting compound from spilling over. As experience shows, it‘s advisable to use a mixer pump.

In order to ensure that the compound will properly set in the anchor hole, do not begin filling in concrete under the base frame until 24 hours later, at the earliest.

4 Mitgeltende Unterlagen

FV 12-012	Vorspannung von Durchgangsankern und Messen der Schraubenlängung

4 Other Applicable Documents

MS 12-012	Trough-Anchor Bolts Prestressing and Bolt Elongation Measurement

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Anlage A: Zeichnungen
Appendix A: Drawings

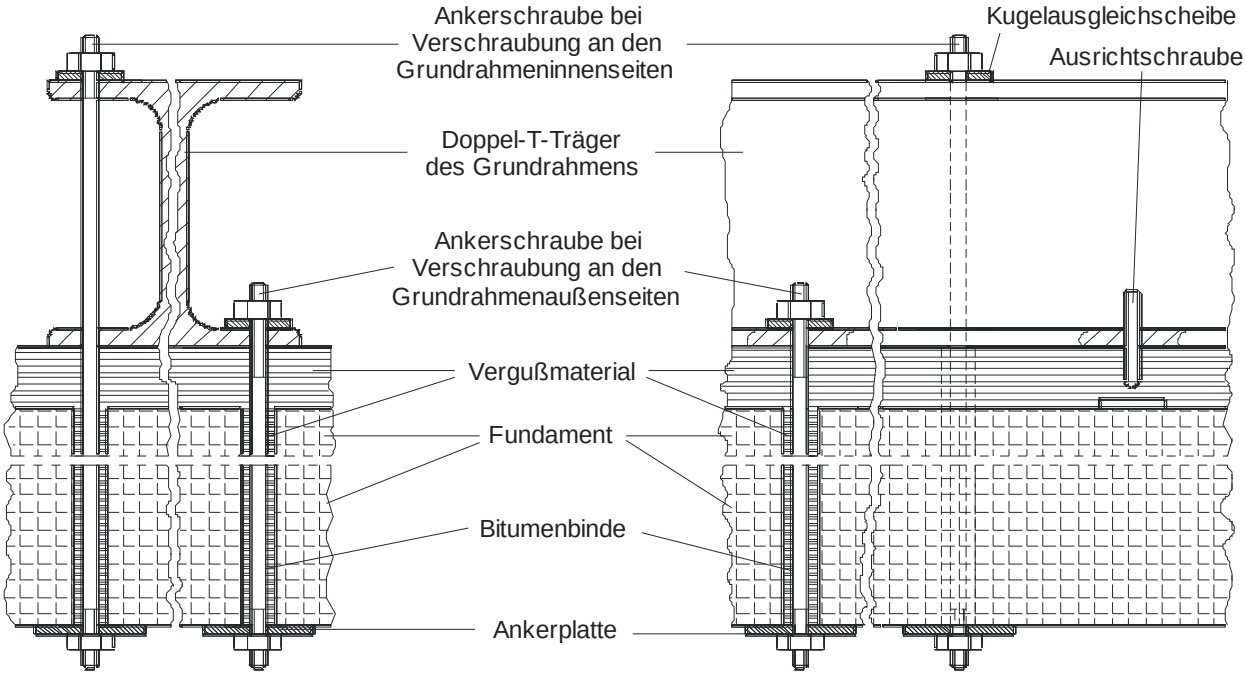


Abb. 1: Mit Ankerschrauben verschraubter Doppel-T-Träger des Grundrahmens

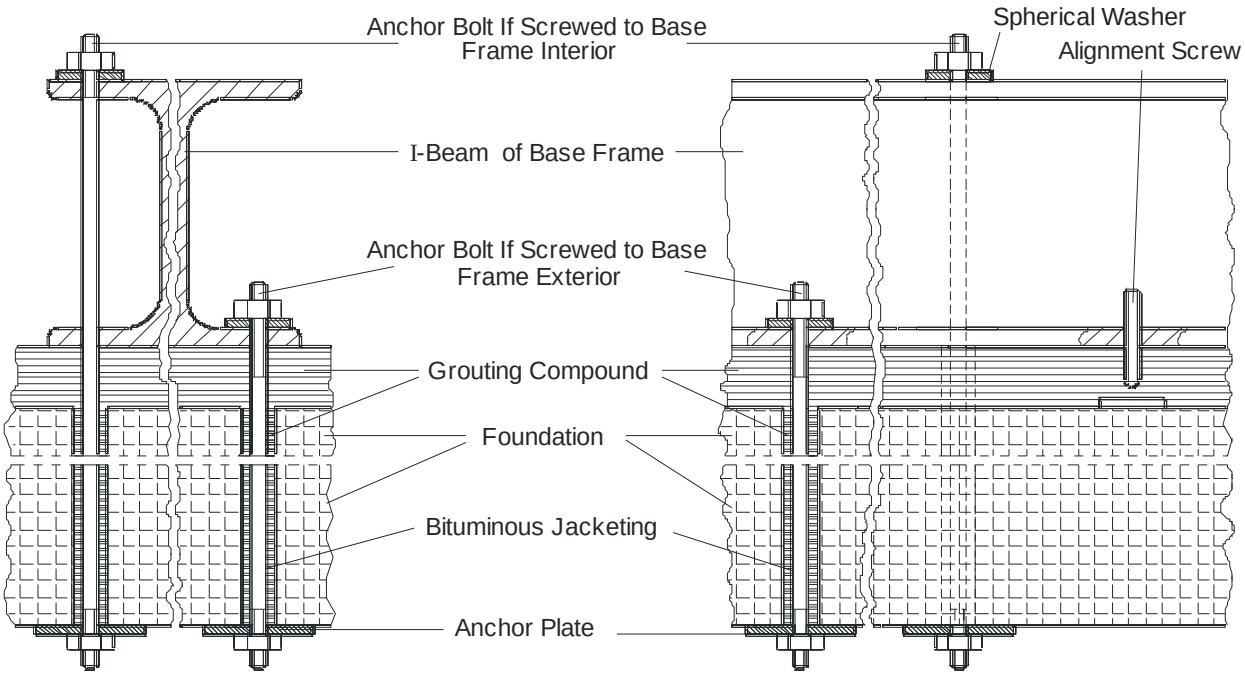


Fig. 1: Double-T-Beam of Base Frame Fixed by Anchor Bolts

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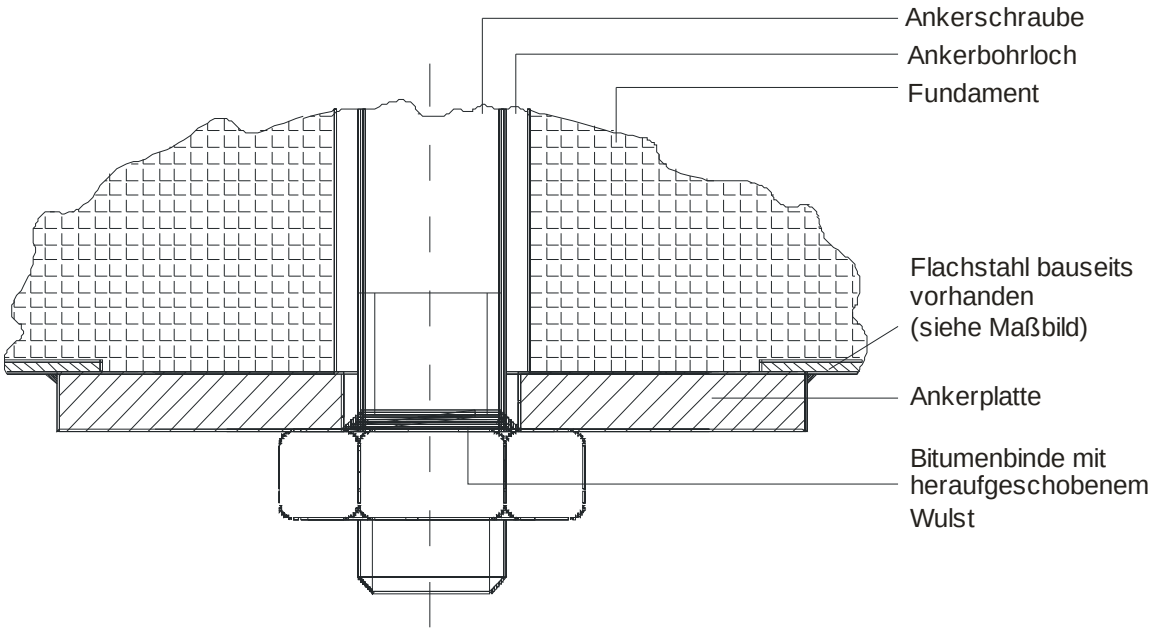


Abb. 2: Unterer Teil der eingebauten Ankerschraube
(oberer Teil analog)

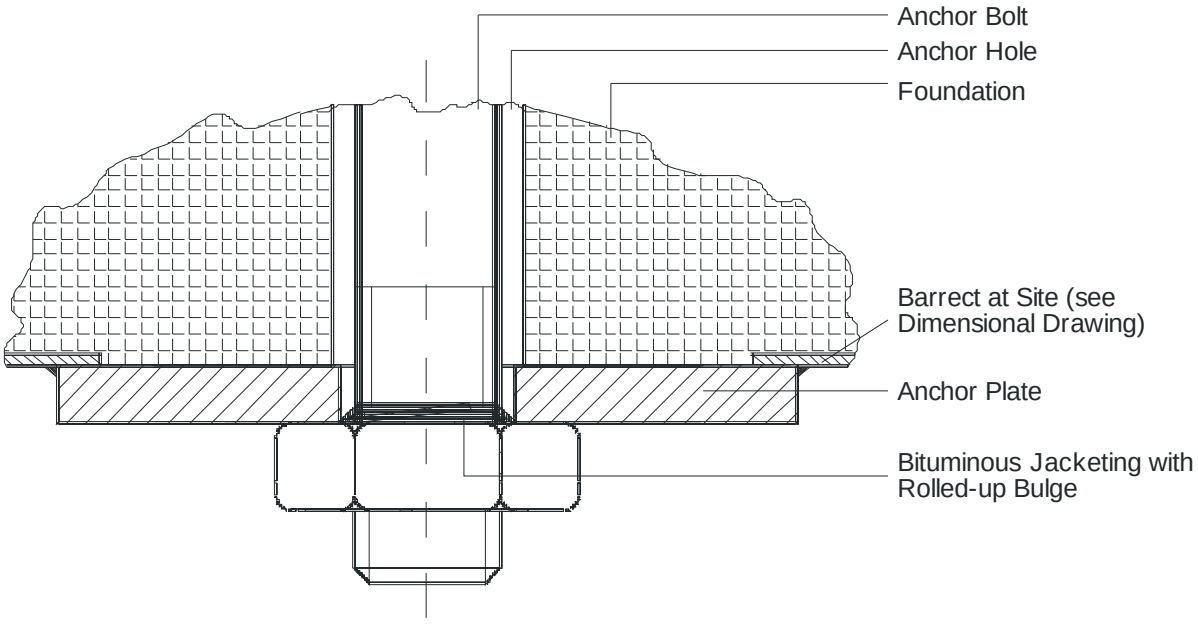


Fig. 2: Lower Portion of the Installed Anchor Bolt
(Upper portion analogously)

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SIEMENS	Unterlagenart / Document type **Fertigungsvorschrift** **Manufacturing Procedure**	Nr./No.: **FV/MP 12-012** Datum/Date: 2009-04-18 Revision: 2 Herausgeber/Issued by: E F PR GN ERF EN 1

Titel/Title

Vorspannung von Durchgangsankern und Messen der Schraubenlängung
Through-Anchor Bolts Prestressing and Bolt Elongation Measurement

Anlagen/Appendices:
Handhabung/Handling: offen / open

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Freigegeben/Released by:	Senske	E F PR GN ERF EN	gez. Senske	
Geprüft/Reviewed by:	Zorn	E F PR GN ERF QM	gez. Zorn	
Geprüft/Reviewed by:	Zeughardt	E F PR GN ERF OM	gez. Zeughardt	
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SIEMENS AG · Energy
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Generatorenwerk Erfurt

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1 Allgemeines

Verantwortlich für Inhalt und Änderungsdienst dieser FV ist Siemens AG – Generatorenwerk Erfurt, Abteilung TEK.

1.1 Änderungsmitteilung

Revision	Datum	Änderungsinhalt
1	2001-07-09	Erste Ausgabe
2	2009-04-18	Zweisprachige Ausgabe

1.2 Zweck

Die Fertigungsvorschrift beschreibt die notwendigen Prüfungen und Messungen beim Einbau und Vorspannen von Durchgangsankern in Betonfundamenten. Sie ist für Durchgangsanker, also Ankerschrauben, deren Klemmlänge von der Tischplattenhöhe des Fundaments bestimmt wird, anzuwenden.

1.3 Geltungsbereich

Siemens AG Energy Sector
Electrical Generators
Generatorenwerk Erfurt

1.4 Abkürzungen und Begriffe

TEK	**T**echnische **K**onstruktion
BG	**B**au**g**ruppe
FV	**F**ertigungs**v**orschrift
AZ	**A**uftrags**z**entrum
QM	**Q**ualitäts**m**anagement

1 General

Siemens Corporation – Erfurt Generator Works – TD Department is responsible for the content and revision service of this MS.

1.1 Technical Modification Report

Revision	Date	Alteration contents
1	2001-07-09	First Edition
2	2009-04-18	Bilingual Edition

1.2 Purpose

This specification describes the tests and measurements required for installing and restressing through-anchors in concrete foundations. It covers trough-anchors for concrete foundations – in other words, anchor bolts – whose clamping length is determined by the tabletop height of the foundation.

1.3 Scope of Validity

Siemens AG Energy Sector
Electrical Generators
Generator Plant Erfurt

1.4 Abbreviations and Terms

TD	**T**echnical **D**esign
DG	**D**esign **G**roup
MS	**M**anufacturing **S**pecification
AC	**A**ssignment **c**entre
QM	**Q**uality **M**anagement

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2 Verantwortung und Zuständigkeiten

Für die Einhaltung dieser Fertigungsvorschrift ist das Montagepersonal im Kraftwerk zuständig.

2 Responsibility and Competences

The field assembly personnel is responsible for the observance of this manufacturing specification.

3 Prozessbeschreibung

3.1 Zeichnungsunterlagen

- Generatormaßbild (BG 0110)
- Generatormaßbild Text (BG 0111)
- Verankerung (BG 5949)

3.2 Einbaubedingungen

Die Ankerschrauben sind unter Berücksichtigung der Fertigungsvorschriften FV 12-010 und FV 12-011 einzubauen.

3.3 Vorspannung der Ankerschrauben

Um trotz Langzeitschwinden und Spannungskriechen des Betons langfristig eine Restvorspannung von ca. 2/3 der Streckgrenze des Schraubenwerkstoffes zu erhalten, müssen Ankerschrauben auf neu abgegossenen Fundamenten auf 90…100% der Streckgrenze vorgespannt werden (Schraubenwerkstoff CK35: $\sigma_{0,2}$ = 280 N/mm^2).
Bei Altanlagen bzw. Montage neuer Generatoren auf alten Fundamenten (Alter mindestens 3…4 Jahre) soll die Vorspannung nur 65…75 % der Streckgrenze betragen.

3 Process Description

3.1 Drawings

- Generator Dimension Drawing (DG 0110)
- Text of Generator Dimension Drawing (DG 0111)
- Anchorage (DG 5949)

3.2 Installation Conditions

When installing the anchor bolts, also observe Manufacturing Specifications MS 12-010 and MS 12-011.

3.3 Bolt Prestressing

In order to preserve a long-term residual prestress of about two thirds of the tensile yield strength of the bolt material despite long-term shrinkage and incremental stress reduction in the concrete, anchor bolts used on freshly poured foundations need to be prestressed to 90 … 100 % of the yield point (for bolt material CK35: $\sigma_{0,2}$ = 280 N/mm^2).
When it comes to existing facilities or the installation of new generators on old foundations (3 years and older), the prestress should be only amount to 65 … 75 % of the yield point.

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Ankergröße	Gewinde-Steigung	Altes Betonfundament (mind. 3 – 4 Jahre)		Neues Beton- bzw. Stahlfundament		Muttemart
	mm	Δl_A mm/m	M_A Nm	Δl_N mm/m	M_N Nm	
M 36	4	0.70	850	0.95	1.000	DIN
M 42	4.5	0.70	1.400	0.95	1.800	DIN
M 48	5	0.70	2.000	0.95	2.700	DIN
M 52	5	0.70	2.600	0.95	3.500	DIN

Tab. 1: Bezogene Schraubenlängung Δl und zugehöriges Anzugsmoment M (geschmiert mit Graphit oder MoS_2) für Durchgangsanker aus CK 35

Bolt Size	Lead of Thread	Existing Concrete Foundation (3 Years and Older)		New Concrete Foundation or Steel Base		Type of Nut
	mm	Δl_A mm/m	M_A Nm	Δl_N mm/m	M_N Nm	
M 36	4	0.70	850	0.95	1.000	DIN
M 42	4.5	0.70	1.400	0.95	1.800	DIN
M 48	5	0.70	2.000	0.95	2.700	DIN
M 52	5	0.70	2.600	0.95	3.500	DIN

Tab. 1: Specific Bolt Elongation Δl and Corresponding Tightening Torque M (Antiseize: Graphite or MoS_2) for Through-Anchors Made of CK 35

3.4 Anzugsverfahren

Die Ankerschrauben dürfen bei zementgebundenem Vergussmaterial (z.B. Pagel V1/50) frühestens 24 h nach dem Vergießen der Maschine gespannt werden. Sind im Sonderfall Epoxidharz-Vergussmaterialien zum Einsatz gekommen, sind die Vorschriften des Herstellers zu beachten.

Um möglichst alle Setzvorgänge in den Auflageflächen und im Gewinde auszuschließen, sind zwei Spannvorgänge erforderlich.

Zum Anziehen der Ankerschrauben ist die Verwendung eines Hubzylinders vorteilhaft.

3.4 Tightening Methods

If a cement-bound grouting compound (such as Pagel V 1/50) is employed, the anchor bolts must not be tensioned until 24 hours after the machine has been grouted. Should epoxybased grouting material be used in specific cases, the manufacturer's instructions have to be followed.

In order to rule out, as much as possible, any setting processes in seating surfaces and on the thread, two stressing operations are required.

The use of a lifting cylinder has favourable effects on the anchor bolt tightening.

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3.4.1 Bestimmung der Schraubenlängung

Das Anziehen der Ankerschrauben kann an beiden oder an nur einem Schraubenende erfolgen.
Um die Schraubenlängung zu bestimmen, wird vor und nach dem Anziehen der Schraube der jeweilige Abstand zwischen Schraubenende und Auflageplatte (oberer Schraubenteil) bzw. Ankerplatte (unterer Schraubenteil) bestimmt (Abb. 1) und dann die Differenz dieser Werte gebildet. Dies geschieht jeweils für den oberen und den unteren Schraubenteil (Gleichungen 1 und 2). Um die tatsächliche Schraubenlängung zu ermitteln, werden die Längenänderungen des oberen und unteren Teiles summiert (Gleichung 3).

Gleichung 1: $\Delta l_o = l_{o2} - l_{o1}$

Gleichung 2: $\Delta l_u = l_{u2} - l_{u1}$

Gleichung 3: $\Delta l = \Delta l_o + \Delta l_u$

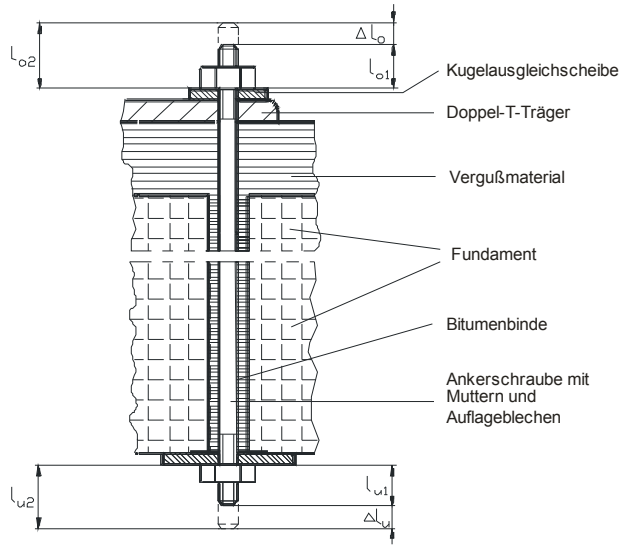


Abb. 1: Bestimmung der Schraubenlängung

Wenn die Ankerschrauben nur an einem Ende angezogen werden, ist zur Bestimmung der Schraubenlängung nur die jeweils zutreffende Gleichung allein heranzuziehen.

3.4.1 Determination of Bolt Elongation

The anchor bolts can be tightened either only on one end or on both ends.
To determine the bolt elongation, measure the distance between the bolt end and the seating plate (upper portion) or between the bolt end and the anchor plate respectively (lower portion) before and after tightening the bolt (Fig. 1) and calculate the difference between these measurements. Be sure to do this both for the upper and lower bolt portions (Equations 1 and 2). In order to obtain the actual bolt elongation, add the longitudinal deformation of the upper and lower portions (Equation 3).

Equation 1: $\Delta l_o = l_{o2} - l_{o1}$

Equation 2: $\Delta l_u = l_{u2} - l_{u1}$

Equation 3: $\Delta l = \Delta l_o + \Delta l_u$

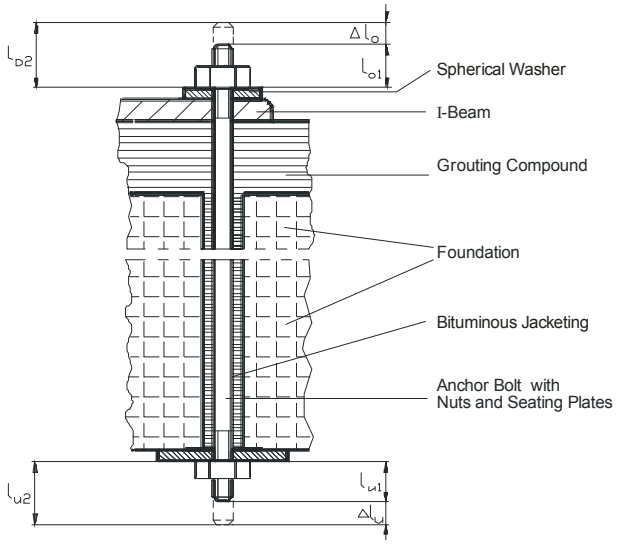


Fig. 1: Determination of Bolt Elongation

For anchor bolts to be tightened only on one end, the applicable equation is to be used only.

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3.4.2 Anzugsverfahren für Ankerschrauben

- Mit Hilfe von Tabelle 1 wird der Sollwert der Schraubenlängung bestimmt.
- Mit den Gleichungen 4 und 5 kann dann der erforderliche Drehwinkel errechnet werden.
- Die Messung der Schraubenlängung erfolgt wie in 3.4.1 erläutert.

1. Schritt: Die Ankerschrauben sind mit der vollen Längung anzuziehen. Δl ist grob nachzumessen.

2. Schritt: Die Schrauben werden gelöst und dann mit ca. 10% des angegebenen Moments wieder angezogen. (Abschätzung über Hebelarm und Armkraft, Armkraft kann als ca. 350 N angenommen werden.)

3. Schritt: Die überstehenden Gewindelängen sind oben gegen die Auflagefläche (l_{o1}) und ggf. unten gegen die Ankerplatte (l_{u1}) zu messen und zu protokollieren. Auf keinen Fall darf die Mutter als Messfläche benutzt werden.

4. Schritt: Die Schraube ist auf die vorgeschriebene Schraubenlängung vorzuspannen (Klemmlänge mal zutreffende Verlängerung je Meter) Der erforderliche Drehwinkel wird über die Gewindesteigung (Tab. 1) bestimmt.

Gleichung 4: $\Delta l_{Soll} = \Delta l$ x Klemmlänge

Gleichung 5: Drehwinkel Soll = 360° x Δl_{Soll} / Gewindesteigung

5. Schritt: Die überstehenden Gewindelängen oben und unten werden erneut gemessen und protokolliert.

3.4.2 Anchor Bolt Tightening Methods

- Determine the desired bolt elongation value, using Table 1.
- Employ Equations 4 and 5 to calculate the necessary angle of rotation.
- Refer to section 3.4.1 for a description of how to measure the bolt elongation.

Step 1: Tighten the anchor bolts with full elongation. Check Δl through coarse measurement.

Step 2: Loosen the bolts and then retighten them to 10% of the specific torque. (Estimate this torque on the basis of the force arm and the strength of your arm. The strength of your arm can be assumed as approximately 350 N.)

Step 3: Measure and record the lengths of the bolts projecting from the anchor plate at the bottom (l_{u1}) and the seating surface at the top (l_{o1}). Be sure not to use the nut as measuring surface.

Step 4: Prestress the bolt to the prescribed bolt elongation (clamping length multiplied by relevant elongation per metre). Use the lead of thread (Tab. 1) to determine the required angle of rotation.

Equation 4: $\Delta l_{des} = \Delta l$ x Clamping length

Equation 5: Desired rotational angle = 360° x Δl_{des} / Lead of thread

$\Delta l_{des} = \Delta l_{desired}$

Step 5: Measure and record again the thread projecting at the top and at the bottom.

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Die Schraubenlängungen sind mit einer Toleranz von ±10% einzustellen. Wird die Längung um mehr als 10% überschritten, kann bereits eine bleibende Verformung eingetreten sein, so dass die Schraube nicht zurückgedreht werden darf. Falls die vorgeschriebene Längung noch nicht erreicht wurde, muss nachgebessert werden.

Wird das angegebene Vorspannmoment für die erforderliche Schraubenlängung wesentlich unterschritten, so sind Bau- oder Montagefehler zu vermuten, die die Steifigkeit im Spannbereich der Ankerschraube wesentlich vermindert haben. Dies kann zum Beispiel bei ungenügendem Maschinenverguss der Fall sein.

Zur Überprüfung für DIN Muttern-Ankerschraubenvorspannungen ist nach dem vorschriftsmäßigen Anzug der Schraube mindestens eine Hammerschlagprobe (Schlagschlüssel, Hammer) durchzuführen.

Abschließend sind alle Muttern und Ankerplatten gemäß den Angaben der BG 5949 (Verankerung) zu sichern. Die überstehenden Enden der Ankerschrauben werden nach dem Sichern samt Muttern mit Fett als Korrosionsschutz eingestrichen. Gleitmolybdän ist als Korrosionsschutz nicht zulässig.

Allow a ±10% tolerance when setting the bolt elongation. If the elongation is exceeded by more than 10%, a lasting deformation may have already occurred, so that the bolt cannot be loosened. If the required elongation has not been reached yet, remedial action must be taken.

If the prestressing torque for the required bolt elongation is considerably lower than specified, construction and installation errors can be assumed, resulting in a marked reduction in the clamping area stiffness of the anchor bolt. This may be the case, for example, if the machine has been insufficiently grouted.

To check the prestress of DIN nut anchor bolts, perform at least one hammer blow test (using a striking-face wrench or a sledge hammer) after proper bolt tightening.

Then secure all the nuts and anchor plates acc. to the information of DG 5949 (Anchoring). After securing the anchor bolts, spread anti-corrosive grease over the projecting end of the bolts, including the nuts. Sliding molybdenum must not be used as a corrosion protection agent.

4 Mitgeltende Unterlagen

FV 12-010	Einbau und Verguss von Durchgangsankern in Betonfundamenten
FV 12-011	Verankern und Vergießen des Generatorgrundrahmens

4 Other Applicable Documents

MS 12-010	Installation and Grouting of Through-Anchor Bolts in Concrete Foundation
MS 12-011	Anchoring and Grouting of the Generator Base Frame

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PAGEL®

PAGEL®-PRE-MIXED-GROUT

V14/10

V14/40

V14/80

PROPERTIES

- **non shrink high viscocity mortar,** cement based
- controlled and even expansion with a rigid bond between concrete foundation and machine base plate
- high **early and final strength**
- has a **plastic consistency** and its density provides **resistance to freeze / thaw-cycles**, impervious to water and resistant to oil and chemicals
- is free of chloride and contains no alumina cement or other additives which may cause corrosion
- **easy to pour**, need only be mixed with water
- is **ready for use** with a working time of approx. 45 minutes at 20 °C, can be pumped and placed very easily
- **company is certified according DIN EN ISO 9001:2008**
- **V14** consists of the following products:

V14/10	(0–1 mm) placing height 10–30 mm
V14/40	(0–4 mm) placing height 10–70 mm
V14/80	(0–8 mm) placing height 50–100 mm

- Pagel's Factory Production Control (FPC) complies with the DafStb Directive on the "Manufacture and use of cementitious concrete and grout"

FILEDS OF APPLICATION

- **placing under machine base plates, bridge bearings, fixator levelling units and pre-fabricated parts**
- **repair** on wall and floor treads, concrete outbreaks
- **filling** of pre-fabricated part-joints

Assigning to expositioncategory according to:
DIN 1045-2 / EN 206-1
PAGEL – PRE-MIXED-GROUT

	XO 0	XC 1 2 3 4	XD 1 2 3	XS 1 2 3	XF 1 2 3 4	XA 1 2 3	XM 1 2 3
V14/10	•	• • • •	• • •	• • •	• • • •	• •	•
V14/40	•	• • • •	• • •	• • •	• • • •	• •	•
V14/80	•	• • • •	• • •	• • •	• • • •	• •	•



Moisture class based on concrete corrosion from alkali silicic acid reactions				
moisture class	WO	WF	WA	WS
	dry	wet	wet • external supply of alkalis	wet • external supply of alkalis • subject to high levels of dynamic stress
V14	•	•	•	•
The aggregates in PAGEL's products comply with the requirements of alkali sensitivity class E1 from non-hazardous sources specified under DIN EN 12620.				

CE 0921

PAGEL SPEZIAL-BETON GMBH & CO.KG
Wolfsbankring 9
45355 Essen, Germany
10
140001
EN 1504-6:2006
V14/10
PAGEL Pre-mixed grout
Anchoring product

Pull-out	≤ 0.6 mm
Chloride ion content	≤ 0.05 %
Reaction to fire	A1

CE 0921

PAGEL SPEZIAL-BETON GMBH & CO.KG
Wolfsbankring 9
45355 Essen, Germany
10
140004
EN 1504-6:2006
V14/40
PAGEL Pre-mixed grout
Anchoring product

Pull-out	≤ 0.6 mm
Chloride ion content	≤ 0.05 %
Reaction to fire	A1

CE 0921

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Anchoring product

Pull-out	≤ 0.6 mm
Chloride ion content	≤ 0.05 %
Reaction to fire	A1

PAGEL®-PRE-MIXED-GROUT

V14/10

V14/40

V14/80

TECHNICAL DATA

TYPE			V14/10	V14/40	V14/80
grain size		mm	0–1	0–4	0–8
grouting height		mm	10–30	10–70	50–100
quantity of water		max. %	10–12	10–12	9–10
consumption (dry-mortar)		app. kg/m³	2000	2000	2100
density of freshly mixed mortar		app. kg/dm³	2.20	2.25	2.30
processing time	at +20 °C	min.	app. 45	app. 45	app. 45
expansion	24 h	Vol.%	+ 0.5	+ 0.5	+ 0.5
compressive strength*	24 h	N/mm²	≥ 45	≥ 45	≥ 40
	7 d	N/mm²	≥ 70	≥ 70	≥ 60
	28 d	N/mm²	≥ 75	≥ 75	≥ 70
	90 d	N/mm²	≥ 85	≥ 85	≥ 80
bending strength	24 h	N/mm²	≥ 5	≥ 5	–
	7 d	N/mm²	≥ 8	≥ 8	–
	28 d	N/mm²	≥ 9	≥ 9	–
	90 d	N/mm²	≥ 11	≥ 11	–
e-modul	7 d	N/mm²	25.000	25.000	25.000
	28 d	N/mm²	30.000	30.000	30.000

All test data are guide values, proofed in our German manufacturing plants, - values from other manufacturing plants may vary.

* DIN EN 196-1-compliant compressive strength testing; DIN EN 12390-3-compliant compressive strength testing

supplied in: 25-kg-bag, euro-pallet 1,000 kg
storage: 12 months. Cool, dry, free from frost. Unopened in its original packaging.
hazard class: no dangerous substance follow safety data sheet.
giscode: ZP1

PAGEL-GROUT
cement: DIN EN 197-1 compliant
aggregates: EN 12620 compliant
additives: EN 450, AbZ, EN13263 compliant (quick ash, microsilica etc.)
additional substances: DIN EN 934-4 compliant

PROCESSING

SUBSTANCE: Clean thoroughly. Remove loose and adhesion-restricting parts and cement sludge by using high-pressure water jets, or other equipment, down to the load-bearing grain structure. Approximately 6 hours before grouting pre-wet to saturation.

FORMWORK: Must be of rigid construction with sand or dry mortar being placed around the concrete base carefully to prevent leakage.

MIXING: The grout is ready-to-use it only has to be mixed with water. Pour water into the forced mixer except for a residual quantity, add dry mortar and mix for approx. 3 minutes; add rest of the water and mix for a further 2 minutes. With other types of mixer allow longer mixing periods if required. The grouting process should proceed directly.

APPLICATION: Place carefully in one continous pour. For repair work use **V14/10** as a primer in form of a slurry. Brush the slurry into the concrete surface and apply the mortar before the surface dries out.

Processing time: approx. 30 min. (at 30 °C)
approx. 45 min. (at 20 °C)
approx. 90 min. (at 5 °C)

NOTE: Open surfaces are to be protected against wind, draughts and premature water evaporation e.g. with plastic foil or **01 PAGEL-SURFACE PROTECTION**. The edge of the grouting should not be wider than approx.
50 mm. In case of frost, please contact us; lower temperatures delay the development of strength and do reduce flow ability, higher temperatures accelerate the same.

The information provided in this leaflet, is supplied by our consulting service and is the end result of exhaustive research work and extensive experience. They are, however, without liability on our part, in particular with regard to third parties proprietary rights, and do not relieve the user of the responsibility for verifying that the products and processes are suitable for the intended application. The data presented was derived from tests under normal climate conditions according to DIN 50014 and mean average values and analysis. Deviations are possible when delivery takes place. Given that recommendations may differ from those shown in this leaflet written confirmation should be sought. It is the responsibility of the purchaser to ensure they have the latest leaflet issue and that its contents are current. Our customer service staff will be glad to provide assistance at any time. We appreciate the interest you have shown in our products. This technical data sheet supercedes previously issued information. Please find the latest leaflet issues at www.pagel.com.

PAGEL®
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Technical Ref. Sheet **0204 GB**
QS-Formblatt 08/16 Rev. 19

Bearings

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Manufacturer: GTW

Bearing designation: TE / EE: WPXYQ 28-315

Shaft seals:

TE

1 x Rigid labyrinth seal type 22 28-355
(protective system IP 55)

1 x Rigid labyrinth seal type 20 28-355
(protective system IP 44)

EE

2x Rigid labyrinth seal type 20 28-355
(protective system IP 44)

Temperature measurement: journal parts (radial)

Bearing insulation: insulated spherical seals

Bearing material: GTW 89

NOTE:

You will find more detailed information in the Dimensional Drawing Text.

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Manufacturer: **GTW Gleitlagertechnik Weißbacher GmbH**

Documentation titles: **Installation and Operating Instructions**
Pedestal bearing Type WP

Repair Manual for ECTFE Coatings in GTW Bearing Housings

No. of pages: 9

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GTW Gleitlagertechnik Weißbacher GmbH

Installation and Operating Instructions

Pedestal bearing Type WP

Locating and non-locating bearings

Shape of bore: C, Y and V

Diameter range 80...900 mm

GTW Gleitlagertechnik Weißbacher GmbH

Weseler Straße 32 Tel.: 49(0)2802/1025-0
D-46519 Alpen Fax: 49(0)2802/7435
e-mail: office@gtwalpen.de

1. Safety advice

GTW foot mounted bearings WP can be used on a wide range of machines. Therefore, please pay attention to the safety instructions of the machines for your special application. The following points have to be observed in particular when operating the WP bearing and during installation, maintenance and repair in order to avoid accidents and injuries.

- Before maintenance and repair, make sure that the machine has come to a stop and the main switch is deactivated and secured against unintentional reactivation.

  Attention! risk of burning during maintenance at a bearing which is still warm from operation.

- The admissible loads and speeds according to our leaflets and our computer-calculation for your application must not be exceeded.
- Rotating parts have to be covered to avoid contact.
- The shaft dimensions and tolerances must be executed according to our catalogue and calculation.
- Incorrect installation and dismantling can cause damage to the bearing and injury.
- The WP bearing can fail due to screws getting loose. Therefore the specified tightening torques and specifications advised must be observed.
- Modifications to the WP bearing may only be made with the approval of the manufacturer.

On request our fitters will be at your disposal for repair and service work. This avoids faults which could be caused by improper workmanship.

2. Bearing types and coding

a) Manufacturer

W Gleitlagertechnik Weißbacher GmbH

b) Housing

G smooth pedestal bearing acc. to DIN 31 690

c) Heat dissipation

Z lubrication by circulating oil with external oil cooling
X lubrication by circulating oil with external oil cooling (high oil throughput)

d) Shape of bore and type of lubrication

C cylindrical bore without oil ring
Y two-lobe bore (lemon shape)
V four-lobe bore
S offset halves

e) Thrust part

Q without thrust surface
B plain white-metal lined shoulders with oil grooves (guide bearing)
K white-metal lined shoulders with taper land faces for each rotating direction
D white-metal lined shoulders with taper land faces for one direction of rotation
A WD-thrust pads (spring supported)

f) Size

g) Shaft diameter

Example:
Designation for a slide bearing for horizontal machines, with smooth pedestal housing, lubrication by oil circulation with external oil cooling (high oil throughput), four-lobe bore without thrust part, size 11, shaft diameter 110 mm:

Slide bearing WPXVQ 11-110

3. Introduction

All items of the installation and operation instructions have to be regarded in order to ensure the perfect operation of the slide bearing. Special importance should be dedicated to the cleanliness of the shop floor and the assembling parts.
At the housings there are provisions for different thermoprobes, oil inlet- and oil outlet tubes, hydrostatic oil inlet tubes and earthing cables depending on the special variation. The oil outlet tubes can be fixed to the housing either by a flange or by screwing-in.
The oil drain plugs are located in about the middle of the front walls at the lowest part of the bottom. By this, the oil sump can be drained totally.
The insulated bearing has a layer of HALAR-material on the spherical seat of the housing, which is particularly wear and temperature resistant.
As the whole inner surface is also coated by HALAR, sparkovers are avoided.
The anti-rotating pins are made of non-conducting material.
The thermoprobes for measuring the bearing temperature have to be suitably insulated (e.g. by using non-conducting fittings or protective tubes). Special technical solutions by GTW upon request.

For transportation of the bearing there are two holes in the casting of the upper part. In no case must these holes be used for transportation of the complete machine.

4. Despatch

The bearings are supplied fully assembled, but without oil filling. The bearings are sufficiently protected against corrosion by a primer. Machined surfaces without primer are protected by a removable coating.
The accessories like thrust pads, thermoprobes, or tubes with mastic are packed separately.
The bearing must be transported in such a way that it is not subjected to any shock loads, cannot slip and is protected against moisture.

5. Installation

First remove the upper part of the housing, the shaft seals and the shell. All items must be cleaned and checked for damages.

Please ensure that the shaft is clean, too, and in accordance with our recommendations for dimensions and tolerances.

Start with the installation as follows:

- Mount the bottom part of the housing on the foundation, but do not tighten the fixing screws to ensure a later aligning of the bearing housing.
- Now put the bottom half of the shell into the housing. (Align the shell to the split line of the housing). All different types of shells are mounted in the same way.
- Lower the shaft partially into position. Take care that the thrust part is not damaged. As soon as the shaft has reached a distance of approximately 1 mm from the bottom shell, the housing base can be precisely aligned. The gap between shaft and lateral bore of the housing may show max. differences of 0,3 to 0,4 mm. The more precise the alignment, the more efficient the seals will be.
- Tighten the fixing screws.
- Now apply oil to the shaft in way of the shell. Use the same type of oil as specified for this application. Then lower the shaft totally into place in the bottom shell.
- Coat the joint face of the lower part of the housing completely with non-hardening mastic.
- Now put on the upper half of the bearing shell. A twisted assembly of the shell is impossible due to eccentric position of the dowel pins.
- Now the upper part of the housing can be positioned. Both parts of the housing will close tightly.
- Now tighten the cap screws crosswise according to the table below:

Size	**7**	**9**	**11**	**14**	**18**	**22**
Thread	M 10		M 12	M 16	M 20	M 24
MA [Nm]	35		60	70	110	180
Size	**28**	**35**	**45**	**56**	**71**	**90**
Thread	M 30	M 42	M 48			
MA [Nm]	340	980	1480			

Tightening torque for cap screws

- In case the machine and bearings are subjected to vibrations during operation, it is necessary to secure the bolts by using screw-securing mastic.
- The rigid seals can now be mounted according to chapter 6. Tighten the fixing screws as indicated below:

Size	**7**	**9**	**11**	**14**	**18**	**22**
Thread	M 6				M 8	
MA [Nm]	10,5				26	
Size	**28**	**35**	**45**	**56**	**71**	**90**
Thread	M 8	M 10				
MA [Nm]	26	51				

Tightening torque for screws for sealings

5.1 Additional instructions for bearings with external oil supply system

When using an external oil supply system choose the cross sections of the tubes in such a way that the flow rates do not exceed 1,5 m/sec in the inlet and 0,15 m/sec in the outlet pipe.
The oil return pipes should be mounted with a gradient of about 10° to prevent a reflux which may lead to an overflow in the bearing and to leakage depending on this. If due to the system of construction the return pipes do not have a sufficient gradient, the cross-section of the tubes must be increased.
Welded and hot-bent, rusted or contaminated pipes must be pickled and then neutralised.
While assembling, all tube connections have to be mounted with sealing compound. A counternut is used to stay the threads of oil outlet pipe and housing. By this, the oil outlet pipe is additionally fixed. It is also advantageous to mount plugs (used for closing of not needed threaded holes) with sealing compound.
After assembly the complete oil supply system must be flushed in order to prevent bearing damages caused by contamination in the oil. Before flushing, the bearings and all gauges must be disconnected from the flushing oil circuit. Clean all filters after flushing. Ensure that all pipes and connections to the bearing housings are free of vibrations and loads.

5.2 Sleeve bearings with hydrostatic lift

If sleeve bearings are equipped with hydrostatic lift for operating reasons, the high pressure hose is to be mounted between shell and lead-through-bush in the housing wall. When dismantling the bearing supplied by GTW, the high pressure hose is loosened only at the bearing wall and the lower half of the shell is taken out.
The high pressure hose remains fitted at the lower half of the shell. When reassembling, this half has to be turned in the housing very carefully to avoid snapping or ripping-off. The hollow screws for the connection of the high pressure hose have to be tightened to prevent leakage.
Pay attention that the high pressure hose must be regarded as a wearing part and should be replaced after about 2 years when doing maintenance work.

6. Shaft seals

The GTW slide bearings in question can be assembled with different types of rigid labyrinth seals according to protection IP 44 or IP 55 (DIN 40050 / IEC 529).
The rigid seal IP 44 has two separate labyrinth systems. Between these a flinger on the shaft can be designed, if the axial movement of the rotor is small.
The rigid labyrinth seal IP 55 has an additional baffle which provides better protection against dirt or water ingress.
When assembling insulated bearings, the rigid labyrinth seals are mounted with insulating gaskets and bushes.
The lower part of the seal has to be pressed slightly from beneath against the shaft before tightening the fixing screws. After this, the upper part of the seal can be mounted.
During operation, the shaft is lifted by the hydrodynamic oil film, so that there is no metallic contact between shaft and rigid seal.
Non-insulated bearings are mounted without insulating gaskets between housing and seal. Instead of this, the flange of the rigid labyrinth seal has to be coated with a thin layer of non-hardening mastic.
Seals for special applications (e.g. protection IP 56 or higher) are available on request.

Attention! Rigid seals must be dismantled each time before assembling or disassem bling the bearings, otherwise they might be damaged by the shaft.

7. Putting into operation

Make sure that all holes are plugged and check the tightness of all connections in order to avoid oil leakage.
The circulated oil system should be switched on, and bearing and piping should be checked for tightness.

Attention! If the bearing temperature measured during test run exceeds the pre-calculated values by far, the machine must be stopped and the reasons investigated.

8. Maintenance

Take care that the bearing housing is clean on the outside because the heat transfer is reduced by deposits of dust and dirt.
If irregular oil levels and bearing temperatures are observed, the reasons have to be investigated.

8.1 Oil change

We recommend to change the lubricant in the oil supply system feeding the bearing after 20.000 hours of operation. If necessary, longer intervals may be admissible upon prior analysis
For filling and refilling use the same oil quality as specified for your application. The relevant oil type is indicated on the type plate of the bearing.
When carrying out the oil change, open the oil drain which is located on one side of the bearing (if possible, drain the oil when the bearing is still warm). If unusual alterations of the oil are noted, it is paramount to investigate the causes. If chemical detergents are used they have to be removed completely after cleaning process.
For filling and refilling use the same oil quality as specified for your application. The relevant oil type is indicated on the type plate of the bearing.

8.2 Inspections

Inspections are to be carried out if essential increases of the operating temperature or alterations of the lubrication are detected.

For an inspection it is necessary to remove the bearing housing cap while the bottom part remains fitted. Before disassembling clean the bearing and the work place.

8.3 Disassembly

- First remove the rigid seals, if this seal type is mounted.
- Unscrew the bolts of the housing cap and lift the housing cap off.
- Take off the upper half of the shell.
- Unscrew the bolts of the oil disc and take it off.
- Disconnect the thermometer and other monitoring instruments, if any exist.
- Raise the shaft just enough to relieve the bottom half of the bearing liner, which can now be turned until it can be removed.

8.4 Visual inspection

While dismantling the individual components check that all sliding surfaces are in perfect condition. Possible scorings should be smoothed before assembly.

Shaft seals have to be replaced if they show an irregular wear or if their edges are broken.

9. Storage

The storage area of the bearing must be dry and must not be subjected to major fluctuations in temperature. If properly stored the bearing can be kept in stock up to one year depending on the type of corrosion protection.

10. Ordering spare parts

Every bearing is provided with a production number and an order number on the type plate. In order to avoid failures when ordering spare parts, these numbers must always be quoted or the damaged part should be sent to us.

11. Service

Our service team is prepared to assist you in all problems occurring on request. Please do not hesitate to contact GTW.

Repair Manual for ECTFE Coatings in GTW Bearing Housings

This manual is aimed at service staff working with GTW bearing housings of types WP, WF and WM. It is assumed that the staff involved with this work has significant experience with installation and service works on GTW plain bearings. This procedure is applicable for defect sizes of 8 mm in length or width. In order to execute the repair, the affected bearing housing has to be dismounted and thoroughly cleaned with degreasing solvent, e.g. Isopropanol.
For defects larger than 8 mm, the housing has to be sent to GTW for repair.

1 Defect Identification

In the rare cases that they appear, defects in the ECTFE coating of GTW bearings are usually detected through failed electrical insulation measurement tests. Since these measurements are carried out with closed bearing housing, it is usually not clear where exactly the defect is located. The ECTFE coating is less than 1 mm thick, so even smaller metal chips between bearing shell and housing can lead to electrical insulation faults during shell assembly. In these cases, e.g. a metallic brush may be used advantageously for defect location. Larger defects may easily be visible, such as the exemplary defects shown in Figure 1.



Figure 1: Top view of exemplary defects in the ECTFE coating of a GTW bearing housing.

2 Defect Removal

The chemical properties of the ECTFE coating used in GTW bearings are such that although the coating bonds very well to the housing, adhesives bond very poorly to the ECTFE surface. It is therefore necessary to remove the defective area mechanically to create bonding of the adhesive with the bearing housing bulk. For this purpose, use a drill to remove an area of maximum diameter 10 mm including the defective area as shown in Figure 2. Drill about 2 mm deep into the cast iron of the bearing housing in order to have sufficient creep length and adhesive bonding. In order to improve bonding, the additional inclined holes with reduced diameter may be added at the bottom of the repair hole, or the sides of the repair holes may be executed with an undercut.

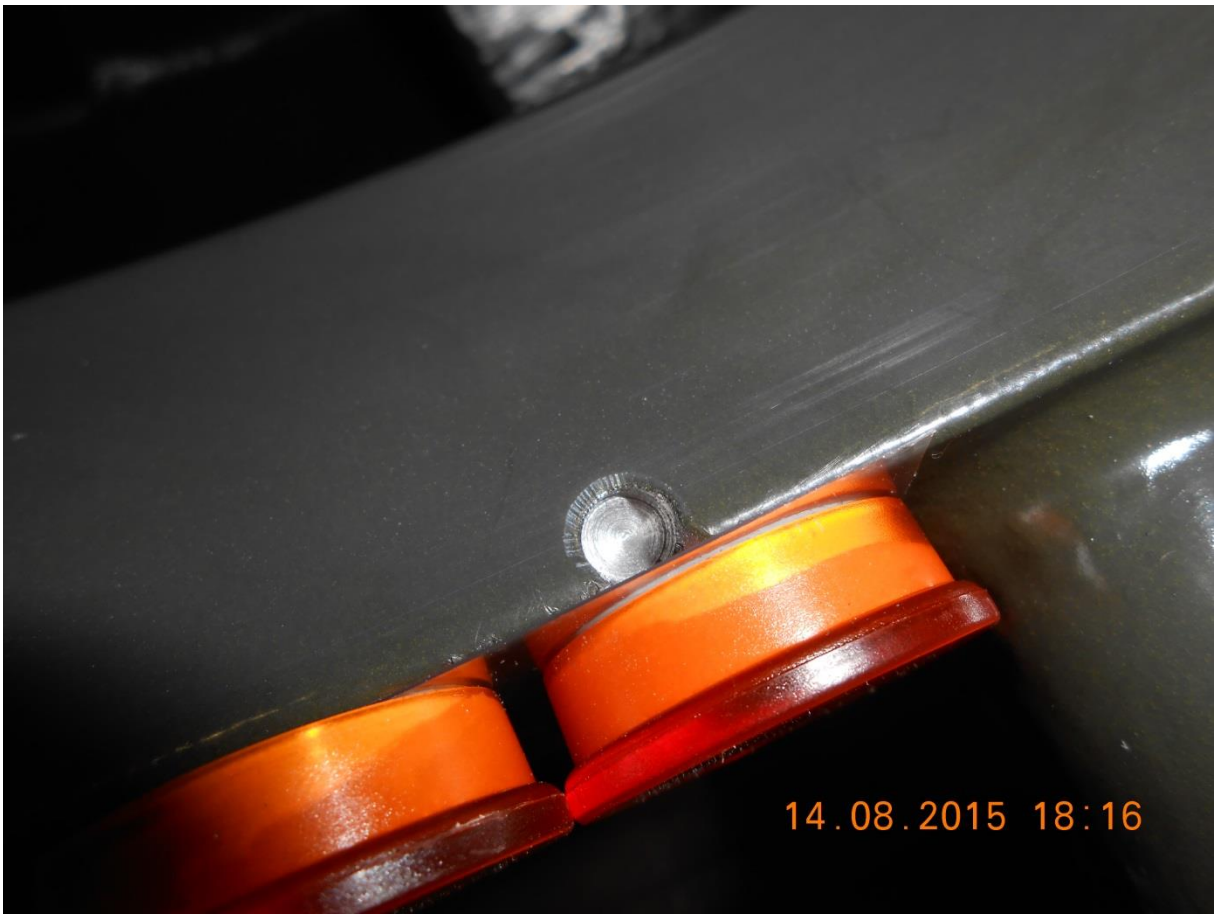


Figure 2: Top view of a hole drilled into the housing bulk material for ECTFE repair purposes.

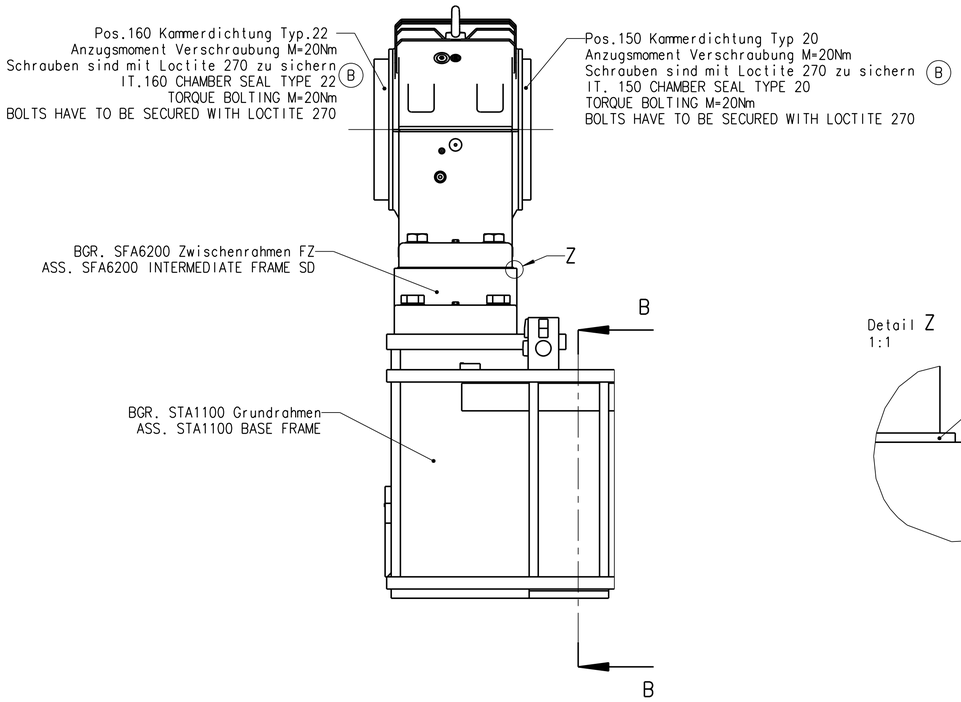
3 Repair

Thoroughly clean the drilled hole and the surrounding area with degreasing solvent, e.g. Isopropanol. Then use epoxy glue Araldite AV138M-1 with Hardener HV998 to fill the hole. Make sure that the hole is thoroughly filled, e.g. by poking with a wire. The glue should protrude about 0.5 mm from the remaining ECTFE coating around it. Let the glue start hardening and remove any protruding glue so that the glued area does not stand out. It may stand back up to 0.05 mm from the ECTFE surface. An exemplary repaired housing is shown in Figure 3.



Figure 3: View of a bearing housing with repaired ECTFE coating.

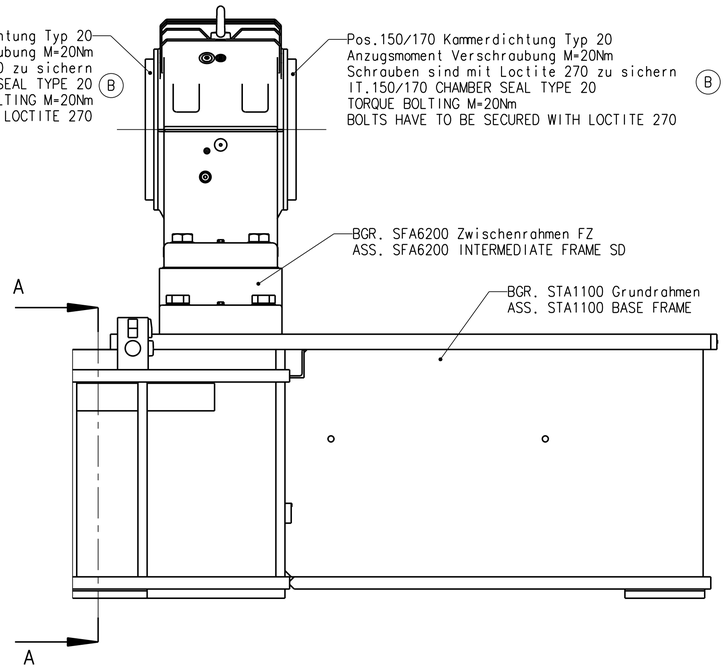
TS
TE



Detail Z
1:1

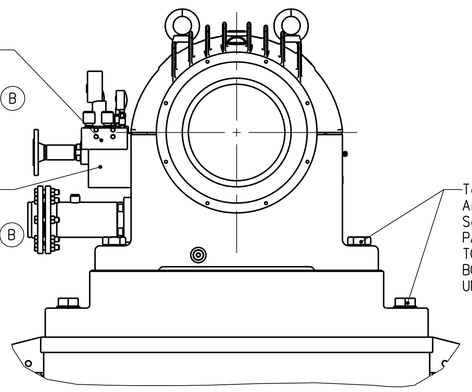
Platten sind Bestandteil der BGR. SFA5560
Lagerzubehoerteile zum Ausrichten der Lagerhoehe
auf TS und ES verwenden
PLATES ARE PART OF ASS. SFA5560
BEARING ACCESSORY USED FOR
ADJUSTMENT OF THE HIGH OF THE BEARING
ON TE AND EE

ES
EE

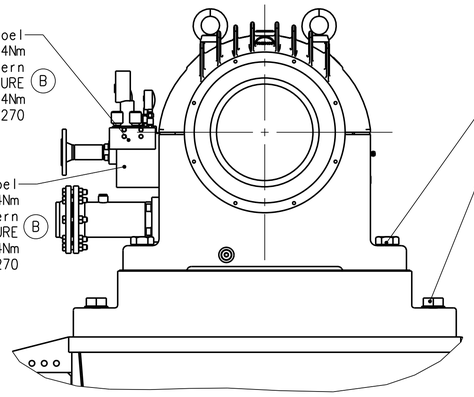


Schnitt A-A
SECTION A-A
1:10

Schnitt B-B
SECTION B-B
1:10



Teile sind in BGR. SFA5560 Lagerzubehoerteile enthalten
Anzugsmoment Verschraubung M=3003Nm
Schrauben sind mit Molykote bis unter den Kopf einzuschmieren
PARTS CONSISTS TO ASS. 5560 BEARING ACCESSORY
TORQUE BOLTING M=3003Nm
BOLTS HAVE TO BE LUBRICATED WITH MOLYKOTE
UNTIL THE SCREW HEAD



Teile sind in BGR. SFA5560 Lagerzubehoerteile enthalten
Anzugsmoment Verschraubung M=3003Nm
Schrauben sind mit Molykote bis unter dem Kopf einzuschmieren
PARTS CONSISTS TO ASS. 5560 BEARING ACCESSORY
TORQUE BOLTING M=3003Nm
BOLTS HAVE TO BE LUBRICATED WITH MOLYKOTE
UNTIL THE SCREW HEAD

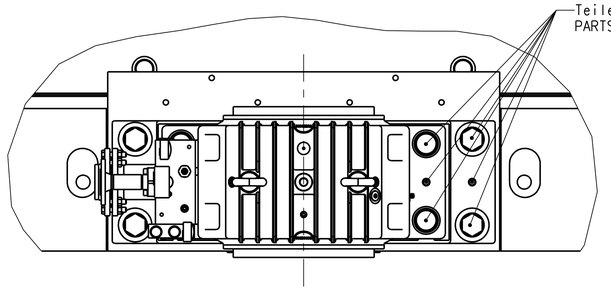
Pos.170 nur bei abweichenden Dichtungsdurchmesser TS und ES vorhanden
IT.170 ONLY IF SEAL DIAMETER TE AND EE DIFFERENT

POS.100 nur bei Bedarf vorhanden Siehe dazu BGR. SFA0000
IT.100 ONLY IF REQUIERED SEE ALSO ASS. SFA0000

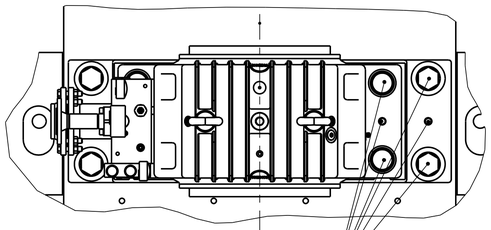
Anzugsmoment fuer Verschraubung der Lagerschalen betraegt
M=170Nm fuer µ=0,1 leicht geoelt
TORQUE BOLTING OF BEARING SHELLS
M=170Nm FOR µ=0,1 LIGHT LUBRICATED

Anzugsmoment fuer die Lagerdeckelgehaeusehaelften
M=1150Nm fuer µ=0,1 leicht geoelt
TORQUE BOLTING OF BEARING HOUSING
M=1150Nm FOR µ=0,1 LIGHT LUBRICATED

Montageseite Pos.90 BGR SFA5520 und Seite der Oelauslassflansche
kann variieren und muss aus BGR. SFA0000 entnommen werden
MOUNTING SIDE IT.90 ASS. SFA5520 AND SIDE OF THE OIL
OUTLET FLANGE IS VARIABLE AND THE RIGHT VERSION IS
SHOWN IN ASS. SFA0000 SHOP FINAL ASS.



Teile sind in BGR. SFA5560 Lagerzubehoerteile enthalten
PARTS CONSISTS TO ASS. SFA5560 BEARING ACCESSORY



Teile sind in BGR. SFA5560 Lagerzubehoerteile enthalten
PARTS CONSISTS TO ASS. SFA5560 BEARING ACCESSORY

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A		FIRST RELEASE / Erstausgabe

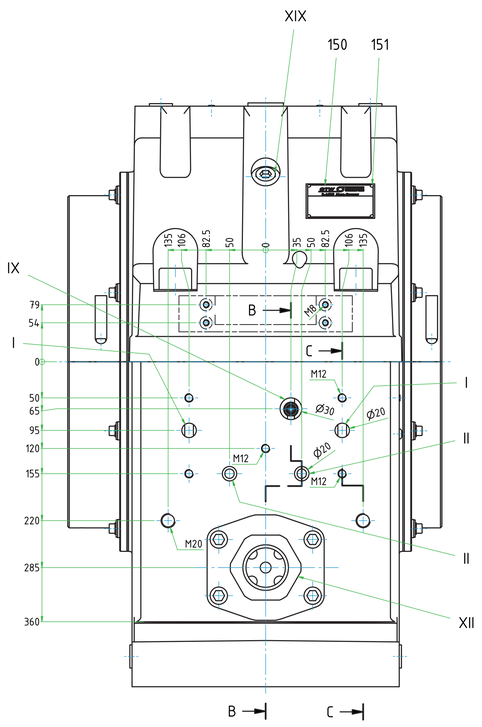
Siemens AG
Energy Sector

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CHECKED: 2012-01-04 SIEBENHAAR		
RELEASED: 2012-01-04 LANGE	SLEEVE BEARING BEARING SIZE 28	
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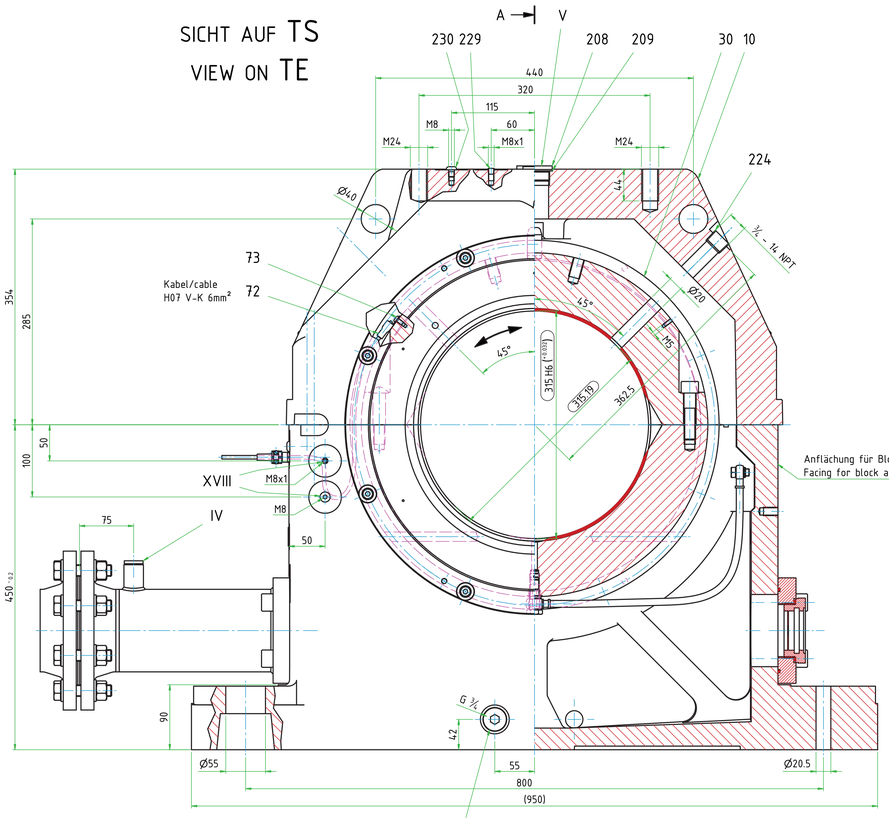
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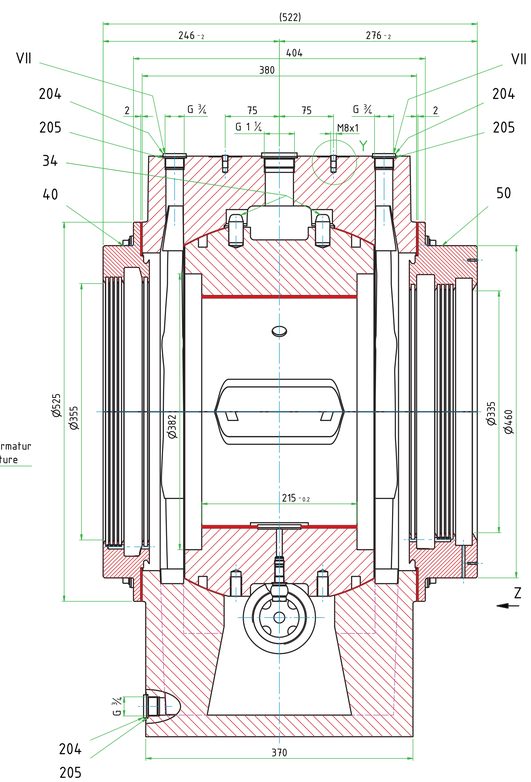
SICHT AUF TS
VIEW ON TE



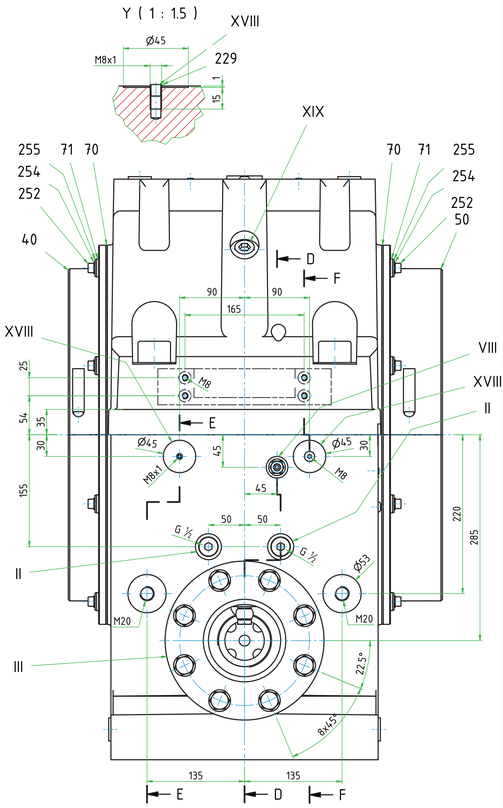
B–B



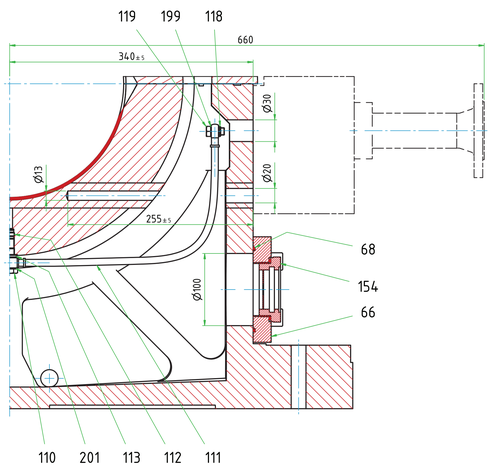
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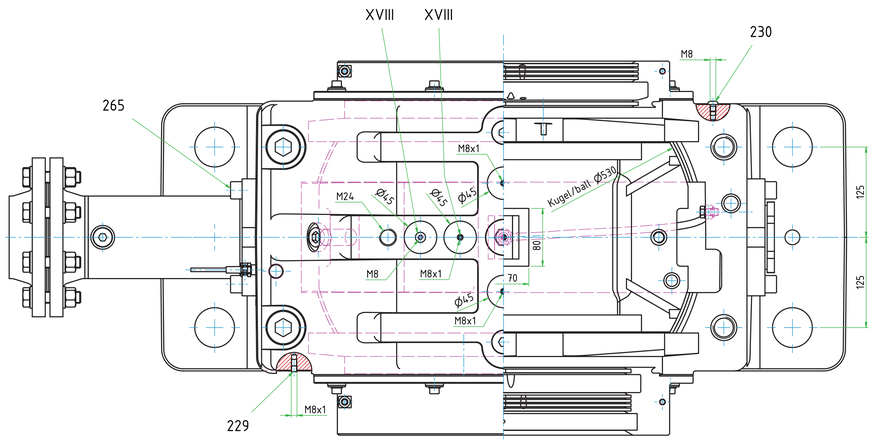


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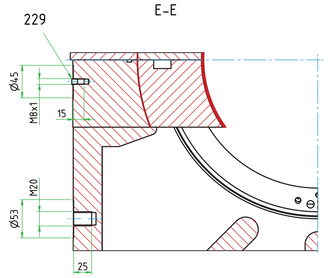


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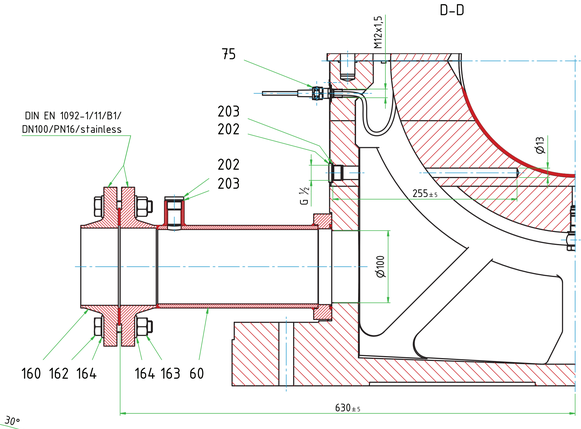




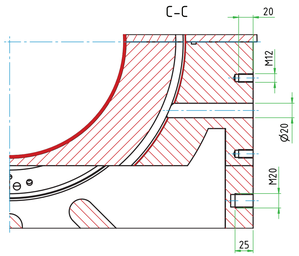
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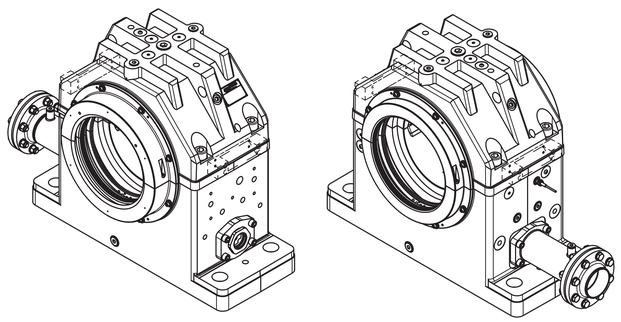


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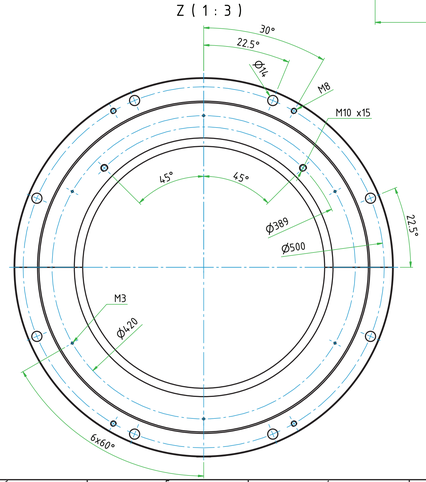


C–C

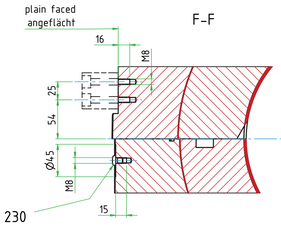




Z (1 : 3)



F–F



I	Ölzulauf bei Ölumlaufanlage radial	Circulation oil inlet radial
II	Temperaturmessung Lagerschale radial	Bearing metal temperature measurement radial
III	Ölablauf bei Ölumlaufanlage	Circulation pump oil outlet
IV	Anschluss für Ölsumpfthermometer	Connection for oil sump temperature measurement
V	Überprüfung Ölförderung des Schmierrings	Inspection of oil ring lubrication performance
VI	Ölablass	Oil drain
VII	Öleinfüllung bzw. Be- und Entlüftungsfilter	Oil filling or aeration filter
VIII	Erdungskabeldurchführung	Earthing cable lead - through
IX	Anschluss für Hydrostatik	Connection for hydrostatics
XII	Ölstandsanzeige	Oil level indicator
XVIII	Anschluss für Schwingungsmessung (Gehäuse)	Connection for vibration sensor (housing)
XIX	Anschluss für Schwingungsmessung (Welle)	Connection for vibration sensor (shaft)

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DPPPG - 7015 8485

INDEX: A
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GENERAL TOLERANCES
DIN ISO 2768 - mH

A0

SCALE: 1 : 100
WEIGHT: 761,7 kg

TITLE
Gleitlager WPXYQ 28-315 TS
Slide bearing WPXYQ 28-335 TE
Assembly Siemens Erfurt - Hy+EK insulated

	DATE	NAME
Drawn BY	20.04.2018	SAN
CHECKED BY	23.04.2018	CBE

GTW Gleitlagertechnik Weißacher GmbH

DRAWING NUMBER: 452031
REVISION: 00
1 OF 2 SHEETS

INDEX | DESCRIPTION OF CHANGE | DATE | NAME | ORIGIN | STATUS: Freigegeben

POS	QTY	BENENNUNG	DESCRIPTION	DWG NO	REV	DIMENSIONS	MATERIAL	MASS
265	8	Zylinderschraube	Socket screw	DIN EN ISO 4762	00	M16x45	8.8 zinced	0,1 kg
255	16	Unterlegscheibe	Washer	DIN 9021	00	8,4	100 HV zinced	0 kg
254	16	Unterlegscheibe	Washer	DIN 125	00	A 8,4	140 HV zinced	0 kg
252	16	Zylinderschraube	Socket screw	DIN EN ISO 4762	00	M8x30	8.8 zinced	0 kg
230	4	Rundkopfschraube	Fillister Socked Head Screw	ISO 7380	00	M8x10	10.9 zinced	0 kg
229	6	Verschlußschraube	Plug	DIN 906	00	M8x1	St zinced	0 kg
224	2	Verschlußstopfen	Plug	ANSI B1.20	00	3/4" NPT	St zinced	0,1 kg
209	1	Dichtring	Gasket	DIN 7603	00	A42x49x2	Cu	0 kg
208	1	Verschlußschraube	Plug	DIN 908	00	G1¼A	St zinced	0,2 kg
205	4	Dichtring	Gasket	DIN 7603	00	A27x32x2	Cu	0 kg
204	4	Verschlußschraube	Plug	DIN 908	00	G¾A	St zinced	0,1 kg
203	3	Dichtring	Gasket	DIN 7603	00	A21x26x1,5	Cu	0 kg
202	3	Verschlußschraube	Plug	DIN 908	00	G½A	St zinced	0 kg
201	1	Dichtring	Gasket	DIN 7603	00	A14x18x1,5	Cu	0 kg
199	1	Dichtring	Gasket	DIN 7603	00	A10x13x1	Cu	0 kg
164	16	Unterlegscheibe	Washer	DIN 125	00	A 17	A2-70	0 kg
163	8	Sechskantmutter	Hexagon nut	DIN EN ISO 4032	00	M16	A2-70	0 kg
162	8	Sechskantschraube	Hexagon head screw	DIN EN 24017	00	M16x70	A2-70	0,1 kg
161	1	Flachdichtung PN16	Gasket	DIN 2690	00	DN100	KLINGERsil C-4400	0 kg
160	1	Vorschweißflansch	Welding neck flange	DIN EN 1092-1	00	11/B1/DN100x3,6/PN16	1.4404/1.4571	4,6 kg
159	1	Curil T- Dichtmasse	Sealing compound	000131	00	Tube 75ml		0 kg
154	1	Ölstandsauge	Oil level gauge	000213	00	G 2 1/2	CuZn40Pb2	0,7 kg
151	4	Kerbnagel	Grooved drive stud	DIN EN ISO 8746	00	2,5x8 - A	1.4404	0 kg
150	1	Typenschild GTW	Name plate	000540	00	95x67x0,5	1.4404	0 kg
119	1	Hohlschraube	Banjo bolt	001763	00	DIN 7643-3 / M10x1	St zinced	0 kg
118	1	Dichtkantenring	Edge sealing ring	001770	00	DKAZ M10	St zinced	0 kg
113	1	Dichtkantenring	Edge sealing ring	000221	00	DKAZ ¼	St zinced	0 kg
112	1	Rückschlagventil RC1	Non-return valve	000026	00	G 1/4	St	0 kg
111	1	Hydraulikschlauch	Hydraulic hose	R7 DN6	00	450mm	Polyflex	0,1 kg
110	1	Hohlschraube	Banjo bolt	000281	00	DIN 7643	St zinced	0 kg
75	1	Kabelverschraubung	Cable connection	001314	00	M12x1.5	Brass nickel plated	0 kg
73	1	Rundkopfschraube	Fillister Socked Head Screw	ISO 7380	00	M5x10	10.9 zinced	0 kg
72	1	Erdungskabel	Erthing Cable	000146	00	2 m		0 kg
71	16	Isolierhülse M8	Insulating bush	300192	00		Grivory GV4H	0 kg
70	2	Isolierscheibe, geteilt	Insulating disc	300193	02	ø525xø434x2	novapress 850	0,2 kg
68	2	O-Ring	O-ring	DIN 3771	00	110,72x3,53	NBR 90	0 kg
66	1	HAVIT SAE-Flansch AFC 4"	HAVIT SAE-Flange AFC 4"	303495	00		S235	3 kg
60	1	Ölablaufrohr DN100	Oil outlet pipe	303915	03	EN 1092-1/11/DN100/PN16	1.4404	10,1 kg
50.1	2	Zylinderschraube	Socket screw	DIN EN ISO 4762	00	M8x40	8.8 zinced	0 kg
50	1	Kammerdichtung W28-335 S	Rigid seal	302979	06		G-AlZn10Si8Mg	17,5 kg
40.1	2	Zylinderschraube	Socket screw	DIN EN ISO 4762	00	M8x40	8.8 zinced	0 kg
40	1	Kammerdichtung W28-355	Rigid seal	300292	07	(IP44)	G-AlZn10Si8Mg	10,2 kg
34	2	Zylinderstift	Pin	300231	00	ø20m6x45	PA66-GF30	0 kg
30.3	2	Zylinderschraube	Socket screw	DIN EN ISO 4762	00	M16x65	8.8	0,1 kg
30.2	2	Zylinderstift	Pin	DIN EN ISO 8733	00	ø16m6x40	St	0,1 kg
30	1	Lagerschale W-YQ 28-315	Bearing shell	303914	03		C10/C15 / GTW 89	206,6 kg
10.3	4	Zylinderschraube	Socket screw	DIN EN ISO 4762	00	M30x150	8.8 zinced	1,1 kg
10.2	2	Zylinderstift	Pin	DIN EN ISO 8733	00	ø20m6x50	St	0,1 kg
10.1	1	Isolierung	Insulation		00		Halar® ECTFE	0,2 kg
10	1	Lagergehäuse WP 28 isoliert	Pedestal housing	306196	00		EN-GJL-300	504,3 kg

Siemens AG
Energy Sector

Zeichnungs-Nr. / DRAWING NUMBER:
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DPPPG - 7015 8485

INDEX: A

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GENERAL TOLERANCES
DIN ISO 2768 - mH

A2

SCALE: 1 : 100

WEIGHT: 761,7 kg

TITLE:
Gleitlager WPXYQ 28-315 TS
Slide bearing WPXYQ 28-335 TE
Assembly Siemens Erfurt - Hy+EK insulated

	DATE	NAME
DRAWN BY:	20.04.2018	SAN
CHECKED BY:	23.04.2018	CBE

INDEX	DESCRIPTION OF CHANGE	DATE	NAME

ORIGIN: GTW Gleitlagertechnik Weißbacher GmbH

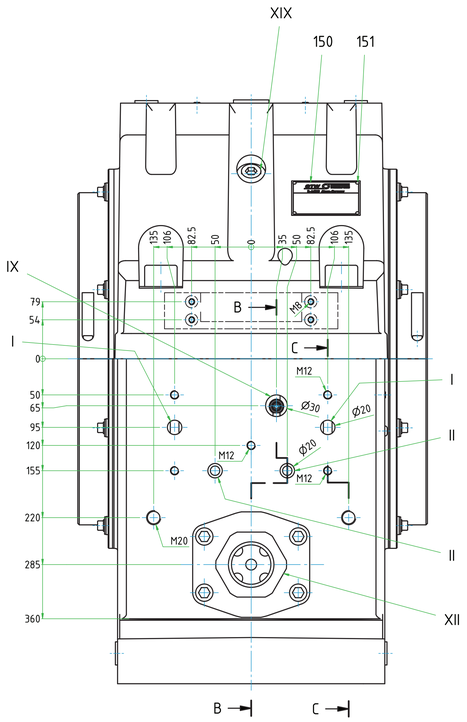
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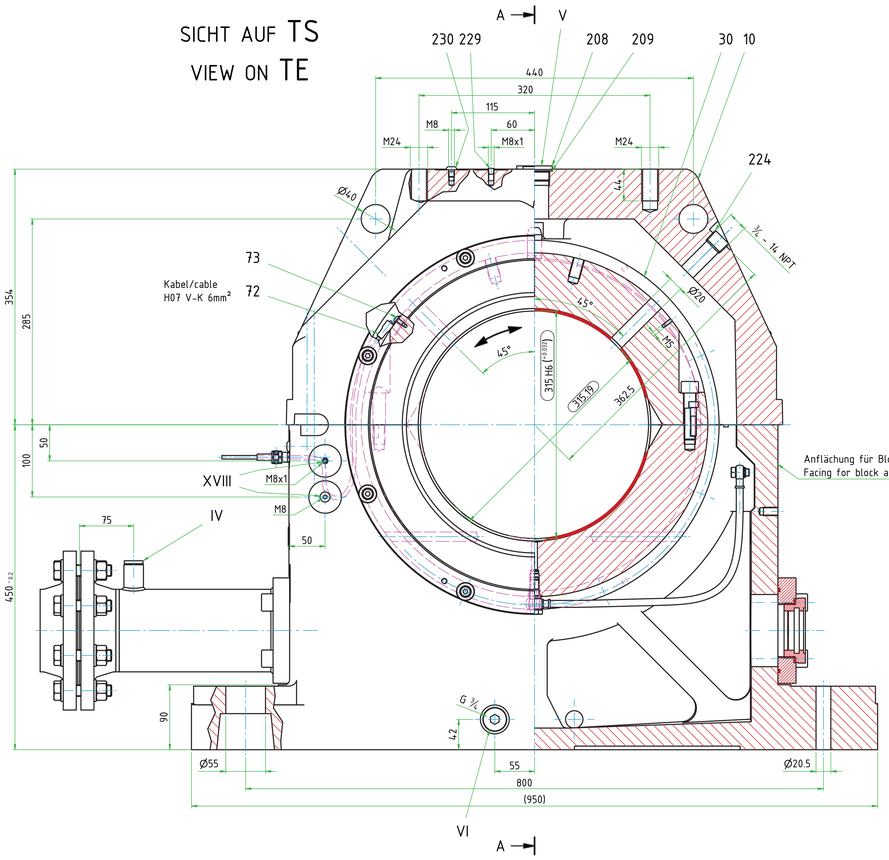
2 OF 2 SHEETS

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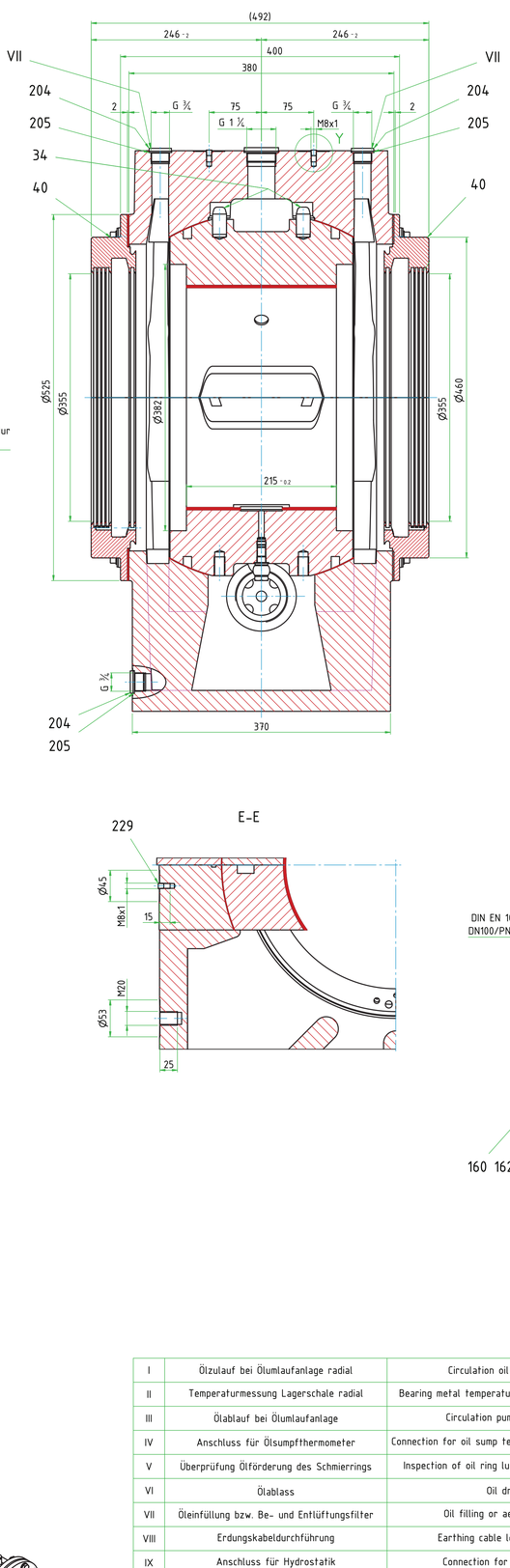
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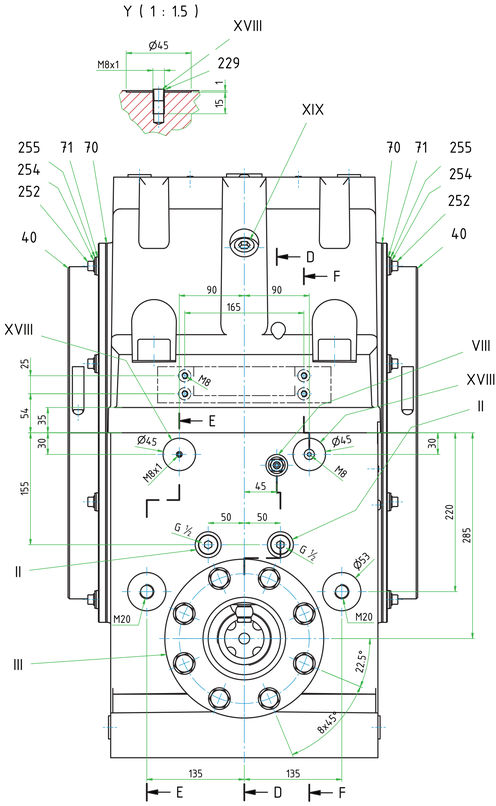
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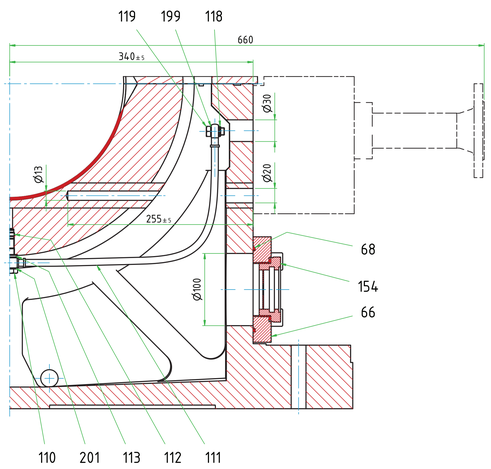
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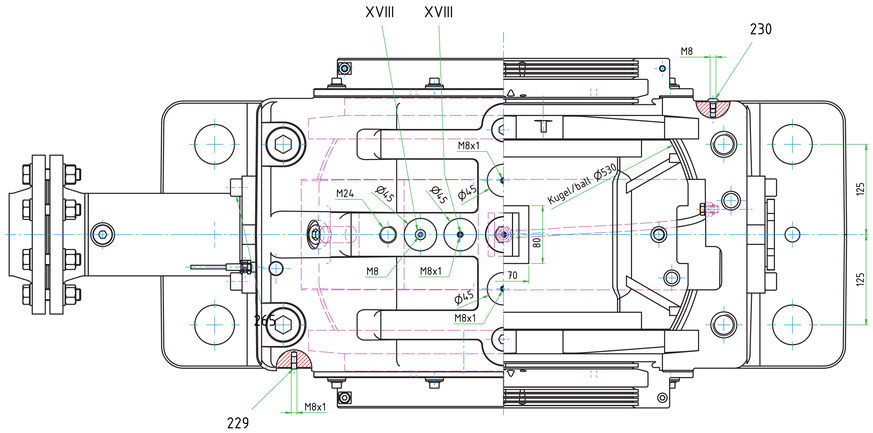


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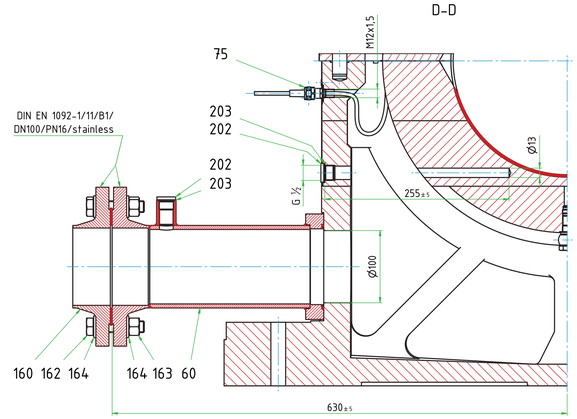
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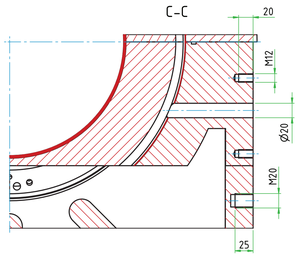


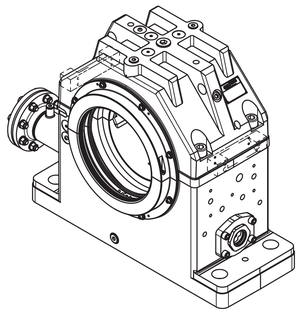
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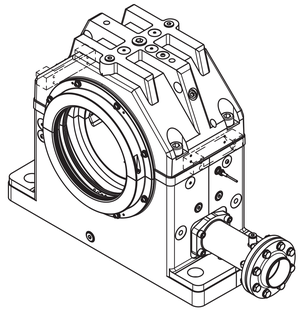
D–D



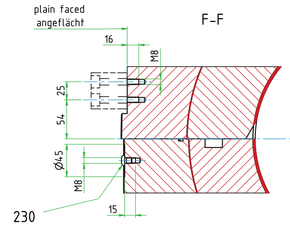
C–C







F–F



I	Ölzulauf bei Ölumlaufanlage radial	Circulation oil inlet radial
II	Temperaturmessung Lagerschale radial	Bearing metal temperature measurement radial
III	Ölablauf bei Ölumlaufanlage	Circulation pump oil outlet
IV	Anschluss für Ölsumpfthermometer	Connection for oil sump temperature measurement
V	Überprüfung Ölförderung des Schmierrings	Inspection of oil ring lubrication performance
VI	Ölablass	Oil drain
VII	Öleinfüllung bzw. Be- und Entlüftungsfilter	Oil filling or aeration filter
VIII	Erdungskabeldurchführung	Earthing cable lead - through
IX	Anschluss für Hydrostatik	Connection for hydrostatics
XII	Ölstandsanzeige	Oil level indicator
XVIII	Anschluss für Schwingungsmessung (Gehäuse)	Connection for vibration sensor (housing)
XIX	Anschluss für Schwingungsmessung (Welle)	Connection for vibration sensor (shaft)

Siemens AG
Energy Sector

Zeichnungs-Nr. / DRAWING NUMBER:
Auftrags-Nr. / ORDER NUMBER:
DPPPG - 7015 3217

INDEX: A
ISO 128

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GENERAL TOLERANCES DIN ISO 2768 - mH

A0

SCALE: 1 : 3
WEIGHT: 754.3 kg

	DATE	NAME
Drawn BY	12.01.2018	SMü
CHECKED BY	12.01.2018	GZO

TITLE:
Gleitlager WPXYQ 28-315 ES
Slide bearing WPXYQ 28-315 EE
Assembly Siemens Erfurt - Hy+EK insulated

GTW Gleitlagertechnik Weißwasser GmbH

DRAWING NUMBER: 452004
REVISION: 00
1 OF 2 SHEETS

INDEX	DESCRIPTION OF CHANGE	DATE	NAME	ORIGIN:

STATUS: Freigegeben

POS	QTY	BENENNUNG	DESCRIPTION	DWG NO	REV	DIMENSIONS	MATERIAL	MASS
265	8	Zylinderschraube	Socket screw	DIN EN ISO 4762	00	M16x45	8.8 zinced	0,1 kg
255	16	Unterlegscheibe	Washer	DIN 9021	00	8,4	100 HV zinced	0 kg
254	16	Unterlegscheibe	Washer	DIN 125	00	A 8,4	140 HV zinced	0 kg
252	16	Zylinderschraube	Socket screw	DIN EN ISO 4762	00	M8x30	8.8 zinced	0 kg
230	4	Rundkopfschraube	Fillister Socked Head Screw	ISO 7380	00	M8x10	10.9 zinced	0 kg
229	6	Verschlußschraube	Plug	DIN 906	00	M8x1	St zinced	0 kg
224	2	Verschlußstopfen	Plug	ANSI B1.20	00	3/4" NPT	St zinced	0,1 kg
209	1	Dichtring	Gasket	DIN 7603	00	A42x49x2	Cu	0 kg
208	1	Verschlußschraube	Plug	DIN 908	00	G1¼A	St zinced	0,2 kg
205	4	Dichtring	Gasket	DIN 7603	00	A27x32x2	Cu	0 kg
204	4	Verschlußschraube	Plug	DIN 908	00	G¾A	St zinced	0,1 kg
203	3	Dichtring	Gasket	DIN 7603	00	A21x26x1,5	Cu	0 kg
202	3	Verschlußschraube	Plug	DIN 908	00	G½A	St zinced	0 kg
201	1	Dichtring	Gasket	DIN 7603	00	A14x18x1,5	Cu	0 kg
199	1	Dichtring	Gasket	DIN 7603	00	A10x13x1	Cu	0 kg
164	16	Unterlegscheibe	Washer	DIN 125	00	A 17	A2-70	0 kg
163	8	Sechskantmutter	Hexagon nut	DIN EN ISO 4032	00	M16	A2-70	0 kg
162	8	Sechskantschraube	Hexagon head screw	DIN EN 24017		M16x70	A2-70	0,1 kg
161	1	Flachdichtung PN16	Gasket	DIN 2690	00	DN100	KLINGERsil C-4400	0 kg
160	1	Vorschweißflansch	Welding neck flange	DIN EN 1092-1	00	11/B1/DN100x3,6/PN16	1.4404/1.4571	4,6 kg
159	1	Curil T- Dichtmasse	Sealing compound	000131	00	Tube 75ml		0 kg
154	1	Ölstandsauge	Oil level gauge	000213	00	G 2 1/2	CuZn40Pb2	0,7 kg
151	4	Kerbnagel	Grooved drive stud	DIN EN ISO 8746	00	2,5x8 - A	1.4404	0 kg
150	1	Typenschild GTW	Name plate	000540	00	95x67x0,5	1.4404	0 kg
119	1	Hohlschraube	Banjo bolt	001763	00	DIN 7643-3 / M10x1	St zinced	0 kg
118	1	Dichtkantenring	Edge sealing ring	001770	00	DKAZ M10	St zinced	0 kg
113	1	Dichtkantenring	Edge sealing ring	000221	00	DKAZ ¼	St zinced	0 kg
112	1	Rückschlagventil RC1	Non-return valve	000026	00	G 1/4	St	0 kg
111	1	Hydraulikschlauch	Hydraulic hose	R7 DN6	00	450mm	Polyflex	0,1 kg
110	1	Hohlschraube	Banjo bolt	000281	00	DIN 7643	St zinced	0 kg
75	1	Kabelverschraubung	Cable connection	001314	00	M12x1.5	Brass nickel plated	0 kg
73	1	Rundkopfschraube	Fillister Socked Head Screw	ISO 7380	00	M5x10	10.9 zinced	0 kg
72	1	Erdungskabel	Erthing Cable	000146	00	2 m		0 kg
71	16	Isolierhülse M8	Insulating bush	300192	00		Grivory GV4H	0 kg
70	2	Isolierscheibe, geteilt	Insulating disc	300193	02	ø525xø434x2	novapress 850	0,2 kg
68	2	O-Ring	O-ring	DIN 3771	00	110,72x3,53	NBR 90	0 kg
66	1	HAVIT SAE-Flansch AFC 4"	HAVIT SAE-Flange AFC 4"	303495	00		S235	3 kg
60	1	Ölablaufrohr DN100	Oil outlet pipe	303915	03	EN 1092-1/11/DN100/PN16	1.4404	10,1 kg
40.1	2	Zylinderschraube	Socket screw	DIN EN ISO 4762	00	M8x40	8.8 zinced	0 kg
40	2	Kammerdichtung W28-355	Rigid seal	300292	07	(IP44)	G-AlZn10Si8Mg	10,2 kg
34	2	Zylinderstift	Pin	300231	00	ø20m6x45	PA66-GF30	0 kg
30.3	2	Zylinderschraube	Socket screw	DIN EN ISO 4762	00	M16x65	8.8	0,1 kg
30.2	2	Zylinderstift	Pin	DIN EN ISO 8733	00	ø16m6x40	St	0,1 kg
30	1	Lagerschale W-YQ 28-315	Bearing shell	303914	03		C10/C15 / GTW 89	206,6 kg
10.3	4	Zylinderschraube	Socket screw	DIN EN ISO 4762	00	M30x150	8.8 zinced	1,1 kg
10.2	2	Zylinderstift	Pin	DIN EN ISO 8733	00	ø20m6x50	St	0,1 kg
10.1	1	Isolierung	Insulation		00		Halar® ECTFE	0,2 kg
10	1	Lagergehäuse WP 28 isoliert	Pedestal housing	306196	00		EN-GJL-300	504,3 kg

Siemens AG
Energy Sector

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Auftrags-Nr. / ORDER NUMBER:
DPPPG - 7015 3217

INDEX A

ISO 128

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GENERAL TOLERANCES
DIN ISO 2768 - mH

A2

SCALE: 1 : 3

WEIGHT: 754,3 kg

TITLE:
Gleitlager WPXYQ 28-315 ES
Slide bearing WPXYQ 28-315 EE

Assembly Siemens Erfurt - Hy+EK insulated

	DATE	NAME
DRAWN BY:	12.01.2018	SWi
CHECKED BY:	12.01.2018	GZO

GTW Gleitlagertechnik Weißbacher GmbH

DRAWING NUMBER: 452004

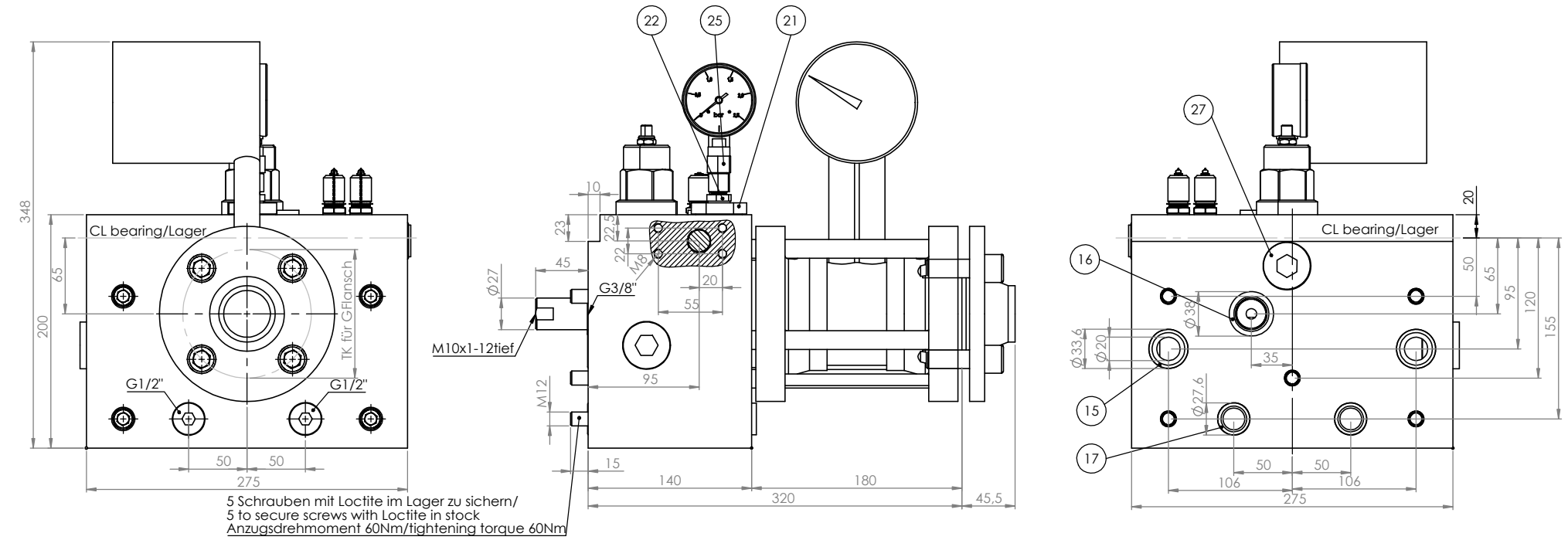
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2 OF 2 SHEETS

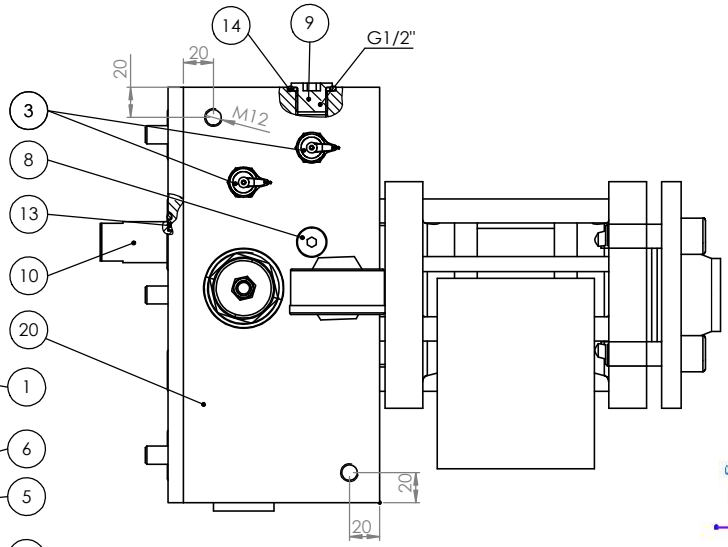
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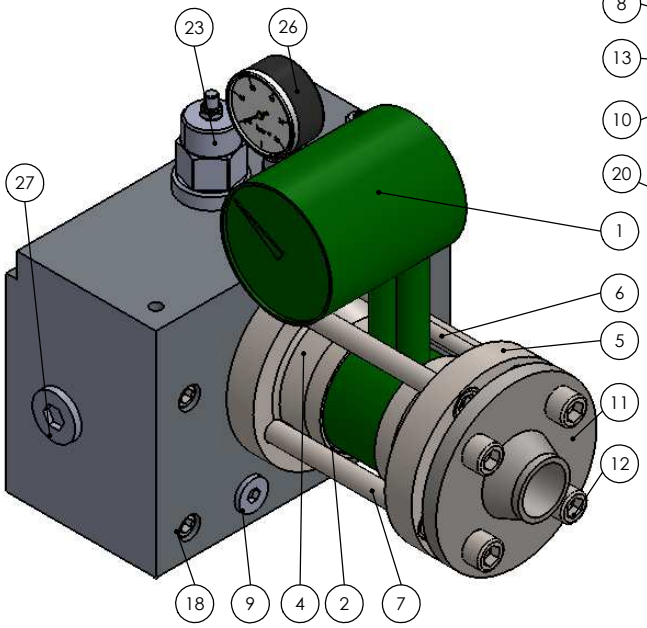
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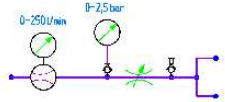
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5 Schrauben mit Loctite im Lager zu sichern/
5 to secure screws with Loctite in stock
Anzugsdrehmoment 60Nm/tightening torque 60Nm







ECCN: EAR99	AL: N	ECL: N	U.S.-CONTENT: N

POS-NR.	MENGE	BENENNUNG
27	2	Verschraubung/screw connection VS-R 1-WD
26	1	Manometer 0-2,5 bar, Einheit bar/psi Gauge 0-2,5 bar, unit bar / psi
25	1	Verschraubung/screw connection EMASD 8LR
23	1	Drosselventil/Throttle valve
22	1	Verschraubung/screw connection GES 8 LR-WD
21	1	Verschraubung/screw connection RED-R1-WD R1-4
20	1	567303_Block NG28 Al
18	5	Schraube/bolt DIN 912 M12 x 140 zn 8.8
17	2	O-Ring 24x2,0 NBR 70 Shore
16	1	O-Ring 32x3,0 NBR 90 Shore
15	2	O-Ring 30x2,0 NBR 70 Shore
14	1	O-Ring 26x3,0 NBR 90 Shore
13	1	O-Ring 22x2,0 NBR 90 Shore
12	4	Schraube/bolt DIN 912 M16 x 50
11	1	Vorschweißflansch/flange DIN40 PN16/ANSI 1 1/2" 150 lbs
10	1	Hydrostatik Anschlussbuchse für NG28/hydrostatic connection socket for NG28
9	3	Verschlussschraube/locking screw VS-R 1/2"-WD
8	1	Verschlussschraube/locking screw VS-R 1/4"-WD
7	4	Schraube/bolt DIN 912 M16 x 190
6	2	Schraube/bolt DIN 912 M10 x 160
5	1	Anschlussflansch/flange NG28
4	1	Flansch am Block/flange NG28
3	2	Schraubkupplung/threaded G1/4"
2	4	Dichtungen/seal
1	1	Durchflussmessgerät/flow meter 1.4571Messbereich/measuring: range 16-100l/min Einheit /unit: Liter/Gallon Anzeige/display: bis 100l/min

F889396	DN40	Stahl
F889398	ANSI 1 1/2"	Stahl
567304-01	DN40	VA
F889394	ANSI 1 1/2"	VA

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Schweißteiltoleranzen ISO 13920-AF
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Gezeichnet	14.03.2017	H. Risch
Geprüft		
Freigabe In		
Freigabe Ex		

Nr/No.	Änderung/Revision	Datum/Date	Name

Fluidtechnik
hydraulik-pneumatik
Friedensstraße 14 · 71687 Geeigenmöd · Tel. 07433-31710
www.fluidtechnik.de

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Werkstoff/Material:
Auftrags-Nr/Order-No:

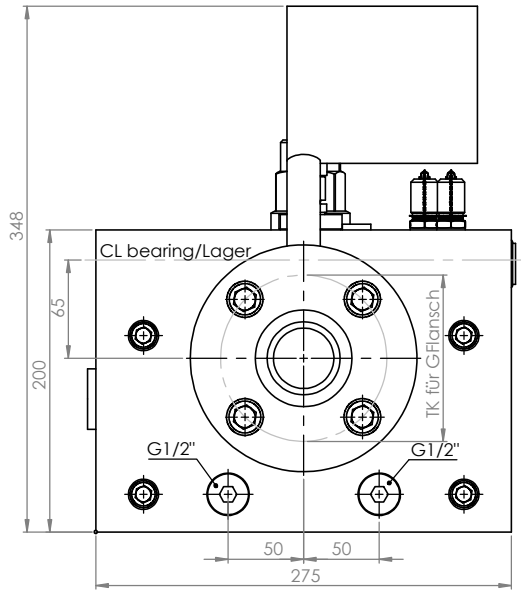
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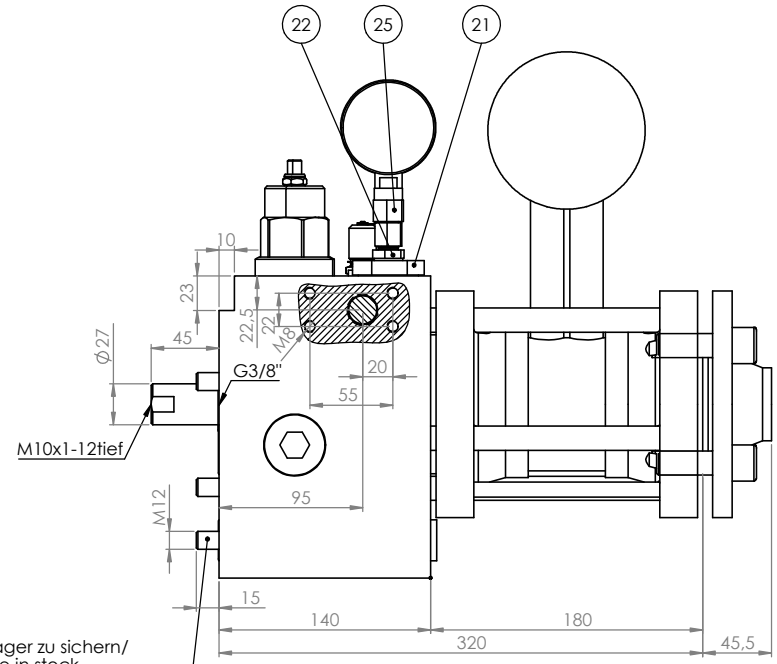
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oilinlet size 28 ri-le

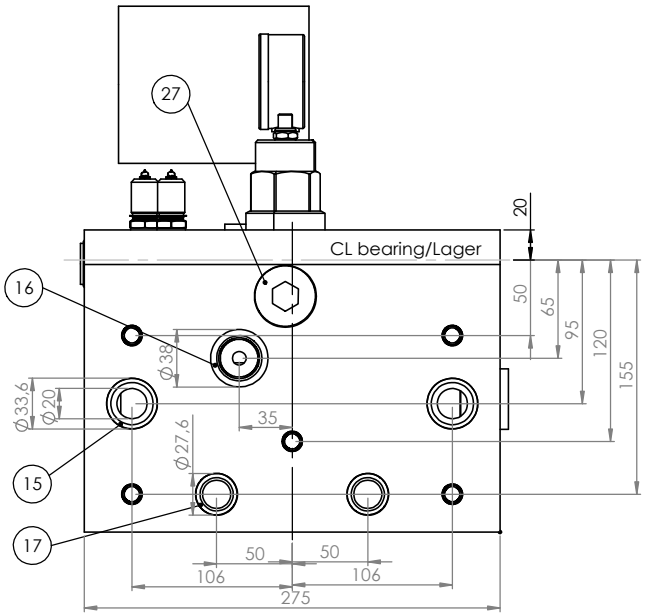
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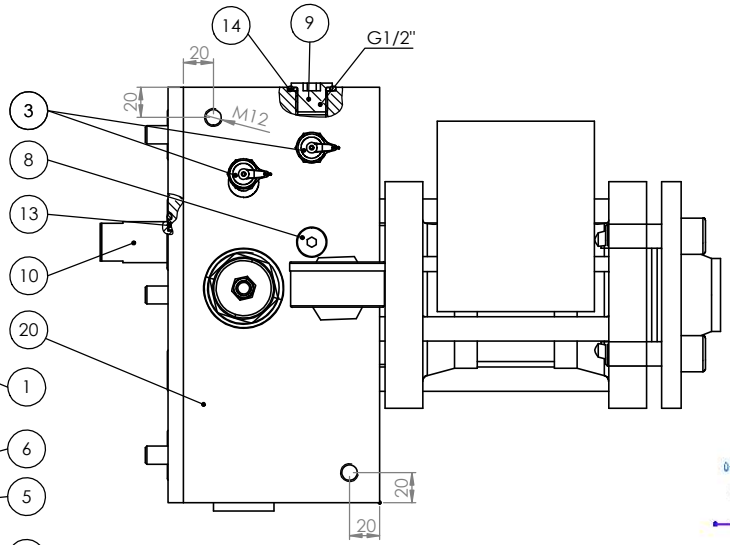
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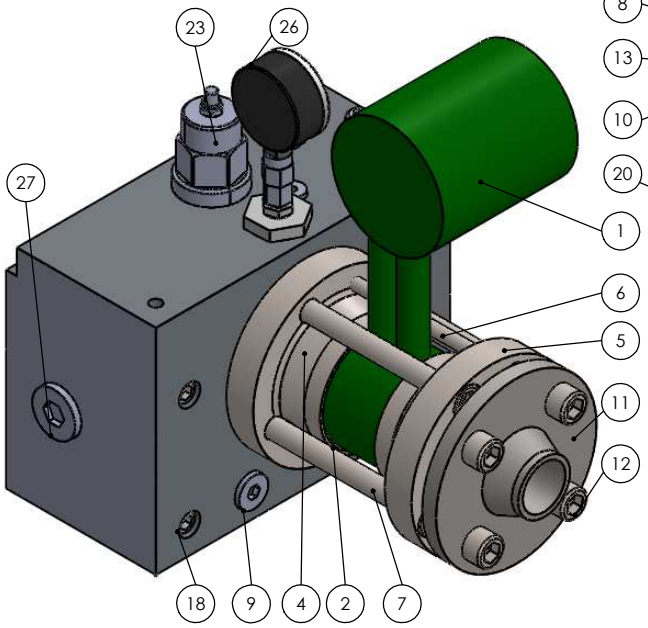


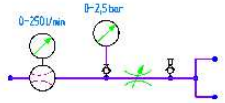




5 Schrauben mit Loctite im Lager zu sichern/
5 to secure screws with Loctite in stock
Anzugsdrehmoment 60Nm/tightening torque 60Nm







ECCN: EAR99	AL: N	ECL: N	U.S.-CONTENT: N

POS-NR.	MENGE	BENENNUNG
27	2	Verschraubung/screw connection VS-R 1-WD
26	1	Manometer 0-2,5 bar, Einheit bar/psi Gauge 0-2,5 bar, unit bar / psi
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1	1	Durchflussmessgerät/flow meter 1.4571Messbereich/measuring: range 16-100l/min Einheit /unit: Liter/Gallon Anzeige/display: bis 100l/min

F889397	DN40	Stahl
F889399	ANSI 1 1/2"	Stahl
567847-01	DN40	VA
F889395	ANSI 1 1/2"	VA

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Schweißteiltoleranzen ISO 13920-AF
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risch, 22.03.2017 11:42:43

Maßstab, Format/scale:	A2	Gewicht/Weight: [kg]	32.72
Werkstoff/Material:		Auftrags-Nr/Order-No:	

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Gezeichnet	14.03.2017	H. Risch
Geprüft		
Freigabe In		
Freigabe Ex		

Benennung/Title:

Ölzulauf NG28 li-re
oilinlet size 28 le-ri

Fluidtechnik
hydraulik-pneumatik
Friedensstraße 14 99867 Georgenthal Tel. 036253-31710
www.fluidtechnik.de

Zeichnungs-Nr/Drawing No:
FTG: 567847-01
Siemens: DPPPG-70133342-002

Blatt/sheet: 1/1

Nr/No.	Änderung/Revision	Datum/Date	Name

Ers. für: | Ers. durch:

M.V. Neutral Point Cubicle
and
M.V. Line Side Cubicle

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Manufacturer: **POWERGEAR LTD**

Documentation title: **Instruction Manual for Line Side Cubicle**

A. Installation, Operation and Maintenance Manual
B. Site Assembly Drawings
C. Contract Drawings

No. of pages: 37 incl. drawings

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Documentation title: **Instruction Manual for Neutral Point Cubicle**

A. Installation, Operation and Maintenance Manual
B. Site Assembly Drawings
C. Contract Drawings

No. of pages: 27 incl. drawings

Instruction Manual

for

LINE SIDE CUBICLE

PURCHESE ORDER No. : E09-3010449826

SIEMENS SPEC. No. : TLV13-024

PROJECT NAME : VILNIUS BIOMASS

SERIAL No. : MP0650

DOCUMENT No. : IOM-LSC-MP0650

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A. INSTALLATION, OPERATION AND MAITENANCE MANUAL

B. SITE ASSEMBLY DRAWING

C. CONTRACT DRAWINGS

A. INSTALLATION, OPERATION AND MAINTENANCE MANUAL

Line Side Cubicle

SIEMENS PROJECT No.	**: 3000018595**
SIEMENS ORDER No.	**: E09-3010449826**
MATERIAL No. Acc. TO PO	**: P00058032900**
CUBICLE IDENTIFICATION	**: +V20MKA10GD010**
PROECT NAME	**: VILNIUS BIOMASS**

Contact information :

M/s Powergear Limited,
Plot No. B-33, 2nd phase,
5th main road, MEPZ,
Tambaram,
Chennai – 600 045. India.
Phone : +91 44 42901111
Fax : +91 44 22624434
Email: engineering.mepz@powergearlimited.com
sbu@powergearlimited.com

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1. INTRODUCTION:

This manual covers the instructions for storage, handling, assembly, installation, operation and Maintenance of Line Side Cubicle supplied under this contract duly meets the requirement of "SIEMENS AG" specification.

2. DESCRIPTION OF EQUIPMENT:

Line side Cubicle is intended to mount on the structure by the side of generator and generator line leads are taken into Line Side Cubicle and terminated at the bottom side for IPB busduct connection.

2.1 Generator Line Accessory Compartment houses the following items:

2.1.1 Three phase busbars supported on Insulators.
2.1.2 Current Transformer (CT)
2.1.3 Voltage Transformer (VT)
2.1.4 Lightning Arrestors
2.1.5 Surge Capacitor
2.1.6 Spherical Point with earthing system (CATU make)
2.1.7 PDA coupler
2.1.8 PDA Termination Box
2.1.9 Junction box.
2.1.10 Heater junction box.

2.2. Construction:

2.2.1 Enclosure:

Line Side Cubicle is constructed with 4mm thick Aluminum Sheets welded over rigid Aluminum Channel frame work.
Provision for terminating the busduct is made at the bottom.

4 Nos. Lifting pad provided on top for lifting.

2 Nos. of Earth pads (PE) are provided at bottom for customer ground connection. These ground pads are connected internally by copper bus. Earth pads are identified by earthing symbol.

Rating plates are fixed near junction box on welded door in English & Lithuanian language.
Danger & Warning plates are provided on all access doors in English & Lithuanian language.

Junction box is mounted on the right side of the Line Side Cubicle, which houses CT, VT secondary terminals and VT secondary MCBs.

Heater junction box is mounted on the left side of the Line Side Cubicle, which houses heater terminals and thermostat.

PDA termination box is mounted on the left side of the line side cubicle wires from PDA couplers are terminated in this box. Refer PDA manual for detail.

Support structure is made of Mild steel channels and mounting holes are made on the structure for fixing the cubicle.

Rubber bellow is provided at Generator end connection busduct.

2.2.2 Bus bar:

Main current carrying bus bars are made out of 2 runs of 150x12mm copper bus bars and supported on epoxy insulators.

Tap-off busbars are made out of 1 run of 50x10mm copper busbars.

Bus bars are painted with matt black paint.
Generator end and IPB end (Flexible connection) are silver plated to 15 microns and other busbar joints are bare. Fasteners used for bus bar joints are of stainless steel A270 grade and are tightened to recommended torque value listed in Section – 6

Copper braid flexible are provided for Generator end connection.

2.3. ARRANGEMENT:

2.3.1 Line Side Bus bar system:

Consisting of 3 Main bus bars supported on epoxy insulators. One end of the bus is connected to Generator and the other side is terminated at the bottom for IPB bus duct connection.

Tap-off bus connection is taken from the main bus bar to connect Voltage Transformer, Lightning Arrestor and Surge Capacitor.

One No. of 3 cores Current Transformer per phase is mounted on these bus bar.

The CT, VT secondary terminals are brought out to LV BOX for external connection. Tap-off bus connection is taken from the main bus bars to connect Voltage Transformers.

The space heater terminals are brought out to HEATER BOX for external connection.

1 No lighting arrestor and surge capacitor per phase is connected in combination package to protect the equipment which is associated with generator cubicles by **Let-through-voltage.**

All equipments ground terminals are connected to main ground bus by means of copper bus/copper wire.

1 No. Spherical point per phase is provided on the main bus bars and 1 No. of spherical point is fixed to one of the grounding pad external to the enclosure.

3 Nos. PDA couplers are mounted inside the line side cubicle at generator end and connected to line bus to monitor the insulation system

4 Nos. Copper flexible (800 Sq.mm CSA) are provided for each phase (supplied as loose), meant for connection between the Generator terminal and the Line side Cubicle busbar.

3. INSTRUCTIONS IN METHODS OF RECEIVING, INSPECTION, STORAGE AND HANDLING PRIOR TO INSTALLATION

Line Side Cubicle is packed as per Powergear Standard for export packing in container shipments.

Packing slips are kept in a water proof envelop and are attached to the package.

All the packing cases shall be unloaded with “UP” facing upwards. While unloading the cases,

Extreme care shall be taken to prevent damages to equipment. Cases shall not be rolled From Container or subjected to impact under any circumstances.

After unloading, remove the packing with care, and keep the panel with the wooden pallets, which can be used during transport prior to installation. Check for any damages, incurred during transport and report damages on receipt.

To absorb the moisture inside the package during transit, dehumidifier bags are placed at bottom of the cubicle. Also VCI bags are placed at various locations and VCI is wrapped over the busbar joints. All these preservatives are to be removed and thrown-out prior to commissioning.

All the equipment / loose parts shall be verified with the packing slip. If there are any discrepancies, the same shall be reported immediately.

After inspection, the loose parts as Listed below shall be stored in a secured and covered storage yard / shed, protected from fire and weather until they are removed for installation.
It is preferred to keep the Line Side Cubicle along with the base pallet till it is erected.

LIST OF LOOSE ITEM:

SL.No.	Part NO.	Item Description	Qty.
1	5.3	Retainer Plate – 50 x 60 x 1300 (MS)	4 Nos.
2	5.3	Retainer Plate – 50 x 60 x 690 (MS)	4 Nos.
3	5.3	M10 x 45 Long + 1PW (SS)	16Nos.
4	5.4	Copper Braid Flexible – 50x25x380mm Long	12Nos.
5	5.4	M12x90 Bolt+NUT+2PW+1SW (SS)	12Nos.
6	5.4	M12x100 Bolt+NUT+2PW+1SW (SS)	12Nos.
7	2.1	ANCHOR BOLT-M12X140/50 HST, HILIT MAKE	24Nos
8	2.1	ANTI- VIBRATION MOUNT	6 Nos.
9	2.1	Packing Shim – 100x100mm Thickness: 15+6+6+3+2	6 No'S Each
10	2.1	M16 NUT+1PW+1SW (SS)	6 Nos.
11	1.1	M12X50LONG+NUT+2PW+1SW (SS)	20Nos.
12	4.2	Earthing System with kit	1 No.
13	5.3	RUBBER BELLOW (EPDM)	1 No.
14	5.3	M10X45N+2PW (SS)	16Nos.
15	2	SUPPORT STRUCTURE (MS)	1 No.
16	-	Epoxy Mica Capacitor (16kV, 80 pF)	3 Nos.
17	-	BNC Connector	6 Nos.
18	-	Coaxial Cable	30 Mtr.

SL.No.	Part NO.	Item Description	Qty.
19	-	PDA Name Plate (-C3L1, -C3L2, -C3L3)	3 Nos.
20	-	EMC Metal Clamp (for PDA) (SS)	6 Nos.
21	-	EMC Boot (For PDA)	3 Nos.
22	-	15kV Jumper Cable with angle lug(for PDA)	3 Nos.
23	-	Ground wire connection (for PDA)	10 ft.
24	-	HI - Voltage lug with heat shink + ground wire lug (for PDA)	3 Nos.
25	4.2.1	Shorting busbar – 1 (150x12th.) (Cu.)	4 Nos.
26	4.2.1	Shorting busbar – 2 (150x12th.) (Cu.)	4 Nos.
27	4.2.1	M12x60 Bolt+NUT+2PW+1SW (SS)	24 Nos.
28	2	12 th. Copper busbar	1 No.
29	2	Epoxy Insulator (95mm height)	2 Nos.
30	2	M12x40 Long+1PW (SS)	2 Nos.
31	2	M16x40 Long+1PW (SS)	2 Nos.

4. INSTRUCTIONS FOR ASSEMBLY AND INSTALLATION

Prior to undertake installation, please ensure the foundation arrangements and location for Line Side Cubicle is in line with the dimensions mentioned in the drawing.

After checking up of above carry out installation in the sequence mentioned below:

4.1 Fix the ANTI - VIBRATION MOUNT [SL No.:8 in Packing list] on the foundation using anchor bolt M12x140/50 [SL NO.: 7 in Packing list]. In line with drg DPPPG-70151868

4.2 Install the Structures [SL. No.:15 in Packing List] in line with drg.DPPPG-70151868. on the ANTI-VIBRATION MOUNT [SL No.:8 in Packing list] using M16 NUT +1PW+1SW SS [SL No.: 10 in Packing list] and align the structure using Packing shims [SL No: 9 in Packing list].

4.3 Lift the Line Side Cubicle using the Lifting lugs and place it over the structure after aligning Then connect cubicle base with support structure using the fastener M12X50L+NUT+2PW+1SW (SS) [SL No: 11 in Packing list].

4.4 Rubber bellow [SL No.: 13 in Packing list] and Retainer plate [SL No.: 1&2 in Packing list] are sending as loose items. After installation of Line Side Cubicle fix the rubber bellow M10X45N+2PW [SL No.:14 in Packing list]. Align and connect the other end of bellow to the Generator flange using Retainer Plate M10x45LONG+1PW [SL No.:3 in Packing list].

4.5 Connect the copper flexible in between Generator terminal and the Line Side Cubicle bus bar using the fastener – M12x100N+2PW+1SW (SS) [SL No.:6 in Packing list] near the generator end and M12x95N+2PW+1SW (SS) [SL No.: 5 in Packing list] in the opposite side.

4.6 In the event of doing site tests ensure to remove the copper flexible.

4.7 In LV BOX the CT terminals are provided with shorting plugs. Do not remove the plug till the end connections are made.

5. COMMISSIONING CHECKS:

The following commissioning checks are recommended on the Line Side Cubicle:

Physical inspection for any damage to insulators, CTs, VTs, LA, SC etc.

SL. No.	Equipment	Type of check
a.	Current Transformer	Ratio test verification, Polarity test
b.	Voltage Transformer	Ratio test verification, Polarity test
c.	Lightning Arrestor	Reference current measurement test
d.	Surge Capacitor	Capacitance measurement
e.	Grounding system	Electrical continuity, Tightness of joints
f.	HT Circuit	HV test at 75% of 38 KV for 1 minute
g.	Secondary wiring	HV test – 1.5 KV for 1 minute
h.	PDA Coupler	Check the cable connection tightness

Ensure the following before conducting the high voltage test on HT Circuit

- All CT, VT, secondary are to be shorted and connected to ground.
- Lightning Arrestor braid , PDA braid & extension flat to be removed during the test.
- Surge capacitor braid to be removed during testing.
- End terminations at generator are to be disconnected.

6. OPERATION INSTRUCTIONS:

Make sure that all the bus bar joints are correctly made by applying contact grease and tightened as per the torque recommendations given below :

	Bolt size	Torque
a.	M8	13 lbs (17 NM)
b.	M10	21 lbs (28 NM)
c.	M12	40 lbs (54 NM)
d.	M16	67 lbs (91 NM)

- Make sure that earth lead to station grid has been connected.
- Make sure to remove all hand tools from inside.
- Remove dust if any, using Vacuum Cleaner specifically on all Insulators.

7. LIST OF TOOLS AND TACKLES TO BE USED

1) **Open spanner** and **Box spanner** for M6, M8, M10, M12, and M16 Hex. Bolts and nuts
2) Torque Wrench with suitable adapters for above
3) Terminal Connector Screw Driver.

8. MAINTENANCE INSTRUCTION:

During annual shutdown the following preventive maintenance schedule is recommended.

Sl. No.	Equipment/Component	Period	Action	Remarks
1.	Current Transformer Voltage Transformer Surge Capacitor Lightning Arrestor	Yearly	Check for dust, clean with dry cotton cloth	
2.	Bus support insulator	Yearly	Check for dust, clean with dry cotton cloth	
3.	Bus bar joints	Yearly	Check for the bolt tightness: Tighten the bolts for required load, apply contact grease.	Use recommended contact grease*
4.	Insulation resistance	Yearly	Check for IR value between bus bars & enclosure. If IR value is not satisfactory when measured with 1000V mega ohm meter, find the source of any faults and rectify.	
5.	Check earth continuity	Yearly	Check for effective earth connection to plant.	

Recommended contact grease: OKS SW Electric (electrical contact) or equivalent.

9. TECHNICAL SPECIFICATION:

1. Rated voltage	: 15 kV
2. Rated frequency	: 50 Hz
3. Insulation level	: 17.5 kV/ 38 kV rms (1min) / 95 kV peak.
4. Rated current	: 3586 A at 55°C ambient
5. Short time current rating	: 80 kA rms for 1Sec. / 200 kA peak
6. Reference standard	: IEC 62271-200
7. Paint Finish:	
Enclosure - Outside and inside	: RAL 7030
Structure	: RAL 7030
8. Bus bar end and Generator end	: Silver Plated
Other Bus bar Joints	: Bare
Bus bar	: Black Matt.

.

B. SITE ASSEMBLY DRAWINGS

BILL OF MATERIALS FOR FIELD ASSEMBLY

POSITION	ITEM	DESCRIPTION	MATERIAL	QUANTITY	IDENTIFICATION
5.3	1	RETAINER PLATE – 50x6x1300	MS PAINTED	4 NO's	SHEET 4
5.3	2	RETAINER PLATE – 50x6x690	MS PAINTED	4 NO's	SHEET 4
5.3	3	M10 x 45 LONG + 1PW	SS A270	16 NO's	SHEET 4
5.4	4	COPPER BRAID FLEXIBLE–50x25x380mm LONG	COPPER	12 NO's	SHEET 4
5.4	5	M12x90 BOLT+NUT+2PW+1SW	SS A270	12 NO's	SHEET 4
5.4	6	M12x100 BOLT+NUT+2PW+1SW	SS A270	12 NO's	SHEET 4
2.1	7	ANCHOR BOLT – M12X140/50 HST, HILTI MAKE	STEEL (5.6 GR.)	24 NO's	SHEET 2
2.1	8	ANTI–VIBRATION MOUNT	–	6 NO's	SHEET 2
2.1	9	PACKING SHIM – 100x100mm THICKNESS : 15+6+6+3+2 (Per Mount)	GALVD.	6 NO's EACH	SHEET 2
2.1	10	M16 NUT + 1PW + 1SW	SS A270	6 NO's	SHEET 2
1.1	11	M12x50LONG+NUT+2PW+1SW	SS A270	20 NO's	SHEET 2
4.2	12	EARTHING SYSTEM WITH KIT	–	1 NO's	SHEET 3
5.3	13	RUBBER BELLOW	EPDM	1 NO's	SHEET 4
5.3	14	M10X45N+2PW	SS A270	16 NO's	SHEET 4
2	15	SUPPORT STRUCTURE	MS	1 NO's	SHEET 2
–	16	EPOXY MICA CAPACITOR (16kV, 80 pF)	–	3 NO's	LOOSE SUPPLY
–	17	BNC CONNECTOR	–	6 NO's	LOOSE SUPPLY
–	18	COAXIAL CABLE	–	30 Mtr.	LOOSE SUPPLY
–	19	PDA NAME PLATE (–C3L1, –C3L2, –C3L3)	SS	3 No's	LOOSE SUPPLY
–	20	EMC METAL CLAMP (FOR PDA)	SS	6 No's (3 Set)	LOOSE SUPPLY
–	21	EMC BOOT (FOR PDA)	–	3 No's	LOOSE SUPPLY
–	22	15kV JUMPER CABLE WITH ANGLE LUG(FOR PDA)	–	3 No's	LOOSE SUPPLY
–	23	GROUND WIRE CONNECTION (FOR PDA)	–	10 ft	LOOSE SUPPLY
–	24	HI – VOLTAGE LUG WITH HEAT SHINK + GROUND WIRE LUG (FOR PDA)	–	3 No's	LOOSE SUPPLY
4.2.1	25	SHORTING BUSBAR – 1 (150–12Th.)	COPPER	4 NO's	SHEET 4
4.2.1	26	SHORTING BUSBAR – 2 (150–12Th.)	COPPER	4 NO's	SHEET 4
4.2.1	27	M12x60 BOLT+NUT+2PW+1SW	SS A270	24 NO's	SHEET 4
2	28	12 Th. COPPER BUSBAR	COPPER	1 NO	SHEET 2
2	29	EPOXY INSULATOR (95mm HEIGHT)	SS A270	2 NO's	SHEET 2
2	30	M12 x 30 LONG + 1PW+1SW	SS A270	2 NO's	SHEET 2
2	31	M16 x 35 LONG + 1PW+1SW	SS A270	2 Set	SHEET 2

ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.

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PROJECT VILNIUS BIOMASS

CUSTOMER SIEMENS AG

W .O. NO MP0650

TITLE LINE SIDE CUBICLE (LOOSE PARTS IDENTIFICATION)

SCALE 1 : 30

SIZE A3

POWERGEAR Experience The Power

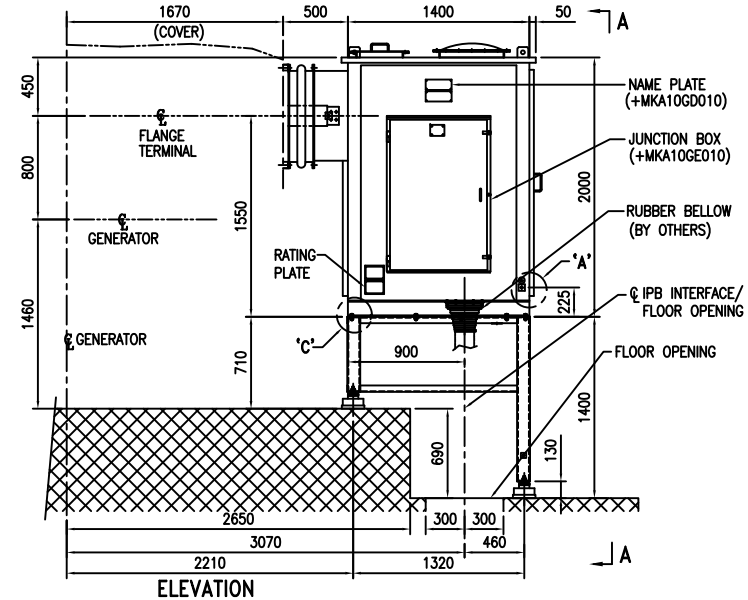
MEPZ, Tambaram, CHENNAI–600045 INDIA

	SIGN	DATE
DRN.	A.ANTONY	06.16.2018
CHD.	H.NARAYANAN	06.16.2018
APPD.	J.RAMASWAMY	06.16.2018

DRG. NO. LSC – MP0650

SHEET 1 OF 4 REV –

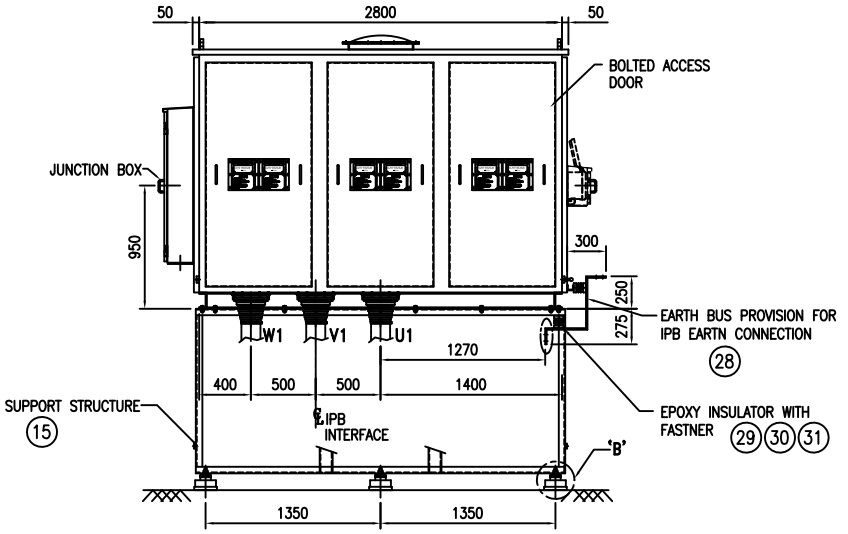
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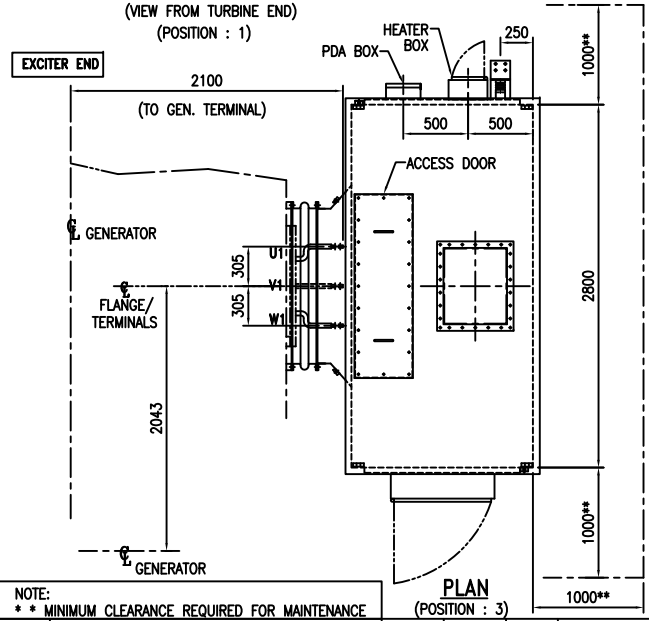
(VIEW FROM TURBINE END)

(POSITION : 1)



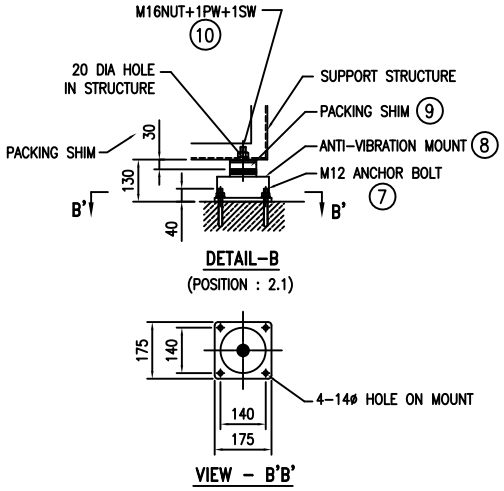
VIEW – AA

(POSITION : 2)



PLAN

(POSITION : 3)

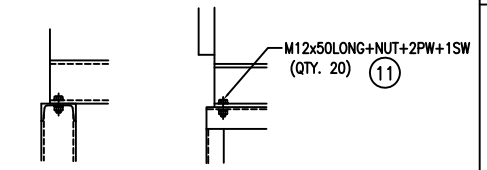


DETAIL–B

(POSITION : 2.1)

END VIEW

VIEW – B'B'



DETAIL–C

(CONNECTION BETWEEN
CUBICLE AND STRUCTURE)

(POSITION : 1.1)

END VIEW

NOTE:
* * MINIMUM CLEARANCE REQUIRED FOR MAINTENANCE

ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.

PROJECT	VILNIUS BIOMASS
CUSTOMER	SIEMENS AG
W .O. NO	MP0650
TITLE	LINE SIDE CUBICLE (LOOSE PARTS IDENTIFICATION)
SCALE	1 : 40
SIZE	A3

POWERGEAR
Experience The Power

MEPZ, Tambaram, CHENNAI–600045 INDIA

	SIGN	DATE
DRN.	A.ANTONY	16.06.2018
CHD.	H.NARAYANAN	16.06.2018
APPD.	J.RAMASWAMY	16.06.2018

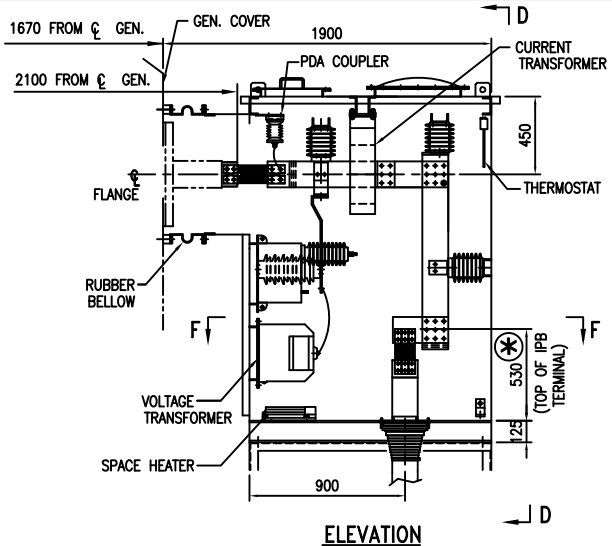
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LSC – MP0650

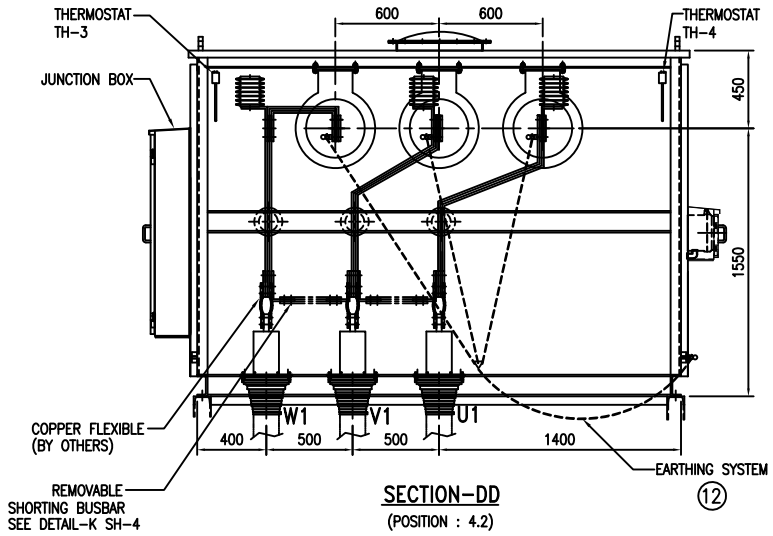
SHEET 2 OF 4 | REV -

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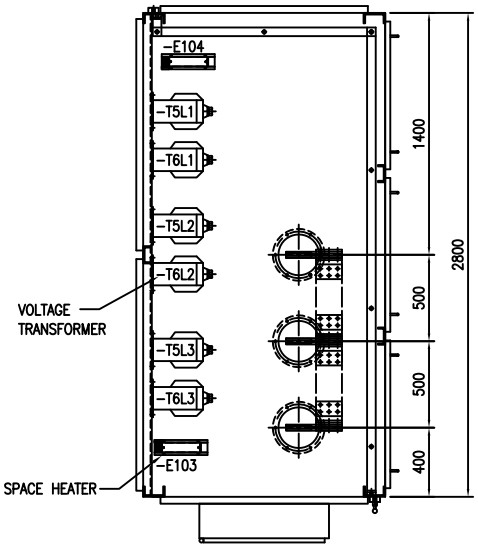
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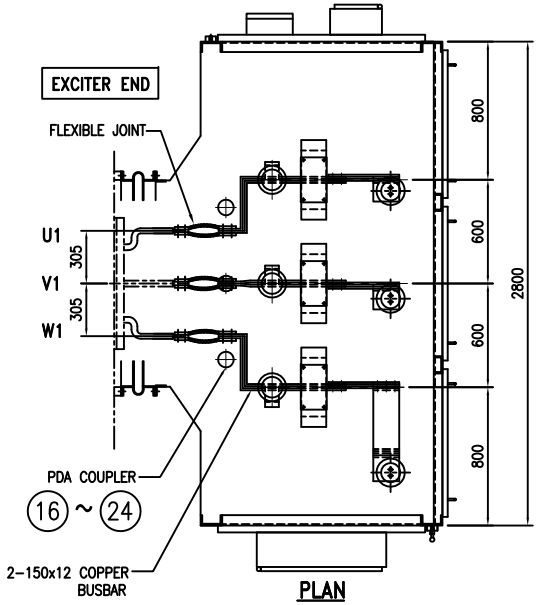
ELEVATION
(INTERNAL DETAILS)
(POSITION : 4)



SECTION-DD
(POSITION : 4.2)



SECTION-FF
(POSITION : 4.3)



PLAN
(POSITION : 4.1)

ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.

PROJECT	VILNIUS BIOMASS
CUSTOMER	SIEMENS AG
W .O. NO	MP0650
TITLE	LINE SIDE CUBICLE (LOOSE PARTS IDENTIFICATION)
SCALE	1 : 30
SIZE	A3

POWERGEAR Experience The Power
MEPZ, Tambaram, CHENNAI-600045 INDIA

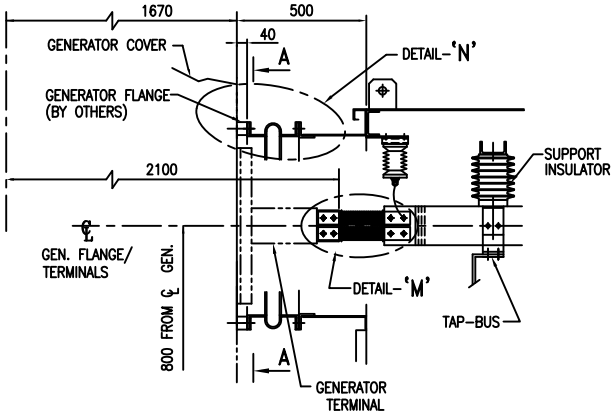
	SIGN	DATE
DRN.	A.ANTONY	06.16.2018
CHD.	H.NARAYANAN	06.16.2018
APPD.	J.RAMASWAMY	06.16.2018

DRG. NO.
LSC - MP0650

SHEET 3 OF 4 | REV -

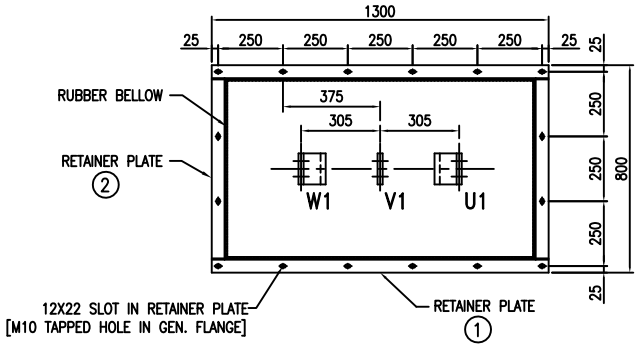
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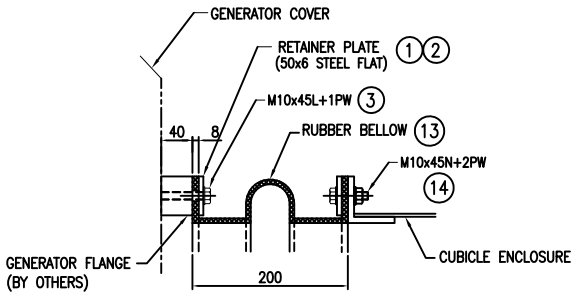
GENERATOR INTERFACE DETAILS

(POSITION : 5)



SECTION-AA

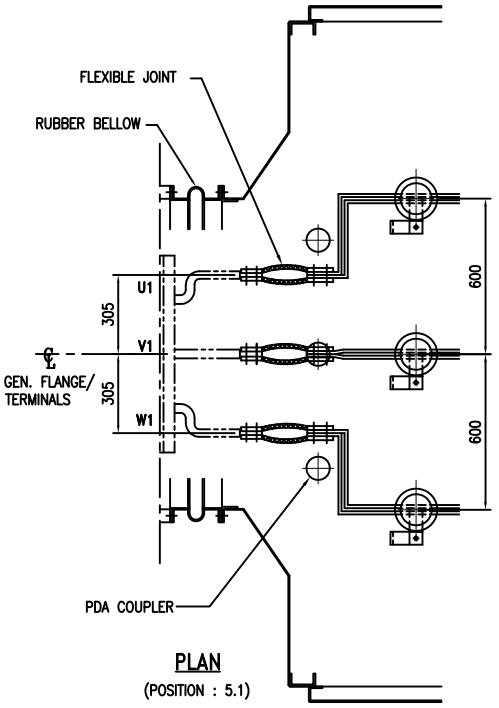
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DETAIL-N

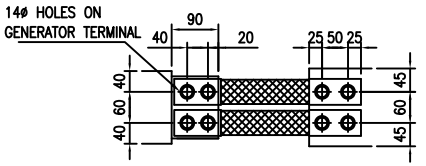
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ENCLOSURE CONNECTION WITH GENERATOR

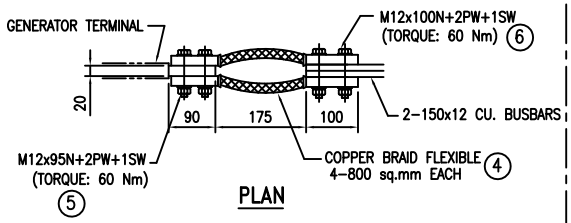


PLAN

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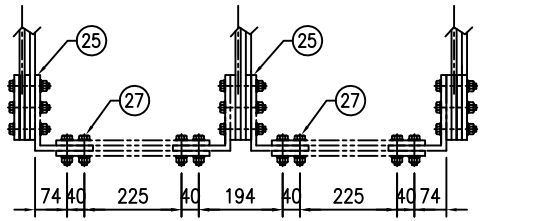
DETAIL-M



PLAN

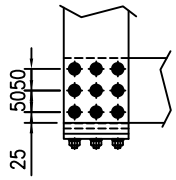
BUSBAR CONNECTION WITH GENERATOR LEAD

(POSITION : 5.4)

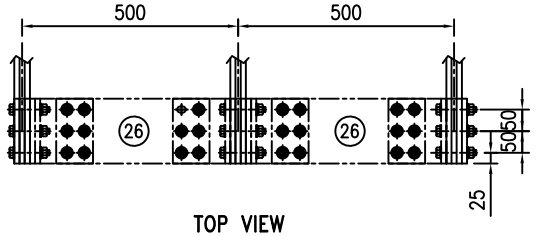


DETAIL - K

(POSITION : 4.2.1)



END VIEW



TOP VIEW

LINE SIDE SHORTING BUSBAR CONNECTING DETAILS

(REMOVABLE TYPE - SUPPLIED LOOSE)
(FOR TESTING PURPOSE ONLY)
(150x12Th. COPPER)

ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.

PROJECT	VILNIUS BIOMASS
CUSTOMER	SIEMENS AG
W .O. NO	MP0650
TITLE	LINE SIDE CUBICLE (LOOSE PARTS IDENTIFICATION)
SCALE	1 : 40
SIZE	A3

POWERGEAR Experience The Power

MEPZ, Tambaram, CHENNAI-600045 INDIA

	SIGN	DATE
DRN.	A.ANTONY	16.06.2018
CHD.	H.NARAYANAN	16.06.2018
APPD.	J.RAMASWAMY	16.06.2018

DRG. NO.

LSC - MP0650

SHEET 4 OF 4 | REV -

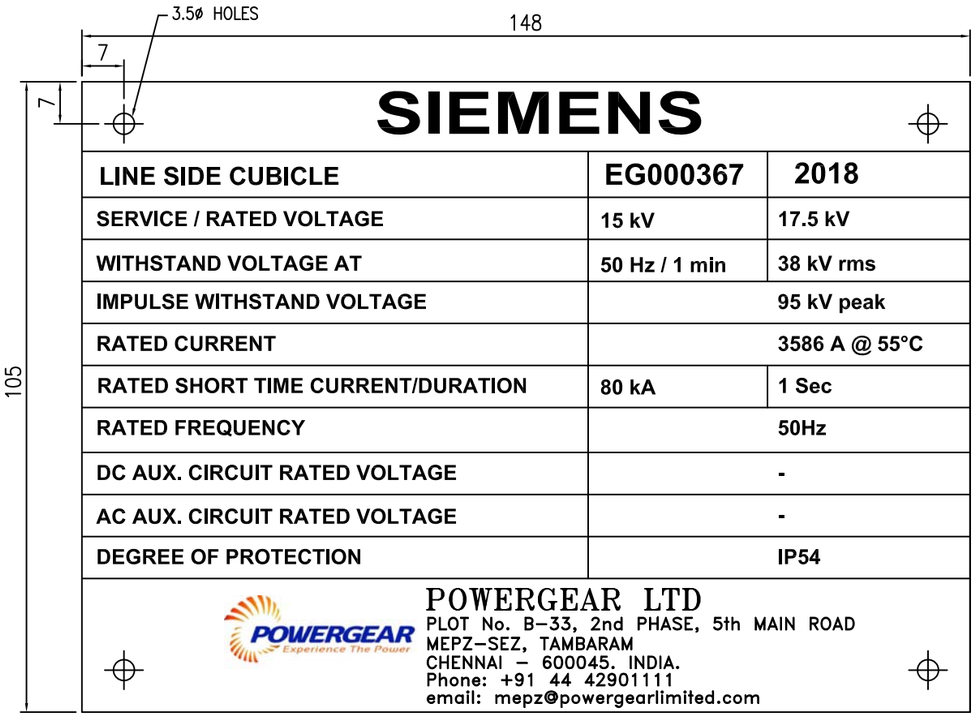
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FILE NAME :

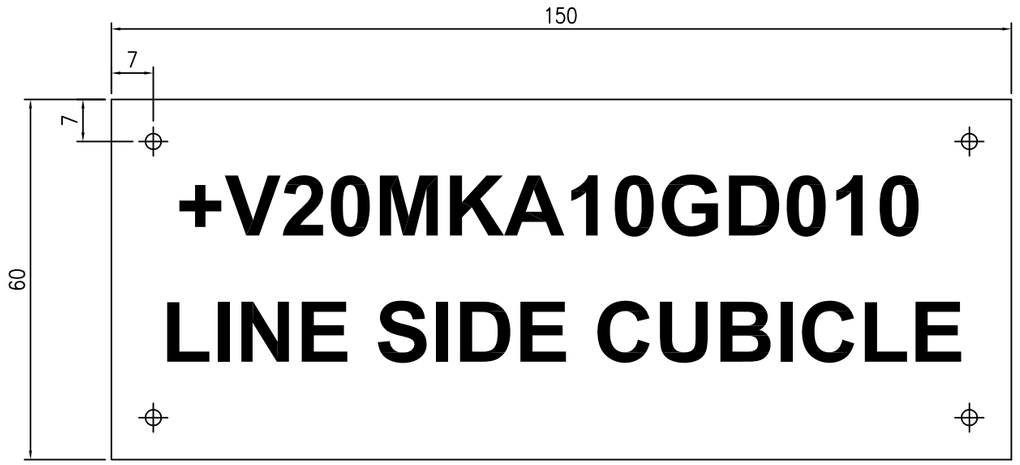
Bestellnummer (8) Purchase Order n°			E09 - 3010449826		*Bpos (4) PO Line*	20		*Materialalk (10) Product code*		*P0058032900*	*Zeichnungsnr. (15) Component doc. n°*	DPPPG-70151868	*Bestellnummer (8) Purchase Order n°*	E09 - 3010449826	*Bpos (4) PO Line*	20		*Materialalk (10) Product code*	P0058032900		*Zeichnungsnr. (15) Component doc. n°*	DPPPG-70151868								
Siemens-Auftrags-Nr. Plant SD number			3000018595		*Norm (18) Standard*	IEC		PO Line value		20	*Bestelltext Description*	LINE SIDE CUBICLE	*Siemens-Auftrags-Nr. Plant SD number*	3000018595	*Norm (18) Standard*	IEC		PO Line value	20		*Bestelltext Description*	LINE SIDE CUBICLE								
Job			LINE SIDE CUBICLE		*Projektname Project name*	VILNIUS BIOMASS					*Zeichnungsnr. DWG n°*	DPPPG-70151868	*Job*	LINE SIDE CUBICLE	*Projektname Project name*	VILNIUS BIOMASS					*Zeichnungsnr. DWG n°*	DPPPG-70151868								
Data of the goods for transport & storage, (INFORMATION TO BE COMPLETED by Supplier)														Administrative	INFORMATION TO BE COMPLETED by Supplier														
SKZ (1)	Posnr (4)	Materialp (10)	ME (2) Unit	Mengep (13) Qt.	MTART (4)	MKTXTD (40) Description	MKTXTE (40) Scope	Abmessung (20) Good dimensions [cm]			Norm (18) Standard	Werkstoff (20) Main primer material	Nettogewicht (10) Net weight	Zeichnungsnr. (15)	Preis (Stk.) (29) Cost	DR (1)	USR (1)	ALNR (8)	ECCN (8)	ULA (3)	URE (3)	PRA (1)	LERKEL (1)	STWN (11)	GEFST (1)	GEFKL (3)	UNSTN (4)	SDBL (1)	UNMBL (1)		
	Item			[D]				L	W	H			[Kg]																	
	5.3	1	Nos	4		Halteplatte	RETAINER PLATE	1300	6	50		MS Painted	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	5.3	2	Nos	4		Halteplatte	RETAINER PLATE	690	6	50		MS Painted	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	5.3	3	Set	16			HEX. BOLT M10x45 LONG+1PW	-	-	-		SS A270	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	5.4	4	Nos	12		KUPFERNE FLECHTE FLEXIBEL	COPPER BRAID FLEXIBLE-50x25x380mm LONG	-	-	-		Copper	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	5.4	5	Set	12		Edelst. Bolz. M. Unterlegsch. U. Mutter	HEX. BOLT M12x90BOLT+NUT+2PW+1SW	-	-	-		SS A270	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	5.4	6	Set	12		Edelst. Bolz. M. Unterlegsch. U. Mutter	HEX. BOLT M12x100BOLT+NUT+2PW+1SW	-	-	-		SS A270	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	2.1	7	Set	24		ANKERBOLZEN	ANCHOR BOLT - M12X140/50 HST, HILTI MAKE	-	-	-		STEEL (5.6 GR.)	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	2.1	8	Nos	6		ANTI-VIBRATION EINFASSUNG	ANTI-VIBRATION MOUNT	-	-	-		-	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	2.1	9	Nos	6No's EA		VERPACKUNG MESSPLÄTTCHEN	PACKING SHIM – 100x100mm 15+6+6+3+2	-	-	-		GALVD	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	2.1	10	Set	6		Edelst. Bolz. M. Unterlegsch. U. Mutter	M16 NUT+1PW+1SW	-	-	-		SS A270	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	1.1	11	Set	20		Edelst. Bolz. M. Unterlegsch. U. Mutter	HEX. BOLT M12x50BOLT+NUT+2PW+1SW	-	-	-		SS A270	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	4.2	12	Nos	1		Erdung system	EARTHING SYSTEM BOX WITH STICK	-	-	-		-	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	5.3	13	Nos	1		Gummibalg	RUBBER BELLOW	-	-	-		EPDM	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	5.3	14	Set	16			M10x45N+2PW	-	-	-		SS A270	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	2	15	Nos	1		Unterstützen Sie Strukturen	SUPPORT STRUCTURE	1410	2850	1270		MS	175	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	-	16	Nos	3			EPOXY MICA CAPACITOR (16kV, 80pF)	-	-	-		-	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	-	17	Nos	6		VERBINDER	BNC CONNECTOR	-	-	-		-	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					

Bestellnummer (8) Purchase Order n°			E09 - 3010449826		*Bpos (4) PO Line*	20		*Materialalk (10) Product code*		*P0058032900*	*Zeichnungsnr. (15) Component doc. n°*	DPPPG-70151868	*Bestellnummer (8) Purchase Order n°*	E09 - 3010449826	*Bpos (4) PO Line*	20		*Materialalk (10) Product code*	P0058032900		*Zeichnungsnr. (15) Component doc. n°*	DPPPG-70151868							
Siemens-Auftrags-Nr. Plant SD number			3000018595		*Norm (18) Standard*	IEC		PO Line value		20	*Bestelltext Description*	LINE SIDE CUBICLE	*Siemens-Auftrags-Nr. Plant SD number*	3000018595	*Norm (18) Standard*	IEC		PO Line value	20		*Bestelltext Description*	LINE SIDE CUBICLE							
Job			LINE SIDE CUBICLE		*Projektname Project name*	VILNIUS BIOMASS					*Zeichnungsnr. DWG n°*	DPPPG-70151868	*Job*	LINE SIDE CUBICLE	*Projektname Project name*	VILNIUS BIOMASS					*Zeichnungsnr. DWG n°*	DPPPG-70151868							
Data of the goods for transport & storage, (INFORMATION TO BE COMPLETED by Supplier)														Administrative	INFORMATION TO BE COMPLETED by Supplier													
SKZ (1)	Posnr (4)	Materialp (10)	ME (2) Unit	Mengep (13) Qt.	MTART (4)	MKTXTD (40) Description	MKTXTE (40) Scope	Abmessung (20) Good dimensions [cm]			Norm (18) Standard	Werkstoff (20) Main primer material	Nettogewicht (10) Net weight	Zeichnungsnr. (15)	Preis (Stk.) (29) Cost	DR (1)	USR (1)	ALNR (8)	ECCN (8)	ULA (3)	URE (3)	PRA (1)	LERKEL (1)	STWN (11)	GEFST (1)	GEFKL (3)	UNSTN (4)	SDBL (1)	UNMBL (1)		
	Item			[D]				L	W	H			[Kg]																	
	-	18	Mtr	30			Coaxial Cable (10Mtr. / Coupler)	-	-	-		-	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	-	19	Nos	3		NAMEN PLATE	PDA NAME PLATE (-C3L1, -C3L2, -C3L3)	-	-	-		-	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	-	20	Nos	6		METALL KLAMMER	EMC METAL CLAMP (FOR PDA)	-	-	-		-	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	-	21	Nos	3			EMC BOOT (FOR PDA)	-	-	-		-	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	-	22	Nos	3		Anschlusskabel mit WINKEL LUG	POWER CABLE WITH ANGLE LUG 15kV (FOR PDA)	-	-	-		-	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	-	23	ft	10		Schutzleiteranschluss	GROUND WIRE CONNECTION (FOR PDA)	-	-	-		-	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	-	24	Nos	3		HOCHSPANNUNGS LUG mit Schrumpf + BODEN DRAHT LUG	HI - VOLTAGE LUG WITH HEAT SHINK + GROUND WIRE LUG (FOR PDA)	-	-	-		-	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	4.2.1	25	Nos	4		Kurzschluss-Busstange	SHORTING BUSBAR-1 (150-12Th.)	-	-	-		Copper	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	4.2.1	26	Nos	4		Kurzschluss-Busstange	SHORTING BUSBAR-2 (150-12Th.)	-	-	-		Copper	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	4.2.1	27	Nos	24		Edelst. Bolz. M. Unterlegsch. U. Mutter	HEX. BOLT M12x60BOLT+NUT+2PW+1SW	-	-	-		SS A270	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	2	28	Nos	1			12Th. COPPER BUSBAR	-	-	-		Copper	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	2	29	Nos	2			INSULATOR (95 mm HEIGHT)	-	-	-		EPOXY	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	2	30	Nos	2		Edelst. Bolz. M. Unterlegsch. U. Mutter	HEX. BOLT M12x30BOLT+1PW+1SW	-	-	-		SS A270	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	2	31	Nos	2		Edelst. Bolz. M. Unterlegsch. U. Mutter	HEX. BOLT M16x35BOLT+1PW+1SW	-	-	-		SS A270	-	DPPPG-70151868	-	N	N			INDIA	ASIA				N					
	1	32	Nos	1		Line Seite Duschkabine	LINE SIDE CUBICLE	1720	2900	2000		ALUMINIUM	1500	DPPPG-70151868	-	N	N			INDIA	ASIA				N					

C. CONTRACT DRAWINGS



RATING PLATE DETAILS



NAME PLATE DETAILS

NOTES :

MATERIAL : 2 th. STAINLESS STEEL

QUANTITY : 1 No. EACH

ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.
				D	REVISION LEVEL UPDATED	24.08.18	J.R
				C	REVISION LEVEL UPDATED	17.07.18	J.R
				B	REVISION LEVEL UPDATED	21.03.18	J.R
				A	REVISION LEVEL UPDATED	03.03.18	J.R

ECCN : EAR99	AL : N	ECL : N	U.S – CONTENT : N
PROJECT VILNIUS BIOMASS			
CUSTOMER SIEMENS AG			
W .O. NO MP0650	TITLE LINE SIDE CUBICLE (RATING PLATE, NAME PLATE)		
SIZE A3	SCALE 1 : 30	POWERGEAR Experience The Power MEPZ, Tambaram, CHENNAI–600045 INDIA	

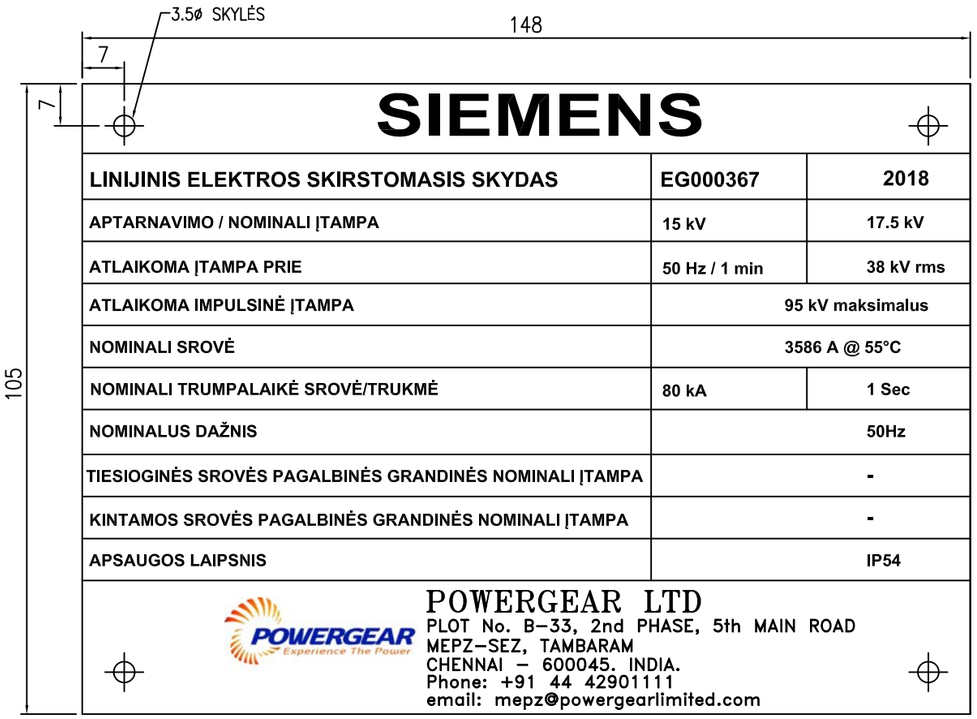
	SIGN	DATE
DRN.	A.ANTONY	29.01.2018
CHD.	J.RAMASWAMY	29.01.2018
APPD.	J.RAMASWAMY	29.01.2018

DRG. NO. DPPPG-70151868

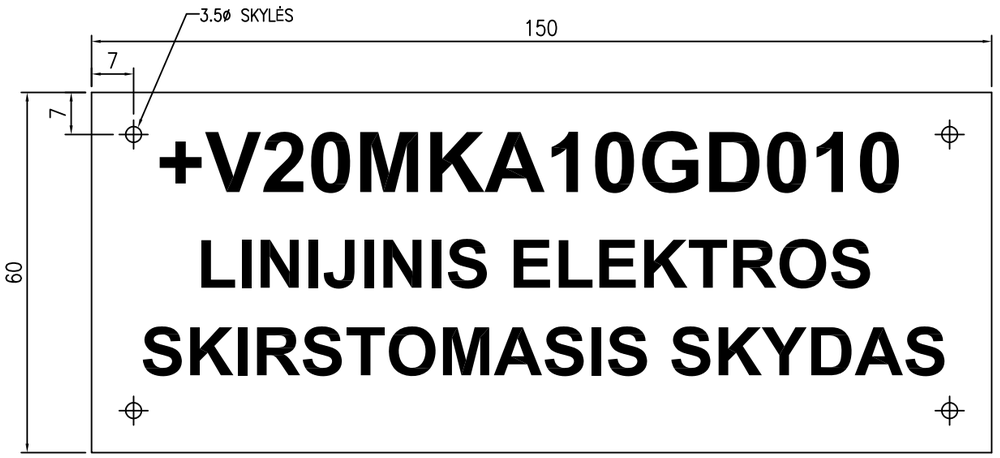
SHEET 1 OF 16 | REV D

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FILE NAME :



ĮVERTINIMO PLOKŠTELĖS DUOMENYS



PAVADINIMO PLOKŠTELĖS DUOMENYS

PASTABOS :

MEDŽIAGA : 2 storio NERŪDYJANTIS PLIENAS
KIEKIS : PO 1 KIEKVIENO NUMERIO

ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.
				D	REVISION LEVEL UPDATED	24.07.18	J.R
				C	LITHUANIAN LANGUAGE UPDATED	17.07.18	J.R
				B	REVISION LEVEL UPDATED	21.03.18	J.R
				A	REVISION LEVEL UPDATED	03.03.18	J.R

ECCN : EAR99	AL : N	ECL : N	U.S – CONTENT : N
PROJECT VILNIUS BIOMASS			
CUSTOMER SIEMENS AG			
W .O. NO MP0650	TITLE LINIJINIS ELEKTROS SKIRSTOMASIS SKYDAS (VERTINIMO PLOKŠTELĖ, PAVADINIMO PLOKŠTELĖ)		
SCALE 1 : 30	POWERGEAR Experience The Power MEPZ, Tambaram, CHENNAI–600045 INDIA		
SIZE A3			

	SIGN	DATE
DRN.	A.ANTONY	29.01.2018
CHD.	J.RAMASWAMY	29.01.2018
APPD.	J.RAMASWAMY	29.01.2018

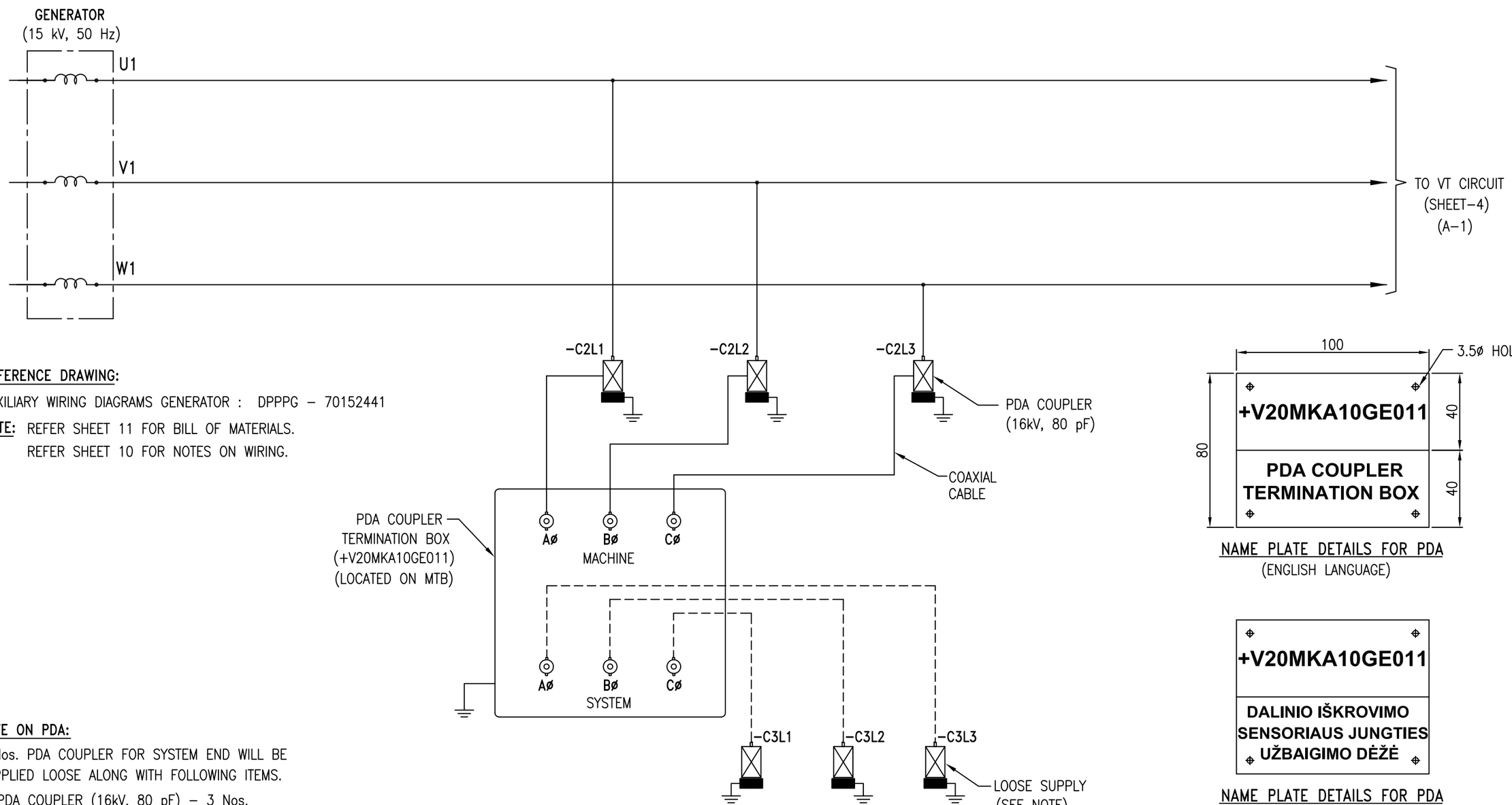
DRG. NO. DPPPG–70151868

SHEET 2 OF 16 | REV D

FILE NAME :

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CUBICLE : +V20MKA10GD010



REFERENCE DRAWING:

AUXILIARY WIRING DIAGRAMS GENERATOR : DPPPG – 70152441

NOTE: REFER SHEET 11 FOR BILL OF MATERIALS.
REFER SHEET 10 FOR NOTES ON WIRING.

NOTE ON PDA:

3 Nos. PDA COUPLER FOR SYSTEM END WILL BE SUPPLIED LOOSE ALONG WITH FOLLOWING ITEMS.

1. PDA COUPLER (16kV, 80 pF) – 3 Nos.
2. BNC CONNECTOR – 6 Nos.
3. COAXIAL CABLE – 30 Mtr. (10 Mtr./COUPLER)
4. WIRING BETWEEN SYSTEM END PDA AND PDA TERMINATION BOX WILL BE DONE AT SITE BY SIEMENS.

NAME PLATE DETAILS FOR PDA
(ENGLISH LANGUAGE)

NAME PLATE DETAILS FOR PDA
(LITHUANIAN LANGUAGE)

ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.
				D	KKS NUMBER +V20 UPDATED AS PER COMMENTS DTD 13.08.18	24.08.18	J.R
				C	PDA NAME PLATE ADDED	17.07.18	J.R
				B	REVISION LEVEL UPDATED	21.03.18	J.R
				A	REVISION LEVEL UPDATED	03.03.18	J.R

PROJECT	VILNIUS BIOMASS		
CUSTOMER	SIEMENS AG		
W .O. NO	MP0650	TITLE	LINE SIDE CUBICLE (SCHEMATIC OF PDA COUPLER)
SIZE	A3	SCALE	–
			MEPZ, Tambaram, CHENNAI–600045 INDIA

	SIGN	DATE
DRN.	A.ANTONY	29.01.2018
CHD.	J.RAMASWAMY	29.01.2018
APPD.	J.RAMASWAMY	29.01.2018

DRG. NO. DPPPG–70151868

SHEET 3 OF 16 | REV D

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FILE NAME :

CUBICLE : +V20MKA10GD010

CONTINUED FROM Sh.-3 (B-8)

U1
V1
W1

TO Sh.-6 (A-1)

-T5L1,-T5L2,-T5L3
PRIMARY
15000/√3 V

A N A N A N

SECONDARY-1
100V/√3
CL 0.2;30VA

a n a n a n

-T5L1:1a
-T5L2:3a
-T5L3:5a
-T5:1n

NFGAFOU
2.5Sq.mm

da dn da dn da dn

SECONDARY-2
100V/3
CL 3P; 6A, 8h

-T5L1:da
-T5:dn

NFGAFOU
2.5Sq.mm

TO VT CIRCUIT
(SHEET-5)
(A-1)

JB : +V20MKA10GE010

MCB BUSBAR

	-F51.1 2.5A	-F52.1 2.5A	-F53.1 2.5A	-F54.1 2.5A	-F55.1 2.5A
	-F51.1:1	-F52.1:1	-F53.1:1	-F54.1:1	-F55.1:1
	-F51.1:3	-F52.1:3	-F53.1:3	-F54.1:3	-F55.1:3
	-F51.1:5	-F52.1:5	-F53.1:5	-F54.1:5	-F55.1:5
	-F51.1:2	-F52.1:2	-F53.1:2	-F54.1:2	-F55.1:2
	-F51.1:4	-F52.1:4	-F53.1:4	-F54.1:4	-F55.1:4
	-F51.1:6	-F52.1:6	-F53.1:6	-F54.1:6	-F55.1:6
	-F51.1:33	-F52.1:33	-F53.1:33	-F54.1:33	-F55.1:33
	-F51.1:34	-F52.1:34	-F53.1:34	-F54.1:34	-F55.1:34
	-F51.1:41	-F52.1:41	-F53.1:41	-F54.1:41	-F55.1:41
	-F51.1:42	-F52.1:42	-F53.1:42	-F54.1:42	-F55.1:42
-X8	-X8:1 -X8:2 -X8:3 -X8:16	-X8:4 -X8:5 -X8:6 -X8:17	-X8:7 -X8:8 -X8:9 -X8:18	-X8:10 -X8:11 -X8:12 -X8:19	-X8:13 -X8:14 -X8:15 -X8:20
-X10	-X10:1 -X10:2 -X10:3 -X10:4	-X10:5 -X10:6 -X10:7 -X10:8	-X10:9 -X10:10 -X10:11 -X10:12	-X10:13 -X10:14 -X10:15 -X10:16	-X10:17 -X10:18 -X10:19 -X10:20
	PROTECTION	INDICATION	VOLTAGE	INDICATION	PROTECTION	INDICATION	MEASUREMENT	INDICATION	SYNCHRONIZATION	INDICATION

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REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.
				D	KKS NUMBER +V20 UPDATED AS PER COMMENTS DTD 13.08.18	24.08.18	J.R
				C	REVISION LEVEL UPDATED	17.07.18	J.R
				B	REVISION LEVEL UPDATED	21.03.18	J.R
				A	REVISION LEVEL UPDATED	03.03.18	J.R

PROJECT VILNIUS BIOMASS

CUSTOMER SIEMENS AG

W .O. NO MP0650

TITLE LINE SIDE CUBICLE (SCHEMATIC OF VT)

SIZE A3

SCALE -

POWERGEAR Experience The Power

MEPZ, Tambaram, CHENNAI-600045 INDIA

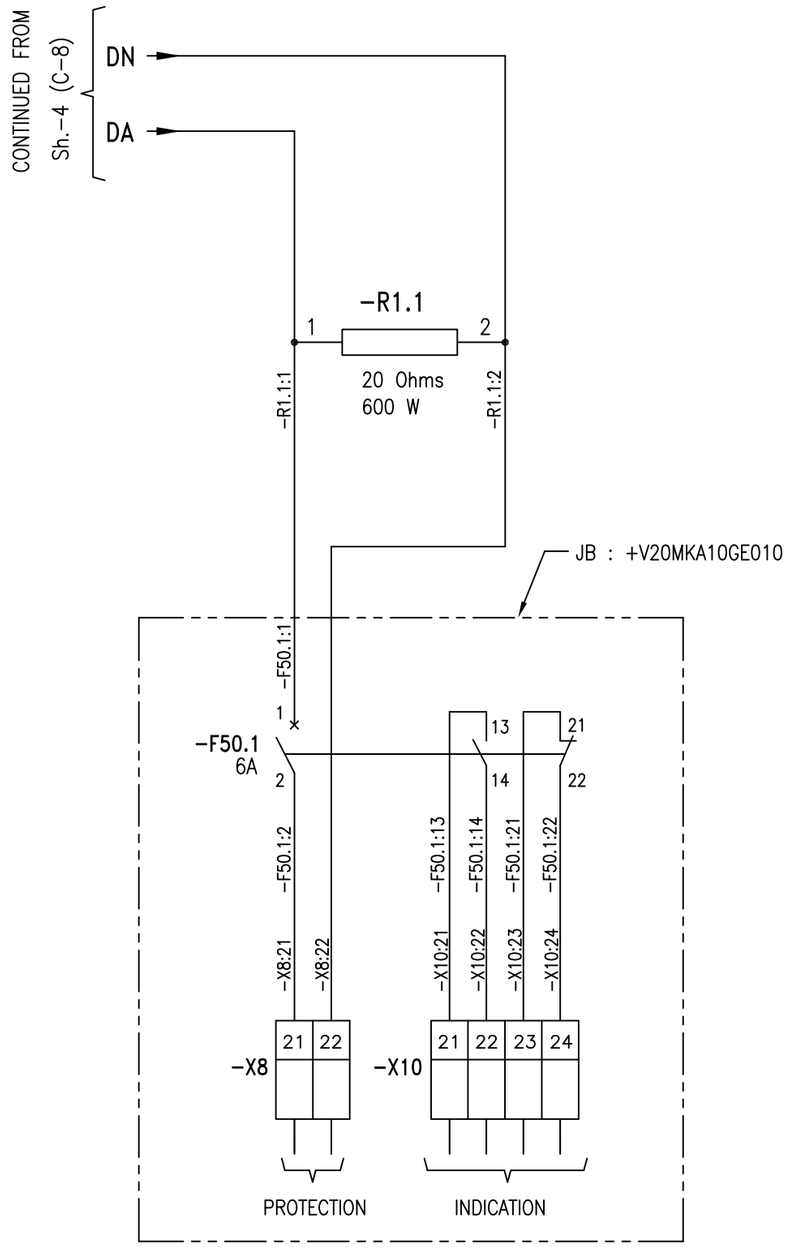
	SIGN	DATE
DRN.	A.ANTONY	29.01.2018
CHD.	J.RAMASWAMY	29.01.2018
APPD.	J.RAMASWAMY	29.01.2018

DRG. NO. DPPPG-70151868

SHEET 4 OF 16 REV D

FILE NAME :

CUBICLE : +V20MKA10GD010



ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.
				D	REVISION LEVEL UPDATED	24.08.18	J.R
				C	REVISION LEVEL UPDATED	17.07.18	J.R
				B	REVISION LEVEL UPDATED	21.03.18	J.R
				A	REVISION LEVEL UPDATED	03.03.18	J.R

PROJECT VILNIUS BIOMASS

CUSTOMER SIEMENS AG

W .O. NO MP0650

TITLE LINE SIDE CUBICLE (SCHEMATIC OF VT)

SCALE -

SIZE A3

POWERGEAR Experience The Power

MEPZ, Tambaram, CHENNAI-600045 INDIA

	SIGN	DATE
DRN.	A.ANTONY	29.01.2018
CHD.	J.RAMASWAMY	29.01.2018
APPD.	J.RAMASWAMY	29.01.2018

DRG. NO. DPPPG-70151868

SHEET 5 OF 16 REV D

FILE NAME :

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CONTINUED FROM Sh.-4 (A-7)

CUBICLE : +V20MKA10GD010

U1
V1
W1

TO Sh.-8 (B-1)

-T6L1,-T6L2,-T6L3

PRIMARY
15000/√3 V

A N A N A N

SECONDARY-1
100V/√3
CL 0.2;30VA

a n a n a n

-T6L1:1a
-T6L2:3a
-T6L3:5a
-T6:1n

NFGAFOU
2.5Sq.mm

da dn da dn da dn

SECONDARY-2
100V/3
CL 3P; 6A, 8h

-T6L1:da
-T6:dn

NFGAFOU
2.5Sq.mm

TO VT CIRCUIT
(SHEET-7)
(A-1)

JB : +V20MKA10GE010

MCB BUSBAR

-F51.2:1 -F51.2:3 -F51.2:5

-F51.2 2.5A	-F52.2 2.5A	-F53.2 2.5A	-F54.2 2.5A	-F55.2 2.5A
1 3 5	1 3 5	1 3 5	1 3 5	1 3 5
2 4 6	2 4 6	2 4 6	2 4 6	2 4 6
-F51.2:2 -F51.2:4 -F51.2:6	-F52.2:2 -F52.2:4 -F52.2:6	-F53.2:2 -F53.2:4 -F53.2:6	-F54.2:2 -F54.2:4 -F54.2:6	-F55.2:2 -F55.2:4 -F55.2:6
-X8:23 -X8:24 -X8:25	-X8:26 -X8:27 -X8:28	-X8:29 -X8:30 -X8:31	-X8:32 -X8:33 -X8:34	-X8:35 -X8:36 -X8:37 -X8:42
-X8:38	-X8:39	-X8:40	-X8:41	
33 41 / 34 42	33 41 / 34 42	33 41 / 34 42	33 41 / 34 42	33 41 / 34 42
-F51.2:33 -F51.2:34 -F51.2:41 -F51.2:42	-F52.2:33 -F52.2:34 -F52.2:41 -F52.2:42	-F53.2:33 -F53.2:34 -F53.2:41 -F53.2:42	-F54.2:33 -F54.2:34 -F54.2:41 -F54.2:42	-F55.2:33 -F55.2:34 -F55.2:41 -F55.2:42
-X10:25 -X10:26 -X10:27 -X10:28	-X10:29 -X10:30 -X10:31 -X10:32	-X10:33 -X10:34 -X10:35 -X10:36	-X10:37 -X10:38 -X10:39 -X10:40	-X10:41 -X10:42 -X10:43 -X10:44
-X8: 23 24 25 38	-X8: 26 27 28 39	-X8: 29 30 31 40	-X8: 32 33 34 41	-X8: 35 36 37 42
-X10: 25 26 27 28	-X10: 29 30 31 32	-X10: 33 34 35 36	-X10: 37 38 39 40	-X10: 41 42 43 44
PROTECTION	INDICATION / VOLTAGE / INDICATION / PROTECTION / INDICATION / MEASUREMENT / INDICATION / SYNCHRONIZATION / INDICATION			

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ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.
				D	KKS NUMBER +V20 UPDATED AS PER COMMENTS DTD 13.08.18	24.08.18	J.R
				C	REVISION LEVEL UPDATED	17.07.18	J.R
				B	REVISION LEVEL UPDATED	21.03.18	J.R
				A	REVISION LEVEL UPDATED	03.03.18	J.R

PROJECT	VILNIUS BIOMASS		
CUSTOMER	SIEMENS AG		
W .O. NO	MP0650	TITLE	LINE SIDE CUBICLE (SCHEMATIC OF VT)
SIZE	A3	SCALE	-
			MEPZ, Tambaram, CHENNAI-600045 INDIA

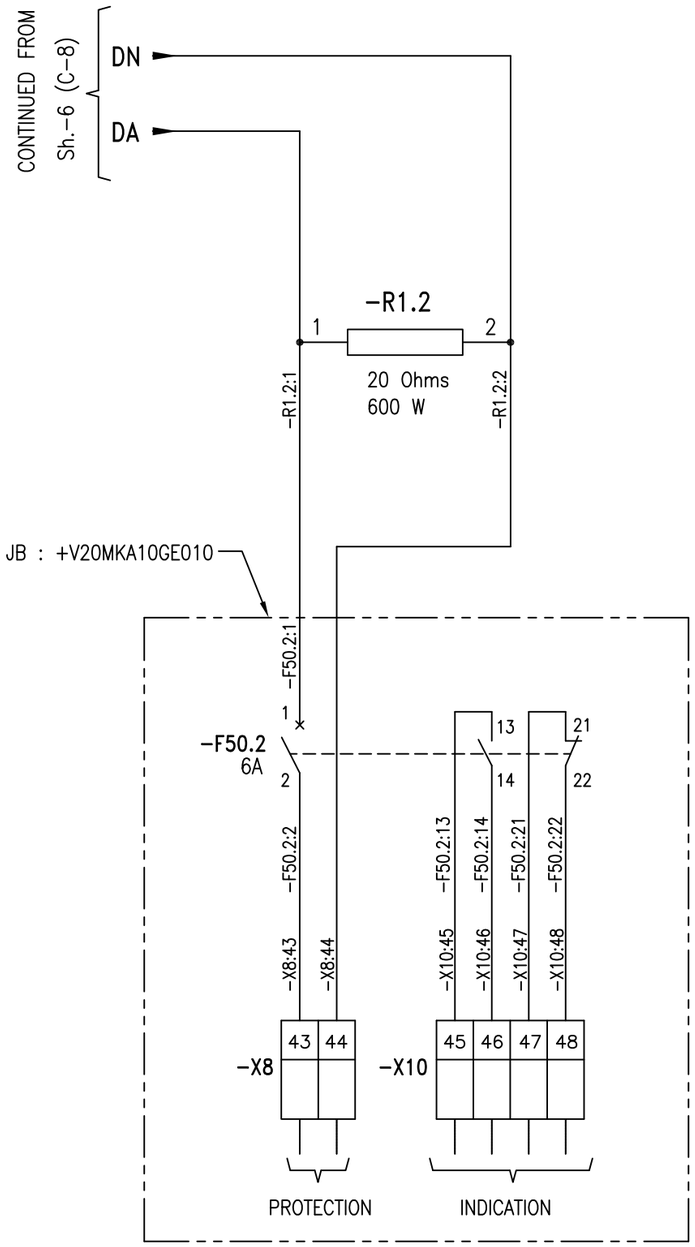
	SIGN	DATE
DRN.	A.ANTONY	29.01.2018
CHD.	J.RAMASWAMY	29.01.2018
APPD.	J.RAMASWAMY	29.01.2018

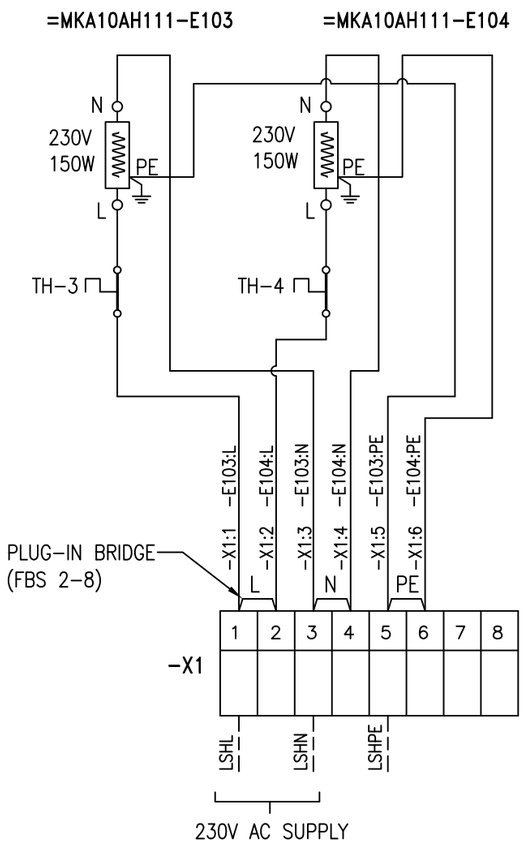
DRG. NO. DPPPG-70151868

SHEET 6 OF 16 | REV D

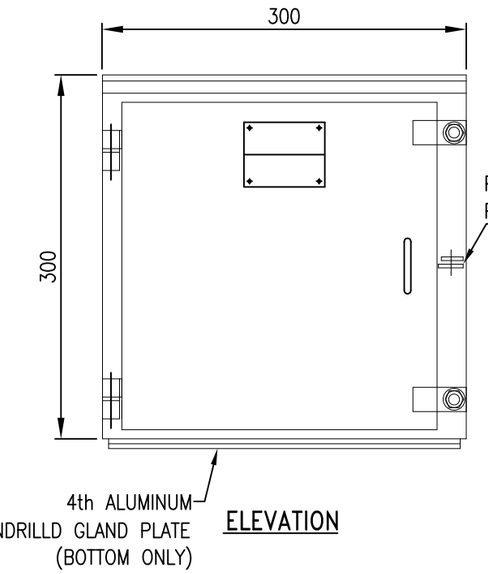
FILE NAME :

CUBICLE : +V20MKA10GD010



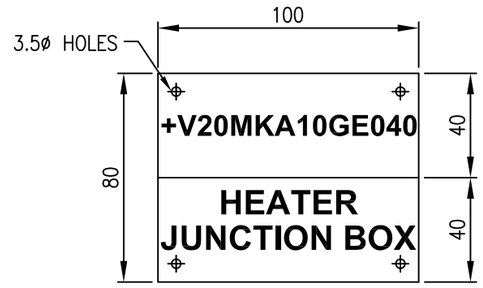


SPACE HEATER CIRCUIT

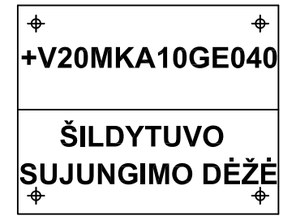


GENERAL ARRANGEMENT OF HEATER BOX

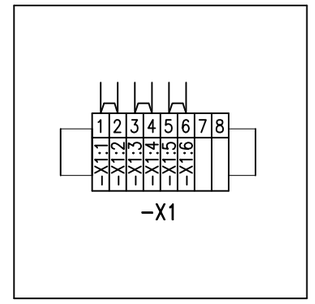
MATERIAL : 2 Thk. STAINLESS STEEL



NAME PLATE DETAILS
(ENGLISH LANGUAGE)



NAME PLATE DETAILS
(LITHUANIAN LANGUAGE)



TERMINAL DETAILS INSIDE HEATER BOX

ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.
				D	KKS NUMBER +V20 UPDATED AS PER COMMENTS DTD 13.08.18	24.08.18	J.R
				C	LITHUANIAN LANGUAGE HEATER BOX NAME PLATE ADDED	17.07.18	J.R
				B	THERMOSTAT ADDED AS PER SIEMENS COMMENTS DTD. 21.03.18	21.03.18	J.R
				A	REVISION LEVEL UPDATED	03.03.18	J.R

PROJECT	VILNIUS BIOMASS		
CUSTOMER	SIEMENS AG		
W .O. NO	MP0650	TITLE	LINE SIDE CUBICLE (SCHEMATIC OF VT & SPACE HEATER)
SIZE	A3	SCALE	-
			MEPZ, Tambaram, CHENNAI-600045 INDIA

	SIGN	DATE
DRN.	A.ANTONY	29.01.2018
CHD.	J.RAMASWAMY	29.01.2018
APPD.	J.RAMASWAMY	29.01.2018

DRG. NO. DPPPG-70151868

SHEET 7 OF 16 | REV D

FILE NAME :

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CUBICLE : +V20MKA10GD010

−T2L1, −T2L2, −T2L3

4000/1A
5P20, 15VA
CORE−3

4000/1A
5P20, 15VA
CORE−2

4000/1A
5P20, 15VA
CORE−1

CONTINUED FROM Sh.−6 (A−7)

U1 V1 W1

P2 P1

3S2 3S1 | 2S2 2S1 | 1S2 1S1

TO CUSTOMER CONNECTION

Uc=16 kV
Ur=20 kV
POLIM−S16N

−F1L1 −F1L2 −F1L3

18 kV
0.25 µf

−C1L1 −C1L2 −C1L3

U12 V12 W12

EARTHING DEVICE

−T2L1:3S2 −T2L2:3S2 −T2L3:3S2 −T2L1:3S1 −T2L2:3S1 −T2L3:3S1
−T2L1:2S2 −T2L2:2S2 −T2L3:2S2 −T2L1:2S1 −T2L2:2S1 −T2L3:2S1
−T2L1:1S2 −T2L2:1S2 −T2L3:1S2 −T2L1:1S1 −T2L2:1S1 −T2L3:1S1

JB : +V20MKA10GE010

FIXED BRIDGE (FBI 4−8)

SWITCHING JUMPER (SB 4−URTK/SP)

−X7L:PE −X7L:1 −X7L:2 −X7L:3 −X7L:4 −X7L:5 −X7L:6
−X7L: PE 1 2 3 4 5 6
PROTECTION

−X7L:PE −X7L:7 −X7L:8 −X7L:9 −X7L:10 −X7L:11 −X7L:12
−X7L: PE 7 8 9 10 11 12
PROTECTION

−X7L:PE −X7L:13 −X7L:14 −X7L:15 −X7L:16 −X7L:17 −X7L:18
−X7L: PE 13 14 15 16 17 18
PROTECTION

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REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.
				D	KKS NUMBER +V20 UPDATED AS PER COMMENTS DTD 13.08.18	24.08.18	J.R
				C	REVISION LEVEL UPDATED	17.07.18	J.R
				B	REVISED AS PER SIEMENS COMMENTS DTD. 16.03.18	21.03.18	J.R
				A	REVISION LEVEL UPDATED	03.03.18	J.R

PROJECT VILNIUS BIOMASS

CUSTOMER SIEMENS AG

W .O. NO MP0650

TITLE LINE SIDE CUBICLE (SCHEMATIC OF CT)

SCALE −

SIZE A3

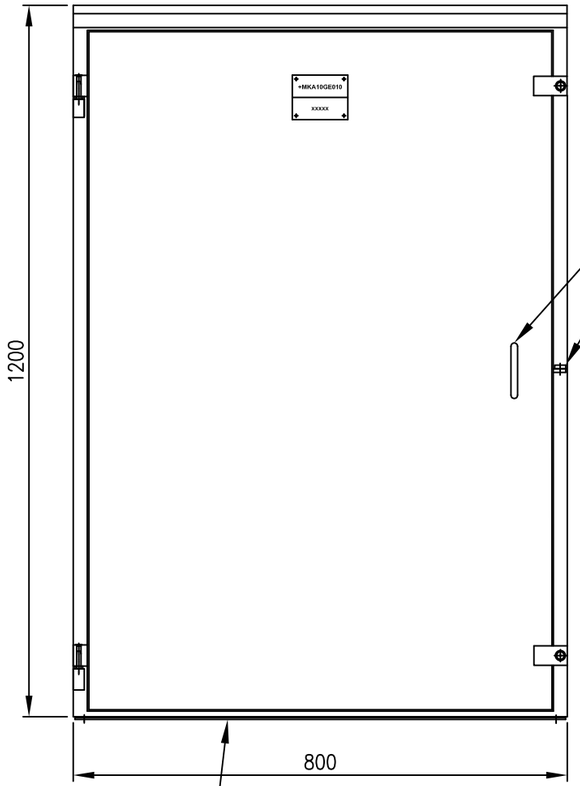
POWERGEAR Experience The Power
MEPZ, Tambaram, CHENNAI−600045 INDIA

	SIGN	DATE
DRN.	A.ANTONY	29.01.2018
CHD.	J.RAMASWAMY	29.01.2018
APPD.	J.RAMASWAMY	29.01.2018

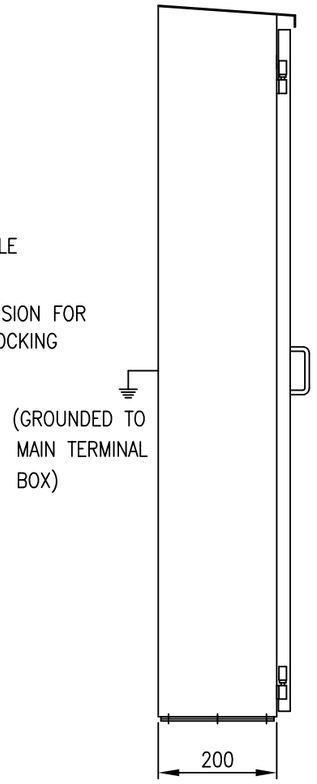
DRG. NO. DPPPG−70151868

SHEET 8 OF 16 REV D

FILE NAME :

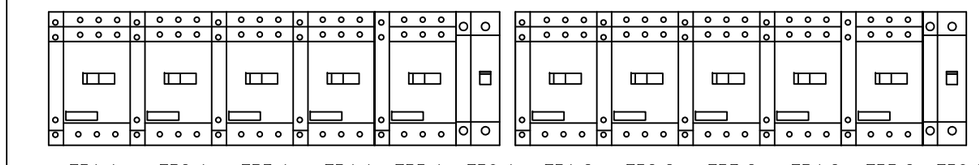


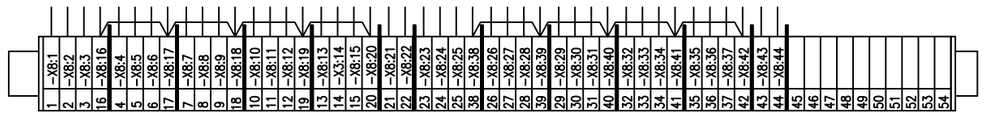
ELEVATION

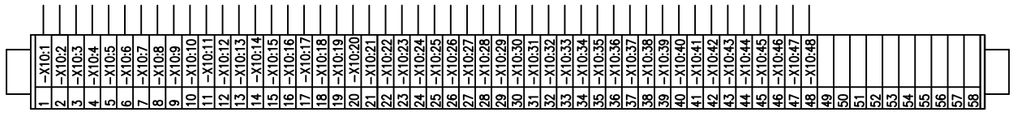


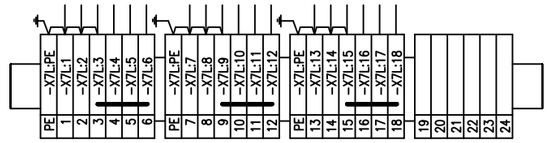
END VIEW

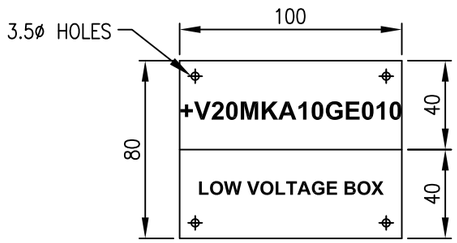
GENERAL ARRANGEMENT OF JUNCTION BOX



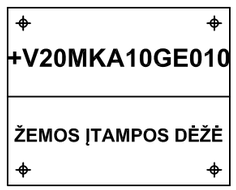




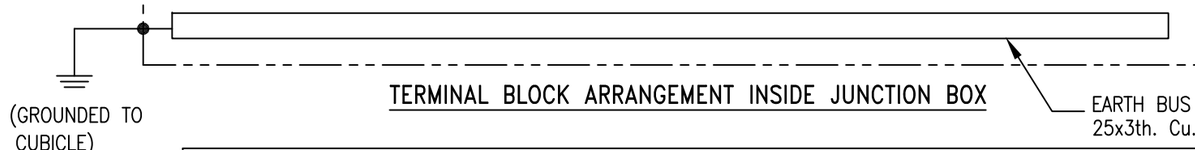




NAME PLATE DETAILS
(ENGLISH LANGUAGE)



NAME PLATE DETAILS
(LITHUANIAN LANGUAGE)



TERMINAL BLOCK ARRANGEMENT INSIDE JUNCTION BOX

ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.
				D	KKS NUMBER +V20 UPDATED AS PER COMMENTS DTD 13.08.18	24.08.18	J.R
				C	LITHUANIAN LANGUAGE JB NAME PLATE ADDED	17.07.18	J.R
				B	REVISION LEVEL UPDATED	21.03.18	J.R
				A	REVISION LEVEL UPDATED	03.03.18	J.R

PROJECT VILNIUS BIOMASS

CUSTOMER SIEMENS AG

W .O. NO: MP0650

TITLE: LINE SIDE CUBICLE (JUNCTION BOX DETAILS)

SCALE: -

SIZE: A3

POWERGEAR Experience The Power

MEPZ, Tambaram, CHENNAI-600045 INDIA

	SIGN	DATE
DRN.	A.ANTONY	29.01.2018
CHD.	J.RAMASWAMY	29.01.2018
APPD.	J.RAMASWAMY	29.01.2018

DRG. NO. DPPPG-70151868

SHEET 9 OF 16 | REV D

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FILE NAME :

CURRENT TRANSFORMER (–T2L1,–T2L2,–T2L3)

TYPE	: DRY TYPE, CAST RESIN
RATED VOLTAGE	: 15 kV
RATED FREQUENCY	: 50 HZ.
INSULATION LEVEL(WHEN MOUNTED)	: 17.5 kV /38 kV rms (1 Min.)/95 kV peak.
INSULATION CLASS	: B (130° C)
SHORT TIME RATING	: 80 KA–1sec
APPLICABLE STANDARD	: IEC 60044–1 / IEC 61869–2

VOLTAGE TRANSFORMER (–T5L1,–T5L2,–T5L3,–T6L1,–T6L2–T6L3)

TYPE	: DRY TYPE, CAST RESIN
RATED FREQUENCY	: 50 HZ.
INSULATION LEVEL	: 17.5 kV/38 kV rms (1 Min.)/95 kV peak
INSULATION CLASS	: B (130° C)
OVER VOLTAGE FACTOR	: 1.2 cont. / 1.9 For 8 Hours
APPLICABLE STANDARD	: IEC 60044–1 / IEC 61869–3

SURGE CAPACITORS (–C1L1,–C1L2,–C1L3)

RATED VOLTAGE	: 18 KV
CAPACITOR RATING	: 0.25 Micro F. ± 10 %
RATED FREQUENCY	: 50 Hz
INSULATION LEVEL FOR CAPACITOR BUSHING	: 17.5 kV/38 kV rms (1 Min.)/95 kV peak
APPLICABLE STANDARD	: IEC 60871

LIGHTNING ARRESTORS (–F1L1,–F1L2,–F1L3)

TYPE	: STATION–GAPLESS, METAL OXIDE, POLYMER
RATED VOLTAGE (Ur)	: 20 kV
MCOV RATING (Uc)	: 16 kV
NOMINAL DISCHARGE CURRENT	: 10 kA
REF. STANDARD	: IEC 60099/ANSI/IEEE C62.11

NOTES

1. WIRING WILL BE DONE AS GIVEN BELOW :

CT CIRCUIT	– 4 Sq.mm TINNED COPPER, 750V GRADE, 90°C HEAT RESISTANCE CABLE	– BLACK COLOUR FOR PHASE & SHORTING GREEN/YELLOW COLOUR FOR GROUND
VT CIRCUIT	– 2.5 Sq.mm TINNED COPPER, 1800V GRADE, NSGAFOU CABLE UPTO MCB	– BLACK COLOUR FOR PHASE
	– 2.5 Sq.mm TINNED COPPER, 750V GRADE, 90°C HEAT RESISTANCE CABLE (AFTER MCB)	– BLACK COLOUR FOR PHASE
	_ 4 Sq. mm TINNED COPPER, 750V GRADE, 90°C HEAT RESISTANCE CABLE	– GREEN/YELLOW COLOUR FOR GROUND
HEATER CIRCUIT	– 2.5 Sq.mm TINNED COPPER, 750V GRADE, 90°C HEAT RESISTANCE CABLE	– BLACK COLOUR FOR LINE – LIGHT BLUE COLOUR FOR NEUTRAL

2. ALL THE ABOVE CABLES ARE "CE" MARKED

ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.
				D	KKS NUMBER +V20 UPDATED AS PER COMMENTS DTD 13.08.18	24.08.18	J.R
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			SIGN	DATE
PROJECT	VILNIUS BIOMASS	DRN.	A.ANTONY	29.01.2018
CUSTOMER	SIEMENS AG	CHD.	J.RAMASWAMY	29.01.2018
W .O. NO	MP0650	APPD.	J.RAMASWAMY	29.01.2018
TITLE	LINE SIDE CUBICLE (TECHNICAL SPECIFICATION)	DRG. NO.	DPPPG–70151868	
SCALE	–	SIZE	A3	
POWERGEAR Experience The Power	MEPZ, Tambaram, CHENNAI–600045 INDIA	SHEET	10 OF 16	REV D

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FILE NAME :

BILL OF MATERIALS

SL.No.	LEGENDA	DESCRIPTION		QUANTITY (Nos.)	MAKE	TYPE	CATALOQUE REF.
1	–T2L1,–T2L2,–T2L3	CURRENT TRANSFROMER (SEE DETAILS IN Sh.8) RATIO : 4000/1/1/1A	CORE–1 : CLASS – 5P20,15VA CORE–2 : CLASS – 5P20,15VA CORE–3 : CLASS – 5P20,15VA	3	PRAYOG, INDIA	CAST RESIN	CT–2452/R
2	–T5L1,–T5L2,–T5L3 –T6L1,–T6L2,–T6L3	VOLTAGE TRANSFORMER (SEE DETAILS IN Sh.10) 15000/√3V:100/√3:100/3	WINDING –1 : CL. 0.2, 30VA WINDING –2 : CL. 3P, 6A, 8h	6	PRAYOG, INDIA	CAST RESIN	VT–2473
3	–R1.1, –R1.2	OPEN DELTA VT RESISTOR 20 Ohms, 600 W		2	KWK, INDIA	WIRE WOUND	
4	–C1L1,–C1L2,–C1L3	SURGE CAPACITOR (SEE DETAILS IN Sh.10)		3	ABB, INDIA		YC1H419450–031
5	–F1L1,–F1L2,–F1L3	LIGHTNING ARRESTOR (SEE DETAILS IN Sh.10)		3	ABB	POLIM–S	POLIM–S16N
6	–C2L1,–C2L2–C2L3	PDA COUPLER – 16kV, 80 pF		3+3	IRIS	EMC	
7		PDA COUPLER CABLE TERMINATION BOX – FIBRE GLASS POLYESTER (+V20MKA10GE011)		1	IRIS	EMC	
8	–X7L	TERMINALS IN (+V20MKA10GE010)		21+6	PHOENIX,GERMANY	DISCONNECTING TYPE	URTK/SP
	–X8,–X10			92+20	PHOENIX,GERMANY	STUD TYPE	UT6
9	–	CT SWITCHING JUMPER		3	PHOENIX,GERMANY	4 WAY	SB 4–URTK/SP
10	–	SHORTING BRIDGE		3	PHOENIX,GERMANY	4 WAY	FBI 4–8
11	–F51.1,–F52.1,–F53.1,–F54.1,–F55.1 –F51.2,–F52.2,–F53.2,–F54.2,–F55.2	MINIATURE CIRCUIT BREAKER, 3POLE, 2.5A WITH 1NO+1NC CONTACTS		10	SEIMENS		3RV1611–1CG14 3RV2901–1A
12	–F50.1, –F50.2	MINIATURE CIRCUIT BREAKER, 1POLE, 6A WITH 1NO+1NC CONTACTS		2	SIEMENS		5SL–61067RC 5ST3 010
13	–	MCB BUSBAR – 5 WAY		2	SIEMENS		3RV1915–2DB
14	–	MCB TERMINAL		2	SIEMENS		3RV1915–5A
15	–U12,–V12,–W12	EARTHING DEVICE		1 SET	CATU		
16	–E103, –E104	SPACE HEATERS 230V AC, 150W		2	KWK, INDIA	BOX TYPE	
17	–X1	TERMINALS IN HEATER BOX (+V20MKA10GE040)		8	PHOENIX,GERMANY	STUD TYPE	UT6
18	–	PLUG–IN BRIDGE		3	PHOENIX,GERMANY	2 WAY	FBS 2–8
19	TH–3 & TH–4	THERMOSTAT (0–50°C SETTING RANGE)		2	JUMO, GERMANY	CAPILLARY TYPE	

ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.
				D	BILL OF MATERIAL UPDATED AS MADE	24.08.18	J.R
				C	REVISION LEVEL UPDATED	17.07.18	J.R
				B	REVISED AS PER SIEMENS COMMENTS DTD. 16.03.18 & 21.03.18	21.03.18	J.R
				A	REVISION LEVEL UPDATED	03.03.18	J.R

PROJECT VILNIUS BIOMASS

CUSTOMER SIEMENS AG

W .O. NO MP0650

TITLE LINE SIDE CUBICLE (TECHNICAL SPECIFICATION)

SCALE –

SIZE A3

POWERGEAR Experience The Power

MEPZ, Tambaram, CHENNAI–600045 INDIA

	SIGN	DATE
DRN.	A.ANTONY	29.01.2018
CHD.	J.RAMASWAMY	29.01.2018
APPD.	J.RAMASWAMY	29.01.2018

DRG. NO. DPPPG–70151868

SHEET 11 OF 16 REV D

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FILE NAME :

TECHNICAL PARTICULARS

SERVICE VOLTAGE	: 15 kV
HIGHEST VOLTAGE	: 17.5 kV
RATED CURRENT	: 3586 A @ 55° C
RATED FREQUENCY	: 50 Hz.
SHORT TIME CURRENT RATING	: 80 kA rms for 1 Sec. (200 kA Peak)
BASIC INSULATION LEVEL	: 17.5 kV / 38 kV rms (1 Min.)/95 kV peak.
TEMPERATURE RISE OVER AN AMBIENT OF 55°C	
– BUSBAR	: 50°C
– ENCLOSURE	: 15°C
DEGREE OF PROTECTION	: IP 54

NOTES :

1. REFERENCE DRAWING
   - a. GENERATOR MASSBILD – OUTLINE DRAWING : DPPPG–70149178 Rev.A
   - b. AUXILIARY WIRING DIAGRAMS GENERATOR : DPPPG – 70152441
   - c. BUSHING / TERMINAL BOARD : 2–460377 Rev.A
   - d. BUSBAR : 3–403720 Rev.B
   - e. WELDING FLANGE : 2–457773 Rev.A
   - f. BUSHING ASSEMBLY : 1–2570–451105 Rev.A
   - g. INQUIRY DATA SHEET : DPPPG/70151865
   - h. BELLOW UNIT 164/94 : 6.37.04.012.611–620.02
   - i. BUS BAR CONNECTION UNIT SIS 17,5–4000A E–A1 : 38.265261.00
2. CONSTRUCTION
   - CUBICLE : 4mm THICK ALUMINUM
   - JUNCTION BOX : 2mm THICK STAINLESS STEEL
   - BUSBAR (MAIN) : 2 – 150 x 12 COPPER
   - EARTH BUSBAR : 1 – 50 x 10 COPPER (TINNED)
   - SUPPORTING STRUCTURE : MILD STEEL EXTRUSION
3. ALL THE DIMENSIONS ARE MARKED IN METRIC SYSTEM. [mm]
4. MINIMUM CLERANCES – PHASE TO PHASE & – PHASE TO GROUND : 160 mm
5. PAINT FINISH
   - ENCLOSURE – INSIDE AND OUTSIDE : RAL 7030
   - BUSBAR : BLACK MATT
   - SUPPORT STRUCTURE : RAL 7030
6. ALL BUSBAR JOINT CONTACT SURFACES ARE BARE COPPER (GEN. FLEXIBLE END SILVER PLATED)
7. HARDWARE, GASKETS TO CONNECT LINE SIDE CUBICLE ENCLOSURE WITH GENERATOR WILL BE SUPPLIED BY POWERGEAR
8. HARDWARE, FLEXIBLES TO CONNECT LINE SIDE CUBICLE BUSBAR WITH GENERATOR LEADS WILL BE SUPPLIED BY POWERGEAR
9. HARDWARE, GASKET, INSULATED BUSBAR, RUBBER BELLOW & FLEXIBLE TO CONNECT IPB END WITH BUSDUCT BY SIEMENS
10. IPB DUCT MUST BE ELECTRICALY ISOLATED FROM CUBICLE
11. DANGER PLATES ARE PROVIDED ON ALL ACCESS DOORS
12. WEIGHT : CUBICLE – 1500 kgs
    : STRUCTURE – 150 kgs

ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.
				D	REVISION LEVEL UPDATED	24.08.18	J.R
				C	REVISION LEVEL UPDATED	17.07.18	J.R
				B	NOTE 9 UPDATED AS PER SIEMENS COMMENTS DTD. 12.03.18	21.03.18	J.R
				A	REVISION LEVEL UPDATED	03.03.18	J.R

BILL OF MATERIALS FOR FIELD ASSEMBLY

ITEM	DESCRIPTION	MATERIAL	QUANTITY	IDENTIFICATION
1	RETAINER PLATE – 50x6x1300	MS PAINTED	4 NO's	SHEET 16
2	RETAINER PLATE – 50x6x690	MS PAINTED	4 NO's	SHEET 16
3	M10 x 45 LONG + 1PW	SS A270	16 NO's	SHEET 16
4	COPPER BRAID FLEXIBLE–50x25x380mm LONG	COPPER	12 NO's	SHEET 16
5	M12x90 BOLT+NUT+2PW+1SW	SS A270	12 NO's	SHEET 16
6	M12x100 BOLT+NUT+2PW+1SW	SS A270	12 NO's	SHEET 16
7	ANCHOR BOLT – M12X140/50 HST, HILTI MAKE	STEEL (5.6 GR.)	24 NO's	SHEET 13
8	ANTI–VIBRATION MOUNT	–	6 NO's	SHEET 13
9	PACKING SHIM – 100x100mm THICKNESS : 15+6+6+3+2 (Per Mount)	GALVD.	6 NO's EACH	SHEET 13
10	M16 NUT + 1PW + 1SW	SS A270	6 NO's	SHEET 13
11	M12x50LONG+NUT+2PW+1SW	SS A270	20 NO's	SHEET 13
12	EARTHING SYSTEM WITH KIT	–	1 NO's	SHEET 15
13	RUBBER BELLOW	EPDM	1 NO's	SHEET 16
14	M10X45N+2PW	SS A270	16 NO's	SHEET 16
15	SUPPORT STRUCTURE	MS	1 NO's	SHEET 13
16	EPOXY MICA CAPACITOR (16kV, 80 pF)	–	3 NO's	LOOSE SUPPLY
17	BNC CONNECTOR	–	6 NO's	LOOSE SUPPLY
18	COAXIAL CABLE	–	30 Mtr.	LOOSE SUPPLY
19	PDA NAME PLATE (–C3L1, –C3L2, –C3L3)	SS	3 No's	LOOSE SUPPLY
20	EMC METAL CLAMP (FOR PDA)	SS	6 No's (3 Set)	LOOSE SUPPLY
21	EMC BOOT (FOR PDA)	–	3 No's	LOOSE SUPPLY
22	15kV JUMPER CABLE WITH ANGLE LUG(FOR PDA)	–	3 No's	LOOSE SUPPLY
23	GROUND WIRE CONNECTION (FOR PDA)	–	10 ft	LOOSE SUPPLY
24	HI – VOLTAGE LUG WITH HEAT SHINK + GROUND WIRE LUG (FOR PDA)	–	3 No's	LOOSE SUPPLY
25	SHORTING BUSBAR – 1 (150–12Th.)	COPPER	2 NO's	SHEET 16
26	SHORTING BUSBAR – 2 (150–12Th.)	COPPER	4 NO's	SHEET 16
27	M12x60 BOLT+NUT+2PW+1SW	SS A270	24 NO's	SHEET 16
28	12 Th. COPPER BUSBAR (WITH TINNED PLATED)	COPPER	3 NO's	SHEET 14

PROJECT VILNIUS BIOMASS

CUSTOMER SIEMENS AG

W .O. NO MP0650

TITLE LINE SIDE CUBICLE (NOTES ON GENERAL ARRANGEMENT & FIELD ASSEMBLY)

SCALE 1 : 30

SIZE A3

POWERGEAR Experience The Power

MEPZ, Tambaram, CHENNAI–600045 INDIA

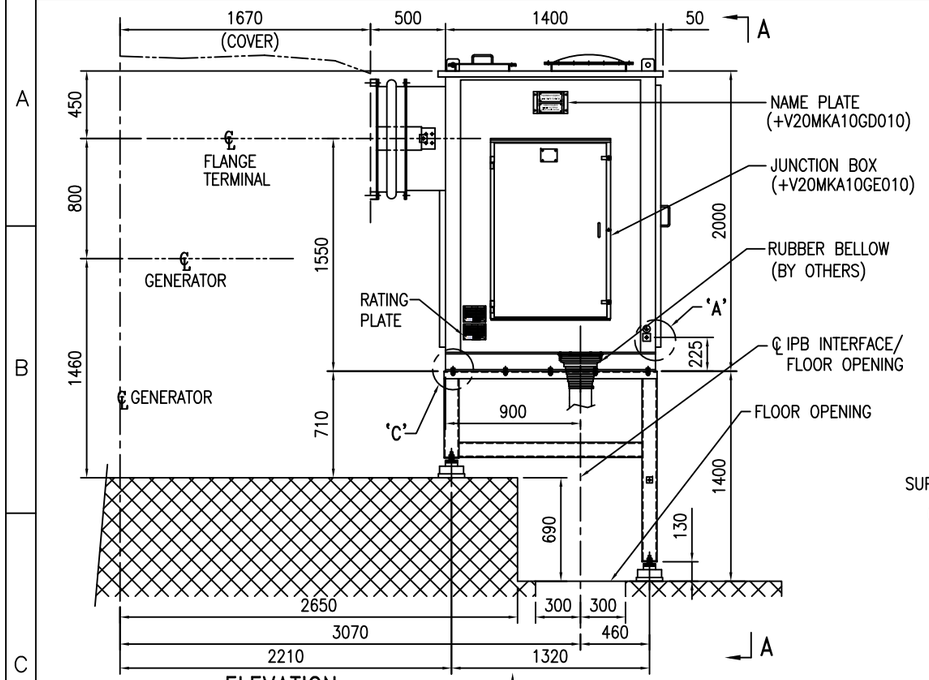
	SIGN	DATE
DRN.	A.ANTONY	29.01.2018
CHD.	J.RAMASWAMY	29.01.2018
APPD.	J.RAMASWAMY	29.01.2018

DRG. NO. DPPPG–70151868

SHEET 12 OF 16 REV D

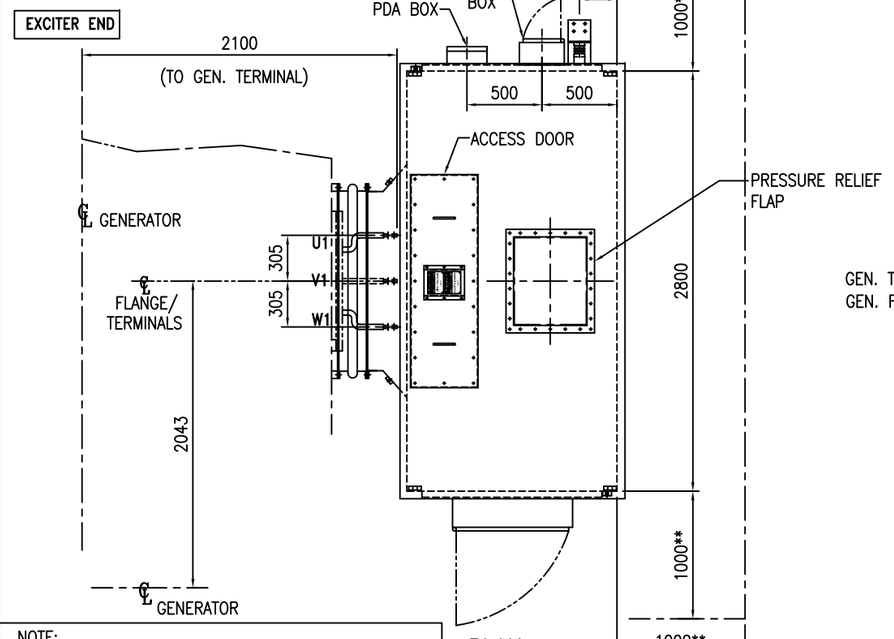
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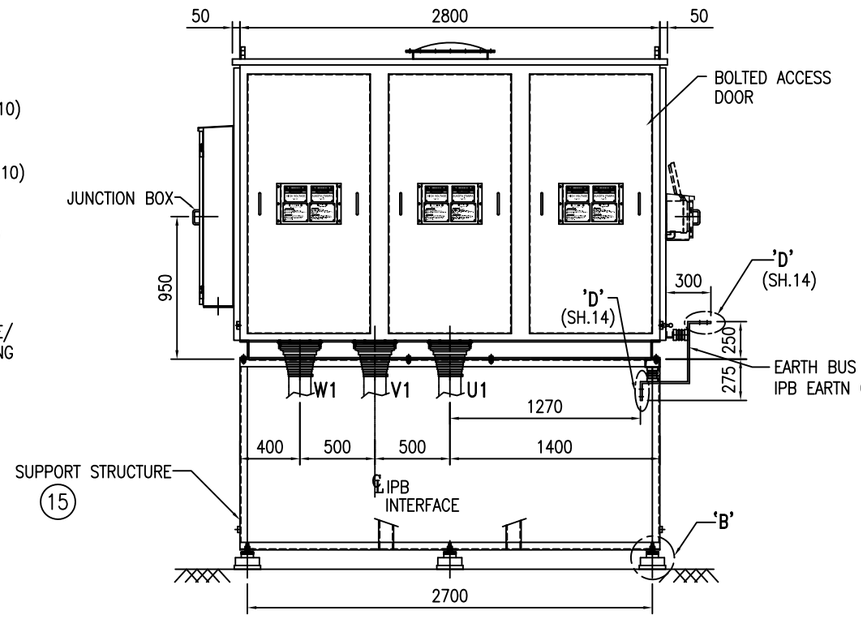


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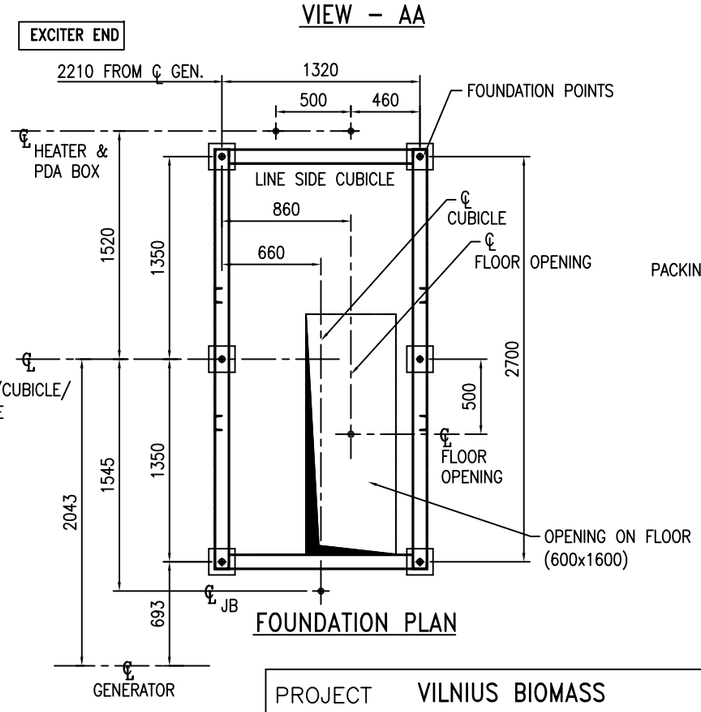
(VIEW FROM TURBINE END)



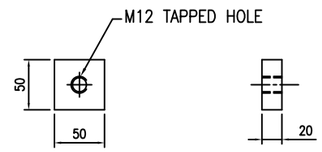
PLAN



VIEW – AA



FOUNDATION PLAN



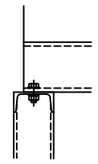
DETAIL–A

END VIEW

MATERIAL : 20 Th. ALUMINIUM

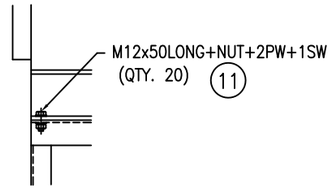
EARTH PAD DETAILS (PE)

(ON DIAGONALLY OPPOSITE SIDES)

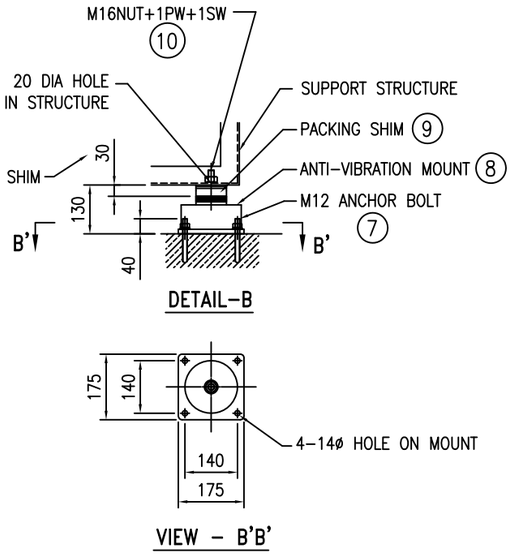


DETAIL–C

(CONNECTION BETWEEN CUBICLE AND STRUCTURE)



END VIEW



DETAIL–B

END VIEW

VIEW – B'B'

NOTE:
* * MINIMUM CLEARANCE REQUIRED FOR MAINTENANCE

ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.
				D	REVISION LEVEL UPDATED	24.08.18	J.R
				C	REVISION LEVEL UPDATED	17.07.18	J.R
				B	REVISED AS PER SIEMENS COMMENTS DTD. 12.03.18	21.03.18	J.R
				A	REVISED AS PER SIEMENS COMMENTS DTD. 01.03.18	03.03.18	J.R

PROJECT	VILNIUS BIOMASS
CUSTOMER	SIEMENS AG
W .O. NO	MP0650
TITLE	LINE SIDE CUBICLE (OUT LINE)
SCALE	1 : 40
SIZE	A3

POWERGEAR
Experience The Power
MEPZ, Tambaram, CHENNAI–600045 INDIA

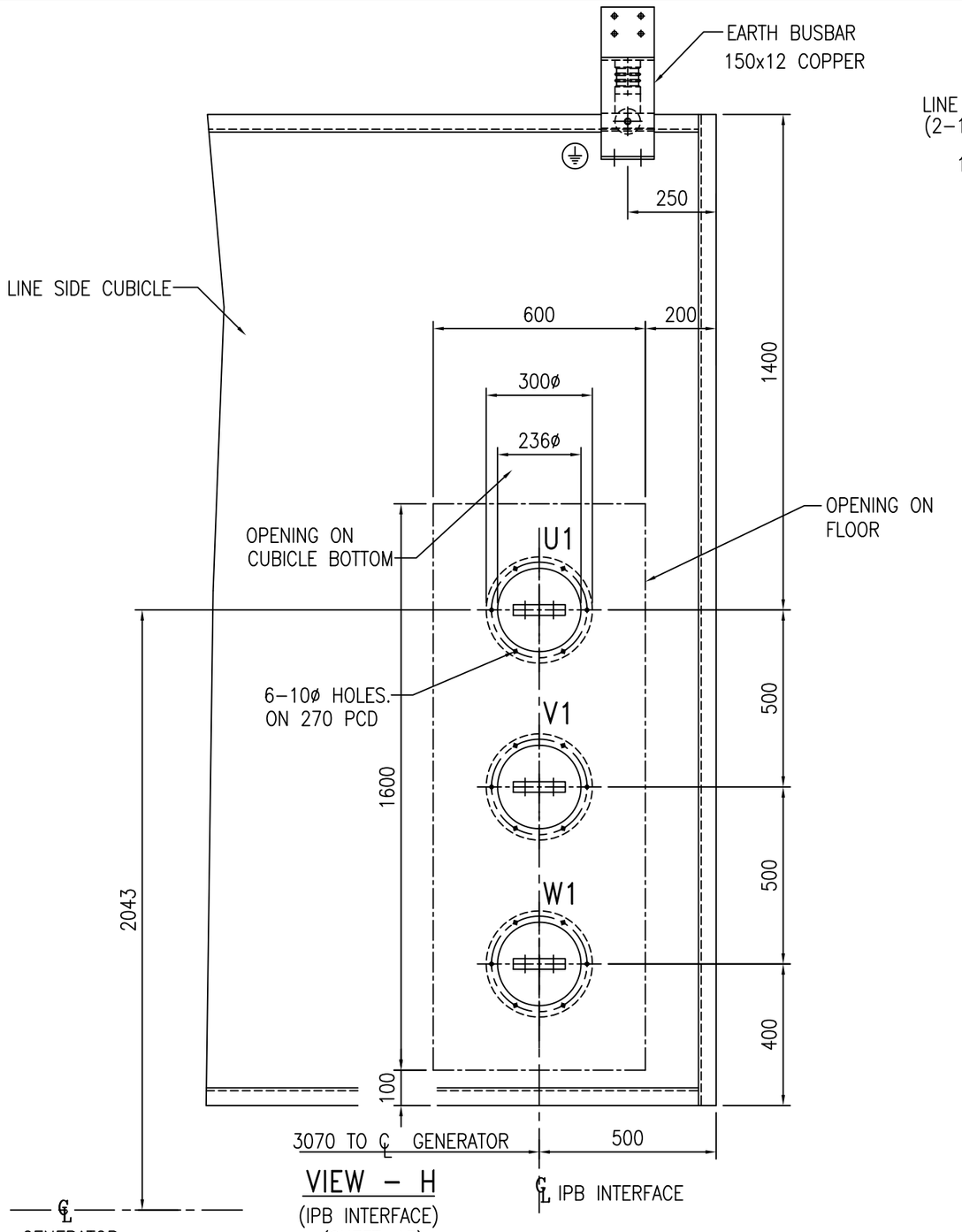
	SIGN	DATE
DRN.	A.ANTONY	29.01.2018
CHD.	J.RAMASWAMY	29.01.2018
APPD.	J.RAMASWAMY	29.01.2018

DRG. NO. DPPPG–70151868

SHEET 13 OF 16 | REV D

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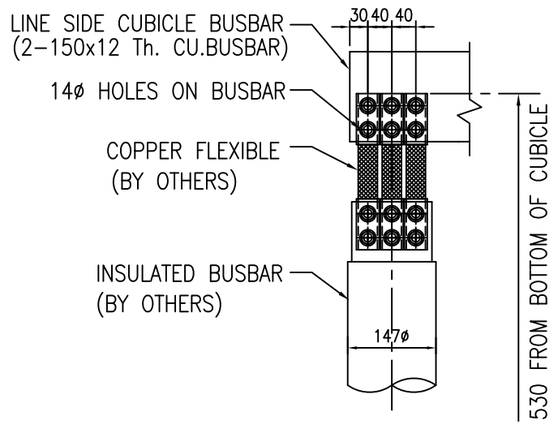
FILE NAME :



VIEW – H

(IPB INTERFACE)

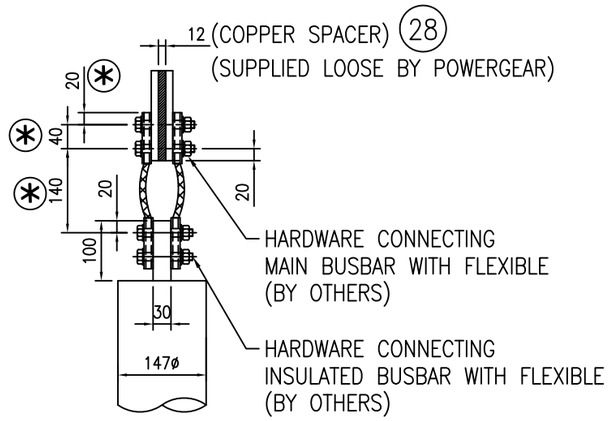
(SHEET–13)



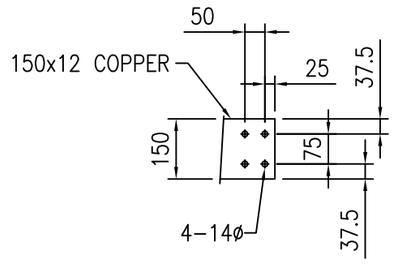
DETAIL–G

(SH. 15)

FLEXIBLE CONNECTION WITH
IPB END INSULATED BUSBAR



END VIEW



DETAIL–D

(IPB EARTH BUS DETAILS)

ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.
				D	UPDATED AS PER SIEMENS COMMENTS DTD.06.09.18	06.09.18	J.R
				C	REVISION LEVEL UPDATED	17.07.18	J.R
				B	REVISED AS PER SIEMENS COMMENTS DTD. 12.03.18	21.03.18	J.R
				A	REVISION LEVEL UPDATED	03.03.18	J.R

PROJECT	VILNIUS BIOMASS
CUSTOMER	SIEMENS AG
W .O. NO	MP0650
TITLE	LINE SIDE CUBICLE (IPB INTERFACE INFORMATION)
SCALE	1 : 40
SIZE	A3

POWERGEAR Experience The Power

MEPZ, Tambaram, CHENNAI–600045 INDIA

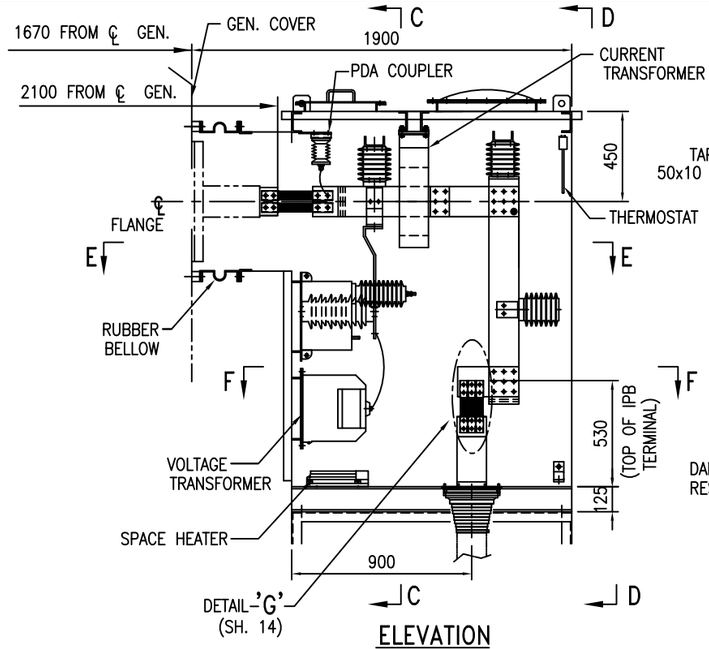
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APPD.	J.RAMASWAMY	29.01.2018

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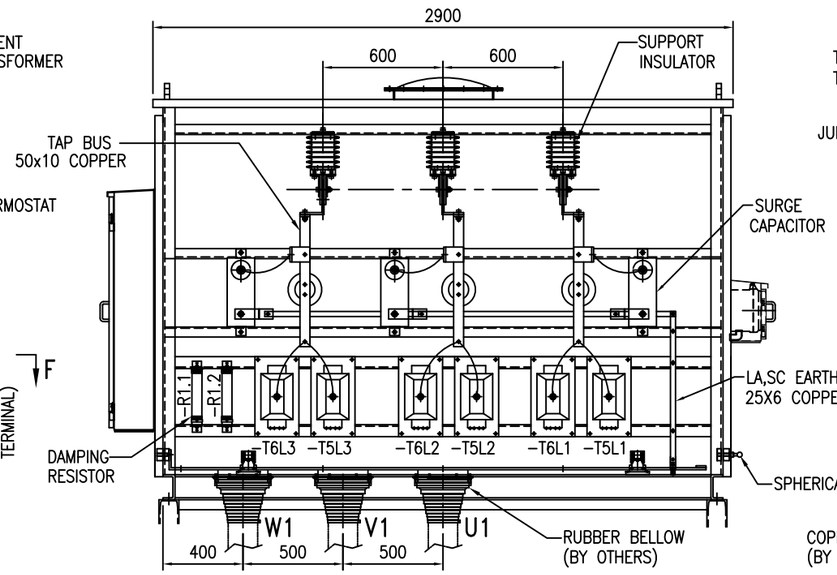
SHEET 14 OF 16 | REV D

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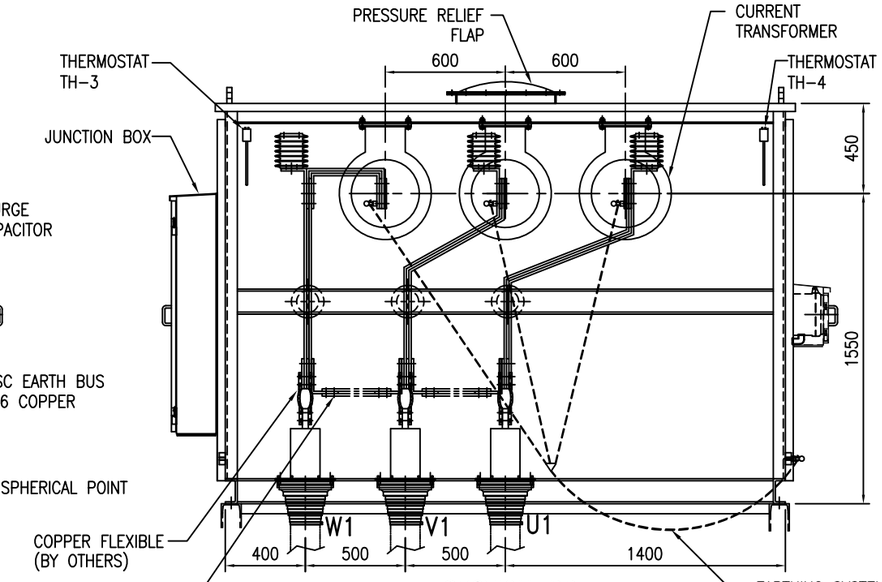
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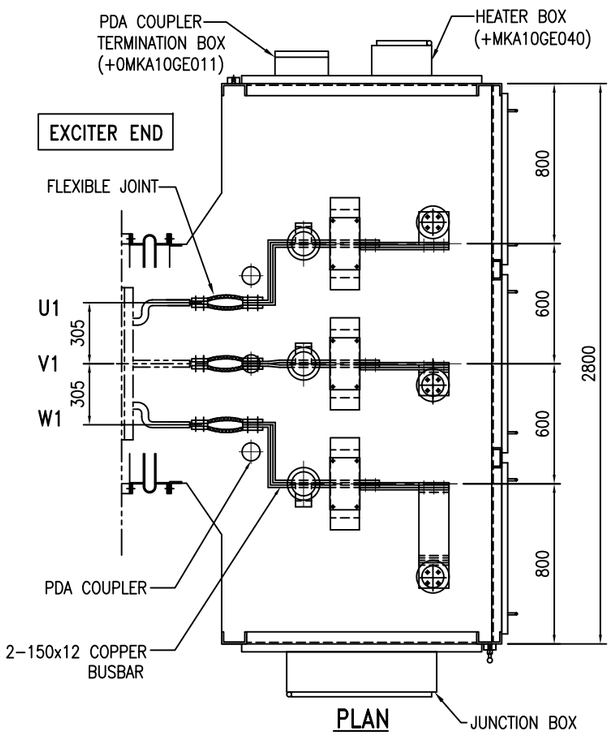
ELEVATION
(INTERNAL DETAILS)



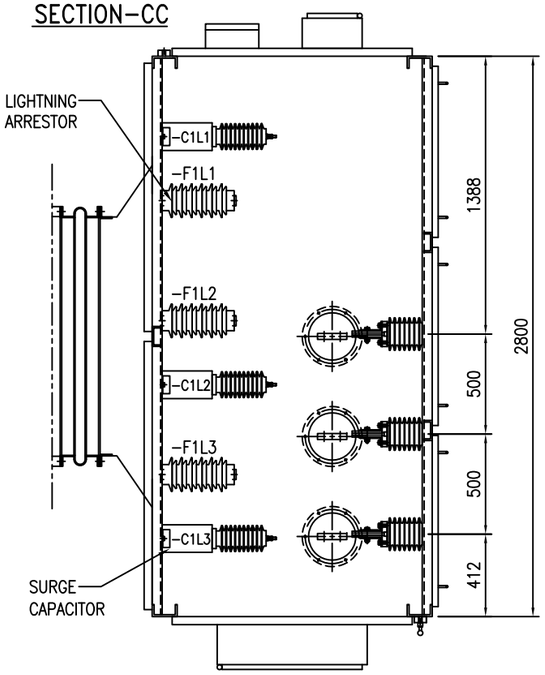
SECTION-CC



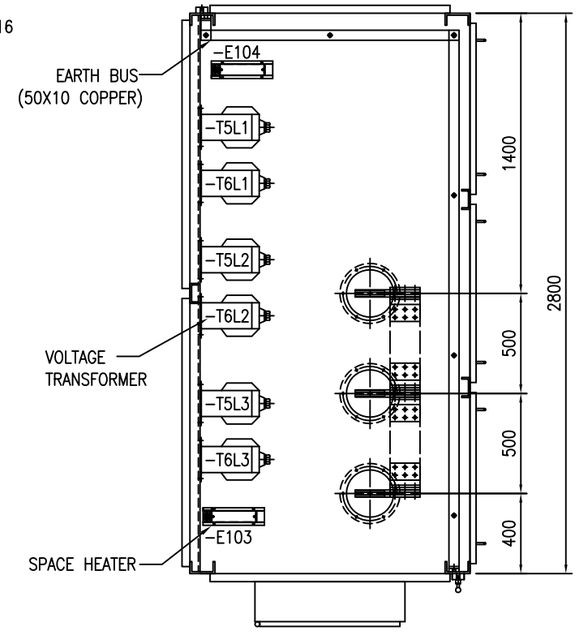
SECTION-DD



PLAN



SECTION-EE
(SHOWING THE LA & SC ONLY)



SECTION-FF

ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.
				D	UPDATED AS MADE	24.08.18	J.R
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				A	REVISION LEVEL UPDATED	03.03.18	J.R

PROJECT VILNIUS BIOMASS

CUSTOMER SIEMENS AG

W .O. NO MP0650

TITLE LINE SIDE CUBICLE (INTERNAL ARRANGEMENT)

SIZE A3

SCALE 1 : 30

POWERGEAR Experience The Power

MEPZ, Tambaram, CHENNAI-600045 INDIA

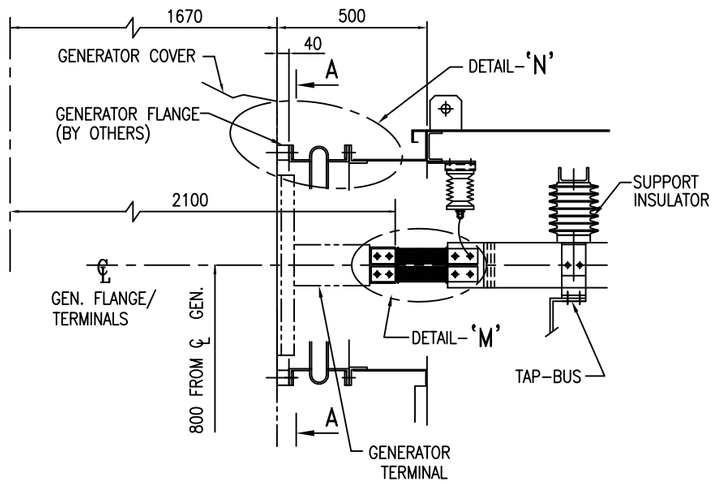
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CHD.	J.RAMASWAMY	29.01.2018
APPD.	J.RAMASWAMY	29.01.2018

DRG. NO. DPPPG-70151868

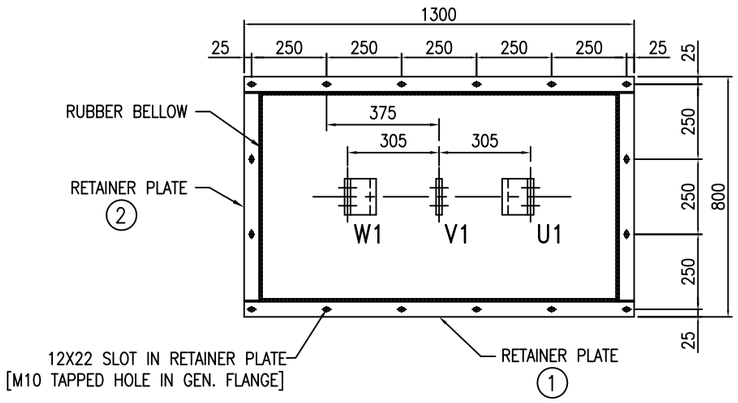
SHEET 15 OF 16 REV D

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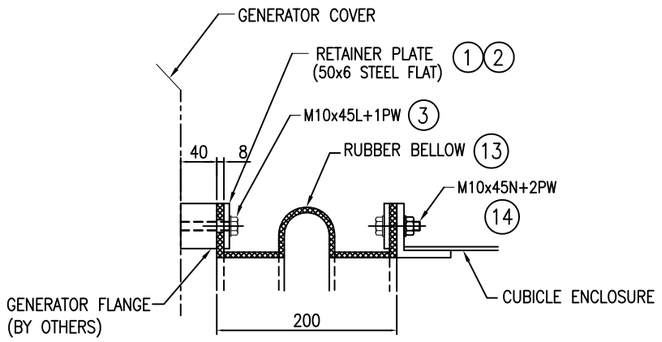
FILE NAME :



GENERATOR INTERFACE DETAILS

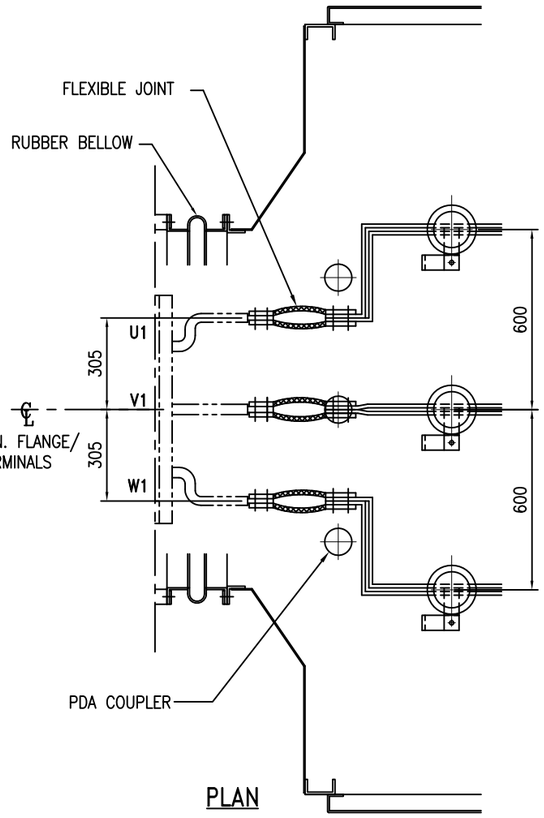


SECTION-AA

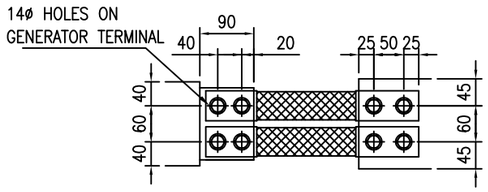


DETAIL-N

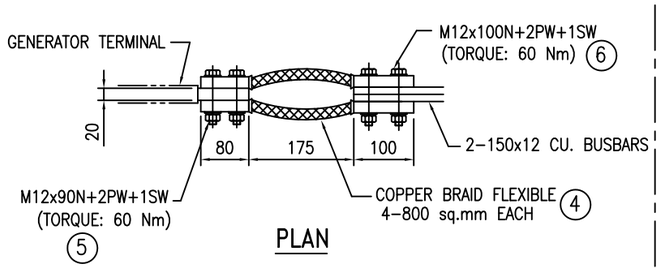
ENCLOSURE CONNECTION WITH GENERATOR



PLAN

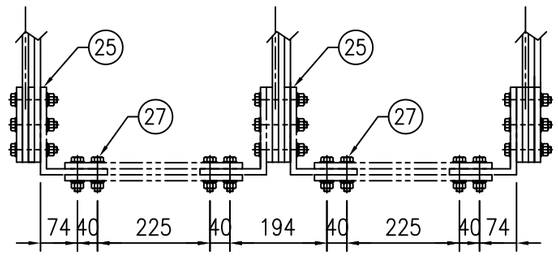


DETAIL-M

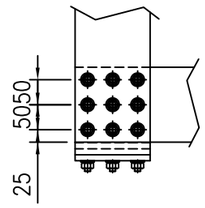


PLAN

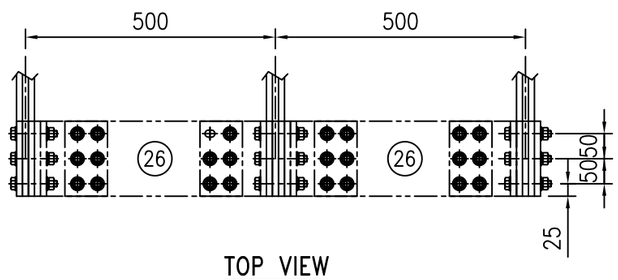
BUSBAR CONNECTION WITH GENERATOR LEAD



DETAIL - K



END VIEW



TOP VIEW

LINE SIDE SHORTING BUSBAR CONNECTING DETAILS

(REMOVABLE TYPE - SUPPLIED LOOSE)
(FOR TESTING PURPOSE ONLY)
(150x12Th. COPPER)

ALL DIMENSIONS ARE IN mm

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				D	REVISION LEVEL UPDATED	24.08.18	J.R
				C	REVISION LEVEL UPDATED	17.07.18	J.R
				B	SHORTING BUSBAR CONNECTION DETAIL UPDATED	21.03.18	J.R
				A	REVISION LEVEL UPDATED	03.03.18	J.R

PROJECT VILNIUS BIOMASS

CUSTOMER SIEMENS AG

W .O. NO: MP0650

TITLE: LINE SIDE CUBICLE (TERMINATION AT GENERATOR)

SCALE: 1 : 40

SIZE: A3

POWERGEAR Experience The Power

MEPZ, Tambaram, CHENNAI-600045 INDIA

	SIGN	DATE
DRN.	A.ANTONY	29.01.2018
CHD.	J.RAMASWAMY	29.01.2018
APPD.	J.RAMASWAMY	29.01.2018

DRG. NO. DPPPG-70151868

SHEET 16 OF 16 | REV D

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FILE NAME :

Instruction Manual

for

NEUTRAL SIDE CUBICLE

PURCHESE ORDER No. : E09-3010449826

SIEMENS SPEC. No. : TLV13-024

PROJECT NAME : VILNIUS BIOMASS

SERIAL No. : MP0650

DOCUMENT No. : IOM-NSC-MP0650

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A. INSTALLATION, OPERATION AND MAINTENANCE MANUAL

Neutral Side Cubicle

SIEMENS PROJECT No. **: 3000018595**

SIEMENS ORDER No. **: E09-3010449826**

MATERIAL No. Acc. TO PO **: P00058032800**

CUBICLE IDENTIFICATION **: +V20MKA10GD020**

PROECT NAME **: VILNIUS BIOMASS**

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1. INTRODUCTION:

This manual covers the instructions for storage, handling, assembly, installation, operation and Maintenance of Neutral Side Cubicle supplied under this contract duly meets the requirements of "SIEMENS AG" specification.

2. DESCRIPTION OF EQUIPMENT:

Neutral Side Cubicle is intended to mount on the structure by the side of Generator and Generator line leads are taken into Neutral Side Cubicle and star formed for neutral Side connection and connected to ground through NGT.

2.1 Generator Neutral Side Cubicle houses the following items:

2.1.1 Three Phase Busbars supported on Insulators.

2.1.2 Current Transformer (CT).

2.1.3 Neutral Grounding transformer (NGT).

2.1.4 Neutral Grounding Resistor (NGR).

2.1.5 Junction box.

2.1.6 Heater junction box.

2.2. Construction:

2.2.1 Enclosure:

Neutral Side Cubicle is constructed with 4mm thick Aluminum Sheets welded over rigid Aluminum Channel frame work.

4Nos. Lifting pad provided on top for lifting.

Provision for lifting is provided at the top corners of the panel.

2Nos. Earth pads (PE) are provided at bottom for customer ground connection. These Earth pads are connected internally by copper bus. Earth pads are identified by earthing symbol.

Rating plates are fixed near junction box on welded door in English & Lithuanian language. Danger & Warning plates are provided on all access doors in English & Lithuanian language.

Junction box is mounted on the right side of the Neutral Side Cubicle, which houses CT, NGR, and NGT, secondary terminals are wired up to this junction box.

Heater box is mounted on the left side of the Neutral Side Cubicle, which houses heater terminals and thermostat.

Support structure is made of Mild steel channels and mounting holes are made on the structure for fixing the cubicle.

Rubber bellow is provided at generator end connection busduct.

2.2.2 Bus bar:

Main current carrying bus bars are made out of 2 runs of 150x12mm copper bus bars and supported on Epoxy Insulators.

Neutral tie busbars are made out of 50X10mm copper busbar.

Bus bars are painted with matt black paint.

Generator end connection joints are silver plated to 15 microns and other busbar joints are bare. Fasteners used for bus bar joints are of stainless steel A270 grade and are tightened to recommended torque value listed in section – 6. Copper braid flexible is provided for generator end connection.

2.3. ARRANGEMENT:

2.3.1 Neutral Side Bus bar system:

Consisting of 3 phase bus bars supported on epoxy insulators one end left free for connecting with generator and other end star formed and neutral is connect to ground through NGT.

Two nos. 4 Core Current transformers per phase are mounted on these bus bars.

Disconnecting links are provided on each phase to facilitate replacement of ct's when required.

The CT secondary terminals are brought out to LV BOX for external connection.

The space heater terminals are brought out to HEATER BOX for external connection.

From Neutral star point, Neutral tie bus is taken and connected to Neutral grounding transformer (NGT). The Secondary of Neutral grounding transformer is connected to Neutral grounding resistor (NGR).

The Neutral terminal of Neutral grounding transformer is connected to common ground bus.

4 Nos. Copper flexible (800 Sq.mm CSA) are provided for each phase (supplied as loose), meant for connection between the Generator terminal and the Neutral Side Cubicle busbar.

3. INSTRUCTIONS IN METHODS OF RECEIVING, INSPECTION, STORAGE AND HANDLING PRIOR TO INSTALLATION

Neutral Side Cubicle is packed as per Powergear Standard for export packing in container shipments.

Packing slips are kept in a water proof envelop and are attached to the package.

All the packing cases shall be unloaded with "UP" facing upwards. While unloading the cases, Extreme care shall be taken to prevent damages to equipment. Cases shall not be rolled From container or subjected to impact under any circumstances.

After unloading, remove the packing with care, and keep the panel with the wooden pallets, which can be used during transport prior to installation. Check for any damages, incurred during transport and report damages on receipt.

To absorb the moisture inside the package during transit, dehumidifier bags are placed at bottom of the cubicle. Also VCI bags are placed at various locations and VCI is wrapped over the busbar joints. All these preservatives are to be removed and thrown-out prior to commissioning.

All the equipment / loose parts shall be verified with the packing slip. If there are any discrepancies, the same shall be reported immediately.

After inspection, the loose parts as Listed below shall be stored in a secured and covered storage yard / shed, protected from fire and weather until they are removed for installation.
It is preferred to keep the Neutral Side Cubicle along with the base pallet till it is erected.

LIST OF LOOSE ITEM:

SL.No.	Part No.	Item Description	Qty.
1	3.2	Retainer Plate – 50 x 60 x 1300 (MS)	4 Nos.
2	3.2	Retainer Plate – 50 x 60 x 690 (MS)	4 Nos.
3	3.2	M10 x 45 Long + 1PW (SS)	16 Nos.
4	3.3	Copper Braid Flexible – 50x25x380mm Long	12 Nos.
5	3.3	M12x90 Bolt+NUT+2PW+1SW (SS)	12 Nos.
6	3.3	M12x100 Bolt+NUT+2PW+1SW (SS)	12 Nos.
7	1.2	ANCHOR BOLT-M12X140/50 HST, HILIT MAKE	16 Nos.
8	1.2	ANTI- VIBRATION MOUNT	4 Nos.
9	1.2	Packing Shim – 100x100mm Thickness: 15+6+6+3+2	4 Nos Each
10	1.2	M16 NUT+1PW+1SW (SS)	4 Nos.
11	1.1	M12X50 Long+Nut+2PW+1SW (SS)	20 Nos.
12	3.2	RUBBER BELLOW (EPDM)	1 No.
13	3.2	M10X45N+2PW (SS)	16 Nos.
14	2	SUPPORT STRUCTURE (MS)	1 No.

4. INSTRUCTIONS FOR ASSEMBLY AND INSTALLATION:

Prior to undertake installation, please ensure the foundation arrangements and location for Neutral Side Cubicle is in line with the dimensions mentioned in the drawing.
After checking up of above carry out installation in the sequence mentioned below:

4.1 Fix the ANTI-VIBRATION MOUNT [SL No.:8 in Packing list] on the foundation using anchor bolt M12x140/50 [SL NO.: 7 in Packing list]. In line with drg DPPPG-70151867.

4.2 Install the Structures [SL. No.:14 in Packing List] in line with drg. DPPG-70151867 On the ANTI-VIBRATION MOUNT [SL No.:8 in Packing list] using M16 NUT +1PW+1SW SS [SL No.: 10 in Packing list] and align the structure using Packing shims [SL No: 9 in Packing list].

4.3 Lift the Neutral Side Cubicle using the Lifting lugs and place it on the structure. After align and Connect cubicle base with support structure using the fastener M12X50N+2PW+1SW. (SS) [SL No.: 11 in packing list].

4.4 Rubber bellow [SL No.: 12 in Packing list] and Retainer plate [SL No.: 1&2 in Packing list] are sending as loose items. After installation of Neutral Side Cubicle fix the rubber bellow with the cubicle using M10X45N+2PW [SL NO.: 13]. Align and connect the other end of bellow to the Generator flange using Retainer Plate M10x45LONG+1PW [SL No.:3 in Packing list].

4.5 Connect the copper flexible in between Generator terminal and the Neutral Side Cubicle busbar using the fastener – M12X100N+2PW+1SW (SS) [SL No.: 6 in Packing list]/M12X90 N+2PW+1SW (SS) [SL No.: 5 in Packing list].

4.6 In LV BOX the CT terminals are provided with shorting plugs. Do not remove the plug till the end connections are made.

5. COMMISSIONING CHECKS:

The following commissioning checks are recommended on the Neutral Side Cubicle:

Physical inspection for any damage to insulator, CTs, NGT, NGR.

SL. No.	Equipment	Type of check
a.	Current transformer	Ratio test verification, Polarity test
b.	Neutral grounding transformer	Ratio test verification, Polarity test
c.	Neutral grounding resistor	Resistance measurement, megger test
d.	Grounding system	Electrical continuity, Tightness of joints
e.	HT Circuit	HV test at 75% of 38 KV for 1 minute
f.	Secondary wiring	HV test – 1.5 KV for 1 minute

Ensure the following before conducting the high voltage test on HT Circuit

- All CT secondary are to be shorted and connected to ground.
- End terminations at generator are to be disconnected.
- Neutral tie bus and NGT primary is disconnected from the bus.

6. OPERATION INSTRUCTIONS:

Make sure that all the bus bar joints are correctly made by applying contact grease and tightened as per the torque recommendations given below :

	Bolt size	Torque
a.	M8	13 lbs (17 NM)
b.	M10	21 lbs (28 NM)
c.	M12	40 lbs (54 NM)
d.	M16	67 lbs (91 NM)

- Make sure that earth lead to station grid has been connected.
- Make sure to remove all hand tools from inside.
- Remove dust if any, using Vacuum cleaner specifically on all insulators.

7. LIST OF TOOLS AND TACKLES TO BE USED

1) **Open spanner** and **Box spanner** for M6, M8, M10, M12, M16 Hex. Bolts and nuts
2) Torque Wrench with suitable adapters for above
3) Terminal Connector Screw Driver.

8. MAINTENANCE INSTRUCTION:

During annual shutdown the following preventive maintenance schedule is recommended.

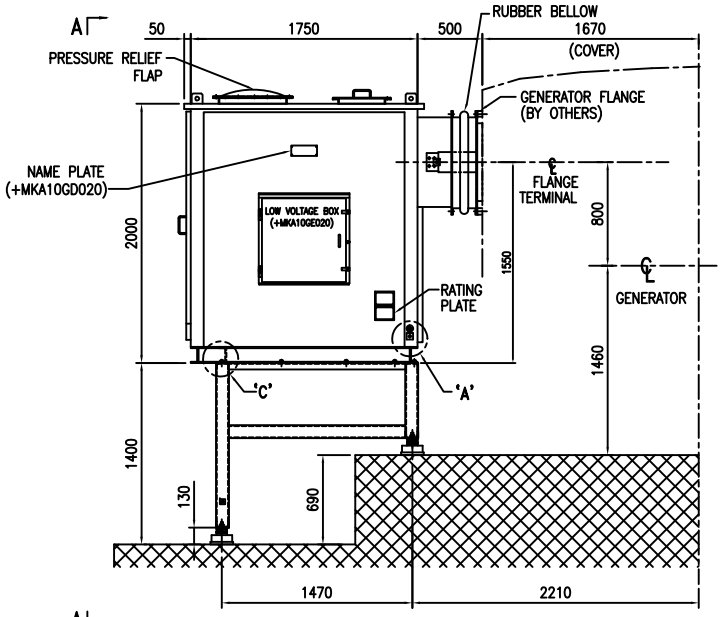
Sl. No.	Equipment/Component	Period	Action	Remarks
1.	Current transformer Neutral grounding transformer	Yearly	Check for dust, clean with dry cotton cloth	
2.	Bus support insulator	Yearly	Check for dust, clean with dry cotton cloth	
3.	Bus bar joints	Yearly	Check for the bolt tightness: Tighten the bolts for required load, apply contact grease.	Use recommended contact grease
4.	Insulation resistance	Yearly	Check for IR value between busbars & enclosure. If IR value is not satisfactory when measured with 1000V mega ohm meter, find the source of any faults and rectify.	
5.	Check earth continuity	Yearly	Check for effective earth connection to plant	

Recommended contact grease: OKS SW Electric (electrical contact) or equivalent.

9. TECHNICAL SPECIFICATION:

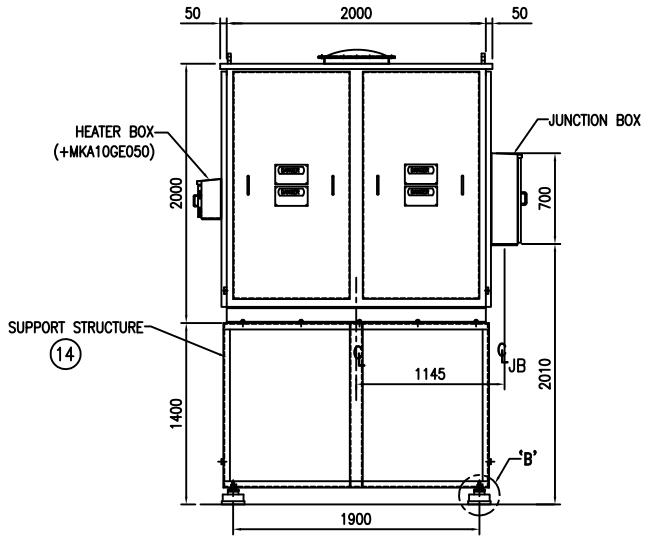
1. Rated voltage	: 15 kV
2. Rated frequency	: 50 Hz
3. Insulation level	: 17.5kV/ 38 kV rms (1min) / 95 kV peak
4. Rated current	: 3586 A @ 55° C
5. Short time current rating	: 80kA rms for 1Sec. (200 kA peak)
6. Reference standard	: IEC 62271-200
7. Paint Finish:	
Enclosure - Outside and inside	: RAL 7030
Structure	: RAL 7030
8. Bus bar joints at Generator end connection	: Silver Plated
Other Bus bar Joints	: Bare
Bus bar	: Black Matt

B. SITE ASSEMBLY DRAWINGS



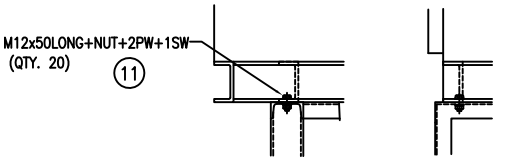
ELEVATION

(POSITION : 1)



VIEW – AA

(POSITION : 2)

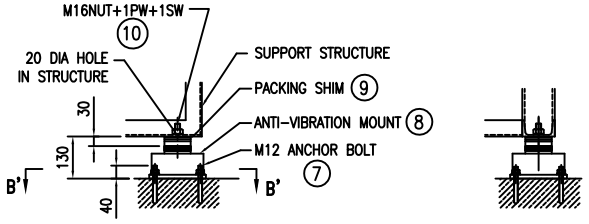


DETAIL–C

(CONNECTION BETWEEN CUBICLE AND STRUCTURE)

(POSITION : 1.1)

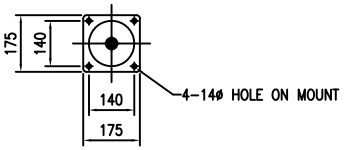
END VIEW



DETAIL–B

(POSITION : 1.2)

END VIEW



VIEW – B'B'

ALL DIMENSIONS ARE IN mm

BILL OF MATERIALS FOR FIELD ASSEMBLY

POSITION	ITEM	DESCRIPTION	MATERIAL	QUANTITY	IDENTIFICATION
3.2	1	RETAINER PLATE – 50x6x1300	MS PAINTED	4 NO's	SHEET 2
3.2	2	RETAINER PLATE – 50x6x690	MS PAINTED	4 NO's	SHEET 2
3.2	3	M10 x 45 LONG + 1PW	SS A270	16 NO's	SHEET 2
3.3	4	COPPER BRAID FLEXIBLE–50x25x385mm LONG	COPPER	12 NO's	SHEET 2
3.3	5	M12x90 BOLT+NUT+2PW+1SW	SS A270	12 NO's	SHEET 2
3.3	6	M12x100 BOLT+NUT+2PW+1SW	SS A270	12 NO's	SHEET 2
1.2	7	ANCHOR BOLT – M12X140/50 HST, HILTI MAKE	STEEL (5.6 GR.)	16 NO's	THIS SHEET
1.2	8	ANTI–VIBRATION MOUNT	–	4 NO's	THIS SHEET
1.2	9	PACKING SHIM – 100x100mm THICKNESS : 15+6+6+3+2 (Per Mount)	GALVD.	4 NO's EACH	THIS SHEET
1.2	10	M16 NUT + 1PW + 1SW	SS A270	4 NO's	THIS SHEET
1.1	11	M12x50LONG+NUT+2PW+1SW	SS A270	20 NO's	THIS SHEET
3.2	12	RUBBER BELLOW	EPDM	1 NO	SHEET 2
3.2	13	M10X45N+2PW	SS A270	16 NO's	SHEET 2
2	14	SUPPORT STRUCTURE	MS	1 NO	THIS SHEET

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.

PROJECT VILNIUS BIOMASS

CUSTOMER SIEMENS AG

W .O. NO MP0650

TITLE NEUTRAL SIDE CUBICLE (LOOSE PARTS IDENTIFICATION)

SCALE 1 : 30

SIZE A3

POWERGEAR Experience The Power

MEPZ, Tambaram, CHENNAI–600045 INDIA

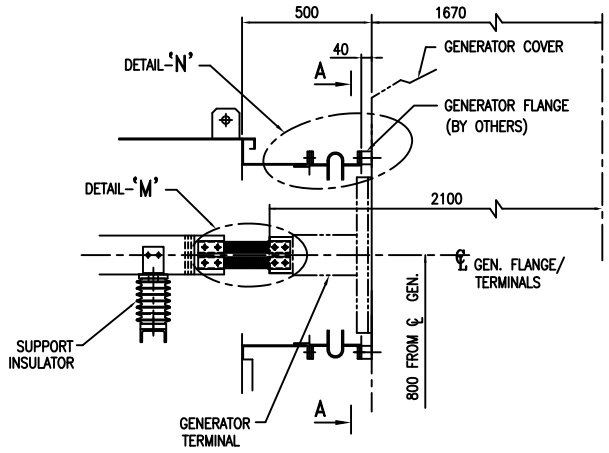
	SIGN	DATE
DRN.	A.ANTONY	16.06.2018
CHD.	H.NARAYANAN	16.06.2018
APPD.	J.RAMASWAMY	16.06.2018

DRG. NO. NSC – MP650

SHEET 1 OF 2 REV –

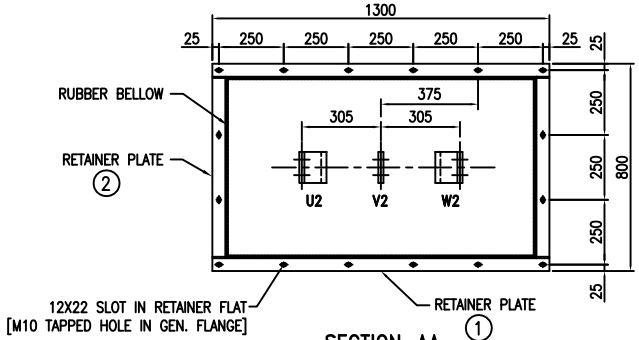
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FILE NAME :



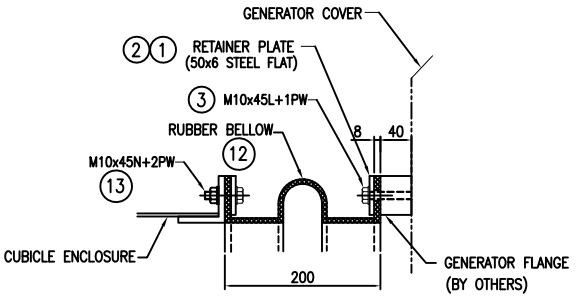
GENERATOR INTERFACE DETAILS

(POSITION : 3)



SECTION–AA

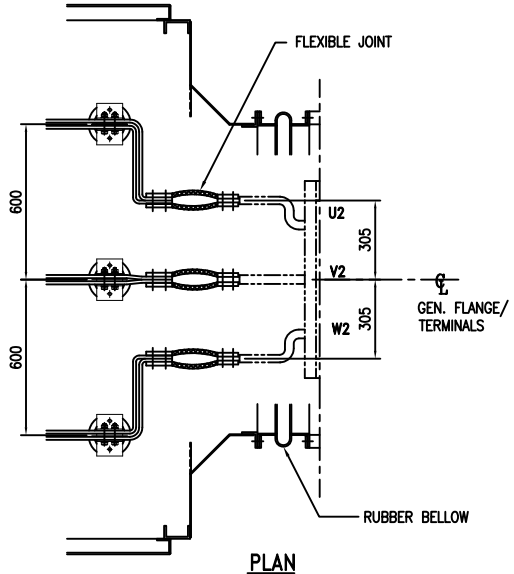
(POSITION : 3.1)



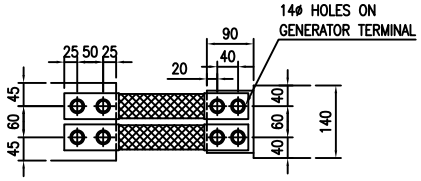
DETAIL–N

ENCLOSURE CONNECTION WITH GENERATOR

(POSITION : 3.2)

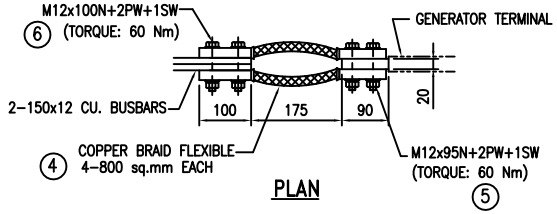


PLAN



DETAIL–M

(POSITION : 3.3)



PLAN

BUSBAR CONNECTION WITH GENERATOR LEAD

ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.

PROJECT	VILNIUS BIOMASS
CUSTOMER	SIEMENS AG
W .O. NO	MP0650
TITLE	NEUTRAL SIDE CUBICLE (LOOSE PARTS IDENTIFICATION)
SCALE	1 : 30
SIZE	A3

POWERGEAR Experience The Power

MEPZ, Tambaram, CHENNAI–600045 INDIA

	SIGN	DATE
DRN.	A.ANTONY	16.06.2018
CHD.	J.RAMASWAMY	16.06.2018
APPD.	J.RAMASWAMY	16.06.2018

DRG. NO.

NSC – MP0650

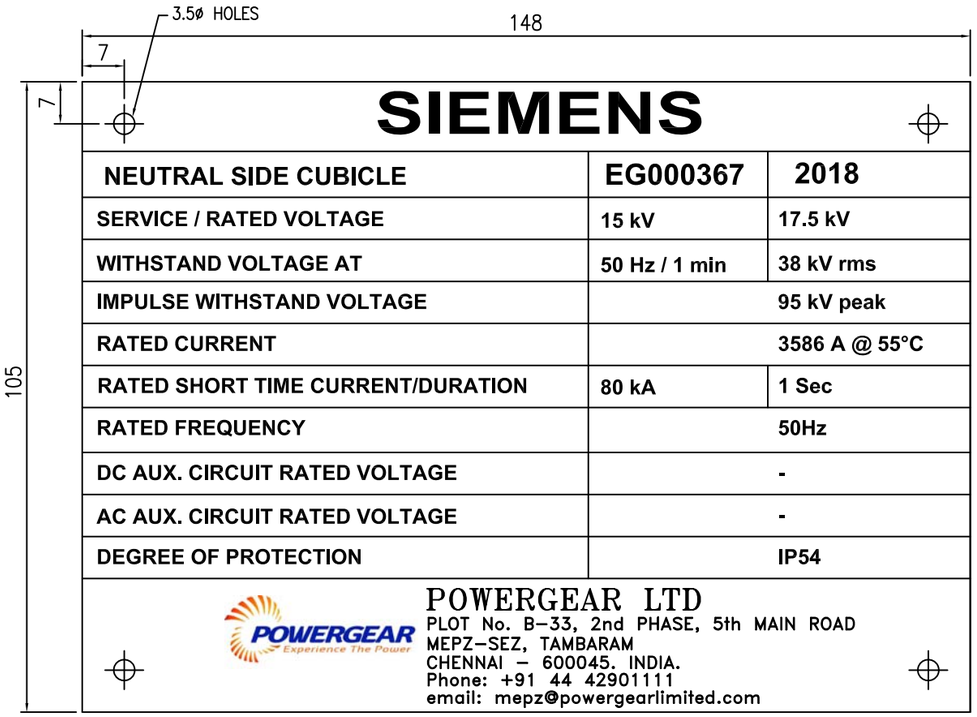
SHEET 2 OF 2 | REV -

FILE NAME :

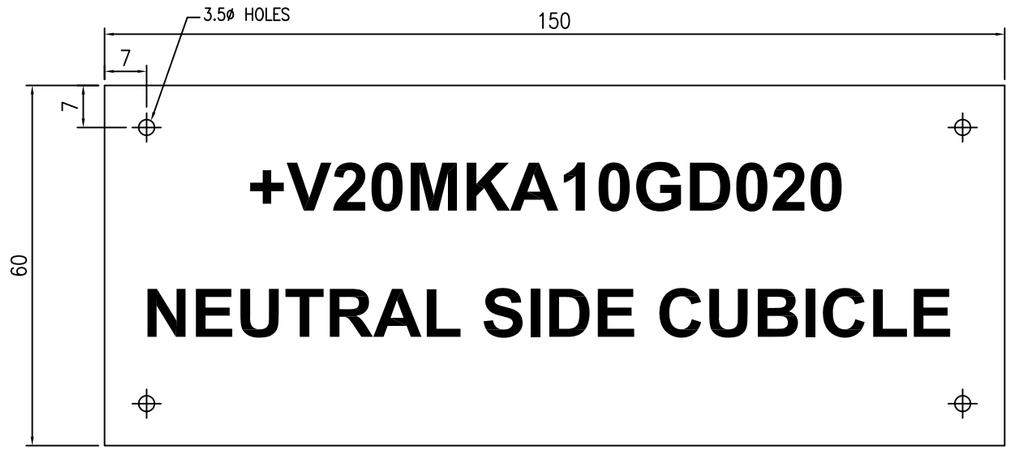
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Bestellnummer (8) Purchase Order n°			E09 - 3010449826	*Bpos (4) PO Line*	10	*Materialalk (10) Product code*	*P0058032800*	*Zeichnungsnr. (15) Component doc. n°*	DPPPG-70151867	*Bestellnummer (8) Purchase Order n°*	E09 - 3010449826	*Bpos (4) PO Line*	10	*Materialalk (10) Product code*	P0058032800	*Zeichnungsnr. (15) Component doc. n°*	DPPPG-70151867												
Siemens-Auftrags-Nr. Plant SD number			3000018595	*Norm (18) Standard*	IEC	PO Line value	10	*Bestelltext Description*	Neutral Side Cubicle	*Siemens-Auftrags-Nr. Plant SD number*	3000018595	*Norm (18) Standard*	IEC	PO Line value	10	*Bestelltext Description*	Neutral Side Cubicle												
Job			Neutral Side Cubicle	*Projektname Project name*	VILNIUS BIOMASS			*Zeichnungsnr. DWG n°*	DPPPG-70151867	*Job*	NEUTRAL SIDE CUBICLE	*Projektname Project name*	VILNIUS BIOMASS			*Zeichnungsnr. DWG n°*	DPPPG-70151867												
Data of the goods for transport & storage, (INFORMATION TO BE COMPLETED by Supplier)											Administrative	INFORMATION TO BE COMPLETED by Supplier																
SKZ (1)	Posnr (4)	Materialp (10) Item	ME (2) Unit	Mengep (13) Qt.	MTART (4)	MKTXTD (40) Description	MKTXTE (40) Scope	Abmessung (20) Good dimensions [cm]			Norm (18) Standard	Werkstoff (20) Main primer material	Nettogewicht (10) Net weight	Zeichnungsnr. (15)	Preis (Stk.) (29) Cost	DR (1)	USR (1)	ALNR (8)	ECCN (8)	ULA (3)	URE (3)	PRA (1)	LERKEL (1)	STWN (11)	GEFST (1)	GEFKL (3)	UNSTN (4)	SDBL (1)	UNMBL (1)		
				[D]				L	W	H			[Kg]																
	3.2	1	Nos	4		Halteplatte	RETAINER PLATE	1300	6	50		MS Painted	-	DPPPG-70151867	-	N	N			INDIA	ASIA				N				
	3.2	2	Nos	4		Halteplatte	RETAINER PLATE	690	6	50		MS Painted	-	DPPPG-70151867	-	N	N			INDIA	ASIA				N				
	3.2	3	Set	16		Edelst. Bolz. M. Unterlegsch. U. Mutter	HEX. BOLT M10x45 LONG+1PW	-	-	-		SS A270	-	DPPPG-70151867	-	N	N			INDIA	ASIA				N				
	3.3	4	Nos	12		KUPFERNE FLECHTE FLEXIBEL	COPPER BRAID FLEXIBLE-50x25x380mm LONG	-	-	-		Copper	-	DPPPG-70151867	-	N	N			INDIA	ASIA				N				
	3.3	5	Set	12		Edelst. Bolz. M. Unterlegsch. U. Mutter	HEX. BOLT M12x90BOLT+NUT+2PW+1SW	-	-	-		SS A270	-	DPPPG-70151867	-	N	N			INDIA	ASIA				N				
	3.3	6	Set	12		Edelst. Bolz. M. Unterlegsch. U. Mutter	HEX. BOLT M12x100BOLT+NUT+2PW+1SW	-	-	-		SS A270	-	DPPPG-70151867	-	N	N			INDIA	ASIA				N				
	1.2	7	Set	16		ANKERBOLZEN	ANCHOR BOLT - M12X140/50 HST, HILTI MAKE	-	-	-		STEEL (5.6 GR.)	-	DPPPG-70151867	-	N	N			INDIA	ASIA				N				
	1.2	8	Nos	4		ANTI-VIBRATION EINFASSUNG	ANTI-VIBRATION MOUNT	-	-	-		-	-	DPPPG-70151867	-	N	N			INDIA	ASIA				N				
	1.2	9	Nos	4No's EA		VERPACKUNG MESSPLÄTTCHEN	PACKING SHIM – 100x100mm 15+6+6+3+2	-	-	-		GALVD	-	DPPPG-70151867	-	N	N			INDIA	ASIA				N				
	1.2	10	Set	4		Edelst. Bolz. M. Unterlegsch. U. Mutter	M16 NUT+1PW+1SW	-	-	-		SS A270	-	DPPPG-70151867	-	N	N			INDIA	ASIA				N				
	1.1	11	Nos	20		Edelst. Bolz. M. Unterlegsch. U. Mutter	HEX. BOLT M12x50BOLT+NUT+2PW+1SW	-	-	-		SS A270	-	DPPPG-70151867	-	N	N			INDIA	ASIA				N				
	3.2	12	Nos	1		Gummibalg	RUBBER BELLOW	-	-	-		EPDM	-	DPPPG-70151867	-	N	N			INDIA	ASIA				N				
	3.2	13	Set	16			M10x45N+2PW	-	-	-		SS A270	-	DPPPG-70151867	-	N	N			INDIA	ASIA				N				
	2	14	Nos	1		Unterstützen Sie Strukturen	SUPPORT STRUCTURE	1560	2050	1270		MS	150	DPPPG-70151867	-	N	N			INDIA	ASIA				N				
	1	15	Nos	1		NEUTRALES SEITENKABEL	NEUTRAL SIDE CUBICLE	2068	2100	2000		ALUMINIUM	1000	DPPPG-70151867	-	N	N			INDIA	ASIA				N				

C. CONTRACT DRAWINGS



RATING PLATE DETAILS



NAME PLATE DETAILS

NOTES :

MATERIAL : 2 th. STAINLESS STEEL

QUANTITY : 1 No. EACH

ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.
				D	REVISION LEVEL UPDATED	17.07.18	J.R
				C	REVISION LEVEL UPDATED	04.04.18	J.R
				B	REVISION LEVEL UPDATED	21.03.18	J.R
E	REVISION LEVEL UPDATED	24.08.18	J.R	A	REVISION LEVEL UPDATED	03.03.18	J.R

ECCN : EAR99	AL : N	ECL : N	U.S – CONTENT : N
PROJECT VILNIUS BIOMASS			
CUSTOMER SIEMENS AG			
W .O. NO MP0650	TITLE NEUTRAL SIDE CUBICLE (RATING PLATE, NAME PLATE)		
SIZE A3	SCALE 1 : 30	POWERGEAR Experience The Power MEPZ, Tambaram, CHENNAI–600045 INDIA	

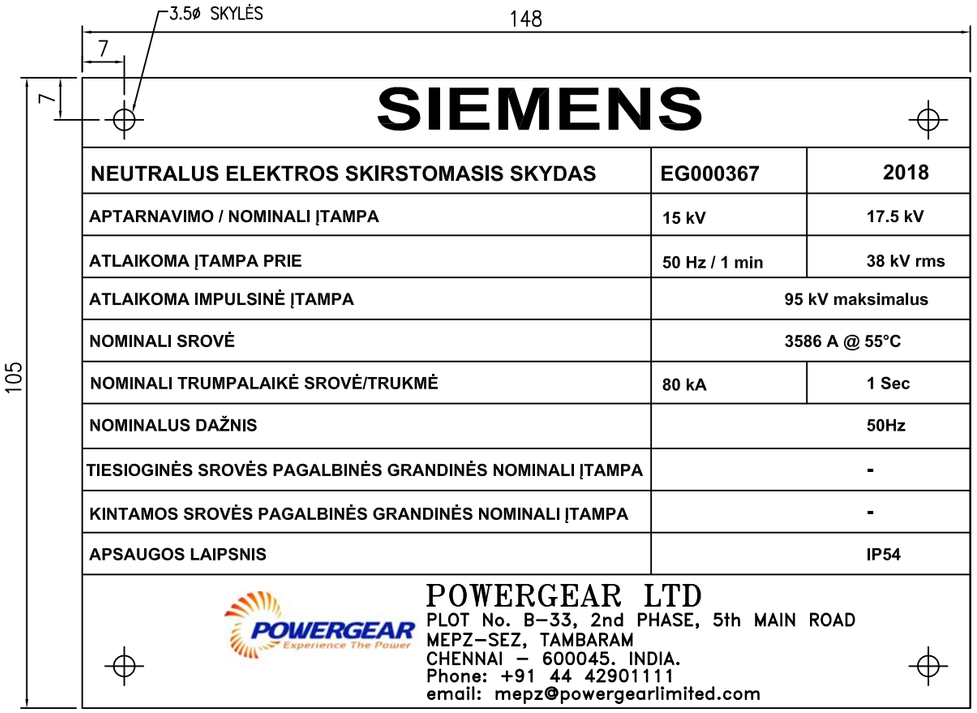
	SIGN	DATE
DRN.	A.ANTONY	30.01.2018
CHD.	J.RAMASWAMY	30.01.2018
APPD.	J.RAMASWAMY	30.01.2018

DRG. NO. DPPPG-70151867

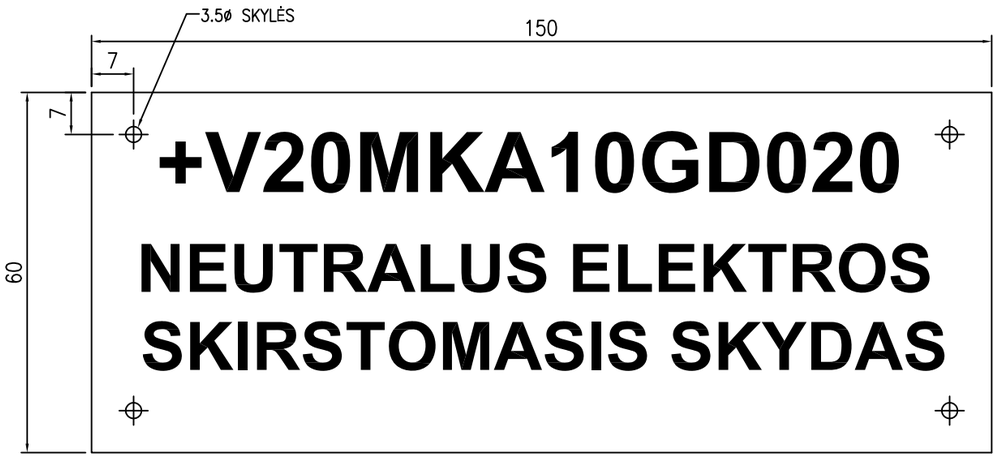
SHEET 1 OF 11 | REV E

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FILE NAME :



ĮVERTINIMO PLOKŠTELĖS DUOMENYS



PAVADINIMO PLOKŠTELĖS DUOMENYS

PASTABOS :

MEDŽIAGA : 2 storio NERŪDYJANTIS PLIENAS
KIEKIS : PO 1 KIEKVIENO NUMERIO

ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.
				D	LITHUANIAN LANGUAGE RATING PLATE ADDED	17.07.18	J.R
				C	REVISION LEVEL UPDATED	04.04.18	J.R
				B	REVISION LEVEL UPDATED	21.03.18	J.R
E	REVISION LEVEL UPDATED	24.08.18	J.R	A	REVISION LEVEL UPDATED	03.03.18	J.R

ECCN : EAR99	AL : N	ECL : N	U.S – CONTENT : N
PROJECT VILNIUS BIOMASS			
CUSTOMER SIEMENS AG			
W .O. NO MP0650	TITLE NEUTRALUS ELEKTROS SKIRSTOMASIS SKYDAS (VERTINIMO PLOKŠTELĖ, PAVADINIMO PLOKŠTELĖ)		
SCALE 1 : 30	POWERGEAR Experience The Power MEPZ, Tambaram, CHENNAI–600045 INDIA		
SIZE A3			

	SIGN	DATE
DRN.	A.ANTONY	30.01.2018
CHD.	J.RAMASWAMY	30.01.2018
APPD.	J.RAMASWAMY	30.01.2018

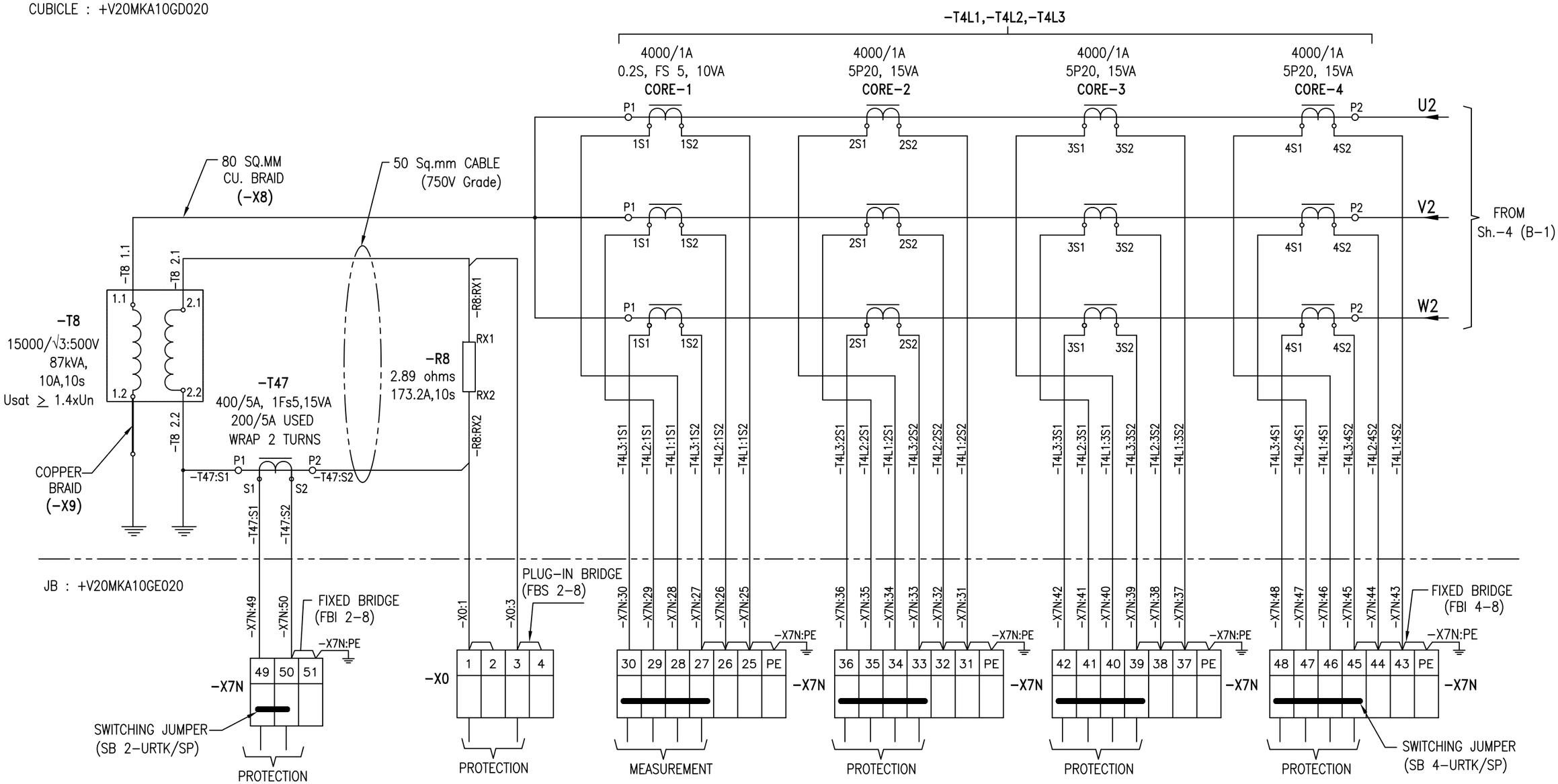
DRG. NO. DPPPG–70151867

SHEET 2 OF 11 | REV E

FILE NAME :

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CUBICLE : +V20MKA10GD020



REFERENCE DRAWING:

AUXILIARY WIRING DIAGRAMS GENERATOR : DPPPG – 70152441

NOTE: REFER SHEET 7 FOR BILL OF MATERIALS.
REFER SHEET 7 FOR NOTES ON WIRING.

ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.
				D	REVISION LEVEL UPDATED	17.07.18	J.R
				C	REVISION LEVEL UPDATED	04.04.18	J.R
				B	CT CLASS & BURDEN UPDATED AS PER SIEMENS COMMENTS DTD. 16.03.18	21.03.18	J.R
E	KKS NUMBER +V20 UPDATED AS PER COMMENTS DTD 13.08.18	24.08.18	J.R	A	CT -T4 ADDED AS PER SIEMENS COMMENTS DTD. 01.03.18	03.03.18	J.R

PROJECT	VILNIUS BIOMASS
CUSTOMER	SIEMENS AG
W .O. NO	MP0650
TITLE	NEUTRAL SIDE CUBICLE (SCHEMATIC OF CT)
SCALE	-
SIZE	A3

POWERGEAR Experience The Power
MEPZ, Tambaram, CHENNAI–600045 INDIA

	SIGN	DATE
DRN.	A.ANTONY	29.01.2018
CHD.	J.RAMASWAMY	29.01.2018
APPD.	J.RAMASWAMY	29.01.2018

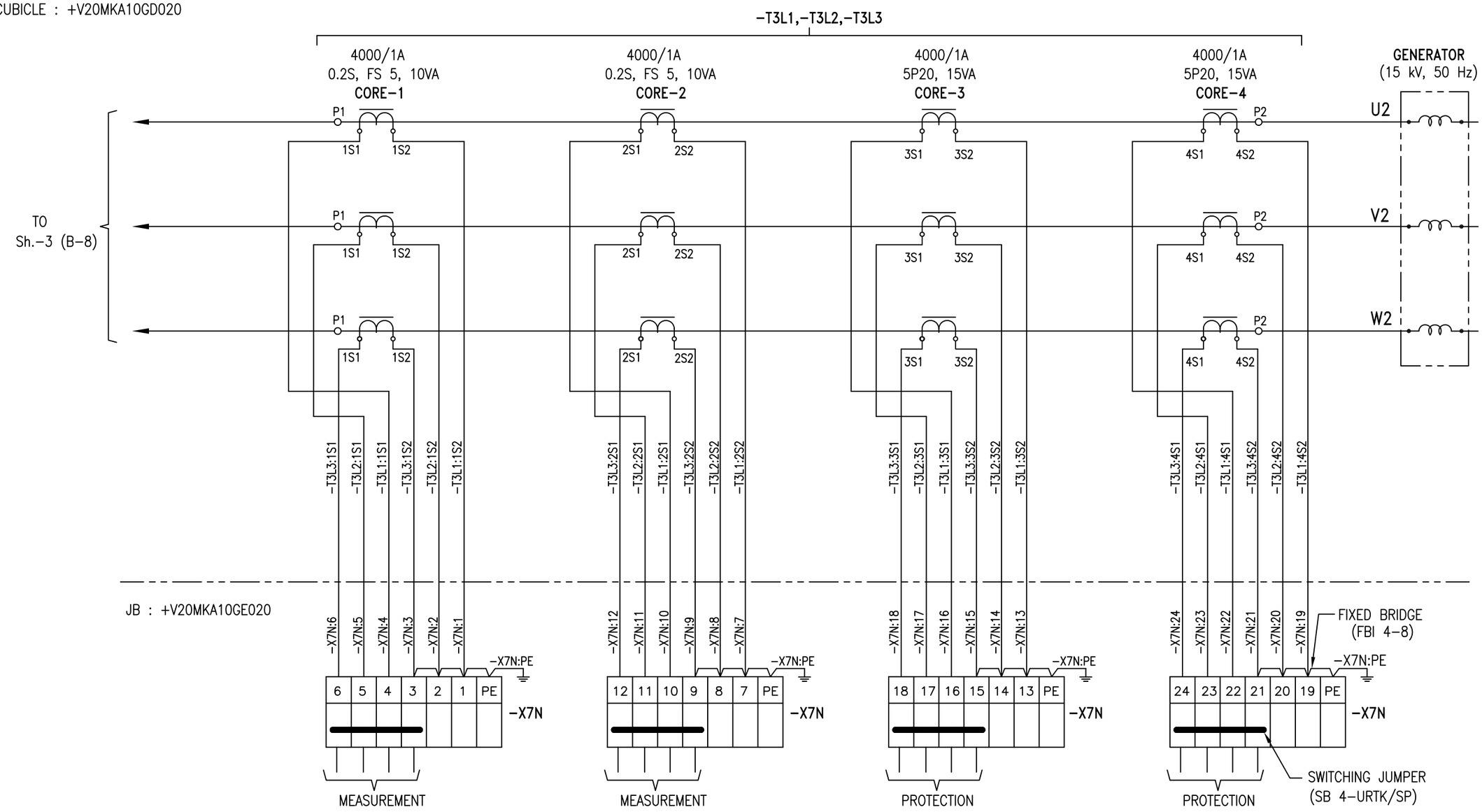
DRG. NO. DPPPG–70151867

SHEET 3 OF 11 | REV E

FILE NAME :

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CUBICLE : +V20MKA10GD020



ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.
				D	REVISION LEVEL UPDATED	17.07.18	J.R
				C	REVISION LEVEL UPDATED	04.04.18	J.R
				B	CT CLASS & BURDEN UPDATED AS PER SIEMENS COMMENTS DTD. 16.03.18	21.03.18	J.R
E	REVISION LEVEL UPDATED	24.08.18	J.R	A	UPDATED AS PER SIEMENS COMMENTS DTD. 01.03.18	03.03.18	J.R

PROJECT VILNIUS BIOMASS

CUSTOMER SIEMENS AG

W .O. NO MP0650

TITLE NEUTRAL SIDE CUBICLE (SCHEMATIC OF CT)

SCALE -

SIZE A3

POWERGEAR Experience The Power

MEPZ, Tambaram, CHENNAI-600045 INDIA

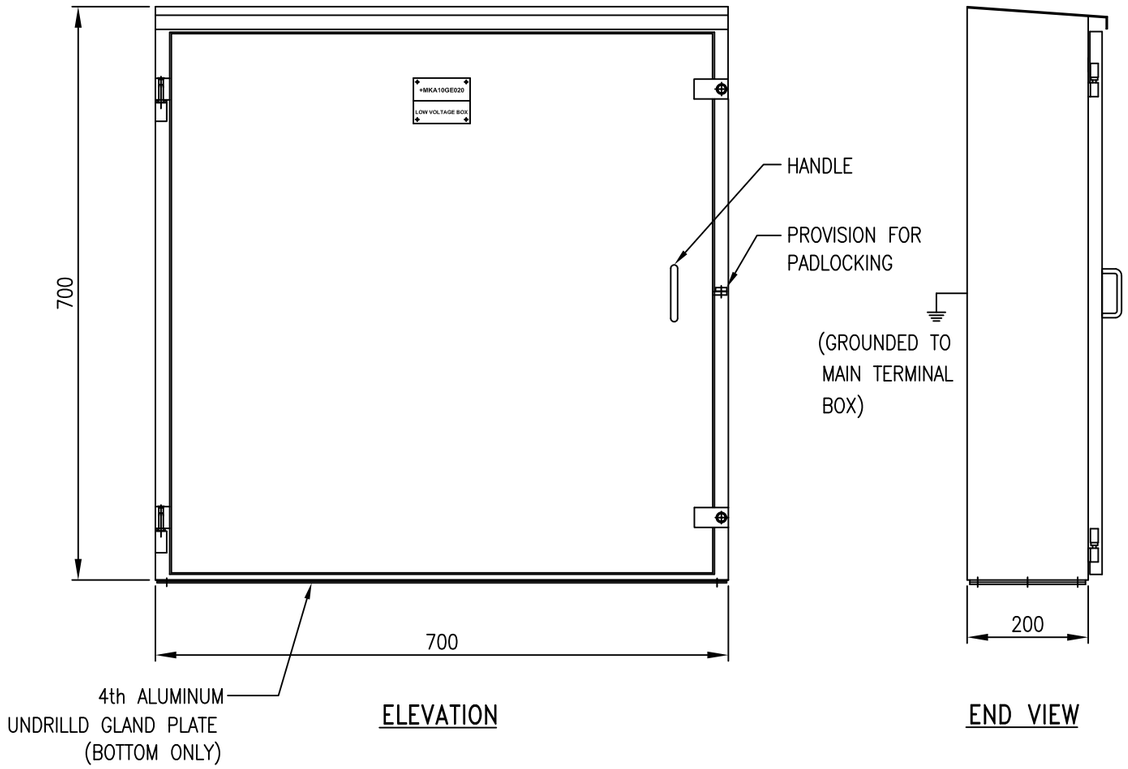
	SIGN	DATE
DRN.	A.ANTONY	29.01.2018
CHD.	J.RAMASWAMY	29.01.2018
APPD.	J.RAMASWAMY	29.01.2018

DRG. NO. DPPPG-70151867

SHEET 4 OF 11 REV E

FILE NAME :

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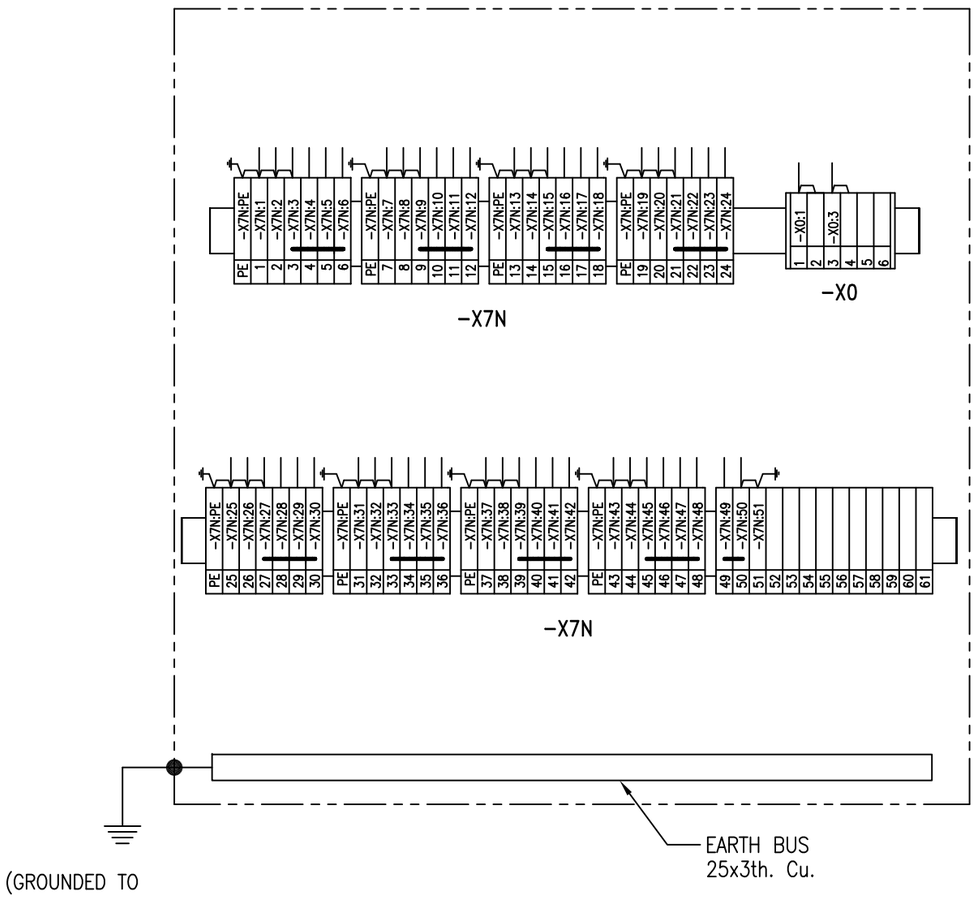


ELEVATION

END VIEW

GENERAL ARRANGEMENT OF JUNCTION BOX

MATERIAL : 2 Thk. STAINLESS STEEL

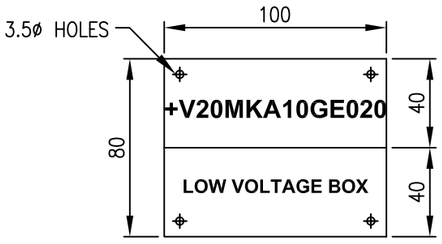


-X7N

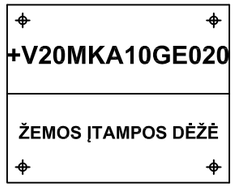
-X0

-X7N

TERMINAL BLOCK ARRANGEMENT INSIDE JUNCTION BOX



NAME PLATE DETAILS
(ENGLISH LANGUAGE)



NAME PLATE DETAILS
(LITHUANIAN LANGUAGE)

ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.
				D	LITHUANIAN LANGUAGE NAME PLATE ADDED	17.07.18	J.R
				C	REVISION LEVEL UPDATED	04.04.18	J.R
				B	REVISION LEVEL UDPATED	21.03.18	J.R
E	KKS NUMBER +V20 UPDATED AS PER COMMENTS DTD 13.08.18 & JB TERMINAL BLOCK ARRANGEMENT UPDATED AS MADE	24.08.18	J.R	A	TERMINAL BLOCK ARRANGEMENT UPDATED	03.03.18	J.R

PROJECT	VILNIUS BIOMASS
CUSTOMER	SIEMENS AG
W .O. NO	MP0650
TITLE	NEUTRAL SIDE CUBICLE (JUNCTION BOX DETAILS)
SCALE	-
SIZE	A3

POWERGEAR Experience The Power
MEPZ, Tambaram, CHENNAI–600045 INDIA

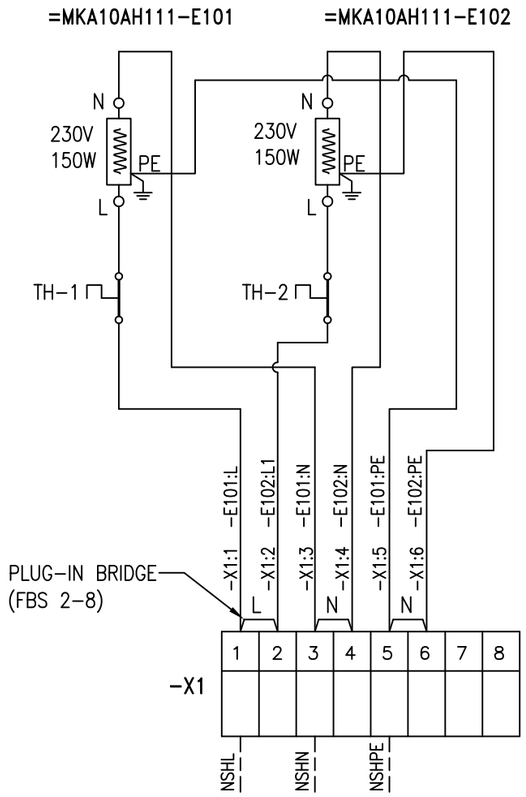
	SIGN	DATE
DRN.	A.ANTONY	29.01.2018
CHD.	J.RAMASWAMY	29.01.2018
APPD.	J.RAMASWAMY	29.01.2018

DRG. NO. DPPPG–70151867

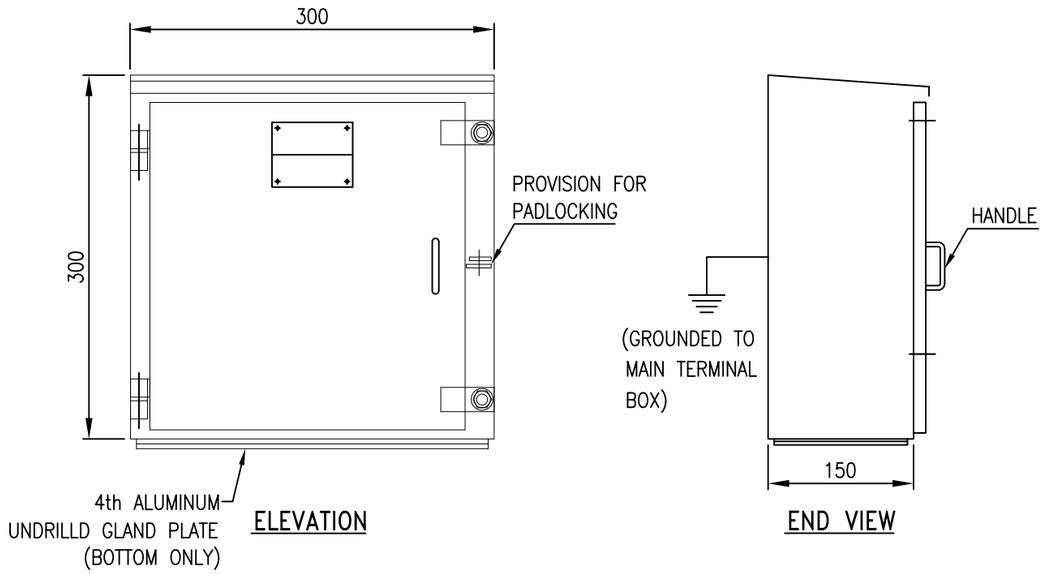
SHEET 5 OF 11 | REV E

FILE NAME :

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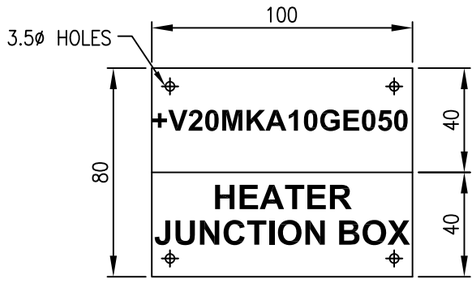


SPACE HEATER CIRCUIT

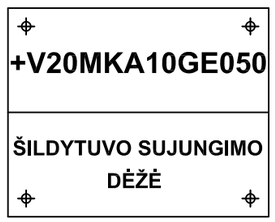


GENERAL ARRANGEMENT OF HEATER BOX

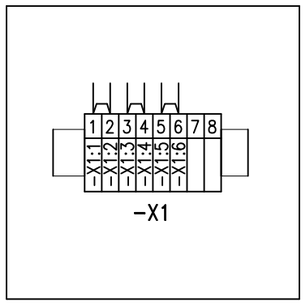
MATERIAL : 2 Thk. STAINLESS STEEL



NAME PLATE DETAILS
(ENGLISH LANGUAGE)



NAME PLATE DETAILS
(LITHUANIAN LANGUAGE)



TERMINAL DETAILS INSIDE HEATER BOX

ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.
				D	LITHUANIAN LANGUAGE NAME PLATE ADDED	17.07.18	J.R
				C	REVISION LEVEL UPDATED	04.04.18	J.R
				B	THERMOSTAT ADDED AS PER SIEMENS COMMENTS DTD. 21.03.18	21.03.18	J.R
E	KKS NUMBER +V20 UPDATED AS PER COMMENTS DTD 13.08.18	17.07.18	J.R	A	REVISION LEVEL UPDATED	03.03.18	J.R

			SIGN	DATE
PROJECT	VILNIUS BIOMASS	DRN.	A.ANTONY	29.01.2018
CUSTOMER	SIEMENS AG	CHD.	J.RAMASWAMY	29.01.2018
W .O. NO	MP0650	APPD.	J.RAMASWAMY	29.01.2018
TITLE	NEUTRAL SIDE CUBICLE (SCHEMATIC OF SPACE HEATER)	DRG. NO.	DPPPG-70151867	
SCALE	-	SHEET	6 OF 11	REV E
SIZE	A3			

POWERGEAR Experience The Power
MEPZ, Tambaram, CHENNAI-600045 INDIA

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FILE NAME :

CURRENT TRANSFORMER (–T3L1,–T3L2,–T3L3,,–T4L1,–T4L2,–T4L3)

TYPE : DRY TYPE, CAST RESIN
RATED VOLTAGE : 15 kV
RATED FREQUENCY : 50 HZ.
INSULATION LEVEL(WHEN MOUNTED) : 17.5 kV /38 kV rms (1 Min.)/98 kV peak.
INSULATION CLASS : B(130 Deg.C)
SHORT TIME RATING : 80 kA rms–1sec.
APPLICABLE STANDARD : IEC 60044–1 / IEC 61869–2

CURRENT TRANSFORMER (–T47)

TYPE : CAST RESIN
RATED FREQUENCY : 50 HZ.
INSULATION LEVEL : 0.72 kV /3 kV rms (1 Min.)
INSULATION CLASS : B
APPLICABLE STANDARD : IEC 60044–1 / IEC 61869–2

NEUTRAL GROUNDING TRANSFORMER (–T8)

TYPE : DRY TYPE, CAST RESIN
RATIO : 15000/√3 – 500V
RATED FREQUENCY : 50 Hz
INSULATION LEVEL : 17.5 kV /38 kV rms (1 Min.)/95 kV peak
RATED POWER : 87 kVA FOR 10 SEC
SATURATION VOLTAGE : ≥1.4 x Un
APPLICABLE STANDARD : IEC 60076–11

NEUTRAL GROUNDING RESISTOR (–R8)

TYPE : SS WIRE GRID
RESISTANCE VALUE : 2.89 ohms
CURRENT RATING : 173.2 A FOR 10 SEC.
APPLICABLE STANDARD : IEEE–32

BILL OF MATERIALS

SL.No.	LEGEND	DESCRIPTION		QUANTITY (Nos.)	MAKE	TYPE	CATALOQUE REF.
1	–T3L1,–T3L2,–T3L3	CURRENT TRANSFROMER RATIO : 4000/1/1/1/1A	CORE–1 : CLASS – 0.2S,FS 5,10VA	3	PRAYOG, INDIA	CAST RESIN	CT–2452/R
			CORE–2 : CLASS – 0.2S,FS 5,10VA				
			CORE–3 : CLASS – 5P 20,15VA				
			CORE–4 : CLASS – 5P 20,15VA				
2	–T4L1,–T4L2,–T4L3	CURRENT TRANSFROMER RATIO : 4000/1/1/1/1A	CORE–1 : CLASS – 0.2S,FS 5,10VA	3	PRAYOG, INDIA	CAST RESIN	CT–2452/R
			CORE–2 : CLASS – 5P20,15VA				
			CORE–3 : CLASS – 5P20,15VA				
			CORE–4 : CLASS – 5P20,15VA				
3	–T47	CURRENT TRANSFROMER RATIO : 400/5A	CLASS – 1Fs5, 15VA	1	PRAYOG, INDIA	CAST RESIN	LTCT–2118
4	–T8	NEUTRAL GROUNDING TRANSFORMER		1	PRAYOG, INDIA	CAST RESIN	NGT–2474
5	–R8	NEUTRAL GROUNDING RESISTOR		1	KWK, INDIA		100910
6	–X7N	TERMINALS IN +V20MKA10GE020		51+10	PHOENIX,GERMANY	DISCONNECTING TYPE	URTK/SP
	–X0			4+2	PHOENIX,GERMANY	STUD TYPE	UT6
7	–	CT SWITCHING JUMPER		8	PHOENIX,GERMANY	4 WAY	SB 4–URTK/SP
8	–	CT SWITCHING JUMPER		1	PHOENIX,GERMANY	2 WAY	SB 2–URTK/SP
9	–	SHORTING BRIDGE		8	PHOENIX,GERMANY	4 WAY	FBI 4–8
10	–	SHORTING BRIDGE		1	PHOENIX,GERMANY	2 WAY	FBI 2–8
11	–	PLUG–IN BRIDGE		5	PHOENIX,GERMANY	2 WAY	FBS 2–8
12	–E101, –E102	SPACE HEATERS 230V AC, 150W		2	KWK, INDIA	BOX TYPE	
13	–X1	TERMINALS IN HEATER BOX (+V20MKA10GE050)		6+2	PHOENIX,GERMANY	STUD TYPE	UT6
14	TH–3 & TH–4	THERMOSTAT (0–50°C SETTING RANGE)		2	JUMO, GERMANY	CAPILLARY TYPE	

NOTES

1. WIRING WILL BE DONE AS GIVEN BELOW :

CT CIRCUIT – 4 Sq.mm TINNED COPPER, 750V GRADE, 90°C HEAT RESISTANCE CABLE – BLACK COLOUR FOR PHASE & SHORTING
GREEN/YELLOW COLOUR FOR GROUND

NGR CIRCUIT – 4 Sq mm TINNED COPPER, 750V GRADE, 90°C HEAT RESISTANT CABLE – BLACK COLOUR
– 4 Sq. mm TINNED COPPER, 750V GRADE, 90°C HEAT RESISTANCE CABLE – GREEN/YELLOW COLOUR FOR GROUND

HEATER CIRCUIT – 2.5 Sq mm TINNED COPPER, 750V GRADE, 90°C HEAT RESISTANT CABLE – BLACK COLOUR FOR LINE
– BLUE COLOUR FOR NEUTRAL

2. ALL THE ABOVE CABLES ARE "CE" MARKED

ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.
				D	REVISION LEVEL UPDATED	17.07.18	J.R
				C	REVISION LEVEL UPDATED	04.04.18	J.R
				B	BILL OF MATERIAL UPDATED AS PER SIEMENS COMMENTS DTD. 16.03.18 & 21.03.18	21.03.18	J.R
D	BILL OF MATERIAL UPDATED AS MADE	24.08.18	J.R	A	–T4 CT ADDED AS PER SIEMENS COMMENTS DATED 01.02.18	03.03.18	J.R

PROJECT VILNIUS BIOMASS
CUSTOMER SIEMENS AG
W .O. NO MP0650
TITLE NEUTRAL SIDE CUBICLE (TECHNICAL SPECIFICATION & BOM)
SCALE –
SIZE A3
POWERGEAR Experience The Power
MEPZ, Tambaram, CHENNAI–600045 INDIA

	SIGN	DATE
DRN.	A.ANTONY	29.01.2018
CHD.	J.RAMASWAMY	29.01.2018
APPD.	J.RAMASWAMY	29.01.2018

DRG. NO. DPPPG–70151867
SHEET 7 OF 11 REV E

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FILE NAME :

TECHNICAL PARTICULARS

SERVICE VOLTAGE	: 15 kV
HIGHEST VOLTAGE	: 17.5 kV
RATED CURRENT	: 3586 A @ 55° C
RATED FREQUENCY	: 50 Hz.
SHORT TIME CURRENT RATING	: 80 kA rms for 1 Sec. (200 kA Peak)
BASIC INSULATION LEVEL	: 17.5 KV / 38 KV rms (1 Min.)/95 KV peak.
TEMPERATURE RISE OVER AN AMBIENT OF 55°C	
– BUSBAR	: 50°C
– ENCLOSURE	: 15°C
DEGREE OF PROTECTION	: IP 54

BILL OF MATERIALS FOR FIELD ASSEMBLY

ITEM	DESCRIPTION	MATERIAL	QUANTITY	IDENTIFICATION
1	RETAINER PLATE – 50x6x1300	MS PAINTED	4 NO's	SHEET 11
2	RETAINER PLATE – 50x6x690	MS PAINTED	4 NO's	SHEET 11
3	M10 x 45 LONG + 1PW	SS A270	16 NO's	SHEET 11
4	COPPER BRAID FLEXIBLE–50x25x380mm LONG	COPPER	12 NO's	SHEET 11
5	M12x90 BOLT+NUT+2PW+1SW	SS A270	12 NO's	SHEET 11
6	M12x100 BOLT+NUT+2PW+1SW	SS A270	12 NO's	SHEET 11
7	ANCHOR BOLT – M12X140/50 HST, HILTI MAKE	STEEL (5.6 GR.)	16 NO's	SHEET 9
8	ANTI–VIBRATION MOUNT	–	4 NO's	SHEET 9
9	PACKING SHIM – 100x100mm THICKNESS : 15+6+6+3+2 (Per Mount)	GALVD.	4 NO's EACH	SHEET 9
10	M16 NUT + 1PW + 1SW	SS A270	4 NO's	SHEET 9
11	M12x50LONG+NUT+2PW+1SW	SS A270	20 NO's	SHEET 9
12	RUBBER BELLOW	EPDM	1 NO	SHEET 11
13	M10X45N+2PW	SS A270	16 NO's	SHEET 11
14	SUPPORT STRUCTURE	MS	1 NO	SHEET 9

NOTES :

1. REFERENCE DRAWING
   - a. GENERATOR MASSBILD – OUTLINE DRAWING : DPPPG–70149178 Rev.A
   - b. AUXILIARY WIRING DIAGRAMS GENERATOR : DPPPG – 70152441
   - c. BUSHING / TERMINAL BOARD : 2–460377 Rev.A
   - d. BUSBAR : 3–403720 Rev.B
   - e. WELDING FLANGE : 2–457773 Rev.A
   - f. BUSHING ASSEMBLY : 1–2570–451105 Rev.A
   - g. INQUIRY DATA SHEET : DPPPG–70151865
2. CONSTRUCTION
   - CUBICLE : 4mm THICK ALUMINUM
   - JUNCTION BOX : 2mm THICK STAINLESS STEEL
   - BUSBAR (MAIN) : COPPER(2 RUNS OF 150 x12)
   - SUPPORTING STRUCTURE : MILD STEEL EXTRUSION
3. ALL THE DIMENSIONS ARE MARKED IN ENGLISH SYSTEM. [mm]
4. MINIMUM CLERANCES – PHASE TO PHASE & – PHASE TO GROUND : 160 mm
5. PAINT FINISH
   - ENCLOSURE – INSIDE AND OUTSIDE : RAL 7030
   - BUSBAR : BLACK PAINTED
   - SUPPORT STRUCTURE : RAL 7030
6. ALL BUSBAR JOINT CONTACT SURFACES ARE BARE COPPER (GEN. FLEXIBLE END SILVER PLATED)
7. HARDWARE, GASKETS TO CONNECT NEUTRAL POINT CUBICLE ENCLOSURE WITH GENERATOR WILL BE SUPPLIED BY POWERGEAR
8. HARDWARE, FLEXIBLES TO CONNECT NEUTRAL POINT CUBICLE BUSBAR WITH GENERATOR LEADS WILL BE SUPPLIED BY POWERGEAR
9. DANGER PLATES ARE PROVIDED ON ALL ACCESS DOORS
10. WEIGHT : CUBICLE – 1000 kgs
    : STRUCTURE – 150 kgs

ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.
				D	REVISION LEVEL UPDATED	17.07.18	J.R
				C	REVISION LEVEL UPDATED	04.04.18	J.R
				B	REVISION LEVEL UPDATED	21.03.18	J.R
E	REVISION LEVEL UPDATED	24.08.18	J.R	A	REVISION LEVEL UPDATED	03.03.18	J.R

PROJECT	VILNIUS BIOMASS		
CUSTOMER	SIEMENS AG		
W .O. NO	MP0650	TITLE	NEUTRAL SIDE CUBICLE (NOTES ON GENERAL ARRANGEMENT & FIELD ASSY BOM)
SCALE			
SIZE	A3	1 : 30	

POWERGEAR Experience The Power
MEPZ, Tambaram, CHENNAI–600045 INDIA

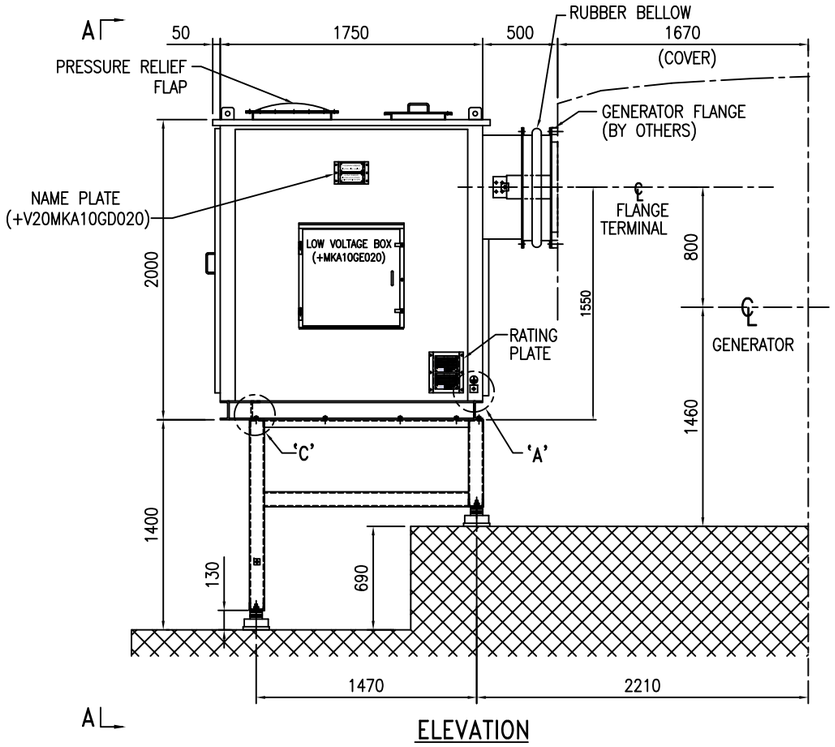
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CHD.	J.RAMASWAMY	29.01.2018
APPD.	J.RAMASWAMY	29.01.2018

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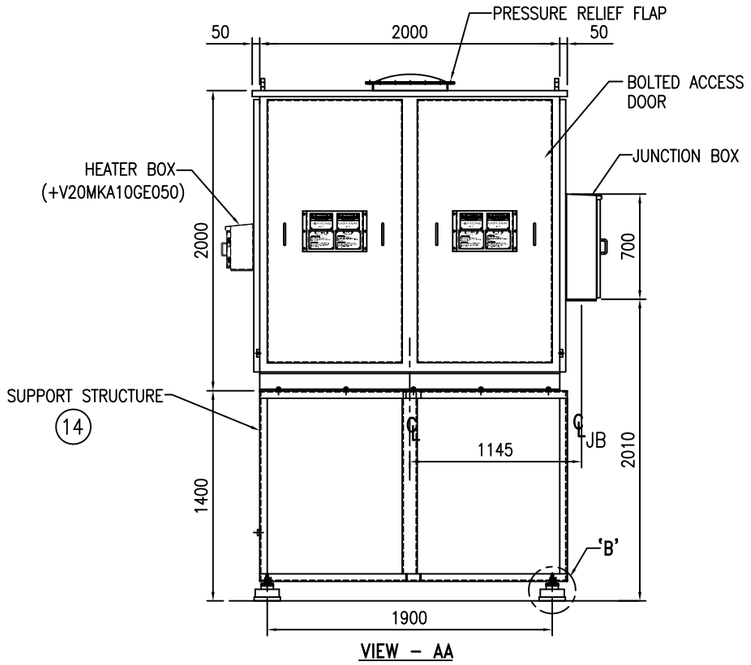
SHEET 8 OF 11 | REV E

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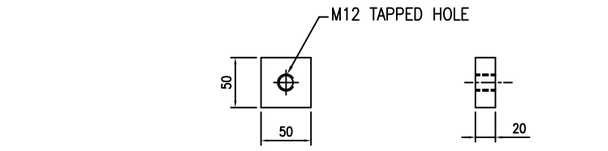
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ELEVATION



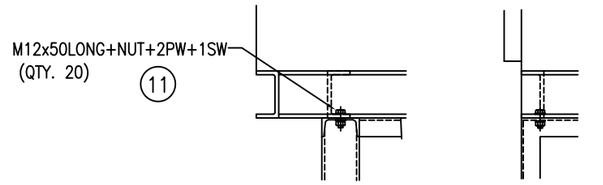
VIEW – AA



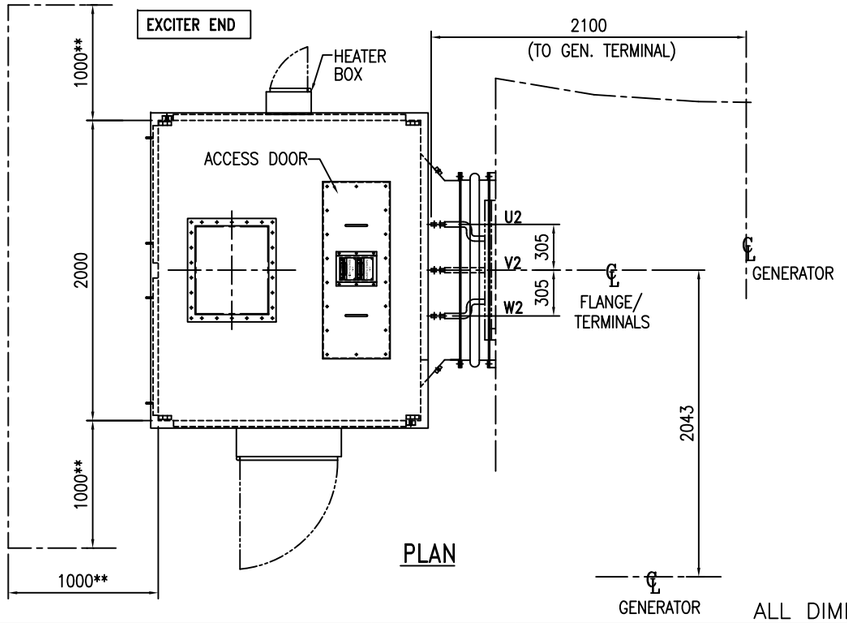
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EARTH PAD DETAILS (PE)

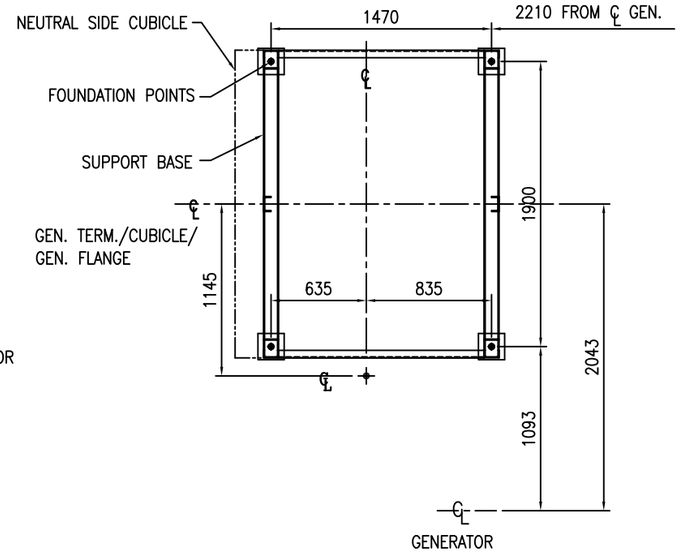
(ON DIAGONALLY OPPOSITE SIDES)



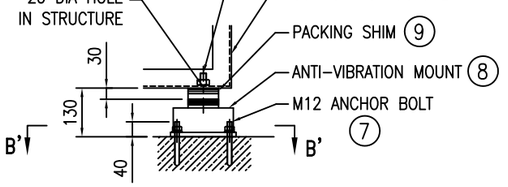
(CONNECTION BETWEEN CUBICLE AND STRUCTURE)

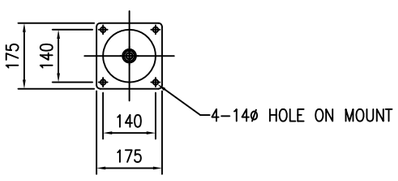


PLAN



FOUNDATION PLAN





NOTE:

* * MINIMUM CLEARANCE REQUIRED FOR MAINTENANCE

ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.
				D	REVISION LEVEL UPDATED	17.07.18	J.R
				C	UPDATED PER SIEMENS COMMENTS DTD. 28.03.18	04.04.18	J.R
				B	REVISION LEVEL UPDATED	21.03.18	J.R
E	REVISION LEVEL UPDATED	24.08.18	J.R	A	CUBICLE SIZE UPDATED	03.03.18	J.R

PROJECT	VILNIUS BIOMASS		
CUSTOMER	SIEMENS AG		
W .O. NO	MP0650	TITLE	NEUTRAL SIDE CUBICLE (OUTLINE)
SIZE	A3	SCALE	1 : 30
			MEPZ, Tambaram, CHENNAI–600045 INDIA

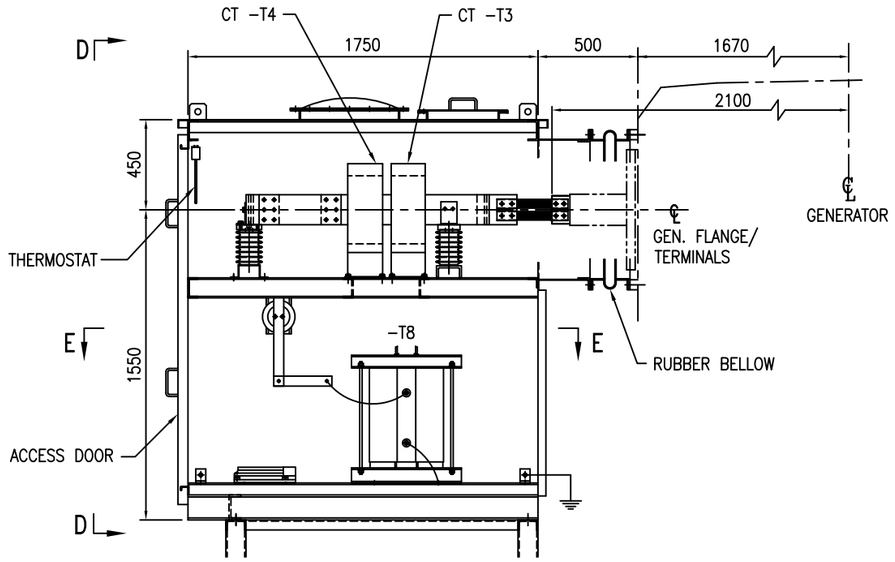
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DRN.	A.ANTONY	29.01.2018
CHD.	J.RAMASWAMY	29.01.2018
APPD.	J.RAMASWAMY	29.01.2018

DRG. NO. DPPPG–70151867

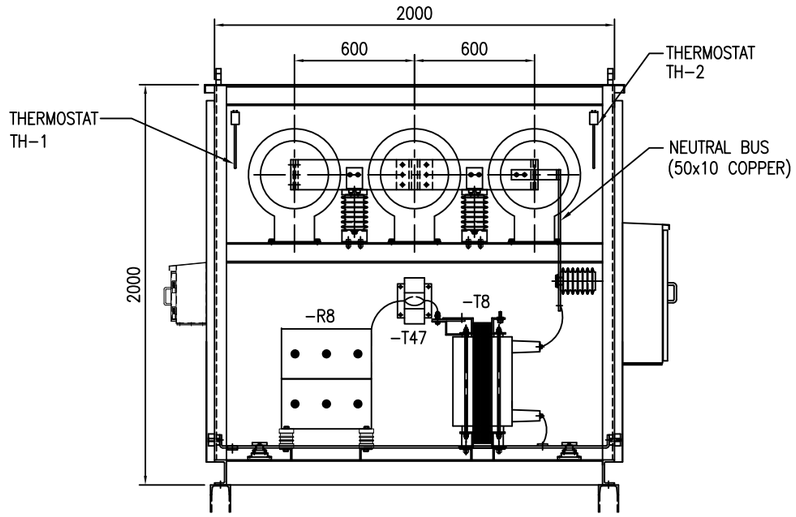
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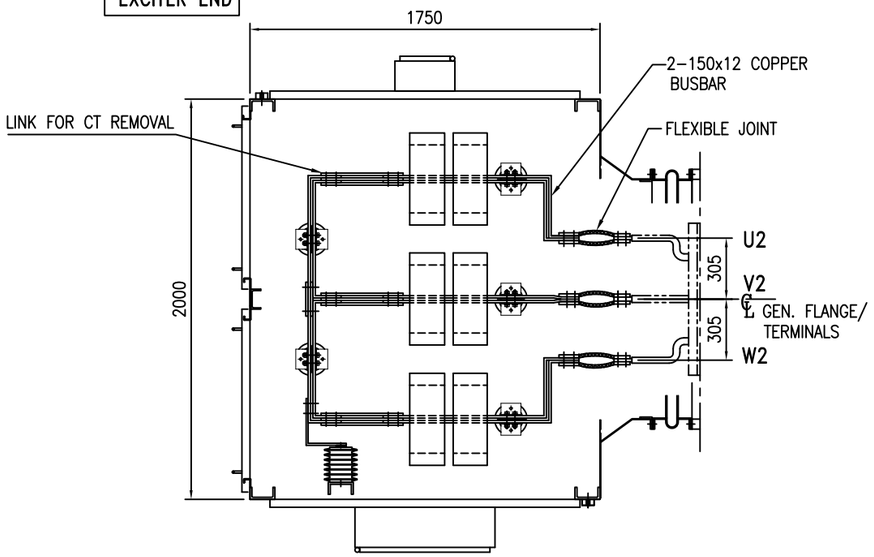


ELEVATION
(INTERNAL DETAILS)

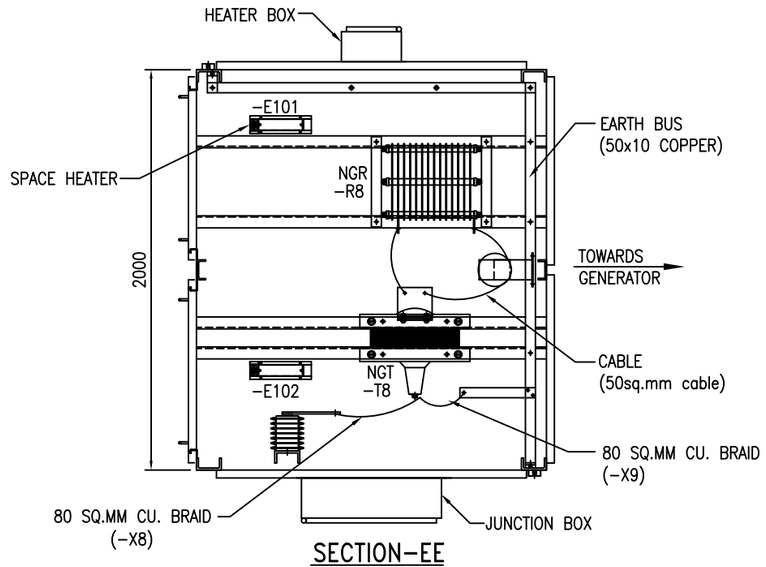


VIEW-DD
(DOOR REMOVED)

EXCITER END



PLAN



SECTION-EE

ALL DIMENSIONS ARE IN mm

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				D	REVISION LEVEL UPDATED	17.07.18	J.R
				C	UPDATED IN LINE WITH SHEET-9	04.04.18	J.R
				B	THERMOSTAT ADDED AS PER SIEMENS COMMENTS DTD. 21.03.18	21.03.18	J.R
E	UPDATED AS MADE	24.08.18	J.R	A	INTERNAL ARRANGEMENT AND CUBICLE SIZE UPDATED	03.03.18	J.R

PROJECT	VILNIUS BIOMASS
CUSTOMER	SIEMENS AG
W .O. NO	MP0650
TITLE	NEUTRAL SIDE CUBICLE (INTERNAL ARRANGEMENT)
SCALE	1 : 30
SIZE	A3
	MEPZ, Tambaram, CHENNAI-600045 INDIA

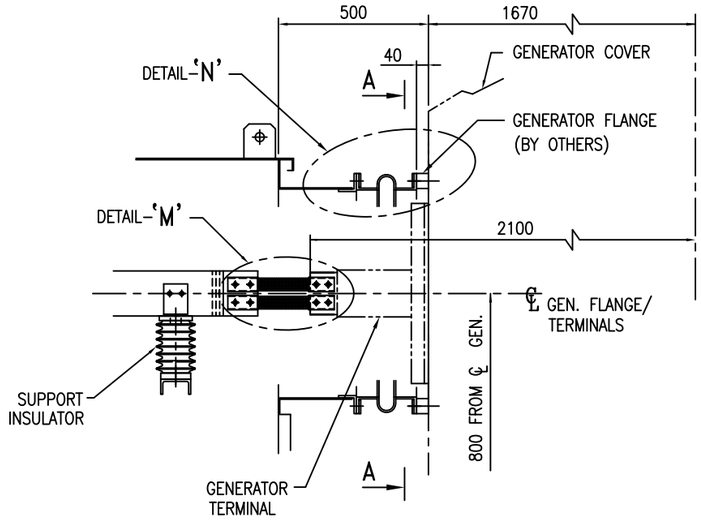
	SIGN	DATE
DRN.	A.ANTONY	29.01.2018
CHD.	J.RAMASWAMY	29.01.2018
APPD.	J.RAMASWAMY	29.01.2018

DRG. NO. DPPPG-70151867

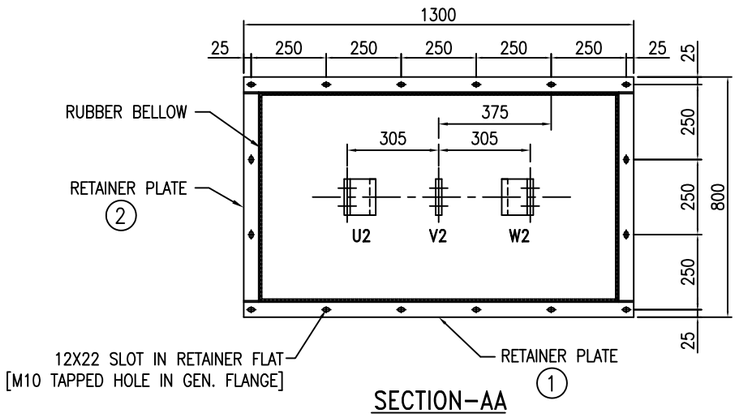
SHEET 10 OF 11 | REV E

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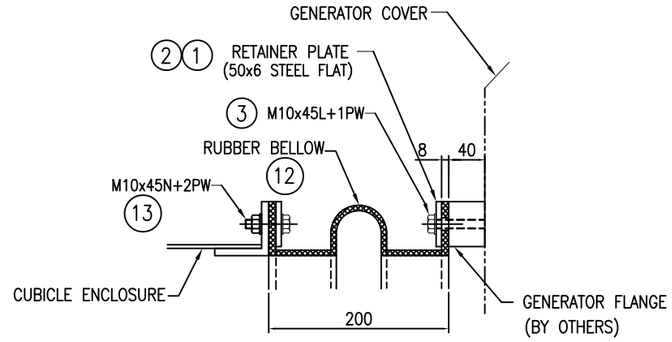
FILE NAME :



GENERATOR INTERFACE DETAILS

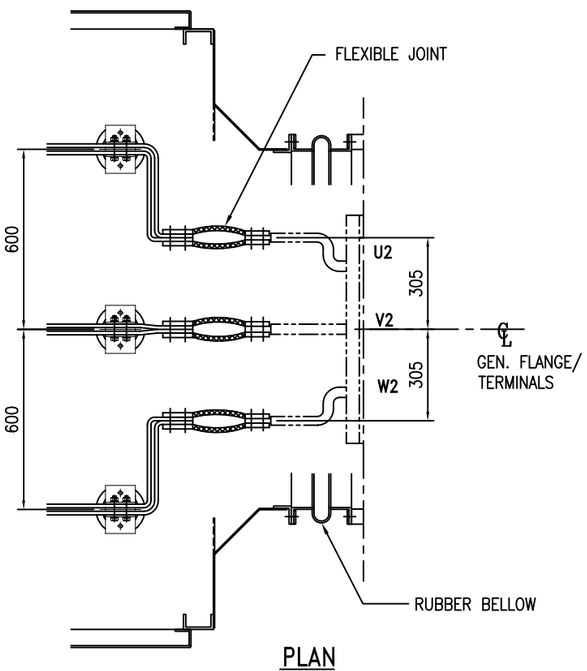


SECTION-AA

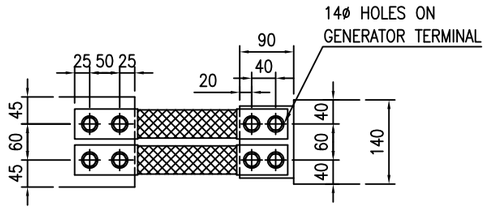


DETAIL-N

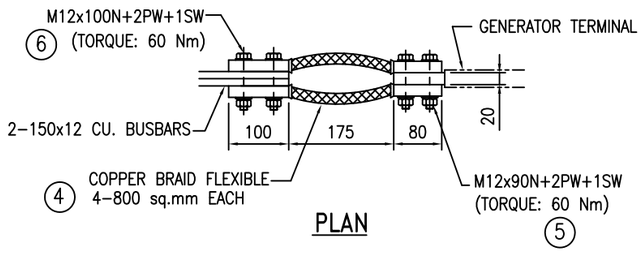
ENCLOSURE CONNECTION WITH GENERATOR



PLAN



DETAIL-M



PLAN

BUSBAR CONNECTION WITH GENERATOR LEAD

ALL DIMENSIONS ARE IN mm

REV. NO.	DESCRIPTION	DATE	APPD	REV.	DESCRIPTION	DATE	APPD.
				D	REVISION LEVEL UPDATED	17.07.18	J.R
				C	REVISION LEVEL UPDATED	04.04.18	J.R
				B	REVISION LEVEL UPDATED	21.03.18	J.R
E	REVISION LEVEL UPDATED	24.08.18	J.R	A	REVISION LEVEL UPDATED	03.03.18	J.R

PROJECT	VILNIUS BIOMASS		
CUSTOMER	SIEMENS AG		
W .O. NO	MP0650	TITLE	NEUTRAL SIDE CUBICLE (TERMINATION AT GENERATOR)
SIZE	A3	SCALE	1 : 30

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	SIGN	DATE
DRN.	A.ANTONY	29.01.2018
CHD.	J.RAMASWAMY	29.01.2018
APPD.	J.RAMASWAMY	29.01.2018

DRG. NO. DPPPG-70151867

SHEET 11 OF 11 | REV E

FILE NAME :

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1 Recommended nominal tightening torques for bus bar boltings

NOTE:

Use table data only if there are no special values given by the neutral point/line side cubicles' supplier.

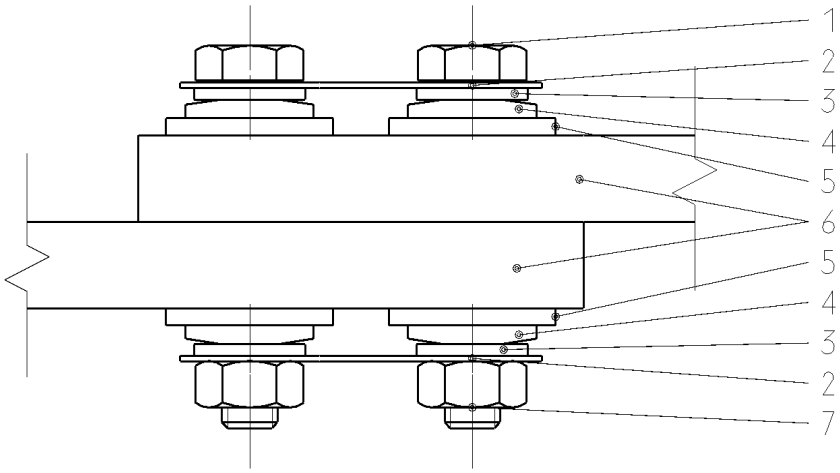
Table data are valid for DC and AC up to 60 Hz. Screws and nuts have to be made of austenitic steel (e.g. A2-70 or A4-70), all other connecting and locking elements should be made of nonmagnetic material as well.

Thread size	Indoor	Indoor & outdoor
	Lubricant: Oil or grease	Lubricant: MoS_2
	Tightening torque [Nm]	Tightening torque [Nm]
M4	1,5	2
M5	2,5	3
M6	4,5	5,5
M8	10	15
M10	20	30
M12	40	60
M16	80	120

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2 Connection bus bar – bus bar, version 1

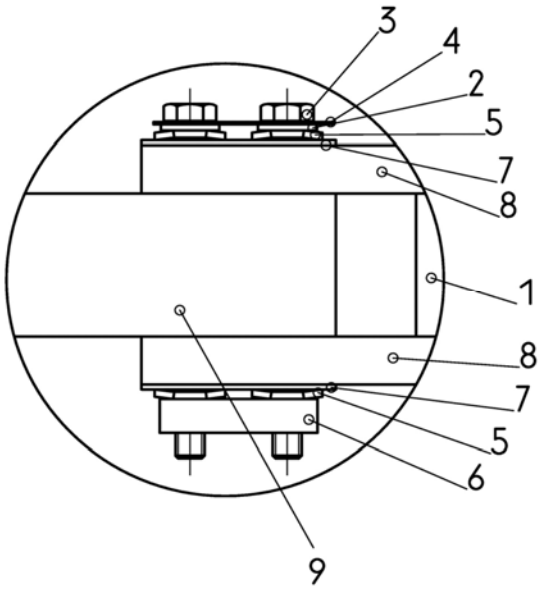
(Principal drawing, for details see Installation Manual, chapter Drawings)



1 Hexagon screw
2 Double-locking plate
3 Tab washer DIN 125
4 Clamping disk DIN 6796
5 Tab washer DIN 9021
6 Bus bars
7 Hexagon nut

3 Connection bus bar – bus bar, version 2

(Principal drawing, for details see Installation Manual, chapter Drawings)

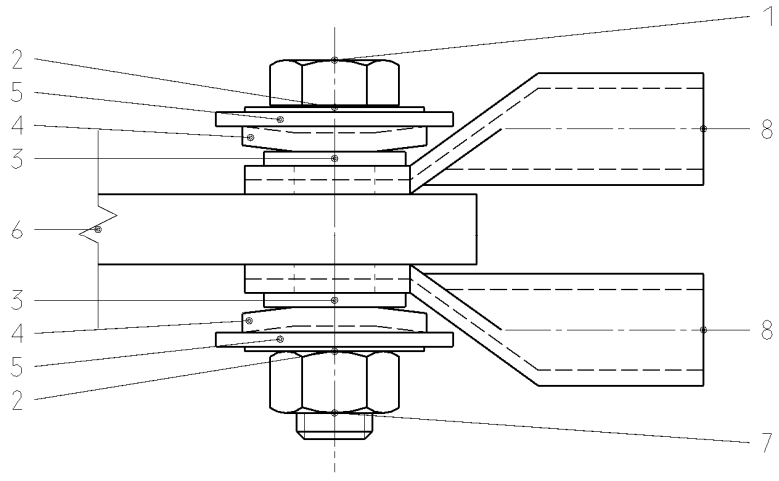


1 Bus bar
2 Tab washer ISO7090
3 Hexagon screw
4 Double-locking plate
5 Clamping disk DIN 6796
6 Twin nut
7 Steel sheet
8 Connecting piece
9 Feed-through bar

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4 Connection cable bus bar – terminal lugs, version 1

(Principal drawing, for details see Installation Manual, chapter Drawings)

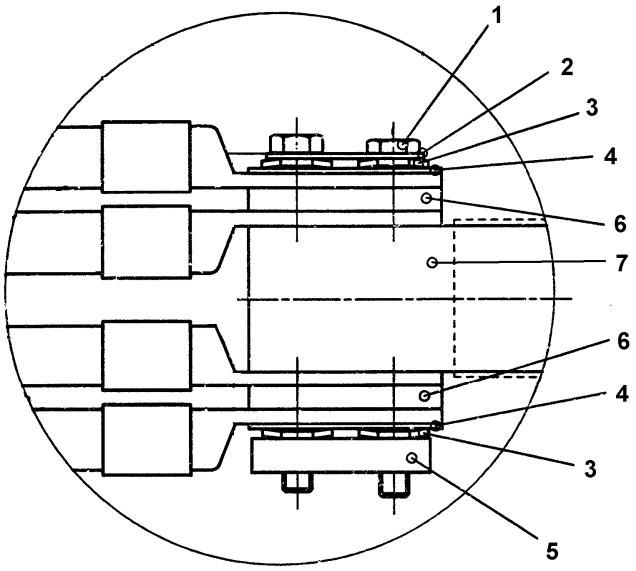


1 Hexagon screw
2 Double-locking plate
3 Tab washer DIN 125
4 Clamping disk DIN 6796
5 Tab washer DIN 9021
6 Bus bar
7 Hexagon nut
8 Cable lug

two terminal lugs arranged on each bus bar side

5 Connection cable bus bar – terminal lugs, version 2

(Principal drawing, for details see Installation Manual, chapter Drawings)



1 Hexagon screw
2 Double-locking plate
3 Clamping disk DIN 6796
4 Steel sheet
5 Twin nut
6 Plate
7 Bus bar

two terminal lugs arranged on each bus bar side

After final assembly, the bolt heads are secured by bending up the double-locking plates.

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Cooling System

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Manufacturer: **Sterling Thermal Technology Limited**

Documentation Title: **Installation, Operation and Maintenance Instructions for Water-Cooled Air-Cooled Elements or Packages**

No. of pages: 31 incl. Drawing

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Installation, Operation and Maintenance Instructions

For

CACW Elements



Sterling
thermal technology

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1. General Information

1.1 Overview

This manual supplies information and instructions for the correct and safe installation, use and maintenance of the CACW Elements Heat Exchanger. It must be carefully read in conjunction with the General Arrangement Drawing(s) for the equipment and fully understood prior to the installation of the equipment. If questions still exist after reading this manual, you must contact the manufacturer / supplier / contractor for more information.

Many accidents occur due to incorrect or inappropriate use of equipment, therefore the instructions in this manual must always be fully understood and correctly carried out.



The equipment must not be put into use until all unclear issues have been resolved

1.2 Pictograms Used in this Manual



Reference to important, useful or supplementary information regarding the use of the equipment



Warning of a dangerous situation which could cause personal injury or damage to the equipment

1.3 Documentation



The following documents will be sent to the originator of the order by STT:-

- General Arrangement Drawing(s), Certificate of Conformity, Certificate of Test, plus Data Dossier if specified in the order.
- Other documentation as requested in the order to STT
- Invoice

The following will be delivered with the cooler:-

- These Installation, Operation and Maintenance Instructions
- Delivery note

The following documentation will be provided at no charge if it is requested at the time of order:-

- Pressure Equipment Directive Statement
- Instrument manufacturers documentation (where applicable)

1.4 Important Notes



The following important notes must be taken into account when using the equipment:-

- Do not pass air across the element unless the heat exchange medium is circulating
- The warranty will be made void if the equipment is not maintained as detailed in this manual.
- The equipment must be earthed if it is used in explosive areas.
- The ingress protection (IP) rating of the element will not be maintained unless appropriate seals are installed as detailed in this manual.
- This manual must be read in conjunction with the drawing(s) for the equipment
- Read the label on the element and ensure that the equipment is suitable for the required use before installation.
- Element fins are fragile and can be easily damaged; they must be handled with care. If damage does occur to fins, the heat exchange properties of the element may be affected.
- Damaged fins can be straightened with the use of a proprietary fin comb.

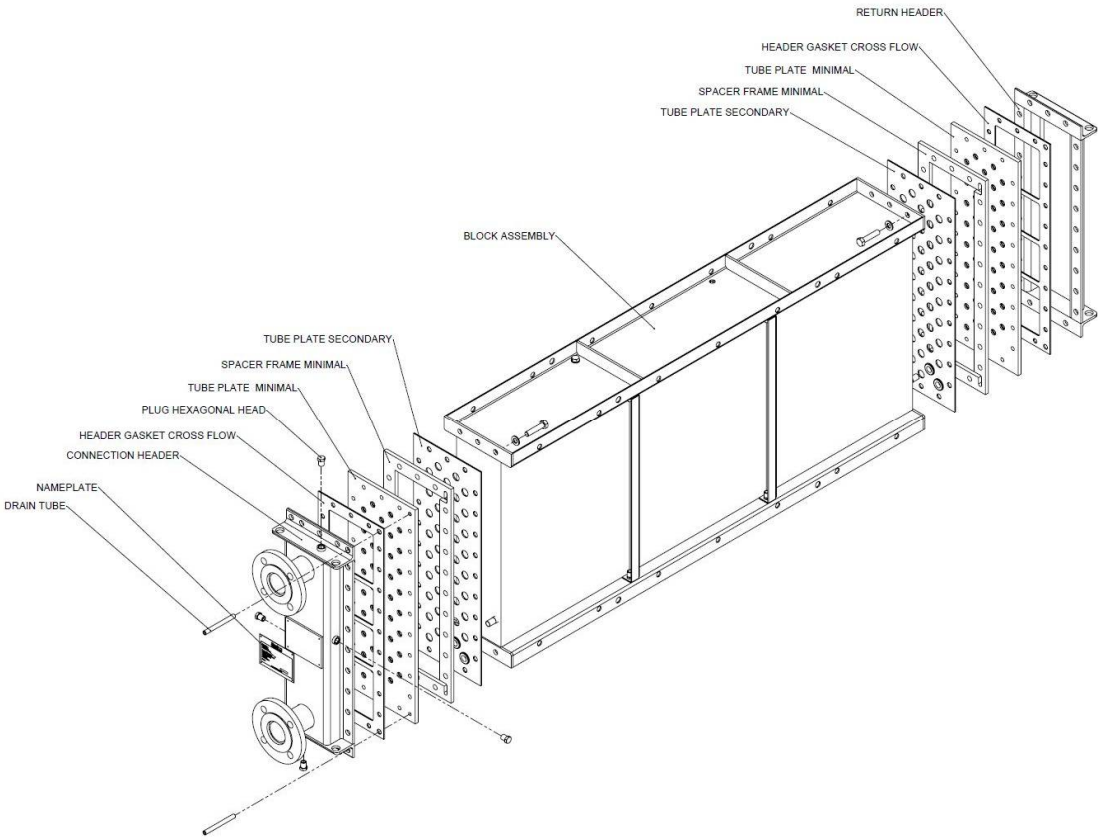
2. Description

2.1 Product Information

Product: Heat Exchanger element with removable covers

Type: See information plate on heat exchanger, technical specification and General Arrangement Drawings

Typical Assembly:



2.2 Product Use

CACW Elements heat exchangers are primarily used to exchange heat between a liquid and a gas; the liquid flowing through the tubes and the gas passing across the finned surface. A typical example is a motor or generator cooler where they are used to remove the excess heat created by the motor or generator; in this instance, the hot air created flows over the finned tubes and the heat contained within it is passed to the cooling water running through the tubes.

Although supplied “stand-alone” the CACW Elements heat exchangers are often built into purpose made heat exchange enclosures.

The properties of the fluid flowing through the tubes may create erosion, corrosion or internal fouling of the tubes necessitating a regular planned cleaning strategy. A filter / strainer installed in the system pipework will greatly lessen the chance of damage due to erosion.

2.3 Product Conformity

The equipment conforms to the following:-

- EU Directives
- Machinery Directive
- Pressure Equipment Directive
- Hazardous Areas Usage

- CE Marking (if specified)
- IEC Specifications (if specified)

2.4 Guarantee

Sterling TT guarantees all products supplied by them to be sound and suitable for the given specification for a period of 12 months after being put into operation or 12 months from delivery (whichever is the sooner) unless covered by a separate agreement.



The guarantee will be voided if the equipment is not stored, handled, used and maintained in accordance with the information given within this manual; if it is utilised with an incorrect medium (i.e. not the design / specified medium); or any adaptions / changes are made.

3. Safety, Storage, Inspection and Handling

3.1 Preservation and Shipping of Equipment



Sterling TT drain all water cooler heat exchangers prior to despatch. However, under normal circumstances some residual water may remain in the tubeside areas due to the circuit configuration. Full drying can be executed where requested as part of the contract requirements. If not specified additional steps need to be taken where equipment is being packed for extended storage and/or shipped through a range of climatic conditions. These steps may include drying and/or evacuating followed by pressurisation with a dry gas. Please refer to STT for advice on these long term preservation requirements.

Where silica gel is used to protect against moisture ingress it must not be placed above or in direct contact with the finned area of the equipment.



Following any operation of the equipment (e.g. string tests) the water passages must be drained before onward shipment. The extent to which further drying is necessary will be dependent of time scales and shipping methods employed.

3.2 Receipt of Goods



On receipt of the equipment, inspect and check that the goods are undamaged. It is important that any damage is noted on the delivery note which you will be asked to sign. If any further damage or omissions are subsequently noticed then you should advise STT immediately.

3.3 Loose Items



Some components, such as leak detectors, will be packaged separately. This is generally for safety and to prevent damage. Any such items will be identified on the delivery note. Please ensure they are present and undamaged. If problems are found note them on the delivery note at the time of signing it.

3.4 Storage



- Where possible keep the equipment in the packing case in which it was delivered until it is to be installed.
- Do not climb on heat exchangers.
- Keep all connection pipes, drains etc. covered and/or plugged to protect them from the ingress of insects, vermin or foreign bodies.
- Coolers designed for an ‘indoor application’ must not be left outdoors as they may not have the sealing, paint system, or general corrosion resistance for such conditions.
- Finned surfaces must always be protected from the ingress of foreign bodies.
- Relaxation of gaskets may occur during storage. The bolts/nuts of the water box should be re-torqued to the final assembly figure when the element is installed, starting at the centre and working towards the corners (ref to para 4.4 & 6.15). This may also be required if the cooler has been subjected to vibration or large temperature deviations during transport to site. (See installation).

- If the cooler elements have been stored for more than 1 year before putting into service, they must be hydrostatically tested to the pressure shown on the cooler nameplate and special attention should be given to the gasketed joints. If a leakage is observed, then it is recommended that the header bolts / nuts are re-torqued as indicated above. (See “Tightening of Bolts” for details para 4.4 & 6.15).
- If the cooler element has been filled for thermal or other testing at any stage, it must be fully drained and the connections covered and plugged before being put into storage.
- If the cooler element has been subjected to occasional use or left drained for extended periods the headers must be re-torqued as above.
- The cooler element must be stored at a temperature above freezing point and protected from mechanical contact. Where the possibility of being below zero exists, it must be examined to ensure it is emptied of water to the extent that only a few droplets may remain.
- The fins must be protected such that there is no risk of damage or fouling to them.

3.5 Handling



The General Arrangement drawing(s) supplied before delivery contain important information regarding the safe handling of the equipment, including:-

- Dry weight
- Position of lifting points
- Angle of chains to be used (if relevant)
- Size and thread of eyebolts (if required)



Personnel involved in handling the equipment must be suitably authorised, trained and qualified and have access to and review the supplied General Arrangement drawing(s) before handling. Lifted or handling must not be carried out at temperatures below -29°C

3.6 Safety



Paint Finish

The equipment is painted to customer specification. Please refer to the paint specification and obtain the correct material safety data sheets for the paint prior to carrying out touching up or paint removal procedures especially in the case of two pack epoxy paints.



Design Parameters

Do not operate the unit beyond the design conditions given on the identification technical specification. If these parameters are exceeded, the equipment must not be used without prior consultation with the manufacturer. Usage of the equipment in a non-design situation will invalidate the warranty. In addition, Sterling TT WILL NOT be held responsible for any material damage or personal injury resulting from such use; this risk is solely the responsibility of the equipment owner / user.



Safety of Personnel

Physical injuries can be caused to personnel by the incorrect handling, operating or maintenance of the equipment.

- Always use suitable personal protective equipment (PPE) for the task being carried out. Safety glasses, gloves, boots and protective clothing should be used as a minimum.
- Burns can be caused by touching the heat exchanger when it is in use.
- The element fins are sharp and can cut.
- The accidental release of a medium under pressure (especially steam and medium or high temperature hot water) presents a risk of burns, scalds and other injuries.
- Even after switching off the installation, the heat exchanger may remain hot. A cool down period of at least 30 minutes should be allowed.
- Maintenance must only be carried out when the equipment is shut down.



Damage to the Equipment

Damage can be caused to the equipment by the following:-

- External forces
- Atmospheric and Chemical Corrosion
- Erosion
- Fatigue
- Steam or thermal shock
- Too high a pressure or temperature
- Impact load
- Freezing
- Incorrect transport / storage / lifting or handling

All of the above parameters must be taken into account when handling, operating and maintaining the equipment.



Working at Height Regulations

If the heat exchanger is located above ground level, due attention must be paid to the Working at Height Regulations when handling, operating or maintaining the equipment.



Danger of Freezing

The heat exchanger must be drained down when not in use; the pipe contents may freeze when exposed to low ambient conditions, leading to burst pipes and deformation of the element



Legionnaires Disease

If the heat exchanger is used in a situation where stagnant water can form i.e. with a drain pan and / or condensate removal system or for dehumidification purposes, a Legionella Risk Assessment must be carried out. Appropriate steps must be taken as dictated by legislation local to the installation; e.g the Health and Safety Executive document HSE L8 “The control of legionella bacteria water systems” and The CIBSE publication TM13:2013 “Minimising the Risk of Legionnaires Disease” in the UK.



Pressure System Safety Regulations

If the heat exchanger is used with a pressurised medium, the recommendations given within the Pressure Systems Regulations 2000 must be followed.

4. Installation

4.1 Siting



- Unless specifically designed otherwise, coolers must be fitted flat and level
- Gaskets (supplied by others) must be fitted between the cooler and the enclosure which ensures the specified ingress protection (IP) level for the system is met.
- The gasket must be compliant enough to seal between the mating faces.
- All pipework attached to the heat exchanger must be supported so that no load is applied via the connections either statically or dynamically (as a result of thermal expansion or vibration).
- Flexible connections / couplings must be fitted wherever vibration transfer may occur to or from pipework.
- It is recommended that pressure and temperature access fittings are installed for the purpose of commissioning and checking the system operating parameters
- If regular venting of the system is difficult or inconvenient then STT recommend that automatic air release valves are fitted to the cooler and other high points in the system.
- The torque on header bolts must be in accordance with Appendix 1 (note that the return end header may be under a bolted cover box)
- Access must be provided for maintenance, withdrawal and cleaning of the element.

4.2 Preparation



- It is expected that recirculating water supplies will be treated with one or more of the following as appropriate to the actual site conditions:-

  1. Corrosion inhibitors
  2. PH regulators
  3. Anti-freeze agent

- The user is responsible for ensuring that the circulated fluid is compatible with the materials offered on the contract data sheet.
- All loose fittings supplied must be attached prior to installation.
- The installation must only be carried out by suitably qualified personnel.
- Remove all packaging and cover caps etc. prior to installation.

4.3 Installation



- The instructions for transport and hoisting must be followed when placing or moving the equipment,
- The weights given on the General Arrangement Drawing(s) are for guidance purposes only.
- All pipes and flanges must not be mounted under stress to the equipment
- Pipes must be able to expand. Flexible connections, anchors and expansion joints should be fitted to the pipes to suit the actual installation.
- Bolt : nut connections must be clean and lightly oiled
- The correct gasket for the application must be installed
- Do not install the equipment at temperature below -29°C

4.4 Tightening of Bolts



The bolts for the removable covers must be tightened with a torque wrench in the manner shown below. Standard bolting tensile is Steel grade 8.8 and stainless steel grade 80. The figures given below are based on those materials.

Header Style	Gasket Material	Bolt Size	Initial Torque	2nd pass	Final Torque
Grid & Cover	1.5 mm Klingersil C4106	M12 or ½"	45	60	80
Grid & Cover	1.5mm Klingersil C4106	M16 or 5/8"	50	80	100
Praxair Style	1.5mm Novus 34	M16 or 5/8"	50	80	100
Formed	3mm EPDM	M12 or ½"	25	35	40
Fabricated	3mm EPDM	M12 or ½"	25	35	40
Oil Coolers	3mm Nitrile	M12 or ½"	25	35	40

Klingersil C4106 is a non-asbestos material consisting of premium quality cork and with a nitrile binder and aramid fibre reinforcement, Compressibility ASTM F36A 20%-30%, Recovery 50%

Novus 34 is a blend of aramid / inorganic fibres and special additives, with a high quality nitrile rubber binder, Compressibility ASTN F36 9%, Recovery ASTM F36 55%.

EPDM has 70-80 Shore hardness

NB. In a small number of instances grade A2-70 or grade A4-70 may be used for M12 bolting of headers. In these instances, a final torque value of 75Nm should be used for Grid and Cover construction using C4106 Klingersil or Novus 34 gaskets.

5. Operation



The installation must be inspected, operated, maintained and repaired only by authorised and suitably trained personnel.

5.1 Inspection Before Use



The unit has been tested by Sterling TT in accordance with the test pressures stamped on the type plate attached to the equipment.

- The element fins must be undamaged and straight to ensure the design heat exchange takes place. If problems are found, use a fin comb to remedy them.
- Burrs must be removed from element connections.
- The element must be flushed to remove all swarf and other foreign bodies that may be present.
- The correct gasket for the application must be installed.
- The correct seals for the application must be used.
- The connected systems (fluid and gas) circuits much be checked to ensure they are complete, suitable for the application and correctly installed.
- The connected systems (fluid and gas) must be operating at the correct temperature and pressure.

5.2 Filling and Venting



When first filling the heat exchanger with water ensure that:-

- the pumps are turned off
- the vent plug is open
- the drain plug is closed
- the flow and return valves are cracked open to allow slow filling. (opening a pressurized supply when the block is full of air could displace inter-pass gaskets)
- Turn on the pumps and allow water to circulate for 5-10 minutes
- Either stop pump or close supply valve and release the air vent plug to release any air bubbles in the headers. (This may need to be repeated on new installations until all trapped air escapes)



If a cold medium is present in the heat exchanger but is not circulating whilst a hot medium is flowing through the heat exchanger, the cold medium may start boiling and the heat exchanger will be damaged.

5.3 Re-tightening of Bolts



The bolts on the gasket and the connecting flanges must be re-tightened to the correct torque after the heat exchanger has cooled down for the first time (ref to para 4.4 & 6.15).

5.4 Testing and Commissioning



Fluid Flow

It is important to set the water flow rate accurately as it is crucial to performance to attain the optimal tube velocity. It is also important to avoid the onset of destructive cavitation by ensuring that excessive velocities are avoided. If in doubt contact STT for advice on maxima and minima for your installation

STT recommends the installation of commissioning valves in the pipework circuit to allow flows to be trimmed as necessary.



Fluid Temperature

Water temperature can generally be measured reliably with a probe inserted at a self-seal test point (Binder or similar) or using fixed pocketed RTD's. Facilities for this are not supplied by STT unless specifically requested.

STT do not fit tappings for air temperature measurement unless specifically requested. Where probes are inserted for the purpose of commissioning it is important to ensure that they are positioned in the fully mixed airflow.



Vibration

STT heat exchangers are generally resistant to vibrations up to 20mm/sec and every effort is made to avoid key frequencies at 50 Hz and 60 Hz. However it is impossible to design a completely rigid cooler and still permit efficient heat transfer.

If when commissioning, it is found that a particular forcing frequency is affecting the cooler, it is important that you contact STT for advice on how to deal with it.

Note that Coolers for machines with Diesel drives, particularly common bed plate mounted are particularly affected. A special execution is available for these cases.



Performance

When commissioning a cooler, it is important to compare the estimated duty on the machine circuit with the extracted heat. A balance within 10% would indicate a reasonable set of results.

5.5 Inspection During Operation



Inspect the element itself and all connections for leakage during the first hour of operation and at regular intervals thereafter.

5.6 Shut Down



To shut down for maintenance purposes:-

- Display appropriate warning notices.
- Ensure heat input has stopped
- Close element flow isolating valve.
- Allow water in element to cool to ambient temperature.
- Close element return double regulating valve.



Drain the element if it is to be shut down for a lengthy period of time to prevent frost protection unless the fluid medium contains an anti-freeze solution.

Flush the element with clean filtered water if it is anticipated that corrosive residues may be present. Chlorination may be appropriate if bio-fouling is a risk.

Drain the element if it is to be shut down for over 48 hours to prevent corrosion.

5.7 Gaskets



If an element has been:-

- in long term storage
- has remained unused for 12 months from manufacture
- has been outside recommended storage temperatures

It is advisable to re-torque the header bolts (see block reassembling for details) prior to being pressurised in service. All polymer gaskets are susceptible to long term creep when under stress.

5.8 Standby Service



Where coolers are on standby for long periods, it is essential that certain actions are taken to ensure that they will perform correctly when called on. Unless frost is anticipated, keep filled with water, even if the supply is isolated.

Note that in the case of seawater, the system must be protected from the potential for marine growths. This may dictate alternative standby arrangements.

6 monthly
- Check for relaxation of gaskets and tighten as necessary
- Vent coolers to ensure no trapped air
- Follow actions as laid out in the Maintenance section.

6. Maintenance

6.1 General



The installation must be inspected, operated, maintained and repaired only by authorised and suitably trained personnel.



Maintenance and cleaning must be carried out when the equipment is shut down and is at ambient temperature.



Physical injuries can be caused to personnel by the incorrect handling, operating or maintenance of the equipment.

- Always use suitable personal protective equipment (PPE) for the task being carried out. Safety glasses, gloves, boots and protective clothing should be used as a minimum.
- Burns can be caused by touching the heat exchanger when it is in use.
- The elements fins are sharp and can cut.
- The accidental release of a medium under pressure (especially steam and medium or high temperature hot water) presents a risk of burns, scalds and other injuries.
- Even after switching off the installation, the heat exchanger may remain hot. The metal temperature should be checked before maintenance activities commence.



The installation must be inspected, operated, maintained and repaired only by authorised and suitably trained personnel.

6.2 Maintenance Frequency



It is recommended that the equipment is maintained at least once every 8000 hours of operation or 12 months, whichever is the shorter period. This frequency may need to be varied due to specific site conditions e.g. exposure to salt water.

6.3 Inspection - Equipment



The following must be inspected at the maintenance frequency given above to ensure the correct operation of the equipment:-

- Ensure fin surfaces are not damaged, dirty or blocked
- Ensure that there is no evidence of leakage from header gaskets
- Ensure there is no fluid leakage from the equipment / pipework connections
- The primary and secondary medium temperate and pressure are within the correct limits

6.3 Inspection – Equipment Continued



- Ensure condensate drains away adequately if applicable
- Check for fouling of the heat exchanger (this will give a drop in capacity).
- Ensure there are no strange noises or vibration at the equipment.
- Check the general condition of the equipment and repair any damage found
- Check for corrosion and carry out remedial work as necessary
- Ensure all safety devices function correctly
- Check the torque of all bolts and re-tighten accordingly
- Check that there is no evidence of leakage from the vent / drain fittings
- Check the leakage detector pipe where fitted to see that it is clear
- With the flow stopped, open the vent plug to release trapped air.

6.4 Inspection - Ducting / Gas Side



The following must be inspected at the maintenance frequency given above to ensure the correct operation of the equipment:-

- that all external fasteners are tight
- that the ducting remains free from corrosion
- that there are no new resonances or vibration which might indicate component failure

6.5 Inspection – Pipework / Fluid Side

The following must be inspected at the maintenance frequency given above to ensure the correct operation of the equipment:-

- Remove water supply pipe and through the connection flange, examine visible surfaces for corrosion, erosion, scaling.
- If anodes are fitted, remove and check that they are in good condition, replace as required.

6.6 Cleaning the Heat Exchanger – Liquid Side

A heat exchanger with straight tubes can be cleaned internally with a special brush available directly from Sterling TT. The covers must be disassembled. See “Header Removal”. After cleaning, the tubes must be thoroughly rinsed with a clean medium.

6.7 Cleaning the Heat Exchanger – Air Side

Protect adjacent equipment or remove element to an area where that equipment will not be adversely affected by cleaning operations. Blow the fins clean using compressed air in the opposite direction to the normal airflow. Take care that the fins do not deform. If further cleaning is deemed necessary, STT recommend the use of a proprietary foaming coil cleaner (see internet for your local vendor) and washed off with a *low pressure* hose using town water. Finned surfaces must be dried using warm air before putting back into service.

Under no circumstances may a pressure washer or steam cleaner be used as this is liable to drive the fouling into the centre of the matrix and / or deform the fins with permanent adverse effect.

6.8 Dissassembly of the Heat Exchanger

Isolate the hot medium first, then once the heat exchanger has cooled to the temperature of the cold medium, isolate the cold medium. Wait until the heat exchanger is cool before progressing any further.

- Isolate the hot and cold media on to and off the heat exchanger
- Drain the liquid medium with the heat exchanger vent open
- Note the location of parts to be disassembled.
- Remove the liquid media flow and return connections and disassemble the cover. The covers must be supported due to their weight.

During the disassembly process, it is possible that residual medium will seep from the heat exchanger. Use a drip tray or similar to catch any drips or leakage.

6.9 Assembly of the Heat Exchanger



- Always use new gaskets – never re-used old ones
- Make sure gasket faces are clean and undamaged
- Apply the gaskets
- Assemble the cover taking note of any markings made during the disassembly process and ensuring the bolts are tightened to the correct torque.

6.10 Straightening Fins



Bent fins can be straightened by careful use of long nosed pliers and a fin comb. Whilst sometimes unsightly, repaired fins do not adversely affect performance.

Fouled fins need to be cleaned, which in most cases require removal of the equipment from the ducting. In the first instance the fin leading and trailing edges should be cleaned with a soft bristle brush, and compressed air.

6.11 Gasket Leaks



Gasket leaks may be sealed by re-torquing in line with the data in Appendix 1 If this fails to seal, then the cooler must be stripped and new gaskets fitted. It is important to identify the type of gasket used and to replace with an equivalent. (Contact STT for gasket availability or advice on alternatives)

6.12 Tube Leaks



Tube to tube plate leaks at commissioning are rare, but if found can usually be sealed by reprocessing (expanding or welding). In service leaks can be sealed by use of a taper plug (contact STT for details). Leaks can usually indicate the end of the coolers useful life, although in the case of double tube coolers, it may be possible to run in a fault condition until a service replacement is available.

6.13 Corrosion



Ducting

Corrosion on the surface of ducting should be stopped as soon as seen by application of a proprietary conversion paint followed by touching up with the original paint system.

Tubes

Corrosion/erosion is most often found in the ‘vena-contracta’ area at the tube entrance. This is often the result of excessive velocity which should be corrected by controlling the water flow rates within the range specified on the STT data sheet. If found early enough it may be possible to extend the life of the tubes by installation of proprietary nylon sleeves.

If it is impossible to sufficiently control water velocities, then consideration should be given to replacing the heat exchanger with one employing velocity tolerant materials such as titanium.

Fins

Corrosion on fins is detrimental to the efficiency of the heat exchanger. If serious corrosion is encountered, the cause of such must be established and advised to STT before replacing the cooler.

Tube Plates

Surface corrosion of ferrous tubeplates can be repaired by shot blasting locally and treating with Zinga or a suitable epoxy paint. Corrosion in excess of 3mm depth will require replacement of the cooler matrix.

Corrosion of non-ferrous tubeplates is usually indicative of excessive velocity, poor water quality or anodic corrosion due to the component being the least noble metal in system

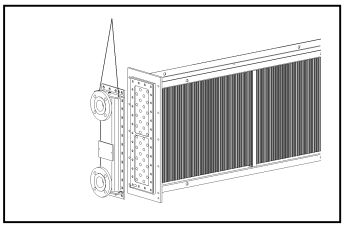
Fixings

Fixings supplied may be plated or coated to resist corrosion. It is not recommended to overcoat these with paint systems as such application may inhibit the maintenance of the equipment and in particular the correct torqueing of pressure bolts.



Tubes, Tubeplates and protective coatings can all be damage by particulates in the water. Whenever coolers are used with non-recirculated water (ie River water, Seawater, etc.) the filtration level should allow no particles larger than 250 microns.

6.14 Header Removal



Formed and fabricated headers:-

- Remove header to tubeplate fasteners leaving two at the top loosely fastened.
- Support weight of header
- Gently prise header away from tubeplate
- Remove last two bolts and remove.

Grid and cover:-

- Remove two bolts from the bottom run of bolts and replace with two temporary studs
- Remove the rest of the fasteners
- Gently prise the cover plate away from the tubeplate and remove
- Note position and handing of grid for replacement.
- Remove grid

All:-

- Remove all traces of gasket from both the tubeplate and header faces with care to prevent damage to the faces. A metal scraper can be used for this purpose if used with care.

- Note: On grid and cover plate header constructions the gasketed joints between tubeplate and grid, as well as between grid and cover plate will require careful removal.
- Inspect the surfaces to be gasketed paying particular attention to surface scratches, dents, and misalignments in machining or local undulations.
- If the gasket sealing surfaces are painted or otherwise coated, it is important that the coating is flat, continuous and without cracks or flakes.
- If the surfaces are damaged then STT should be consulted to recommend a suitable method of repair.

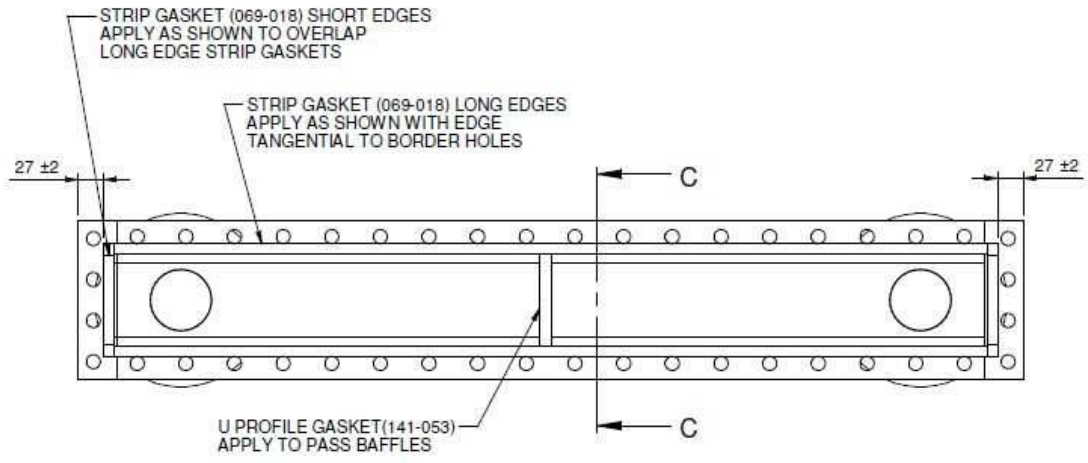
6.15 Header Reassembly

Formed and fabricated headers:-

- Lay a clean piece of paper larger than the grid on a flat surface and place the grid on it.
- Coat the gasket sealing surface with gasket dressing (Spraytack) by Industrial Adhesives Ltd or equivalent.
- Apply a new gasket to the tacky surface
- Ensure that the gasket is firmly held at the pass baffle positions

Note some coolers with formed headers are fitted with self adhesive strip gaskets

- Apply 1 row of strip gasket just touching the inside of the border holes and overlapping the strips slightly at the corners.
- The U-profile gasket should form a continuous flat upper face by butting sides. Do not try to mitre or take it round bends.
- The U-channel gasket improves the reliability of the seal in circumstances where centre baffle seals have been displaced due to sudden opening of water valves when the cooler is empty. If you would like to retro fit your cooler with this type of gaskets, please contact STT technical department for advice.



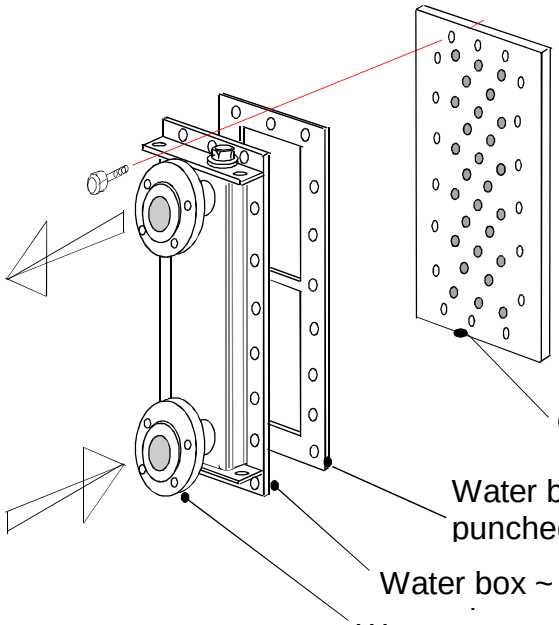
Grid and cover:-

- Fit two temporary studs in the tubeplate to support the grid during assembly.
- Fit two temporary studs coincident with the location tabs on the gasket to support gaskets during assembly. (if no tabs use spraytack as formed headers)
- Fit new gasket to tubeplate, ensuring correct orientation.
- Assemble the grid to the tubeplate, second new gasket and the coverplate to the grid in accordance with the drawing ensuring that any grid baffles are correctly orientated.

All:-

- Lubricate all bolts/studs threads prior to fitting. This will ease assembly and allow validation of the torque measurements.
- Mild steel fasteners - lubricate with a few drops of light oil. i.e. 3 in 1 type.
- Stainless fasteners- lubricate with copper slip. i.e. Rocol antisieze J 166.

Formed or Fabricated Header box



Assembly torque
40 Nm (M12)

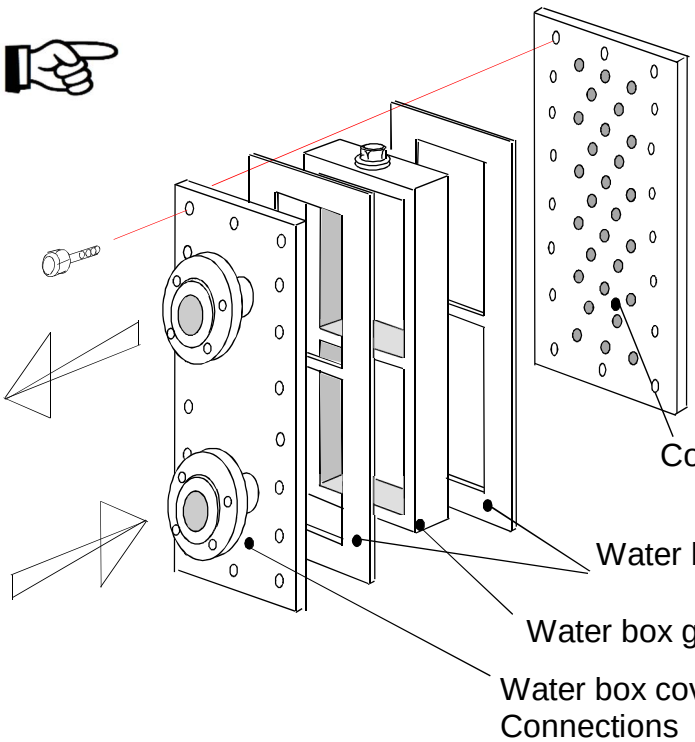
Connection end tubeplate

Water box gasket ~ EPDM may be punched or strip gasket

Water box ~ Carbon Steel Rilsan

Water connections

Grid & Coverplate Header Box



Assembly torque
80 Nm (M12)
(75Nm for Gr 70 fixings)

Connection end tubeplate

Water box gasket ~ Klinger C4106

Water box grid ~ Carbon Steel or Non ferrous

Water box cover plate.
Connections

Refer to section 4.4 for full tightening and torque details

- Assemble all bolts (or studs and nuts), nipping up to a light pressure.
- Tighten progressively to initial torque (section 4.4) in a symmetrical pattern starting at the centre and working toward each end as Figure 1

+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
46	43	42	39	38	35	34	31	5	4	1	7	10	11	14	15	18	19	22	23	26
+																				+
47																				27
+																				+
49																				29
+																				+
50																				30
+																				+
48																				28
+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
45	44	41	40	37	36	33	32	6	3	2	8	9	12	13	16	17	20	21	24	25

Figure 1

- Re tighten to 2nd pass torque using the same symmetrical pattern.
- Re tighten to final torque using the same symmetrical pattern.
- Finally, re tighten at same torque starting with a bolt on the centre line and working around clockwise.

6.16 Pressure Test



- Fit blanking plates to the connection flanges
- Fill with water
- Slowly increase pressure
- Check for leaks
- Pressure test to the pressure on the rating plate or as advised by STT for a period of 30 minutes.

After 24 hours EPDM gaskets should be re-torqued to allow for settling.

Follow commissioning guide for return to service.

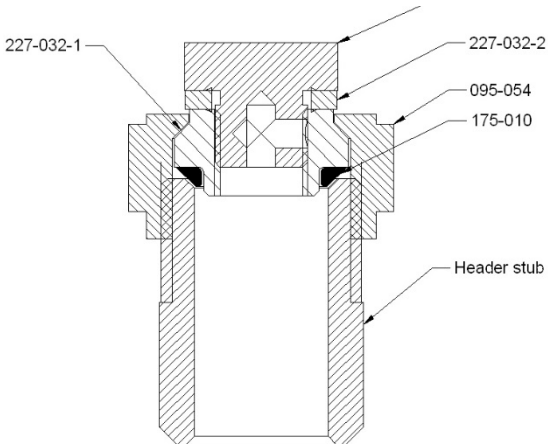
6.17 Vent and Drain Connections

Rilsan coated Formed and fabricated headers

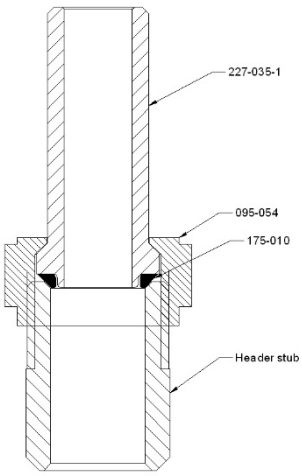
Subject to the application, two main differing types of vent and drain connection may be fitted:-

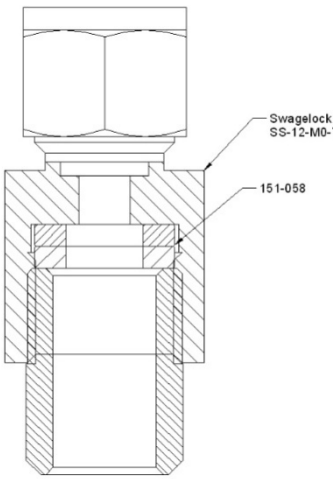
1. A non-ferrous boss silver soldered into the steel header. The boss is fitted with a ¼" BSP parallel plug with an o-ring seal under the head. Boss size and thread may vary subject to contract requirements.

2. Welded in stub pipe with an external thread, fitted with a non-ferrous ring nut which can employ several different fittings depending on application. Normally it is not necessary to undo the ring nut as venting/draining can be carried out on the fitting. See below.



Other attachments





It is not permissible to direct couple pipe work to the stub unless the fitting seals with a sealing washer on the end.

Grid and cover headers

The grid will have ¼" BSP threaded ports fitted with a parallel plug having an o-ring seal under the head. The plug is cross drilled so that venting can be safely carried out without completely removing the plug.

7. Fault Finding

Fault	Possible Cause	Remedy
Heat exchanger has insufficient capacity	There is air in the fluid side	Vent and top up as necessary
	Operating conditions are different to design	Adjust the operating conditions to the specified design
	The heat exchanger is fouled	Clean the heat exchanger
	The heat exchanger has been piped incorrectly	Check and remedy any problems found
	Gasket pass partition has been displaced	Reposition or replace gasket.
	The fins are damaged or dirty	Clean and re-align the fins
Heat exchanger is leaking	Gasket faces dirty or damaged	Check and clean gasket faces. If found to be damaged contact STT
	Defective gasket	Replace gasket
	Bolts incorrectly tightened	Check and re-tighten to the recommended torque
	Defective tube	When a tube is defective it can be blocked as an emergency measure using plugs on the inlet and outlet sides. This may only be done after consulting and obtaining permission from STT
	External forces / stresses	The installation must be stress and vibration free. Check cause and remedy any fault found.
	Defective tube to tube plate connection	Contact STT to replace a tube or repair the heat exchanger.

8. Spares

8.1 Ordering Spare Parts



Spare parts can be ordered directly from STT. The following information is required as a minimum:-

Project / order number
Description / model of product (see GA)
Description of part (see GA)
Equipment Serial Number (See Cooler Nameplate)

8.2 Recommended Spares



Please contact our Spares Department for an up to date spares listing:

t: +44 (0)1296 487171
f: +44 (0)1296 436805
mail@sterlingtt.com

9. Customer Service

9.1 How to Contact Us

Full contact details are given on the rear cover of this document

9.2 Complaints Procedure

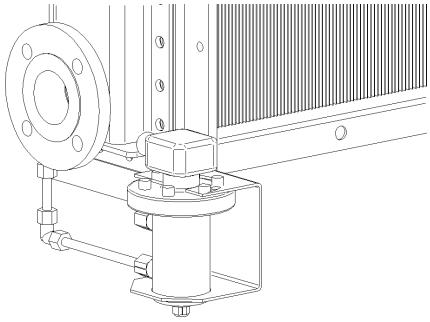
In the event of any malfunction, complaints or dissatisfaction with this equipment, please contact the STT Service Department using the contact details on the rear of this document

10. Optional Extras

10.1 Leak Detection Package

Float Type

Periodically open leakage detector sump and ensure that it is clean, test operation of alarm by manually lifting float. Inspect leak detector pipes to ensure they are not clogged.



Ultrasonic type

These are self-checking and have an indicator to show system health.

10.2 Pressure Relief Package

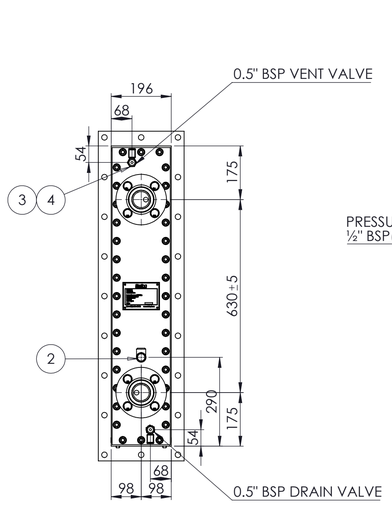
A pressure relief valve may be supplied to protect the equipment form over pressure. This will be set at an agreed value for the equipment – normally the design pressure. The discharge port must be kept free from any obstruction or foreign matter. If discharging during normal operation check system for overpressure and / or valve for failure with a view to replacement.

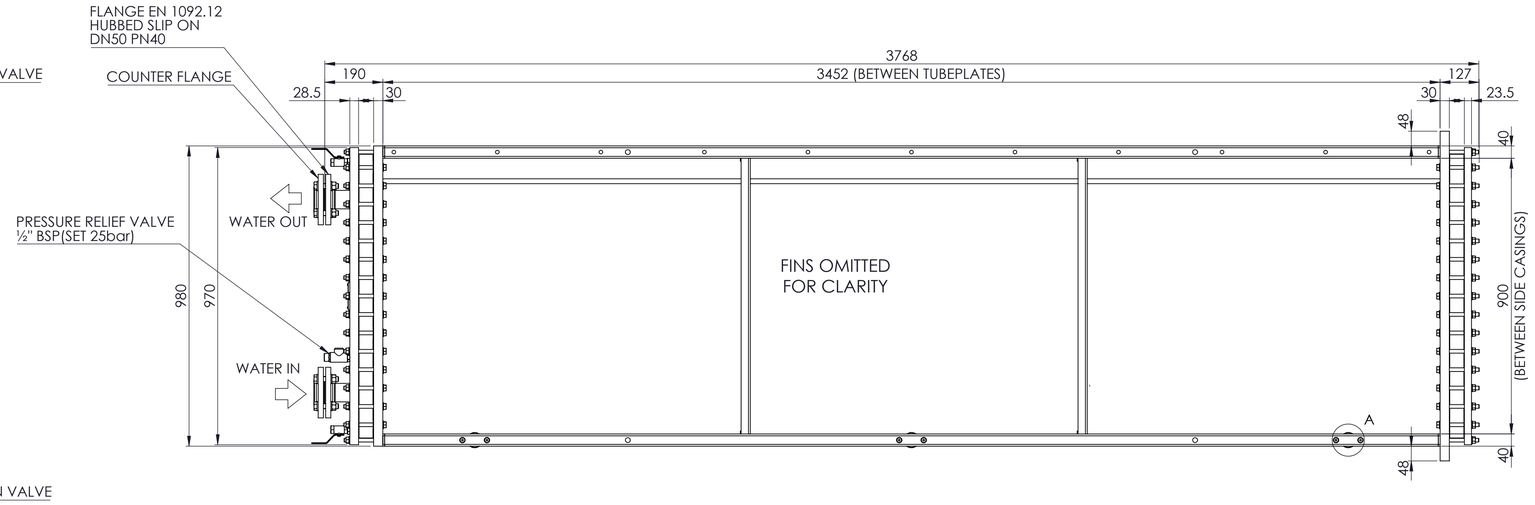
Sterling Thermal Technology Limited

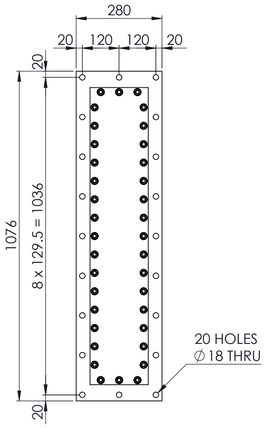
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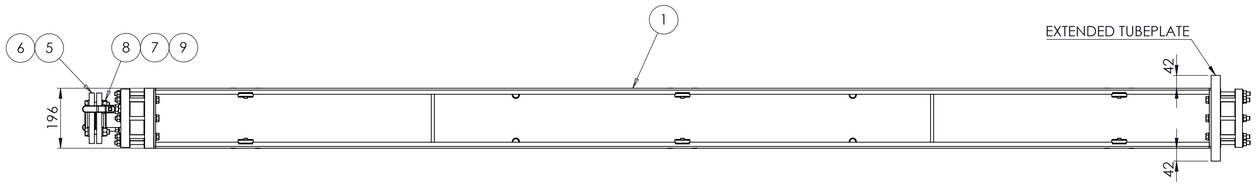
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REVISION							
REV.	REASON FOR CHANGE	ECN	DRAWN	DATE	CHK'D	DATE	APP'D	DATE
B	ELEMENTS WERE BOLTED TOGETHER	5833	JJW	21-02-18	AP	21-02-18	AP	21-02-18











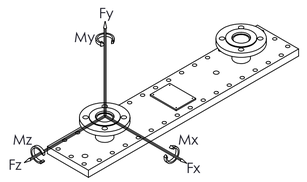
DETAIL A
SCALE 1 : 5

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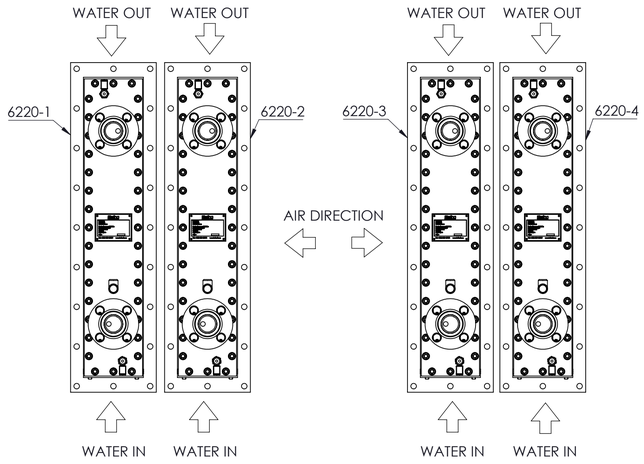
1) SEE SIEMENS DESIGN AND DATA SHEET: DPPPG-70152425 REV A
2) NO PIPE WORK LOADS TO BE CARRIED OUT BY THE COOLER CONNECTIONS - AS TABLE BELOW
3) MASS PER ELEMENT - 425 KG
4) MASS PER PAIR OF ELEMENTS - 852KG
5) APPROX. VOLUME PER ELEMENT - 47 LITRES
6) DESIGN TEMPERATURE 94 °C
7) DESIGN PRESSURE 25 bar g
8) TEST PRESSURE 37.5 bar g
9) NAMPLATES - ENGLISH

MATERIALS & FINISH
TUBES: COPPER NICKEL 90/10
FINS: ALUMINIUM, NATURAL
SIDE CASINGS AND INTERMEDIATES: GALVANISED STEEL SHEET BS EN10346, GALVANISED
FASTENERS: CARBON STEEL GRADE 8.8 DELTA-TONE

TUBEPLATES, HEADERS AND GRIDS: CARBON STEEL BSEN10025 S275 JR
WATERSIDE: EPOXY PAINT 525µm RA
AIRSIDE: TO SIEMENS SPECIFICATION TLV13-047 REV B 3.3.1 (INDOOR)
60µm INTERCURE 200, 60µm INTERTHAN 990
TOTAL 120 µm RA. COLOUR RAL7030



ALLOWABLE PIPEWORK LOADS								
DN	MAX FORCE				MAX MOMENT			
	Fx	Fy	Fz	Fres	Mx	My	Mz	Mres
50	1024	1335	1024	1970	149	243	149	322
NOTE: TABLE FOR REFERENCE ONLY SEE DPPPG-70152425 Rev A								



VIEW OF ELEMENTS INSTALLED ARRANGEMENT

EG000367	VILNIUS BIOMASS	DPPPG-70152426

US and EU Export Controls
Technology Classification:
ECCN: EAR99 AL: N US-Content: NO

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ITEM NO.	Number	STT Ref	DESCRIPTION	MATERIAL	QTY.
1	51345-04		ELEMENT GA [SINGLE TUBE]		1
2	K22512	K21106	PRESSURE RELIEF VALVE BIS-TS50P25B-½ in BSPP(SET 25bar)	STAINLESS STEEL 316/316L	1
3	K11130	K11130	0.5 ONE PIECE BALL VALVE TYPE 820	STAINLESS STEEL EN 10222-5 / 1.4401	2
4	P004328	086-021	0.5 INCH BSP HEX NIPPLE	STAINLESS STEEL 316/316L	2
SPARE PARTS LIST (PER ELEMENT)					
5	K22493	K22493	FLANGE EN 1092. 12 HUBBED SLIP ON DN50 PN40	CARBON STEEL EN10025 S235 JR	2
6	067-008	067-008	FLANGE GASKET BS EN 1514-1 FULL FACE DN50 PN40	NOVUS 30 (SUPRA)	2
7	098-017		SCREW HEXAGON HEAD M16 x 70	CARBON STEEL GRADE 8 GALVANISED	8
8	115-030	115-030	NUT HEXAGON FULL BS 3692 M16	CARBON STEEL GRADE 8 GALVANISED	8
9	122-040	122-040	WASHER PLAIN [FORM C] BS 4320 M16	CARBON STEEL GRADE 8 GALVANISED	16
10		51345-23	HEADER GASKET (CONNECTION)	KLINGER C-4106	2
11		51345-22	HEADER GASKET (RETURN)	KLINGER C-4106	2
SPARE PARTS LIST (PER FOUR ELEMENTS)					
12	293-007	293-007	CLEANING BRUSH AND ROD SET 0.625in 4M MAX		1

TITLE
CUSTOMER ELEMENT GA [SINGLE TUBE]

UNLESS OTHERWISE STATED ALL SYMBOLS ETC. TO BS.8888 BS.1553 BS.1646 BS.3939 ANSI/AWS A2.4
ALL DIMENSIONS IN MILLIMETRES (mm) MACHINE WHERE MARKED ✓
IF IN DOUBT ASK DO NOT SCALE
TOLERANCES TO BE AS SPECIFIED BELOW UNLESS OTHERWISE STATED

MACHINING		FABRICATION PLATE AND STRUCTURAL WORK					
BREAK ALL SHARP CORNERS AND EDGES 0.40mm MAX	UP TO 100mm ± 0.25mm 100-300mm ± 0.4 mm 300-1000mm ± 0.8 mm	SIZES	UP TO 300mm ± 1mm	300-1000mm ± 1.5mm	1000-2000mm ± 2mm	2000-4000mm ± 3mm	4000-8000mm ± 4mm	8000-12000mm ± 5mm
ANGLES ± 1°		LINEAR						
		⊥ ▱ ○	2	3	4	6	8	10

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MATERIAL
STT REF. No.
FINISH:- SEE JPS
WEIGHT Kg 852

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JOB No. 06220-1P/4P
SCALE 1:20
SHT SIZE A1
DRAWING No. 51345-02
SHT OF SHTS. 1 OF 1
REV. B

SIEMENS

Cooling System – Top Mounting

Installation and Maintenance Guide

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1 Preliminary Remarks

This Installation and Maintenance Guide describes the structure and installation of the cooler hood on the generator, and provides instructions for inspecting and maintaining the air/water heat exchangers.

NOTE

In some cases, the structure of the hood and heat exchangers described in this guide may differ from the versions actually supplied.

Fig.1: Cooling system, deflection chamber side



Fig.2: Cooling system, water inlet side (left) and leakage air filter



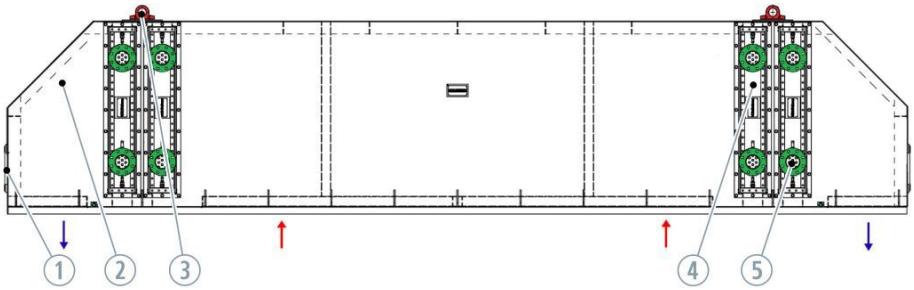
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2 General Safety Instructions

- Secure all loose and movable parts.
- Avoid impacts and suddenly changing stresses on the hood.
- Wear appropriate protective clothing, and hearing protection to prevent hearing impairment.
- Do not wear any jewelry or loose clothing.
- Adequately ground all connected electric circuits to prevent electric shocks.
- Do not drastically change the operating conditions.

3 Description of the Cooling System

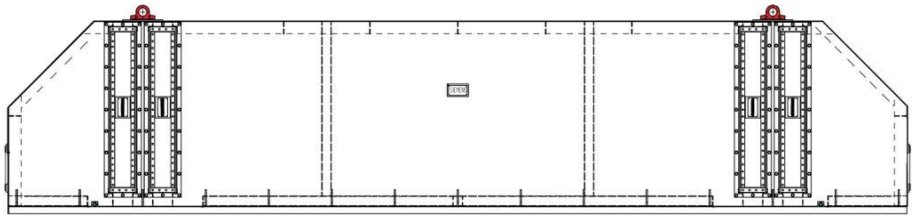
Fig.3: Cooling system, view of the water connection side



1 Inspection hatch with leakage air filter
2 Cooler hood
3 Eyebolt
4 Heat exchanger
5 Water connector

Warm air
Cold air

Fig.4: Cooling system, view of the deflection chamber side



3.1 General Information

The generator is equipped with a cooler hood to facilitate totally enclosed water-to-air cooling (TEWAC), which dissipates the operating heat from the interior of the generator.

The cooler hood is mounted on the sound attenuation cover of the generator. The cooling system consists of the heat exchangers and the hood. Any pre-installed electric wiring must be connected to the customer's corresponding terminal boxes. Follow the manufacturer's instructions.

Together the cooling system and the sound attenuation cover keep out dirt, sand, water and moisture. After the generator has been assembled, it is therefore important to mount the cooling system on the sound attenuation cover of the genera-

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tor as quickly as possible. Once the cooling system has been received and unpacked on site, any apertures should be temporarily sealed with foil to keep out dirt, sand, water and moisture.

3.2 Design

Cooler hood

The cooler cover consists of a welded profile frame structure with slide-in frames. Single or multiple, side-by-side heat exchangers are mounted in these frames.

Heat exchanger

Liquid coolant flowing through these heat exchangers absorbs the heat energy from the circulating air. The maximum working and test pressures are marked on the rating plates of the individual heat exchangers. The heat exchangers are housed vertically in the slide-in frames in the cooler hood, and can only be dismounted from one side.

The heat exchangers can be dismounted for maintenance and cleaning purposes. Rollers or sliding elements are mounted on the ends of long, heavy heat exchangers to make it easier to dismount them from the slide-in frames. Follow the manufacturer's detailed instructions when maintaining, cleaning, disassembling and reassembling the individual heat exchangers.

3.3 Enclosure

The enclosure of the cooling system is designed to ensure effective distribution of the cooling air to the heat exchangers and to minimize pressure losses. The interior lining is sound insulated and designed to match the local conditions of the particular customer.

Condensation water troughs

Condensation water troughs with drainage outlets are mounted under the heat exchangers in the cooler hood to prevent condensation water or water leaking uncontrolled from a pipe penetrating into the interior of the generator. The condensation water troughs are fitted with leakage water warning electrodes which signal the uncontrolled escape of cooling water inside the hood. The cabling and function of these warning electrodes must be tested after completion of installation.

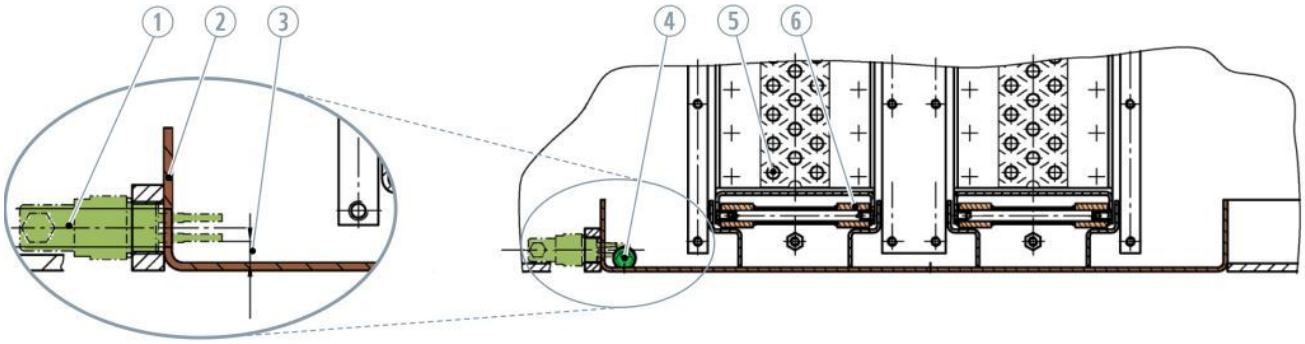


Fig.5: Condensation water trough

1 Leakage water warning electrode
2 Condensation water trough
3 Distance between sensor and trough, approx. 13 mm
4 Four drains for the condensation water trough
5 Heat exchanger
6 Rollers for dismounting the heat exchangers

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4 Transport and Storage

Transport

The cooling system is delivered packed in a transport crate, see Fig. 6.

Eyebolts are provided on the top of the cooler hood for transporting and mounting the cooling system after the packaging has been removed.



⚠ WARNING

Danger of crushing! Risk of damaging the cooling system and generator! The eyebolts are only designed for suspending the cooling system, not for lifting heavy loads.

- Only use the eyebolts for transporting and mounting the cooling system.

Storage

Check the moisture indicators on the packaging every month while the cooling system is in storage in its unopened packaging. No other action has to be taken as long as the indicators remain blue. If the indicators turn pink, the silica gel desiccant in the packaging must be renewed, that is it must be dried separately or replaced.

5 Assembly Instructions

5.1 Unloading the Cooling System from the Transport Truck

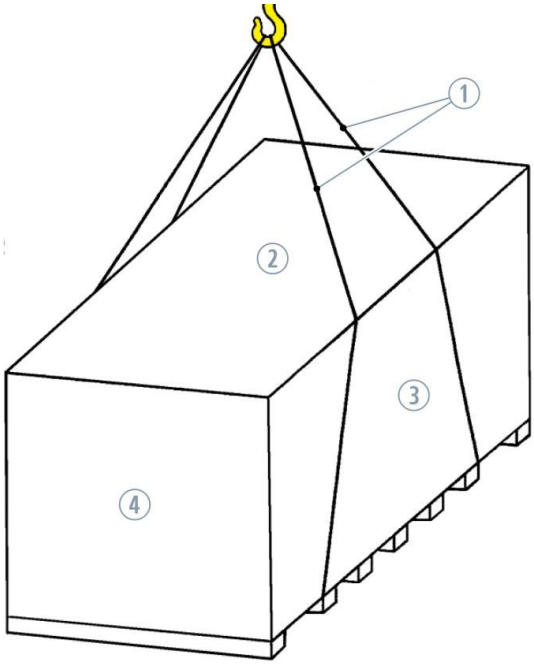


⚠ WARNING

Risk of crushing injuries caused by falling objects!

- Do not stand or walk under suspended loads during the transport work.

Fig. 6: Unloading from the transport truck



1 Steel ropes
2 Cover
3 Side wall
4 End wall

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Work steps

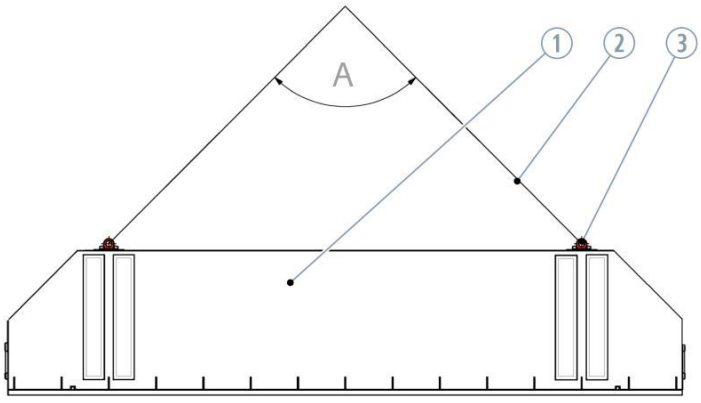
1. Use two steel ropes with an adequate loading capacity.
2. Hitch the transport crate at the marked hitching points (Fig. 6).
3. Lift the crate off the transport truck and lower it onto a flat surface so that it is evenly supported.
4. Check that the packaging and moisture indicators are undamaged.

5.2 Removing the Packaging

Work steps

1. Remove the metal edge protection profiles from the top and bottom of the packaging.
2. Use a nail puller and crowbar to force apart the sides, ends and roof of the packaging. Remove the roof of the crate with a crane.
3. Use a nail puller and crowbar to force apart one side wall from one end wall and the floor.
4. Carefully remove the side wall, the end wall, the second side wall and the second end wall one after the other with a crane.
5. Remove the tie-downs from the floor of the crate, as well as the aluminum and foam foils.
6. Remove the pallet holding the accessory cartons from the floor of the crate.
7. Check the accessory parts against the enclosed packing list for completeness.
8. Inspect the visible outer surfaces of the cooler hood.
9. Hitch each of two load bars or adequate spread angles (for long ropes) to two of the 4 eyebolts provided (Fig. 7). Closed-system load suspension devices, such as hook locks or shackles, must be used.
10. Lift the cooling system uniformly, until the chain slings or rope slings have been extended. The maximum spread angle must not exceed 90°.

Fig. 7: Diagram of the cooling system hitched for transport



1 Cooler hood
2 Four-strand steel rope
3 Eyebolt

A Spread angle of the steel ropes Max. 90°

11. Undo the screws connections holding the cooling system to the floor of the crate, and lift the cooling system carefully.
12. Remove the floor of the crate.

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13. Inspect the cooling system, including the heat exchangers and internal parts. Remove all desiccant bags.

5.3 Mounting the Cooling System

Prerequisites

- ✓ The sound attenuation cover of the generator must be clean and dry.
- ✓ All transport covers have been removed from the sound attenuation cover.
- ✓ Any necessary blind covers have been mounted on the sound attenuation cover (terminal board bushings/phase leads).
- ✓ The cooler hood must be clean and dry.
- ✓ The rubber seal in the flange area of the hood must be undamaged.

NOTICE

Dirt hazard!

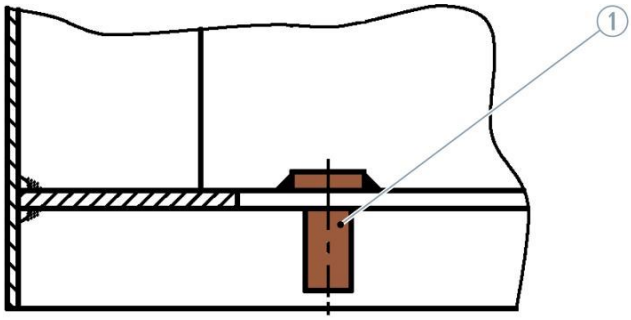
If the cooler hood is dirty, the required standard of cleanliness of all the air-carrying components is no longer ensured.

- ▶ Keep the cooler hood clean, and clean it thoroughly before mounting it on the generator.
- ▶ Do not leave any loose parts, such as nuts and bolts, in the cooler hood.
- ▶ Do not perform any work that creates dirt or chips, such as grinding and welding, near the open hood.

Work steps

1. With the cooling system in its normal orientation, attach the ropes to the 4 eyebolts with a maximum spread angle of 90°. Use four-strand load suspension devices with an adequate loading capacity (Fig. 7).
2. Lift the cooling system with the crane over the generator sound attenuation cover and, with it suspended horizontally, align it in the longitudinal direction with the flange of the sound attenuation cover.
3. Lower the cooling system carefully so that the 4 guide bolts go into the 4 guide-bolt holes at the corners of the sound attenuation cover (see Fig. 8).

Fig. 8: Führungsbolzen der Kühlerhaube



1 Guide bolt

4. After the cooling system has been lowered onto the sound attenuation cover, bolt the cooler hood air-tight with bolts which may have been provided (option if there is a higher risk of earthquakes).
5. Connect the supply and return pipes to the water connection side of the heat exchangers. Welding neck flanges, as counterflanges for the heat exchanger flanges, are optionally premounted or supplied loose together with corresponding hexagonal nuts, bolts and gaskets. Install shut-off valves in the supply and return pipes.

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NOTICE

- Check the direction of flow in the supply and return pipes to the flanges of the heat exchangers.
- Lay the pipes stress and torque-free, so that no forces are transmitted to the connectors. Use compensators. Install connecting pieces, for pressure and temperature tests during commissioning.

6. Mount the pipes for draining and venting the heat exchangers with appropriate holding clamps (Fig. 9).

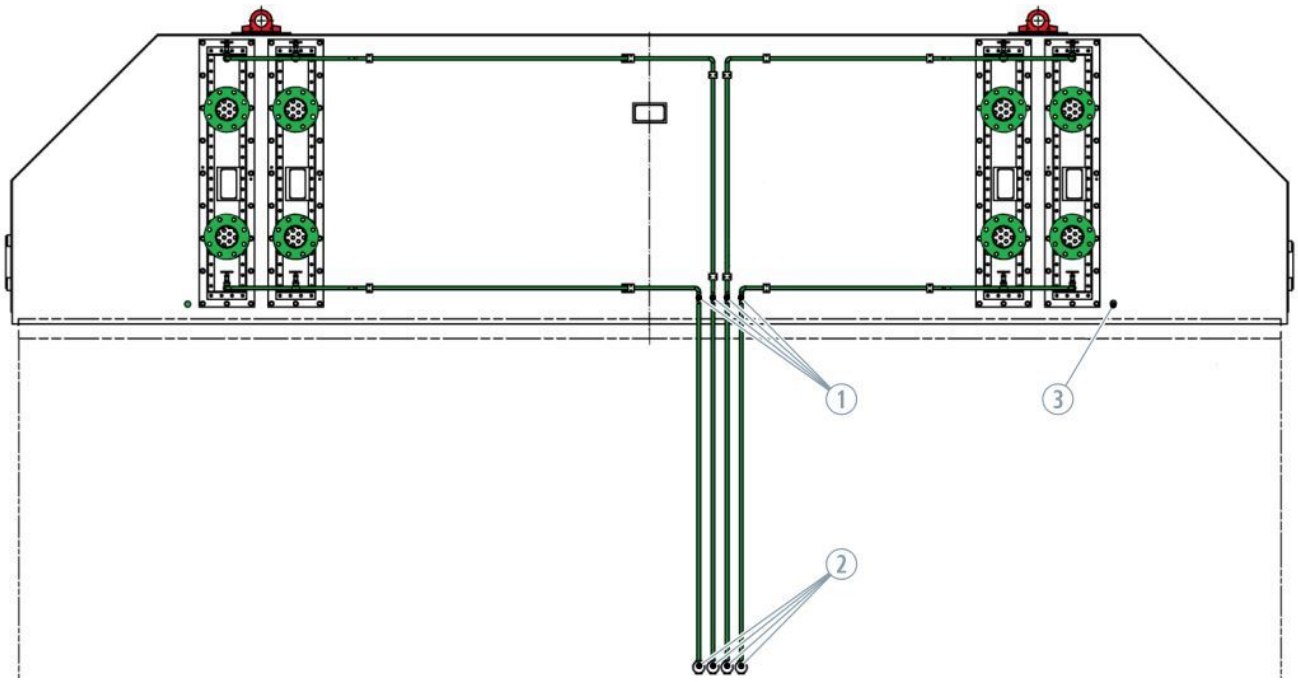


Fig. 9: Pipes for draining and venting the heat exchangers

1 4 x screw joint
2 2 drains, 2 vents
3 Condensation water trough drain (one on each side)

7. Mount or check the filter mats in the mounting frames of the leakage air filters.
8. Mount the leakage water warning electrodes and/or make the electrical connections. Check that the condensation water troughs are clean before installing the leakage water warning electrodes.
9. Safely ground all mounted components. Connect the intended grounding points between the cooler hood and generator cover.

NOTICE

- If necessary climb into the inside of the hood through the inspection hatches: Before doing so, empty all pockets, remove watches and jewelry.
- Do not leave any loose parts, such as nuts and bolts, in the cooler hood.

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5.4 Mounting the Heat Exchangers

The cooling system is usually delivered with the heat exchangers already mounted, however in exceptional cases they have to be mounted on site.

NOTE

When mounting and dismounting the heat exchangers observe the following without fail:

- The manufacturer's technical documentation
- Use the spare parts recommended in this documentation
- The available clearance above the cooling system

Trained personnel should perform the necessary water pressure tests on the heat exchangers, before the units are installed in the hood, and connected and commissioned (see page 14).

Measures during installation

- All pipes and flange connections must be laid stress and torque-free to the heat exchangers, and seals fitted that are appropriate for the water quality, pressure and temperature.
- The cooling water should be neutral and free from contamination. Prepare with anti-corrosion agents, pH regulator and/or antifreeze according to the on-site conditions.
- A suitable filter can be fitted on the cooling water inlet during the first commissioning to prevent blockages in the cooling pipes. Check or clean the filter, and remove after connecting the water unit.
- If necessary, vent and subject the cooling system to overpressure so that all heat exchangers can work optimally under all operating conditions.

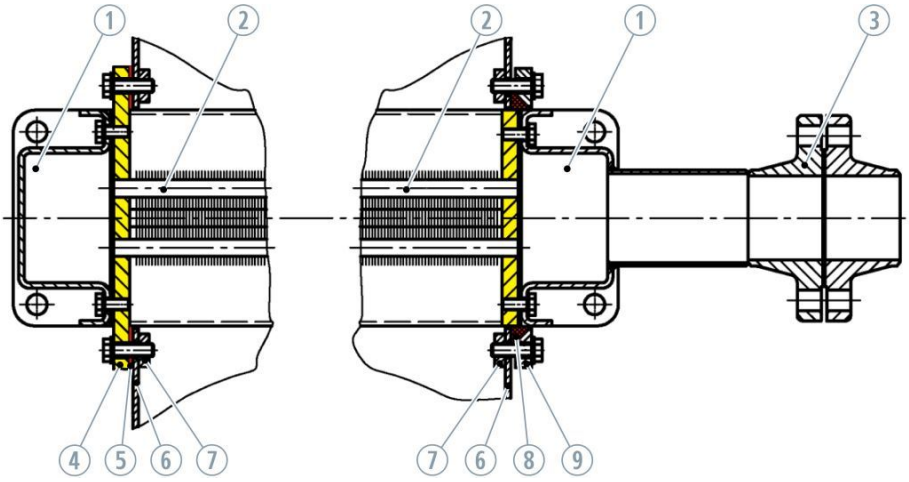
NOTE

When mounting and dismounting the heat exchangers and pipes, observe the following without fail:

The heat exchangers are only bolted tightly to the hood enclosure on one side of the cooler hood, and sealed with a rubber-frame gasket. The other side of the cooling unit is not bolted to the hood, but sealed to the flange of the hood by a rubber profile (e.g. an O-ring). A pressure frame holds the rubber profile in place. This arrangement allows the heat exchangers to expand and contract in response to changes in temperature (Fig. 10).

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Fig. 10: Heat exchanger, bolted connections



1 Water chambers
2 Cooling tube
3 Water inlet/water outlet flange
4 Projecting tube sheet
5 Flat gasket
6 Enclosure
7 Bolt-on strip
8 Round cord seal
9 Clamping frame

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6 Commissioning the Cooling System

Before commissioning

- Before commissioning the cooling system after a lengthy period of storage (over 3 months), retighten the bolted joints of the chambers of the individual units. Observe the sequence of work and torques specified by the corresponding manufacturers. Check all seals, and replace if they are more than two years old.
- Check that the cooler hood has been properly mounted with a seal on the generator to prevent the uncontrolled escape of cooling air.
- Check that all additional units, such as leakage water warning electrodes and thermometers, have been connected correctly.
- Fill the cooling system pipes with clean coolant, and vent the heat exchangers at the highest point above the vent lines. Open the supply valves little by little to avoid water hammer. The flow rate of the coolant should be regulated solely by the return valves, whereas the supply valves remain fully open. Close the venting valves when there is a smooth flow of water in the vent lines and they do not contain any air.

Checks and measures after the first commissioning

- Check the pressure and, if necessary, the flow rate to the heat exchangers.
- Check all connections and the heat exchangers for water leaks.
- Check the system for vibrations and unusual noises.
- Drain any condensed water from the condensation water troughs below the heat exchangers through the screwed drain plugs.

NOTE

If corrosive coolants (e.g. water) are used, continuous operation of at least 2 months is required to build up a passive protective coating on the metal surfaces.

7 Regular Inspections and Control List

Regular inspections and checks have to be made to ensure trouble-free operation of the cooling system. The times for inspections and checks are to be taken from the Maintenance and Inspection sections of this manual.

Inspection

In general, the following checks are recommended:

- Visual inspection of the general condition of the system
- Check for dirt and damage on the outside surfaces
- Check the surfaces of the cooling fins for blockages and damage
- Check the pipes for blockages and damage
- Check for water leaks in all areas
- Check the water pressure or, if necessary, the flow rate
- Check and clean the leakage air filters, if necessary Replace the filter mats
- Check for vibrations and unusual noises
- Check water-carrying parts for corrosion
- Check the function of the safety devices, such as the leakage water warning electrodes

8 Decommissioning the Cooling System

Work steps

1. Shut down the generator.



⚠ CAUTION

Danger of burns if the heat exchangers have not yet cooled down.

▶ After the generator has been shut down, the cooling water pumps should continue to run for some time to dissipate the residual heat.



NOTICE

▶ When necessary, climb into the inside of the hood through the inspection hatches: before doing so empty all pockets and take off watches and jewelry.

▶ Ensure that no loose parts, such as nuts and bolts, are left in the cooler hood.

2. Shut down cooling water pump.
3. Depressurize the system: first shut the return valves, and then the supply valves.
4. Disconnect the power supply to the leakage water warning electrodes.
5. Drain and vent the heat exchangers through the corresponding pipes.

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9 Maintenance and Cleaning

NOTE

When maintaining and cleaning the heat exchangers, follow the manufacturer's technical documentation and use the recommended spare parts without fail. The following sections contain only general instructions.

NOTICE

Risk of damaging the heat exchangers.

- Have the cleaning work done by an expert.

The heat exchangers have to be cleaned to maintain a good heat transfer and avoid corrosion. It is recommended to remove the heat exchangers for cleaning from the slide-in frames of the cooler hood. When refitting, ensure that there is a correct seal between heat exchangers and enclosures (see also the pipe fitting instructions on page 9).

The documentation of the manufacturer of the heat exchangers must be followed without fail.

Fig. 11: Dismounting the heat exchangers





9.1 Cleaning the Air-Side of the Heat Exchangers

The external hot surfaces of the heat exchangers, whether mounted or dismounted, are preferably vacuum cleaned. When dismounted, they can also be cleaned with dry compressed air. When blowing out, ensure that the cooling air is blown out in the opposite direction to the normal air flow.

If the external hot surfaces are cleaned with water and a pH-neutral cleanser, subsequently blow out the heat exchangers with compressed air, and dry with hot air.

NOTICE

The compressed air can damage the cooling fins.

- Use the compressed air carefully.

9.2 Cleaning the cooling pipes of the heat exchangers

Work steps before cleaning the cooling pipes

1. Drain the heat exchangers and remove all operating materials.
2. Dismount the heat exchangers from the hood.
3. Dismount the water chambers by undoing the screwed connections.
4. If there are tapped holes in the water chamber flange for screwing in forcing-off screws, use these screws to carefully force off the chamber.

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Cleaning the cooling pipes

Loosely adhering dirt is cleaned off the internal pipes by means of oil-free compressed air. Clean out firmly adhering dirt with a high-pressure water jet (maximum temperature: 90°C). The spray must be directed in the opposite direction to the flow of the coolant. Only use pH-neutral cleanser (pH 6.0 to 7.5) for cleaning. As a rule all, all washing up liquids lie within this range. A round nylon brush of the appropriate diameter can also be used for cleaning, here again use it against the direction of flow of the coolant.



NOTICE

Danger of damaging or removing the passive protective coatings from the surfaces of the heat exchangers during the cleaning process.

- A method that does not damage the protective coating is preferred for mechanically cleaning the internal pipes of the heat exchangers.
- Do not clean heat exchangers by poking mechanically or with a wire brush, and do not bore out blocked pipes.

If the usual mechanical methods are unsuccessful, chemical cleaning of the cooling pipes can be considered.



NOTICE

With chemical cleaning, there is a risk of burning the cooling pipes.

- The cleaning process should only be carried out under the supervision of a chemist, who specifies the concentration of the cleansing solution and the duration of application according to the degree of contamination and the pipe material.
- Alkaline and acidic cleansers must not be used.
- Ensure that all chemical residues are thoroughly flushed out with water after the cleaning process.

Work steps after cleaning the cooling pipes

1. When re-assembling the water chambers, ensure that the guide plates and diverter plates are correctly oriented in their correct places.
2. Fit the water chambers with new seals, and tighten the screwed connections with the specified torques. The screwed connections are tightened alternately, diagonally from the inside to the outside to ensure that the seals settle evenly.
3. After re-assembling the heat exchangers, ensure that seals used are fully functional. Make a water-pressure test to check the tightness of the heat exchangers (see page 14).

9.3 Cleaning the Water Chambers

Clean the water chambers with water, commercial, pH-neutral cleanser and a nylon brush. Follow the manufacturer's instructions.



NOTICE

Risk of damaging or removing the corrosion protection in the water chambers.

This may lead to pitting and irreparable damage to the water chambers.

- If the corrosion protection becomes detached it has to be renewed.

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9.4 Cleaning the Cooler Hood

Vacuum clean the insides of the cooler hood and the sound attenuation cover of the generator (in as far as they are accessible) and wipe down with a damp cloth. Add commercial pH-neutral cleanser to the wiping water. Finally, thoroughly dry the damp surfaces.

10 Reworking, Repairing and Testing the Heat Exchangers

If leaks occur in the heat exchangers, the procedures for testing and repairing the components should always be agreed with the responsible department of Siemens AG. Leaks in the area of the chambers, seals and shell can usually be localized from the outside. A leak should be repaired by skilled personnel according to its type and position.

If a leak cannot be found from the outside, it has to be localized by a leak test of the heat exchanger. Depending on the type of heat exchanger and the suspected position of the leak, test for leaks either from the outside (shell side) or the inside (chamber space). The leak test localizes the defective pipe or the position of the leak. If the heat exchanger has been dismounted, test for leaks with the medium suitable for the particular operating material of the shell or chamber space. The pipes and water chambers are tested for leaks from the inside by, for example, **water pressure tests**, and from the outside after, for example, weld repairs by the **dye penetration test**. The most frequent **leaks** are **in the weld seams of the water chambers** and **leaks in the pipes in the joints of the chamber floors**.

10.1 Water pressure test

The water pressure test on the heat exchanger ensures that there are no leaks in the expansion and connection elements, seals, welded chambers or fitted pipes.

Equipment

The following equipment is required to perform a water pressure test:

- A hand water pump with adequate capacity for the specific test pressure
- A calibrated manometer
- Connecting hoses or elements



NOTICE

Risk of damaging the heat exchanger.

▶ Allow the water pressure test to be performed only by trained personnel.

Work steps

1. Connect the pump to the inlet flange of the heat exchanger, and mount the manometer on the outlet flange.
2. Mount all other parts as shown in Fig. 12.
3. Fill the heat exchanger with water, and vent it through the air cocks on the water chambers.
4. Close the air cocks and gradually increase the water pressure to the specified test pressure.
5. Monitor the test pressure for at least 2 hours.
6. All parts of the heat exchanger - such as chambers, pipes, seals, welded seams - are tested during the pressure test. During the pressure test there should be no measurable pressure fall on the manometer.

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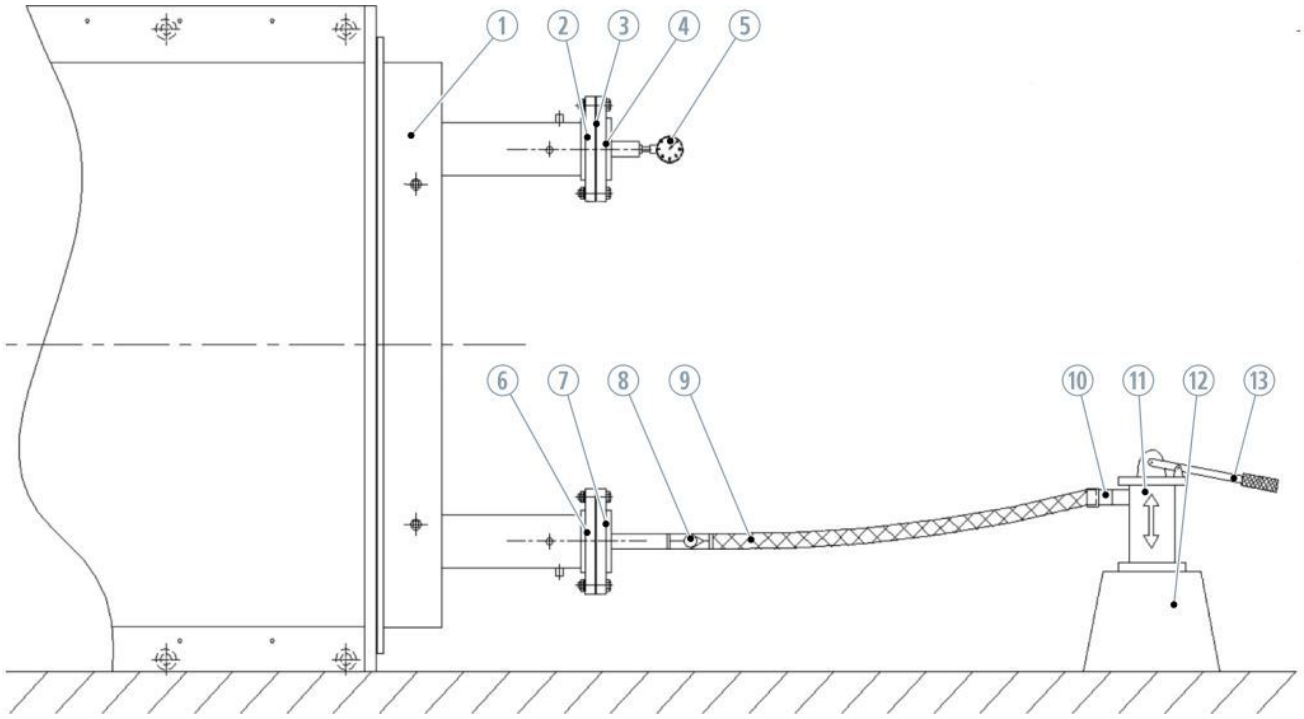


Fig. 12: Connecting the heat exchanger for the water pressure test

1 Heat exchanger
2 Water outlet flange
3 Gasket
4 Blind flange
5 Pressure gauge
6 Water inlet flange
7 Connecting flange
8 Non-return / cut-off valve
9 Hose
10 Hose union
11 Manual pump
12 Reservoir
13 Pump handle

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10.2 Dye Penetration Test after Weld Repairs

NOTICE

Risk of damaging the heat exchanger.

- Always have the dye penetration test performed by an expert.

The dye penetration test can test surfaces and weld seams for the smallest cracks and openings in the surface. It serves to prove that there are no leaks after weld repairs to the cooling system. The smallest faults are made visible by a colored penetration agent and a developer with high color contrast to the penetration agent.

10.3 Leaks in the Weld Seams of the Water Chambers

NOTICE

Risk of damaging the heat exchanger.

- Allow necessary tests of weld seams and weld repairs to be performed only by trained, authorized personnel.

Work steps

1. During the pressure test, mark possible leaks in weld seams with chalk or paint.

2. Reduce the pressure and drain the heat exchanger. If necessary, blow the heat exchanger dry with compressed air to remove all traces of moisture.
3. Use a dye penetration test to find whether there is a leak at the affected spot.
4. Regrind the defective spot and weld the crack.
5. Then perform another dye penetration test to check the weld seam.
6. Remount the heat exchanger, and perform another pressure test.

10.4 Leaks in Pipes in the Joints of the Chamber Floors



NOTICE

Risk of damaging the heat exchanger.

▶ Allow the repairs to be performed only by trained personnel.

Work steps

1. During the pressure test, mark pipe leaks with chalk or paint.
2. Reduce the pressure and drain the heat exchanger. If necessary, blow the heat exchanger dry with compressed air to remove all traces of moisture.
3. Remove the affected water chambers.
4. If the damaged spot is not obvious, search for the leak in the tube sheet with a light. If necessary, test the pipes individually.
5. Check the bore of the pipe at the joint, and widen the joint.
6. If the affected pipe still leaks after another pressure test, seal both ends of the pipe with conical copper plugs, and braze the pipe and plug together. A suitable two-component adhesive can also be used.



NOTE

Alternatively, the defective pipe can be replaced by a new one. Whether this exchange is made depends on whether a replacement is available, and the time frame involved. In this case contact Siemens AG.

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GEWICHTSTABELLE TABLE OF WEIGHTS	
KUEHLERHAUBE COOLER COVER	5730 kg
KUEHLERHAUBE MIT KUEHLERN COOLER COVER WITH COOLING ELEMENTS	7430 kg
KUEHLERHAUBE MIT GEFUELLTEN KUEHLERN COOLER COVER WITH FULL COOLING ELEMENTS	7618 kg

AUFTRAG ORDER	BEZEICHNUNG PROJECT NAME
EG000367	VILNIUS BIOMASS

1. WASSER AUSTRITT
VORSCHWEISSZFLANSCH MIT GEGENFLANSCH EN1092,12 DN50 PN40
WATER OUTLET
WELDING NECK FLANGE WITH COUNTERFLANGE EN1092,12 DN50 PN40
HUBBED SLIP ON

2. WASSER EINTRITT
VORSCHWEISSZFLANSCH MIT GEGENFLANSCH EN1092,12 DN50 PN40
WATER INLET
WELDING NEC KFLANGE AND COUNTERFLANGE EN1092,12 DN50 PN40
HUBBED SLIP ON

3. ENTLUEFTUNG
MUFFENKUGELHAHN 1/2" BSP
VENT
BALL VALVE 1/2" BSP

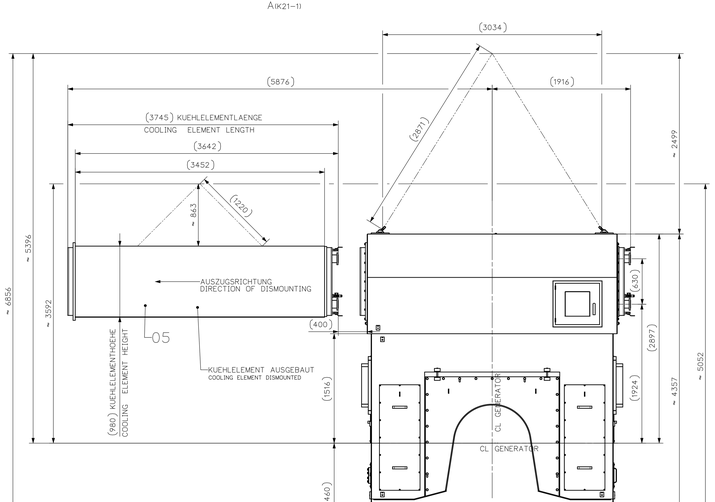
4. ENTLEERUNG
MUFFENKUGELHAHN 1/2" BSP
DRAIN
BALL VALVE 1/2" BSP

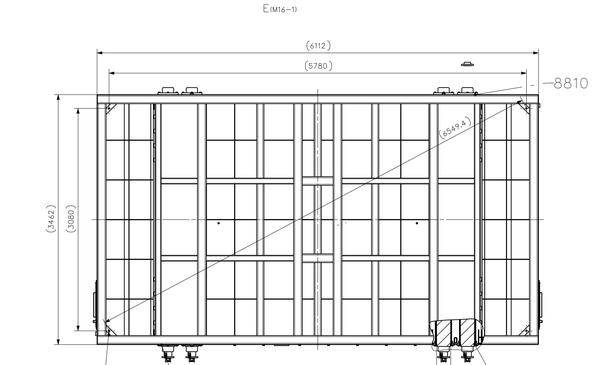
5. SICHERHEITSVENTIL 1/2" BSP
OEFFNUNGSDRUCK 25 BAR
PRESSURE RELIEF VALVE 1/2" BSP
SET PRESSURE 25 BAR

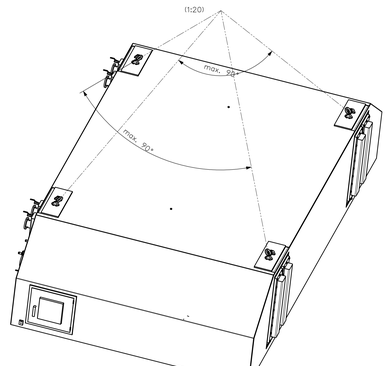
ANZUGSMOMENT POS. 8020: 87 Nm
BOLTING TORQUE IT. 8020: 87 Nm

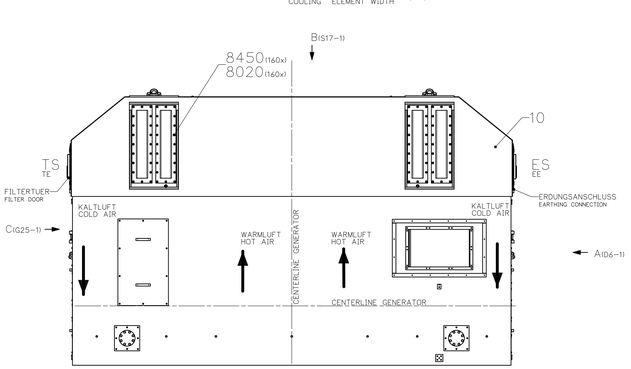
6. Nach Montage Leckwassersensoren nicht genutzte Stopfen mittels Loctite (Pos. 8630) sichern (Anzugsmoment: 30 Nm)
AFTER INSTALLATION LEAKAGE (IT.8630) WATER SENSORS SECURE UNSUED PLUGS WITH LOCTITE (TIGHTENING TORQUE: 30 Nm)

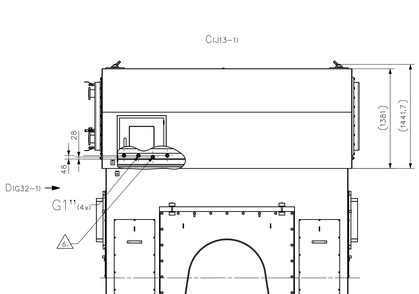
ACHTUNG! LUFTRICHTUNG AN KUEHLELEMENTEN BEACHTEN!
CAUTION! PAY ATTENTION TO AIR DIRECTION OF THE COOLING ELEMENTS

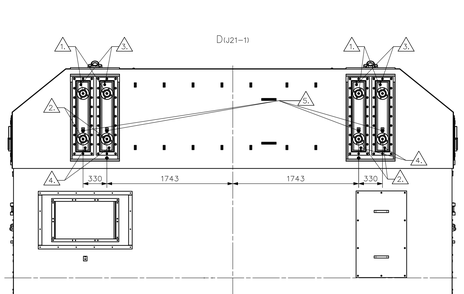


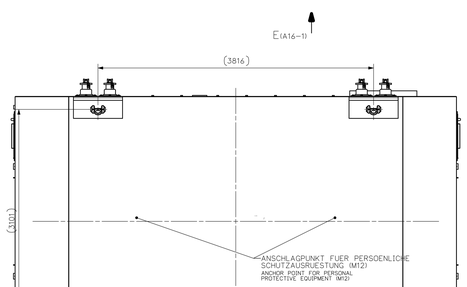












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WEIGHT: SEE TAB	SCALE: 1:20	SPEC.: KUN351.00	
ORIGINATED:	2018-01-17 Behnke	TITLE:	SFA5702 COOLER COVER
CHECKED:	2018-01-17 GOETZ		GENERAL DRAWING
RELEASED:	2018-01-17 Behnke		Kuehlerhaube Uebersichtszeichnung
CONFIDENTIAL		LANG. - DRAWING NO. / VALUE:	DPPPC-70156503
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		REV.: A	SHEET: 1/1
			1:5A

SCHWEISSANGABEN/WELDING PROCEDURE INFORMATION

WERKSTOFF	/ BASE MATERIAL	:	S235JR (X6CrNiTi18-10)
ZUSATZWERKSTOFF	/ FILLER MATERIAL	:	G4Si1; (G18 8Mn)
SCHWEISZVERFAHREN	/ WELDING PROCESS	:	MAG
SCHWEISZNAHTGROESSE	/ WELDING THICKNESS	:	▷ a2;a3;a4;a5;a6;a8;∨;∨;∨ ;
PRUEFUMFANG nach	/ TEST SCOPE ACCORDING TO	:	PV00260-00000
BEWERTUNGSGRUPPE	/ CLASSIFICATION GROUP	:	DINENISO 5817 – C
PRUEFSTUFE	/ TEST CLASS	:	S

OBERFLAECHE OHNE ANHAFTENDE SCHWEISZSPRITZER
SURFACE WITHOUT ADHERENT WELD SPLATTER

FREI VON SCHWEISSSPRITZERN UND STRAHLGUT!
NO WELD SPLATTERS AND BLASTING MEDIUM

ZULAESSIGE WELLIGKEIT DER AUSSENBLECHE: SMM/M²!
ALLOWED SURFACE RIPPLE: SMM/M²

AUSSENLIEGENDE SCHWEISSNAEHTE EINEBNEN!
FLAT WELDINGS AT THE OUTSIDE!

UNTERBROCHENE NAEHTE MIT POS. 8610 ABDICHTEN
SEAL INTERRUPTED WELDS WITH IT. 8610

HAUBE IM INNENBEREICH FREI VON SCHWEISZSPRITZERN UND STRAHLGUT!
NO WELD SPLATTERS AND BLASTING MEDIUM INSIDE THE COVER!

FARBGEBUNG SIEHE BGR; SFA5100
FOR COLOR LOOK ASSEMBLY SFA5100

1 GILT FUER ALLE RIPPEN
VALID FOR ALL RIBS

2 IN DIESEM BEREICH UNTER DEN ANHAENGEOESEN ALLE SCHWEISZVERBINDUNG ZWISCHEN BELCHEN UND PROFILEN NICHT UNTERBROCHEN AUSGEFUEHREN
AT THE AREA BELOW LIFTING EYEBOLTS ALL WELDINGS BETWEEN SHEET METALS AND PROFILES EXECUTED NOT INTERRUPTEDLY

3 VORWAERMTEMPERATUR BEACHTEN!
SIEHE SCHWEISZANWEISUNG
OBSERVE PREHEAT TEMPERATURE!
SEE WELDING INSTRUCTION

DPSTP-70000115

4 VORWAERMTEMPERATUR BEACHTEN (MIN. 120°C)!
OBSERVE PREHEAT TEMPERATURE (MIN. 120°C)!

5 POS. 1010 WERKSTOFF: S235JR+Z15
IT. 1010 MATERIAL: S235JR+Z15

6 POS. 1130 VOLLSTAENDIGE ANSCHRAUBBARKEIT MIT POS. 2010 FLANSCHPLATTE AUS BGR. KEUHLERADAPTER PRUEFEN UND LOOSE BEILEGEN
CHECK FULL DRILLING PATTERN IT. 1130 WITH IT. 2010 FLANGE PLATE FROM ASSY. COOLER ADAPTER AND SHIP LOOSE

7 POS. 8900 NACH DEM FINALEN VERSCHWEISZEN VON POS. 1020 UND 1030 ANSCHWEISZEN
WELD IT. 8900 AFTER THE FINAL WELDING OF IT. 1020 AND 1030

NACH SCHWEISZEN GEWINDE PRUEFEN UND GGF. NACHARBEITEN
CHECK THREAD AFTER WELDING AND IF NECESSARY REWORK

8 GILT FUER ALLE POS. 8710 UND 8740
VALID FOR ALL IT. 8710 AND 8740

9 GILT FUER ALLE 4 ECKEN
VALID FOR ALL 4 EDGES

10 UEBER DIE GESAMTE LAENGE ALLER KUEHLELEMENTAUSSCHNITTE ALLE 250mm MESSEN
MEASUERE EVERY COOLING ELEMENT CUTOUT EVERY 250 mm OVER THE HOLE LENGTH

11 GILT FUER ALLE POS. 1040 MIT POS. 1020
VALID FOR ALL IT. 1040 WITH IT. 1020

12 GILT FUER ALLE POS. 1040 MIT POS. 1070
VALID FOR ALL IT. 1040 WITH IT. 1070

ZZ(1:5;D21-1)

ZX(1:5;D20-1)

ZY(1:5;G21-1)

ZU(1:10;A21-1)

ZT(1:2;J20-1)

G(P18-1)

ZU(A33-1)

A–A(K14-1)

N○180°(J18-1)

M–M(D21-1)

DARSTELLUNG OHNE AUSZENBLECHE
VIEW WITHOUT OUTSIDE SHEET METALS

H(H20-1)

ZV○90°(I1;2;S17-1)

AD(I9-1)

NI(B26-1)

F(P17-1)

ZT(A30-1)

H(H5-1)

F–F○90°(H19-1)

G(B18-1)

SICHT AUF TS
VIEW ON TE
L○90°(L14-1)

SICHT AUF ES
VIEW ON EE
K○–90°(L21-1)

ZV(K12-1)

NUR POS. 1020 UND 1030 GEZEIGT
ONLY IT. 1020 AND 1030 SHOWN

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US-CONTENT: NO

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CHECKED:	2018-01-17 GOETZ		
RELEASED:	2018-01-17 Behnke		SFA5702 COOLER COVER 2P

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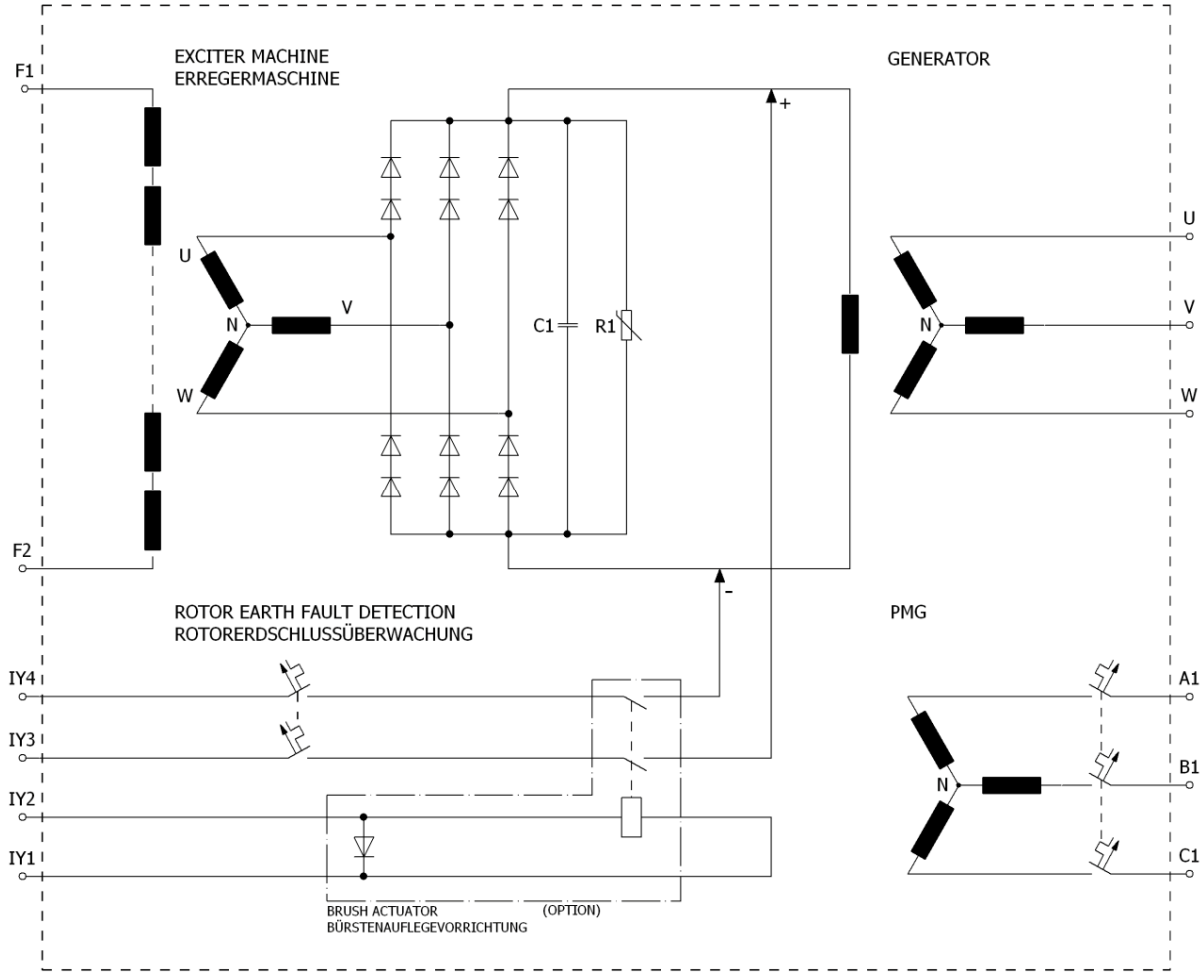
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Excitation System

Exciter Machine

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Siemens AG
Energy Sector



F1, F2	Field winding
IY3, IY4	Ground fault measuring instrument
R1, C1	High Voltage Protection
IY2, IY1	Brush lifting gear

Identification and Electrical Data	**Exciter machine**
Project	Vilnius Biomass
Type	ELR 62/19-30/8-2S
Year of construction	2018
Rating	186,4 kW
Voltage	213 V
Current	875 A
Speed	3000 RPM
Exciter voltage (F1, F2)	60,0 V
Exciter current (F1, F2)	11,8 A

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SIEMENS

Brushless Exciter Machine ELR 62/10 | ELR 62/19

Technical Description

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1.6 Surge Diverter 5
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1 Design and Operating mode

NOTE

For rotor ground fault detection the brushless exciter is equipped either with a pair of slip-rings with brushes or with a telemetric system. The figures refer to the slip-ring version.

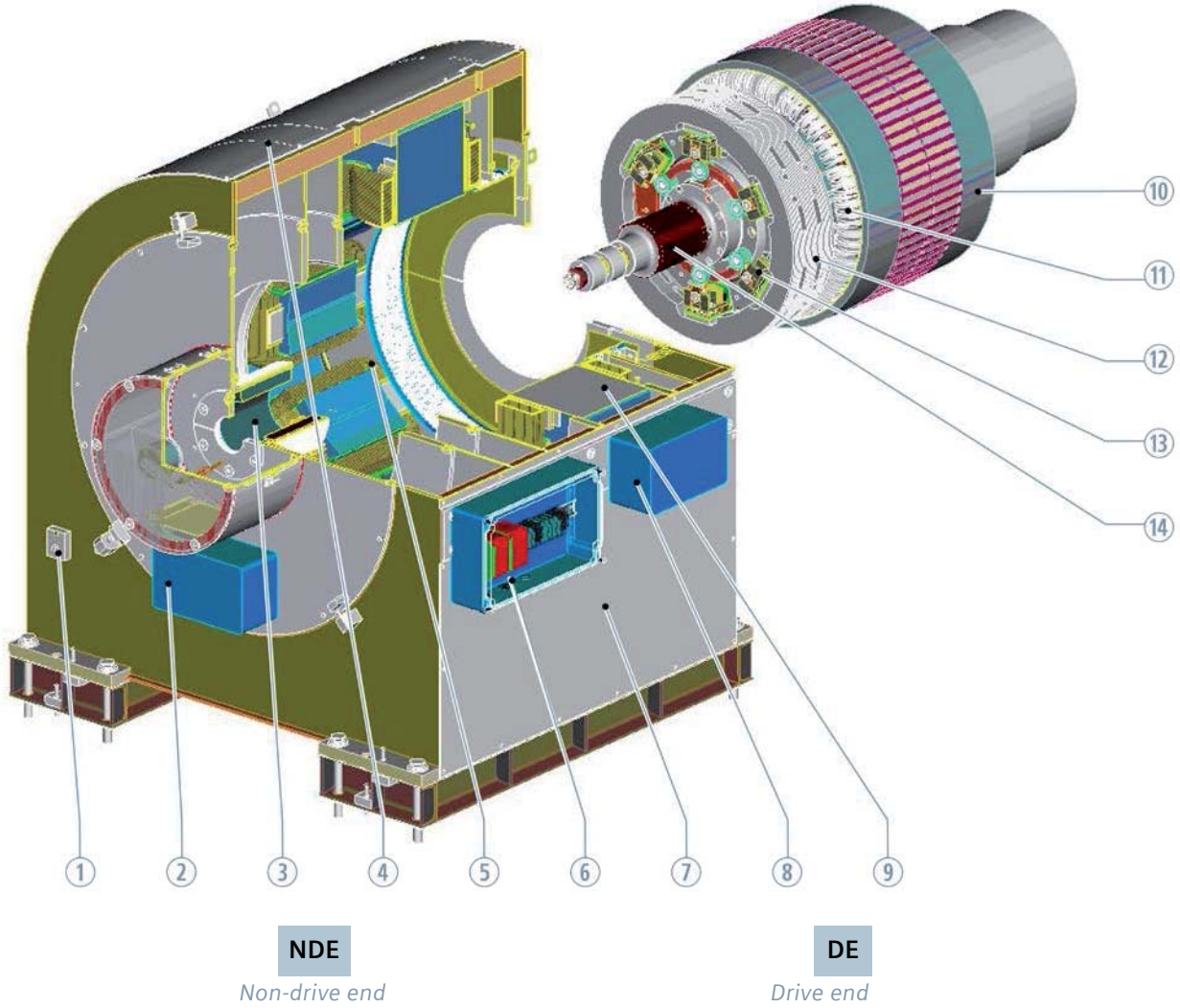


Fig. 1: Main components of the exciter machine

1 Earthing terminal
2 Junction box of ground fault detection
3 Pilot exciter, stator
4 Housing, upper cover
5 Stator winding (field coils)
6 Junction box of pilot exciter
7 Housing, side cover
8 Junction box of field coils and anti-condensation heating
9 Stator active part
10 Rotor active part
11 Rotor winding
12 Diode wheel
13 Rectifier unit with silicon diodes
14 Pilot exciter, rotor

1.1 General

The brushless exciter machine takes the form of an external-pole generator. Its rotor is overhung mounted on the shaft end of the generator. The stator is fixed to the base frame of the generator.

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The field of the external-pole generator is excited by the pilot exciter, which is part of the voltage regulator. Three-phase current flows through the rotor winding as a result. A rectifier unit made of silicon diodes (also see Fig. 3 and Fig. 4) is integrated into the rotor. It is used to rectify the three-phase current and conduct the resulting current through the exciter current conductor in the hollow drilled shaft of the generator to its rotor winding.

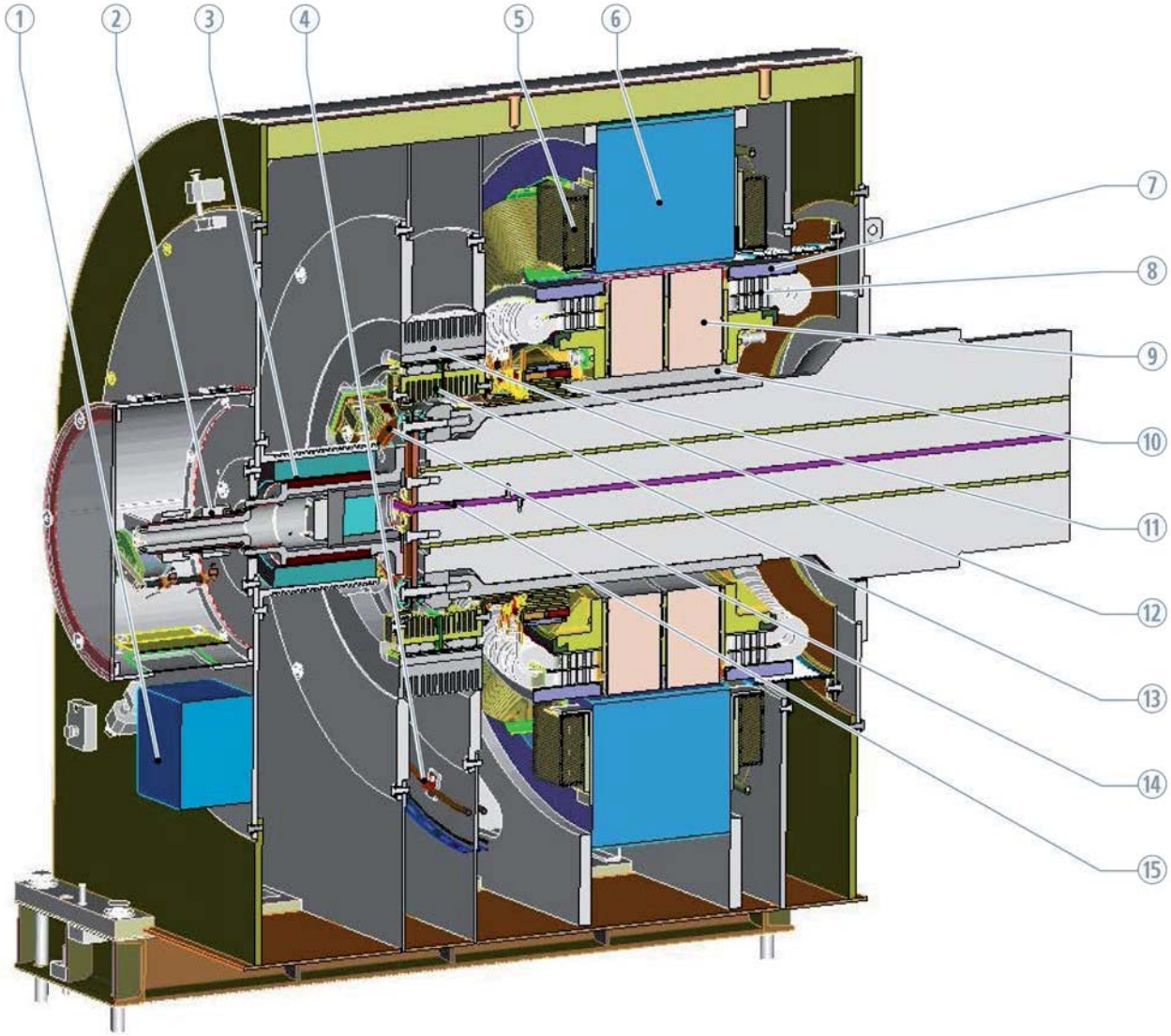


Fig. 2: Exciter machine in operation (longitudinal section)

1 Junction box of ground fault detection
2 Measuring slip rings
3 Pilot exciter
4 Anti-condensation heater
5 Stator winding (field coils)
6 Stator core
7 End winding tape binding
8 Rotor winding
9 Rotor core
10 Rotor hub
11 U, V, W and neutral bus rings
12 Diode wheel
13 Diode module
14 DC power line
15 Cavity for field current lead

1.2 Rotor

The rotor is shrunk onto the shaft extension of the main machine. The rotor hub carries the laminated core on the outer circumference. The diodes are integrated directly in the rotor.

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The three-phase rotor winding inserted into the slots of the laminated core is connected in star. It is a two-layer winding of insulated copper wire with multiple parallel conductors. The free ends of the individual windings are arranged at non-drive end and connected to the U, V, W and neutral bus rings arranged on the same side. The complete rotor is vacuum impregnated with epoxy resin. The winding overhangs are provided with bandings to afford protection against centrifugal forces.

1.3 Stator

The stator consists of a stacked and welded core with integrated poles and housing. The core is manufactured separately, and it is provided with the pole winding. Afterwards the coil ends are connected and the complete stator is vacuum impregnated. The core is welded with the finished housing. An earthing terminal is provided on the housing for the connection of an earth cable. The stator frame is fixed by means of hexagon bolts to the base frame of the main machine and taper dowel pins are used for locating the exciter on the substructure.

The housing base plate is simultaneously used for cooling air inlet and outlet. At both ends the housing has shields equipped with separately fastened fiberboard sealings.

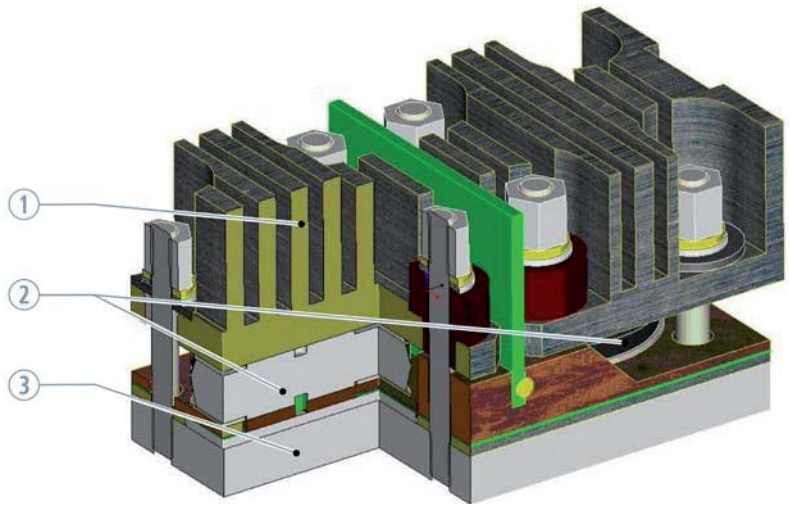
The switch box containing the connections for the earth/ground fault monitoring equipment is located at the end shield of the non-drive end. If a telemetric system is used, the box is arranged at side of the housing.

The control box, which contains the terminal connections for field coils and anti-condensation heater, is also installed at this side. If a pilot exciter is installed, its switch box is located next to the box for the field coils.

1.4 Diodes

The rectifier is designed as a 6-pulse bridge circuit. Two serially connected silicon diodes, in each case, form a module (Fig. 3). The diode modules, together with the current-carrying heat sinks, are insulated against the base plate and attached directly to the diode wheel. The respective polarity is defined by the mounting position of the modules in the diode wheel.

Fig. 3: Diode module



1 Current-carrying heat sinks
2 Diodes
3 Base plate

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The connection between the heat sink and the main rotor winding is established via connecting pieces.

1.5 Ventilation

The brushless exciter is of the closed-circuit cooled type. The stator core and the rotor permit the pas-sage of cooling air past the stator coils and rectifier heat sinks. The exciter machine is connected by air ducts in the base frame to the cooling circuit of the generator.

1.6 Surge Diverter

The rectifier bridge is protected against high-energy over-voltages as may occur in the event of faults by surge diverters situated between the positive and the negative pole.

2 Troubleshooting on Diode Failure

2.1 Fault Tracing

Defective diode modules can be located in standstill by means of a DC continuity tester. It should be noted, however, that owing to the low measuring voltage depending on the measuring range selected, measurements carried out with instruments of this type may provide greatly differing results, particularly in the forward direction.

With faultless diodes and with a measuring voltage of 3 V, the resistance in the forward direction may be about 100 Ohm to 10 kOhm, depending on the measuring range, and several 100 kOhm in the re-verse direction. Diodes can be tested for faults after the leads of all the diode modules have been disconnected – or even better – after all the diode modules have been completely dismounted.

Diode bridges are likely to give rise to two kinds of faults as follows:

- Loss of blocking capability (Diode failure)
- Loss of conductivity in the forward direction (Interruption)

Loss of blocking capability (diode failure)

In the event of failure of a single diode, the diode module is still working without any restrictions (redundancy). If both serial diodes in one module fail, only a low current flows through the exciter winding of the main machine, so that the machine under load can hyper-synchronously fall out of synchronization. To clear the fault, the generator must therefore immediately be de-excited and shut down. The resistance of faulty diodes is reduced to extremely low values in either direction.

Loss of conductivity in the forward direction (interruption)

Loss of diode conductivity occurs considerably less often than diode breakdown. It is indicated by a reduction of the voltage delivered by the bridge of approx. 15%. Thanks to the excitation reserve, the auxiliary excitation is able to fully compensate this loss of excitation voltage even though the machine requires a higher auxiliary excitation current at rated output and nominal power factor. Diodes which have become blocked have extremely high resistance values in both directions.

2.2 Replacing the Diode Module

The entire diode module needs to be replaced whenever a faulty diode has been identified.

Preparation

✓ To have access to the diode wheel and to the exciter rotor, remove the exciter non-drive end shield and the lateral cover plates.

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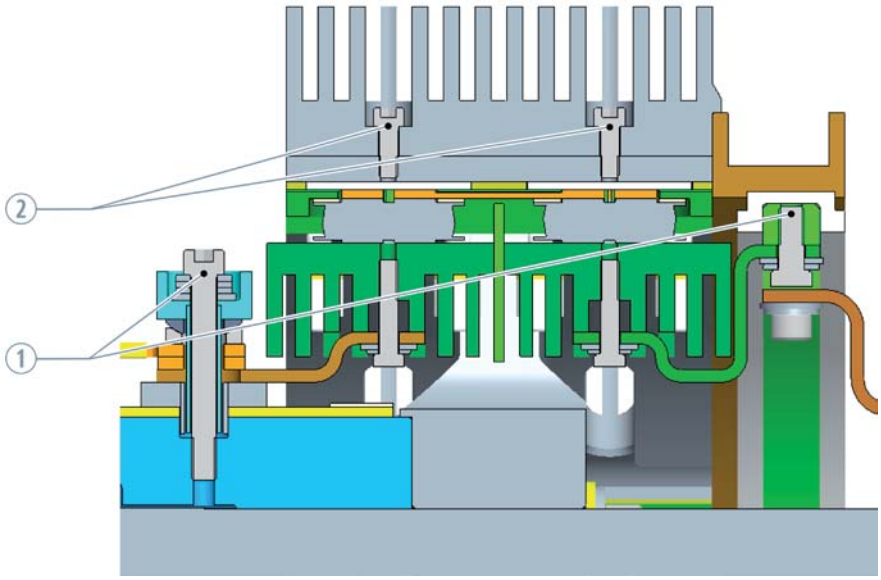
✓ The rotor must be mounted turnable.

Tools
- Standard tool set
- Insulation meter

Work steps

1. Undo the screw joints of the connecting leads.
2. Undo the screw connections from diode module to diode wheel.

Fig. 4: Diode wheel with diode module



1 Connecting lead screw joints

2 Screw connections from diode module to diode wheel

3. Remove the defective diode module in axial direction.
4. Proceed in reverse order to install the new diode module.

NOTICE

The exciter will break down and be damaged when the poles of the diode module are mixed up.

▶ Observe the proper fitting position of the diode module: Anode and cathode need to be in the correct positions. The poles of the diode module are identified by the letters *A* for anode and *K* for cathode.

5. To ensure the current flow, measure the insulation resistance.

3 Maintenance and Inspection

3.1 Cleaning Operation

The brushless exciter requires only a minimum of maintenance. It is advisable to inspect the machine during revisions for dust deposits and to clean it if necessary, above all the heat sinks.

Cleaning in the heat sink area

Blowing out with compressed air is sufficient (maximum: 4 bar), while the upper and lateral covers as well as the non-drive end shield must be demounted. To clean the heat sinks, the diode modules should be removed as described in chapter 2.2 Replacing the Diode Module.

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Checking for brush abrasion

If the brushless exciter is equipped with slip rings: it is advisable to inspect the area of the slip rings for brush abrasion and to clean it, if necessary.

If a telemetry system is available: No brush wear is created there as this is non-contacting.

3.2 Exciter Disassembly for Inspections

If the generator rotor must be withdrawn to allow an inspection, the exciter needs to be demounted beforehand.

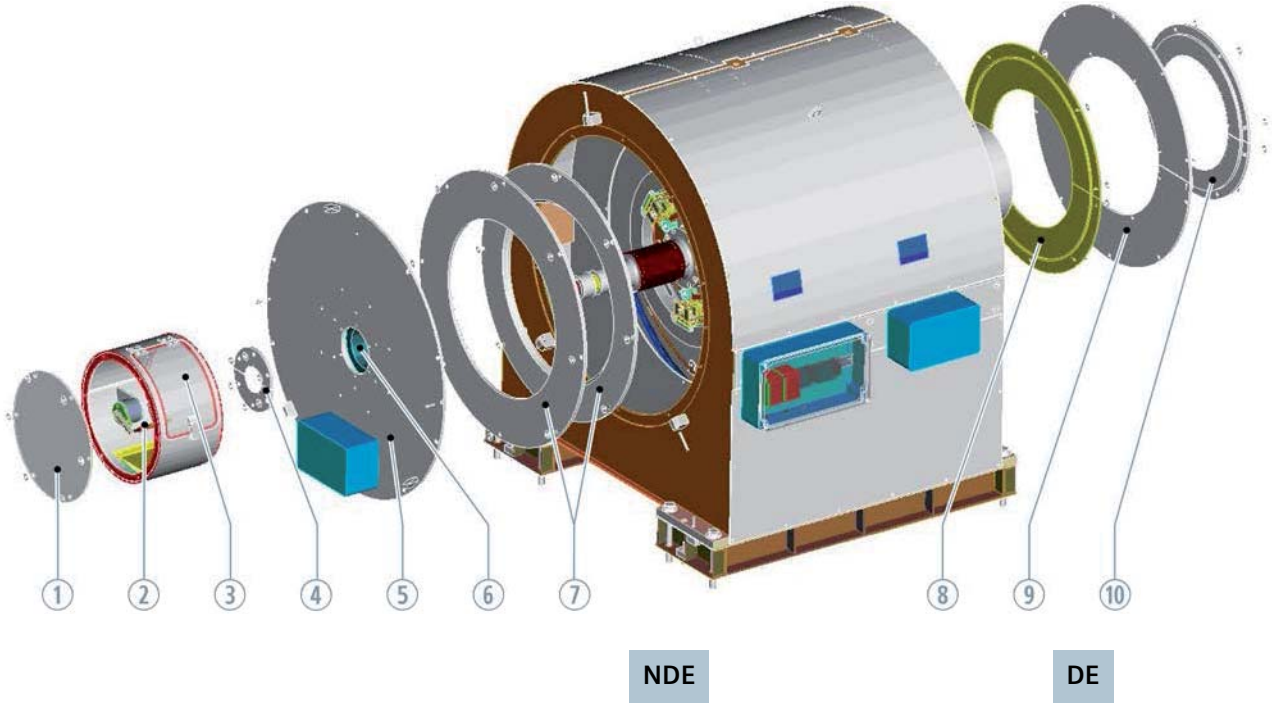


Fig. 5: Stator disassembly, exploded view

1 Fiberboard sealing
2 Measuring brushes covering / stator of telemetric system (receiver)
3 Fiberboard sealing
4 Measuring brushes
5 Housing shield NDE
6 Pilot exciter
7 Inner air-guide plates at NDE
8 Inner air-guide plate at DE
9 Housing shield AS
10 Fiberboard sealing

Stator disassembly

For **stator disassembly** proceed as follows:

Work steps

1. In order to avoid damages, dismount the ground fault detection:

1.1 If there are measuring brushes: dismount them in the box at the non-drive end.

1.2 If there is a telemetric system:
Loosen and remove the screws of the housing cover at the non-drive end.
Remove telemetric system stator (receiver) carefully from telemetric system rotor (sender).

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NOTICE

Protect sensitive electrical parts from damages!

- Carefully remove telemetric system stator from telemetric system rotor. Telemetric system rotor is particularly fragile and must be protected.

2. Dismount the fabric-base fiberboard sealing located at non-drive end.
3. Disassemble the drive-end fiberboard sealing and end shield.

⚠ **CAUTION**

Danger of tipping over.

There is a risk of people being injured when the stator housing end shield is dismounted.

- Secure the stator housing end shield by a supporting device before loosening the bolts.

4. In order to access the internal seals dismount the housing shield at the non-drive end. Therefore proceed as follows:
   - 4.1 Disconnect the cable connections to the ground fault detection.
   - 4.2 If a pilot exciter is present, disconnect also its cable connections and place a protective sleeve made of fabric-based laminate or plastic around the rotor of the pilot exciter (protection against damage to the carbon-fiber wrapping).
   - 4.3 Secure the housing shield by a hitch.
   - 4.4 Only then remove the shield-fixing screws and, carefully, the shield.
5. Dismount the three seals on the inner air-guide plates.
6. Disconnect all the cables lead to the terminal box.
7. Undo the screw joints to the base frame including the tapered pins.

NOTE

Please note: In addition to the external screw joints, two further ones are located under the cover.

8. Mark the shims.
9. Push the complete stator assembly in the axial direction as far as necessary to clear the rotor so that the stator can be lifted off.

Auxiliary equipment such as current measuring devices or anti-condensation heater need not be detached or disassembled when removing the stator.

Pulling off and heat shrinking the exciter rotor

If the **exciter rotor is to be removed** from the shaft of the main machine, detach the following components before the hub is heated by means of a welding torch:

- the slip ring shaft with the protective circuits
- the DC power line and
- the diode wheel.

To extract the rotor use an extractor device. To install the device, use the threaded holes of the disassembled diode wheel.

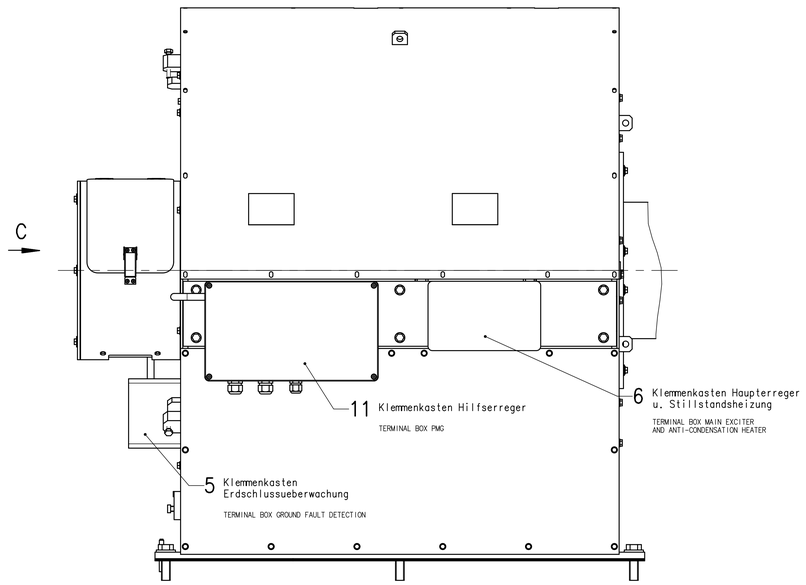
Before shrink fitting, heat up the completely assembled rotor with diode wheel, but without the protective circuits, to 130°C in a suitable oven.

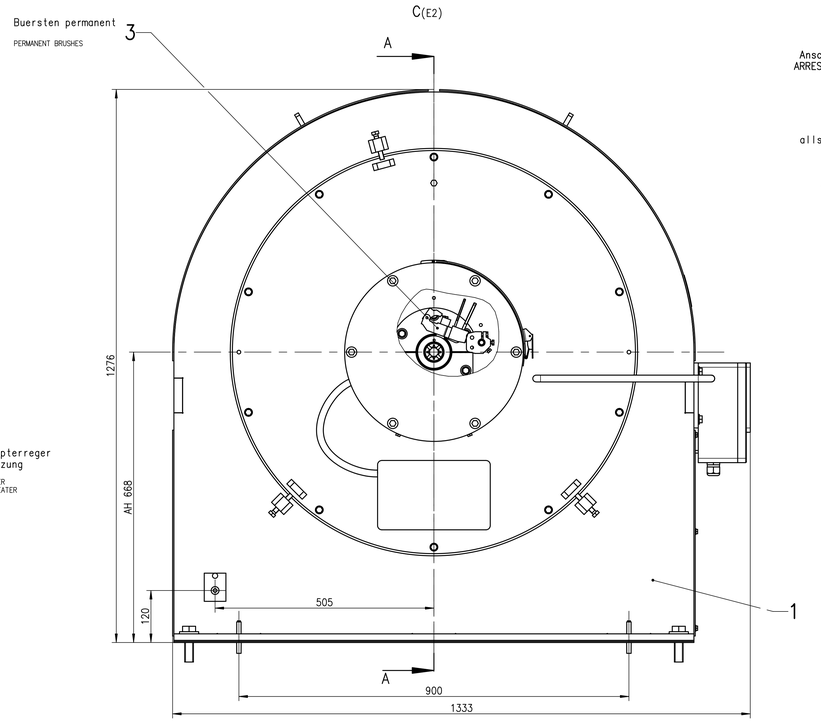
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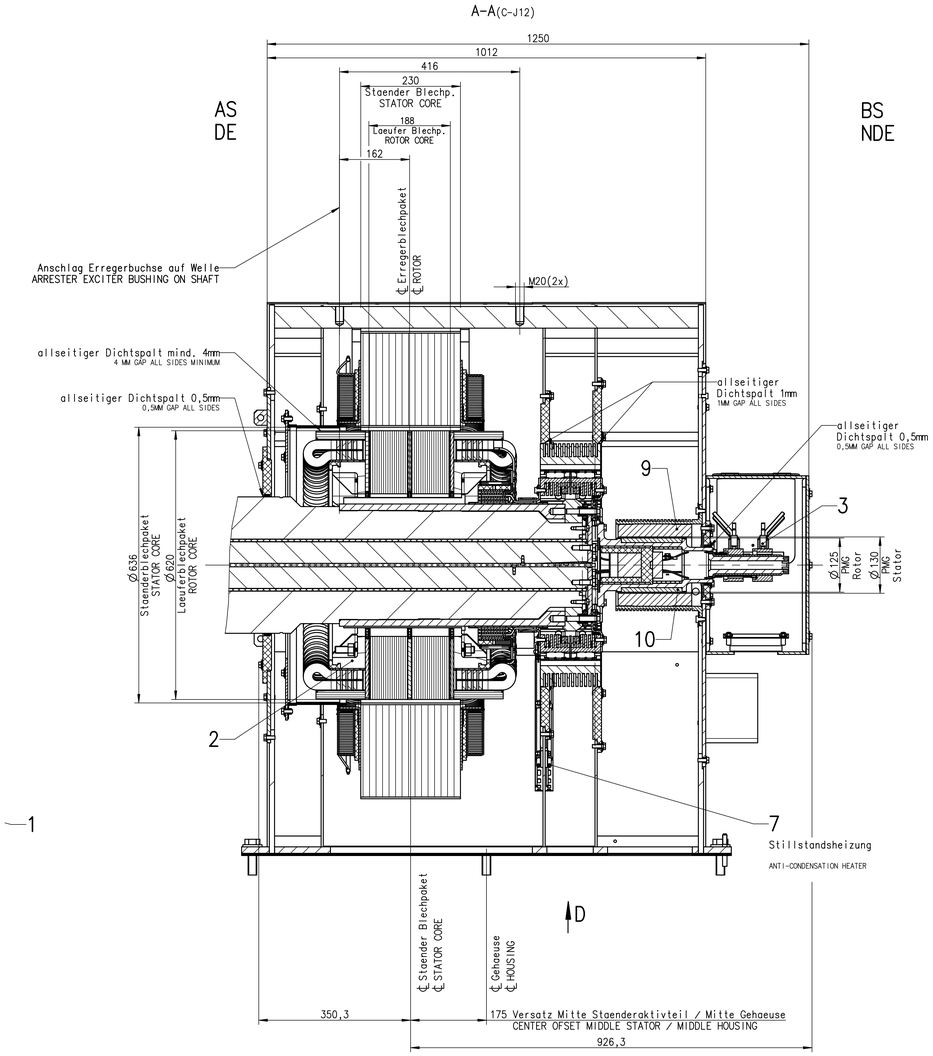
SIEMENS					
KIND OF MACHINE:	MAIN EXCITER	MACHINE No.:	EG000367	YEAR OF MANUFACTURE:	2018
MACHINE CODE:	ELR 62/19-30/8-2S	RATED SPEED:	3000 rpm	DIRECTION OF ROTATION:	
GENERATOR:	_ _ _ _			CCW	
RATED VOLTAGE/ RATED CURRENT:	213 V / 875 A	RATED POWER:	186,4 kW	S1	DPPPG-70166425
CEILING VOLTAGE/ CEILING CURRENT:	426 V / 1750 A	CEILING POWER:	745,5 kW	S2 10s	
SELF-EXCITATION		RATED VOLTAGE/ RATED CURRENT:	60 V / 11,8 A		
		CEILING VOLTAGE/ CEILING CURRENT:	122 V / 23,7 A		
INSULATION CLASS: F		TYPE OF CONSTRUCTION:	IM 5410	DEGREE OF PROTECTION:	IP54
STATOR TRANSPORTATION WEIGHT:	1660 kg			IEC 60034	
ROTOR TRANSPORTATION WEIGHT:	580 kg				
Siemens Power and Gas					

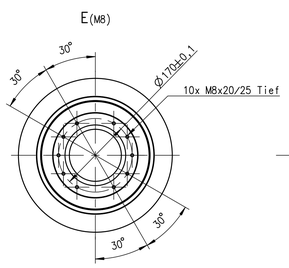
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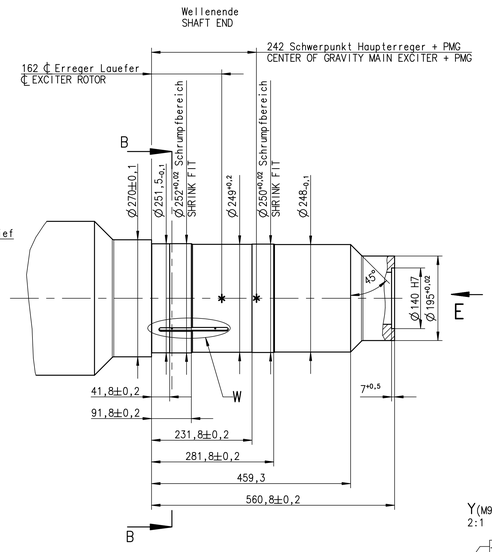
Baugruppe / ASSEMBLY	Gewicht/WEIGHT
Staender/STATOR	1660 kg
Laeufer/ROTOR	580 kg
Staender HiErr/STATOR PMG	19 kg
Laeufer HiErr/ROTOR PMG	16,5 kg

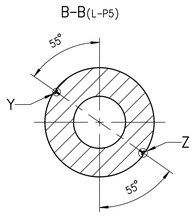


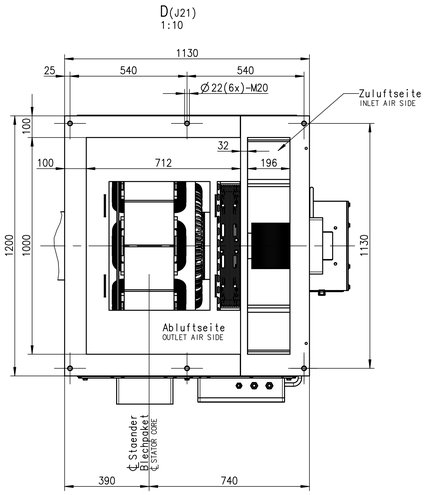


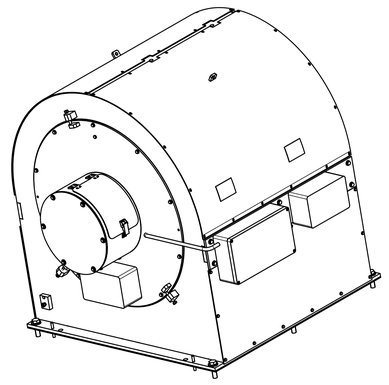


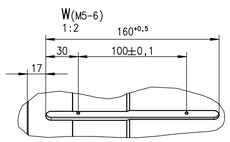


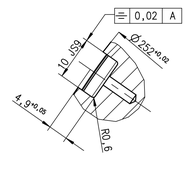


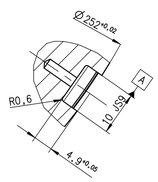












Wellensitze vor der Montage des Laeufers mit Fett Alltemp Q NB50 einstreichen.
COAT SHAFT FIT WITH GREASE ALLTEMP Q NB50 BEFORE ASSEMBLY ROTOR

US and EU Export Controls

Technology Classification:

ECCN: EAR99 AL: N US-Content: NO

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Siemens AG
Energy Sector

WEIGHT:	2240 KG	SCALE: 1:5; 1:10	SPEC.:KUN351.00
ORIGINATED:	2014-05-14 KRAUSS	TITLE:	MASZBILD ERREGERMASCHINE AH668
CHECKED:	2014-05-14 BARTH		OUTLINE DRAWING EM
RELEASED:	2014-05-14 KRAUSS	LANG. - DRAWING NO. / VALUE:	DPPPG-70067248
			26-EXC0100-70067248
			ELR 62/19-30(36)/8-2S
		REV.:	A
		SHEET:	1/1

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Erregermaschine mit T. 60-80 auf dem Grundrahmen ausrichten und mit T.170/180 sichern. Gehaeuse auf BS-Seite zum Grundrahmen 2x aufbohren und mit T.240-260 verstiften.

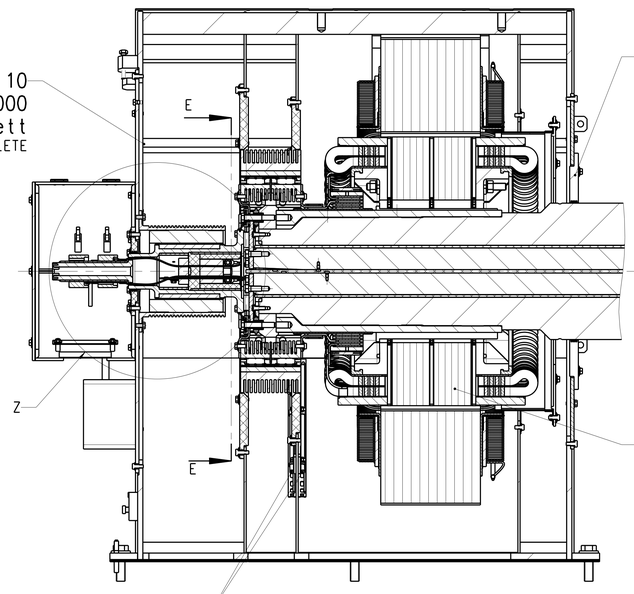
ALIGN EXCITER MACHINE WITH IT.60-80 AT BASE FRAME AND SECURE WITH IT.170/180. DRILL OUT 2 BORE HOLES AT BS_SIDE OF EXCITER TO BASE FRAME AND PIN WITH IT.240-260

T.120, 130, 140, 270 und 310 nur in Stueckliste
IT.120, 130, 140, 270 AND 310 ONLY IN BILL OF MATERIAL

BS
NDE

A-A(K-R,13)

AS
DE



10
EXC2000
Staender komplett
STATOR COMPLETE

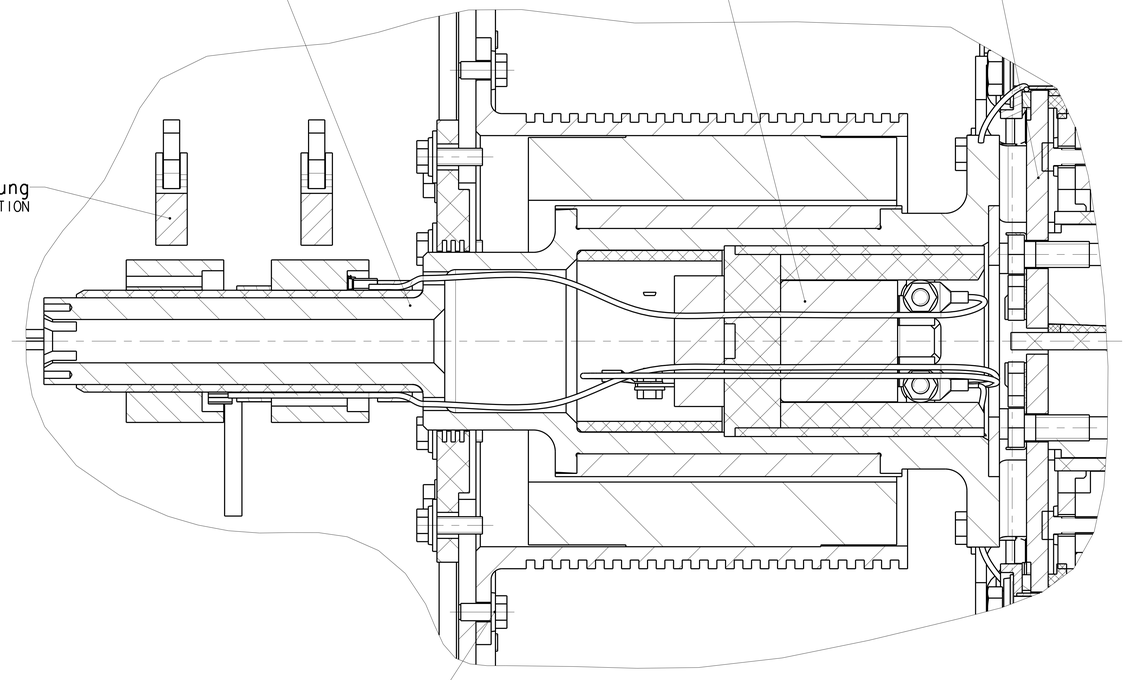
Dichtring Gehaeuseschild
SEAL RING HOUSING END SHIELD

Spaltmasze fuer Dichtringe nach EXC0100 Maszbild
GAP FOR SEAL RINGS ACC. TO EXC0100 DIMENSIONAL DRAWING

20
EXC3000
Laeufer komplett
ROTOR COMPLETE

Stillstandsheizung
ANTICONDENSATION HEATER

Z (D,6)
1:1



Hilfserreger Laeufer
PMG ROTOR

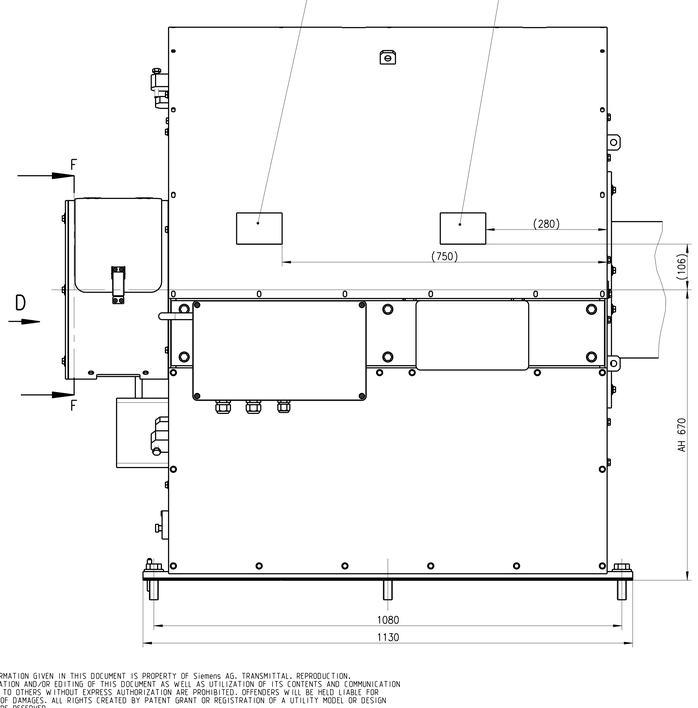
RG-Beschaltungsblock
RR-NETWORK ASSEMBLY

Gleichstromleitung
DC LEAD

Erdschlussueberwachung
GROUND FAULT DETECTION

220,230 (6x)

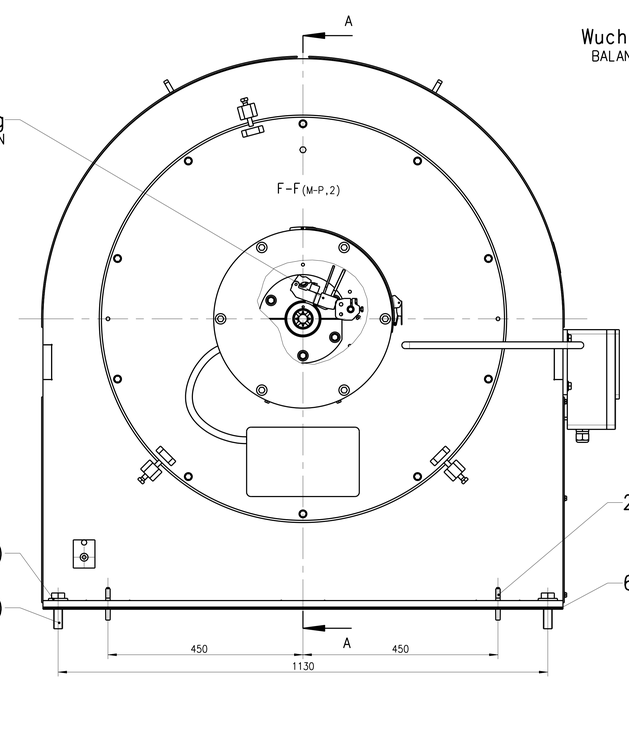
E-E(C-F,6)
2:5



Leistungsschild Hilfserreger
RATING PLATE PMG

100
Leistungsschild Haupterreger
RATING PLATE MAIN EXCITER

D(N,2)



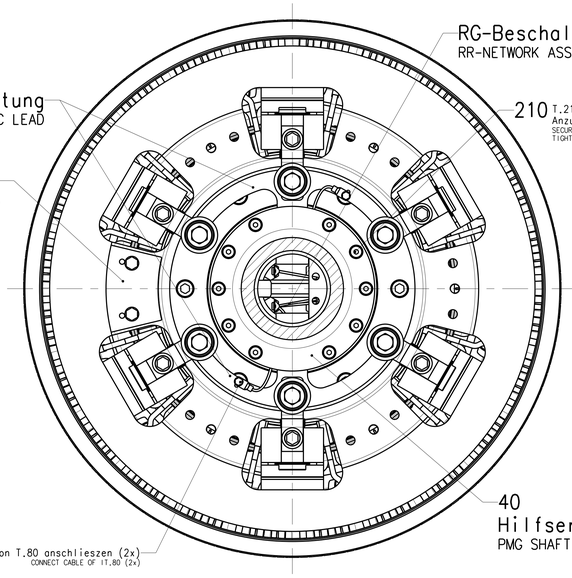
Erdschlussueberwachung
GROUND FAULT DETECTION

180 (6x)

170 (6x)

240,250,260 (2x)

60/70/80



RG-Beschaltungsblock
RR-NETWORK ASSEMBLY

Gleichstromleitung
DC LEAD

Wuchtgewichte
BALANCING WEIGHTS

210 T.210 mit Loctite T.190 gesichert
Anzugsmoment: 34 Nm
SECURE IT.210 WITH IT.190 LOCTITE
TIGHTENING TORQUE: 34 NM

40
Hilfserreger Laeufer
PMG SHAFT

Kabel von T.80 anschlieszen (2x)
CONNECT CABLE OF IT.80 (2x)

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Technology Classification:

ECCN: EAR99 AL: N US-Content: NO

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Energy Sector			
WEIGHT: 2240 KG	SCALE: 1:5	SPEC.:KUN351.00	
ORIGINATED: 2014-08-04 KRAUSS	TITLE: ERREGERMASCHINE KOMPLETT ELR 62/19-30(36)/8-2S		
CHECKED: 2014-08-04 BARTH	EXCITER MACHINE COMPLETE		
RELEASED: 2014-08-04 KRAUSS	LANG. - DRAWING NO. / VALUE: DPPPG-70067255		
CONFIDENTIAL	26-EXC0001-70067255	REV.: A	SHEET: 1/1

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Maßbildtext ***DIMENSIONAL DRAWING TEXT***	**Vilnius Biomass**
Zeichnungsnummer/*DRAWING NUMBER*: **DPPPG-70162509**	RK.-Nr./W.-NO.: **EG000367**

Index	**Datum** ***Date***	**bearbeitet** ***constr.***	**geprüft** ***checked***	**Änderungsbeschreibung** ***Description of Revision***
a	2018-05-29	Liebergeld	Schmitt	Erstausgabe / first release

Maßbild **DPPPG-70067248**
DIMENSIONAL DRAWING

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Haupterregermaschine	***MAIN EXCITER***	
Nenndaten	*TECHNICAL DATA*	2
Bauform	*TYPE OF CONSTRUCTION*	2
Gewichte	*WEIGHTS*	2
Allgemeine Daten	*GENERAL DATA*	2
Hilfserregermaschine	***PILOT EXCITER***	3
Nenndaten	*TECHNICAL DATA*	3
Gewichte	*WEIGHTS*	3
Allgemeine Daten	*GENERAL DATA*	3

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MF

Spr. Kz.

POS.	Nenndaten	*RATINGS*	Wert S1 *VALUE*	Wert S2 (10s) *VALUE*	Einheit *DIM.*	REV.

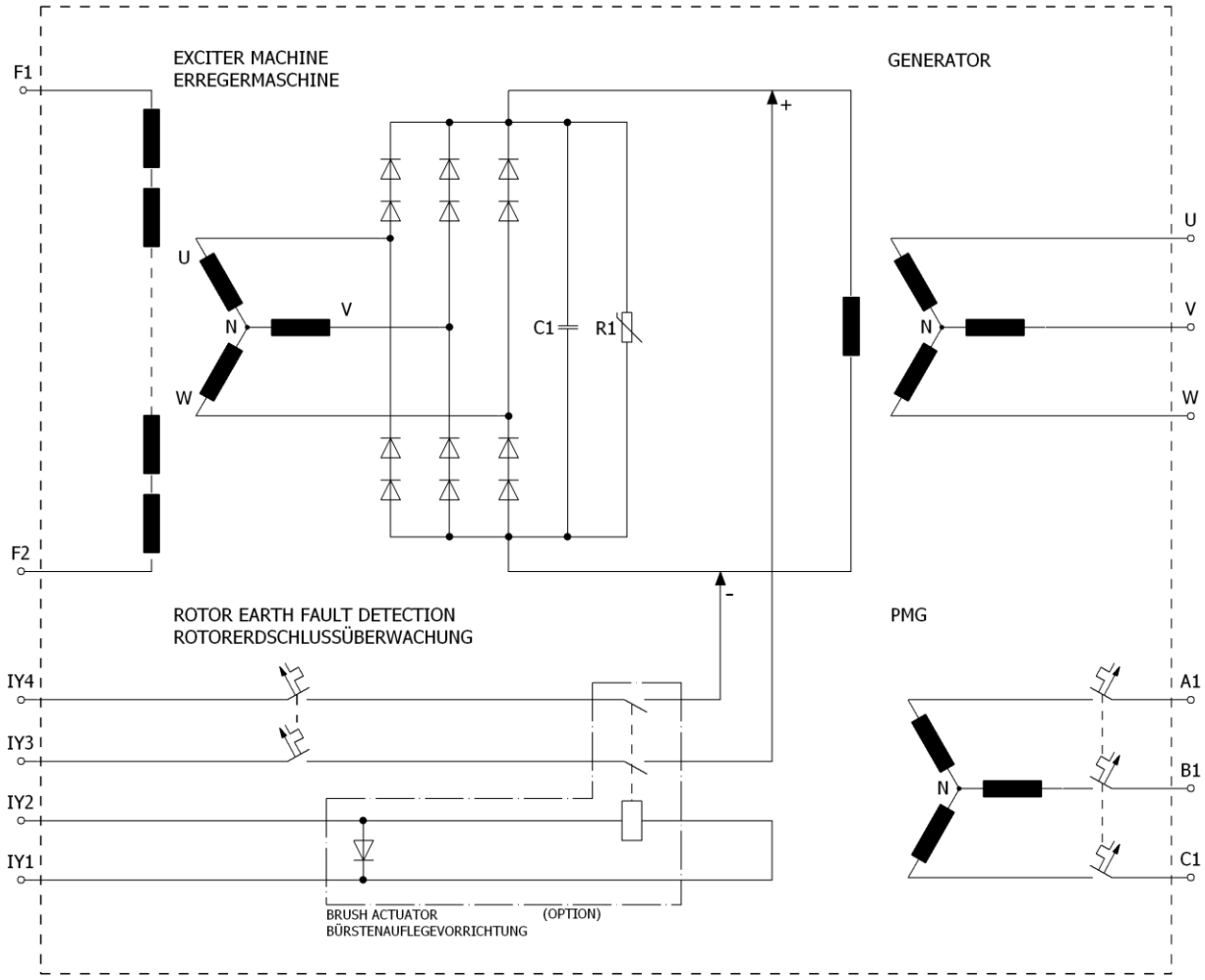
Erregermaschine Typ: ELR 62/19-30/8-2S

	Nenndaten	***RATINGS***				
	Leistung	*POWER*	186,4	745,5	kW	
	Drehzahl	*SPEED*		3000	min^{-1}	
	Drehrichtung, bei Sicht von Turbine auf Gen.	*DIRECTION OF ROTATION, VIEW FROM TURBINE TO GEN.*	Gegenuhrzeigersinn /Counterclockwise			
	Spannung	*VOLTAGE*	213	426	V	
	Strom	*CURRENT*	875	1750	A	
	Fremderregung	*SEPARATE*	60 11,8	122 23,7	V A	
	Bauform	***TYPE OF CONSTRUCTION***				
	Bauform (DIN IEC 34 T.7)	*TYPE OF CONSTRUCTION*	IM 5410			
	Schutzart (DIN IEC 34 T.5)	*DEGREE OF PROTECTION*	IP 54			
	Gewichte	***WEIGHTS***				
1	HEM Ständer	*STATOR*	1660		kg	
2	HEM Rotor	*ROTOR*	580		kg	
	Allgemeine Daten	***GENERAL DATA***				
	Läuferträgheitsmoment	*ROTOR MOMENT OF INTERIA*	31,4		kgm^2	
3	Messbürsten permanent	*MEASURING BRUSHES PERMANENT*	Ja / YES			
5	Klemmenkasten Erdschlußüberwachung	*TERMINAL BOX GROUND FAULT DETECTION*	+V20MKC20GA010			
6	Klemmenkasten Feldwicklung u. Heizkörper	*TERMINAL BOX FIELD WINDING ANTICONDENSATION HEATER*	+V20MKC20GE010			
7	Stillstandsheizung	*ANTICONDENSATION HEATER*	200 (AC) 2x100		V W	

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POS.	Nenndaten	*RATINGS*	Wert S1 *VALUE*	Wert S2 (10s) *VALUE*	Einheit *DIM.*	REV.

	Hilfserreger	***PMG***	**ATE DC 190/90/6**			
	Nenndaten	***RATINGS***				
	Leistung	*POWER*	9,9	12,7	kVA	
	Spannung	*VOLTAGE*	248	244	V	
	Strom	*CURRENT*	23,0	30,0	A	
	cos phi		0,99			
	Gewichte	***WEIGHTS***				
9	HiE Ständer	*PMG STATOR*	19		kg	
10	HiE Rotor	*PMG ROTOR*	16,5		kg	
	Allgemeine Daten	***GENERAL DATA***				
11	Klemmenkasten mit 2. Einspeisung	*TERMINAL BOX*	+V20MKC10GE010			



ECCN: EAR99	AL: N	ECL: N	US-Content: N

SIEMENS	Form	Z.-Sys.	Zeichnungs-Nummer / DRAWING NUMBER	Index	Blatt / SHEET 3
ERF EN1	44		**DPPPG-70162509**	**a**	Von / OF 3
			26-EXC0110-70162509		

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Spr. Kz.

The brushless exciter is provided with a pair of slip rings required for earth leakage protections of the whole equipment.

The extension shaft is fitted to the front end of the exciter rotor. The two shrink-fitted slip rings are located there on an insulating base. Two connection cables run through the central bore in the extension shaft. They connect the slip rings each to the connection pieces of the positive and negative bus rings.

The brush holder consists of two brush holder bolts fastened in the EE end shield. The brush holders with the measuring brushes are fitted to an insulated section. The brushes are in permanent contact with the slip rings.

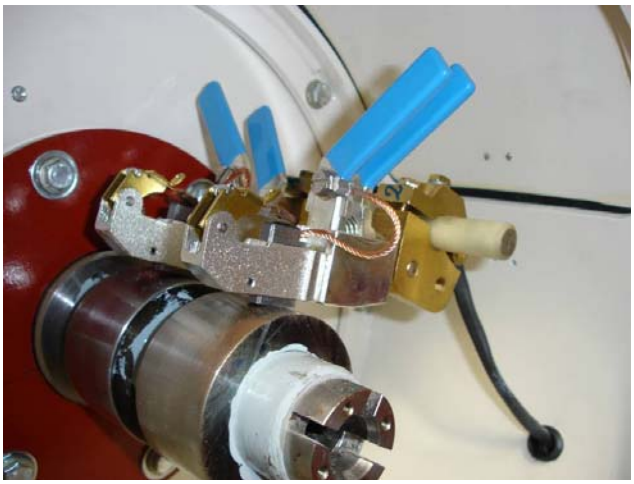


Fig. 1: Measuring slip rings with permanently applied measuring brushes in plug-in brush holders

The measuring brushes are connected to a terminal block located in a terminal box at the exciter end frame.

The voltage measuring system enables measurement of the excitation voltage of the main machine while the equipment is in operation.

NOTICE

Corrosion can appear on the measuring slip rings after lengthy periods of stand-still.

To avoid corrosion lift off the brushes when the generator is at standstill (pull out the plug-in brush holders).

Before any longer standstill apply a protective coating of acid-free grease (Vaseline) to the measuring slip rings. Remove this protective coating before starting-up the generator again.

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Manufacturer:	**ATE Antriebstechnik und Entwicklungs GmbH**
Documentation title:	**Technical Description** **Datasheet 249 0003 100, Type: DC 190/90/6** **Permanent magnet generator PMG**
Amount:	6 pages of documentation incl. drawing

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Technical Description

Datasheet 249 0003 100 Type: DC190/90/6
"Permanent magnet generator PMG" Customer: Siemens Power Generation

Change history

Date	Change	Responsible
20.08.09	Start	W. Thaler / ATE

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Installation	2
Maintenance	2
Magnetization	3
Safety checks before commissioning	3
Technical specifications	4

Necessary drawings und documents to take care of

Responsible	Title	Doc. number	Index
Siemens P. G.	Auxiliary Exciter Bushing	2-425258	B
Siemens P. G.	Slip Ring Shaft	1-425257	G
Siemens P. G.	PMG Outline	1-508817	B
ATE	Date sheet	249 0003 100	-
ATE	Product information	290_ATE_Technische Beschreibung_A6_090724	6

Introduction:

The "PMG" permanent magnet generator will be delivered as a permanent exciter generator – stator/rotor unit as defined in Siemens Power Generation drawing 1.508817. This drawing includes all relevant dimensions which are needed for the installation of the stator-rotor unit at the main unit. The "PMG" provides the excitation voltage for the exciter of a big brushless synchronous generator (or motor) via an automatic voltage regulator.

The nominal power may be generated on a permanent basis by the "PMG". The maximum nominal power is available for 10 seconds to cover the short-term demand during the fast-response excitation of the main generator. In general, the "PMG" has a three-phase design, and generates single-phase voltage through a rectifier. The three-phase connection is led out of the stator using three single cables with a cross-section of 2.5mm2 and a rough length of 1m.

The PMG consists of:

a) a 6 pole permanent magnet rotor unit to be installed on the shaft of a main generator (Siemens Power Generation drawing 1.508817)
b) a stator casing assembly with the wound stator and the cooler casing including the mounting flange complete with mounting holes and voltage cables (Siemens Power Generation drawing 1.508817)

Installation:

Before installation, the "PMG" should be stored in a clean and dry room. The PMG should be inspected thoroughly before it is used. This inspection should make sure in particular that the rotor magnet system is protected completely against any contact with metal particles, and that the insulation resistance of the stator windings is satisfactory. The insulation resistance may be tested using a 500V – insulation tester. A value of more than 10 MOhms is considered satisfactory.

The dimensions of the "PMG" (stator and rotor) are shown in the following drawing: Siemens Power Generation drawing 1.508817

The rotor must be pressed on slightly at the main generator, and be secured in this position in order to avoid its displacement with regard to the shaft under any circumstance. The temperature of the rotor assembly must never exceed 130°C. During installation, the unit must not be heated to more than 85°C. Caution: the rotor's reinforcement is made of CFRP. Make certain to protect this against any damage also during installation. (Use, e.g., plastic protective sheets or sleeves for storage and assembly.)

The stator housing should be installed at the matching surface of the main generator, and be fastened using bolts inserted in the mounting holes at the mounting flange. The air gaps should be inspected for equal spacing at all poles and positions, and be adjusted accordingly. The nominal radial air gap between stator and rotor is 2.5mm.

Maintenance:

The "PMG" (stator and rotor) does not contain any wearing parts. Accordingly, no routine maintenance and no spare parts are required.

Magnetization:

The permanent magnet rotor assembly is magnetized in its as-delivered condition. The magnets consist of high-energy NdFeB magnet material. The assembly is air-stabilized, and will not lose its magnetic properties. The assembly has also been stabilized against short circuits. This means that it will not lose its magnetic properties even when the "PMG" is short-circuited inadvertently.

Safety checks before commissioning:

Caution!!
The voltage which is applied in the terminal box when the unit is running may be dangerous to life. Never remove the cover of the terminal box when the unit is running.

The following **safety checks must** be performed before starting up the "PMG":

a) Check that the "PMG" is clean and dry.
b) Check the voltage cables or connection cables for any damage.
c) Check the rotor's firm seat.
d) Check the unit's earthing/grounding connection.
e) Check the rotor's bandage for any damage.
f) Check that the connecting cables are connected properly.

Technical Description

Datasheet 249 0003 100 Type: DC190/90/6
"Permanent magnet generator PMG" Customer: Siemens Power Generation

Technical specifications:
The data sheet 249 0003 100 contains the technical specifications.

ATE Antriebstechnik und Entwicklungs GmbH
Brandenburger Straße 10
D-88299 Leutkirch im Allgäu

Telephone: +49 (0) 7561-9854-0
Telefax: +49 (0) 7561-9854-22

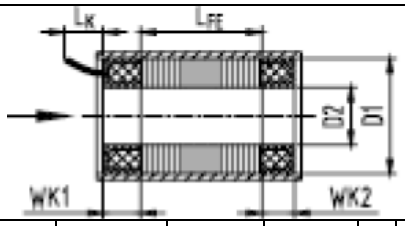
Technical data sheet
DC Motorelement

No.: 249 0003 100 **DC 190 / 90 / 6** **Siemens**

Stator

Direction of rotation

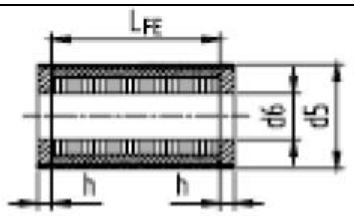
[X] left
[ ] right



	L_{FE} [mm]	$WK1_{max}$ [mm]	$WK2_{max}$ [mm]	D1 [mm]	D2 [mm]		
As-delivered dimensions	90	45	35	189,7	130		
Final dimensions	-	-	-	-	-		

	Lk [mm]	U [mm^2]	V [mm^2]	W [mm^2]				
Motor strands	1000	2.5	2.5	2.5				
		brown	blue	black				
Strand diameter max. 4 [mm]								

Rotor



d5	d6	d	L_{FE}			
125	104	10**	140			

[1] Finishing by the customer
[X] ATE magnet system directly installed on shaft
[X] Soft magnetic shaft material
Max. peripheral speed 23.6 m/s

Cooling
[ ] Water cooling
[ ] Oil cooling
[ ] Air-cooling
[X] Air cooler
[ ]

Winding protection
[1] PTC 130° Drilling (series)
[2] KTY 84-130
[ ] Thermal switch 130°C
[ ] NTC K227
[ ] PT3C-51F-F!

Potting material
[X] Stator potted in cooling jacket
[ ] steel
[X] Aluminium

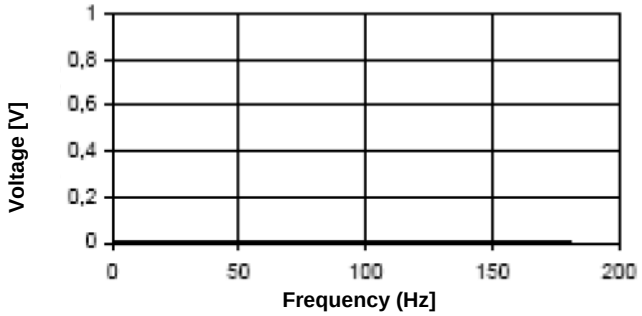
Insulation class
[F] Winding
[H] Strands

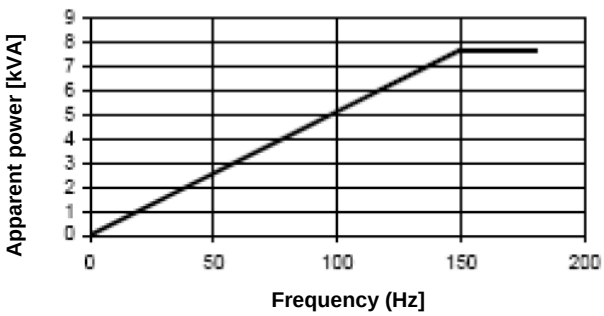
Maximum permissible phase current 65 A Choke - mH / phase

Phase circuit	Y							
Operating mode	S1 -100 % generatively						Short-time duty (10 sec)	
Converter voltage [V]	-	-		-	-		-	-
Motor voltage, ph to ph [Vrms]	262	316		261	314		257	312
Current [A]	17	14		23	23		42	35
Frequency (Hz)	150	180		150	180		150	180
Speed [rpm]	3000	3600		3000	3600		3000	3600
Shaft power [kW]	8	8		10.7	13		19.5	19.6
Torque [Nm]	25.5	21		34.3	34.4		62	52
Apparent power [kVA]	7.7	7.7		10.3*	12.5*		18.7	18.9.
P. F.	0.99	0.99		0.99	0.99		0.98	0.99

Technical Description

Datasheet 249 0003 100 Type: DC190/90/6
"Permanent magnet generator PMG" Customer: Siemens Power Generation



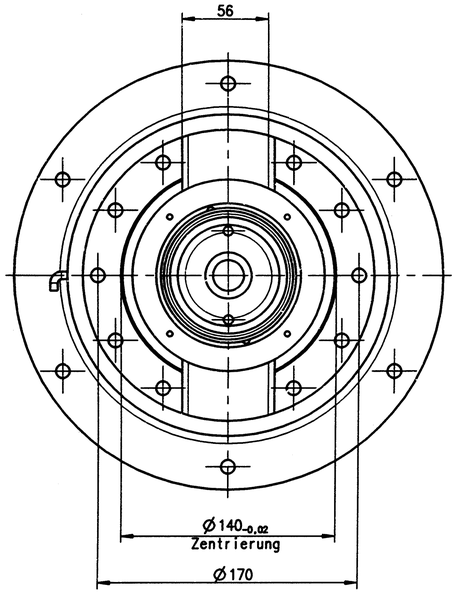


The data indicated apply to sinusoidal voltage and current.
For frequency converter operation, the effective fundamental voltage must correspond to the motor voltage indicated.
The current values measured may also be higher than the values indicated due to the harmonic component.

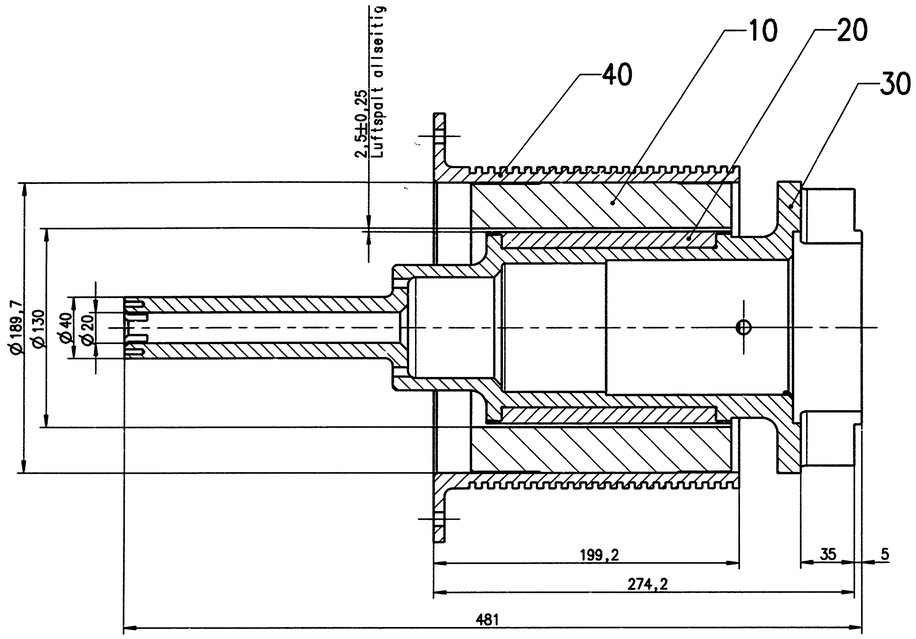
ATE motorelements are components for manufacturing synchronous motors. A test as defined in IEC 34-1 or in the applicable standards must be performed after completing the motor (assembly in its casing).

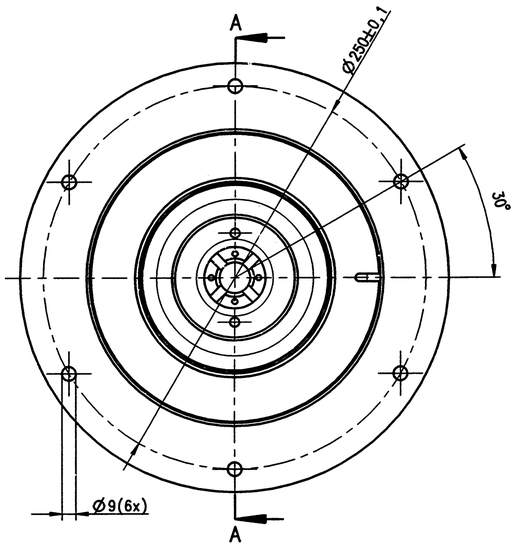
The spindle manufacturer is responsible for consulting with the converter manufacturer beforehand in order to make certain that the motor will work without any problem.

Note: *) For webbed stator housings and ventilation of stator housing **) End rings incorporated in shaft
Inductance per phase: 0.66 mH / Resistance ph to ph: 0.31 Ohm / EMF ph to ph: 89 Vrms per 1000 rpm



Schnitt A-A
SECTION A-A



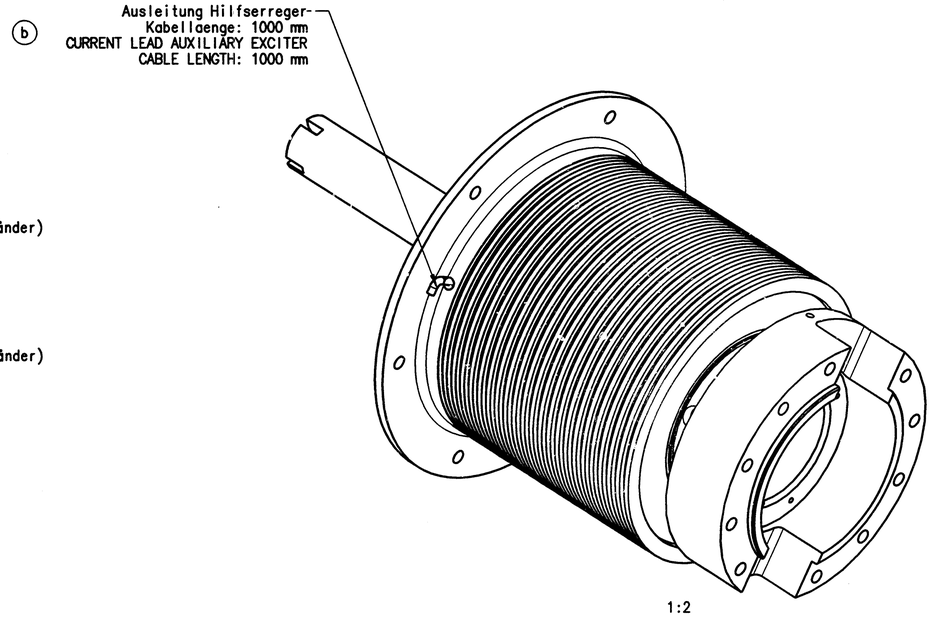


Technische Daten

Nenndrehzahl: 3000/3600 U/min
Schleuderdrehzahl: 4350 U/min für 2min
Kühllufttemperatur: max. 60°C

Werte für 3000 U/min:
Leerlaufspannung: <275 V (bezogen auf magnetische Mitte zwischen Läufer und Ständer)
Abweichung der verketteten Spannung: max ±5%
Frequenz: 150Hz
Leerlauf
S1: 160 V; 23,5 A; 7,3 kVA; cosphi 0,9
S2 10 Sekunden: 250 V; 37,5 A; 18,1 kVA; cosphi 0,9

Werte für 3600 U/min:
Leerlaufspannung: <275 V (bezogen auf magnetische Mitte zwischen Läufer und Ständer)
Abweichung der verketteten Spannung: max ±5%
Frequenz: 180Hz
Leerlauf
S1: 160 V; 23,5A; 7,3 kVA; cosphi 0,9
S2 10 Sekunden: 250 V; 37,5 A; 18,1 kVA; cosphi 0,9



1:2

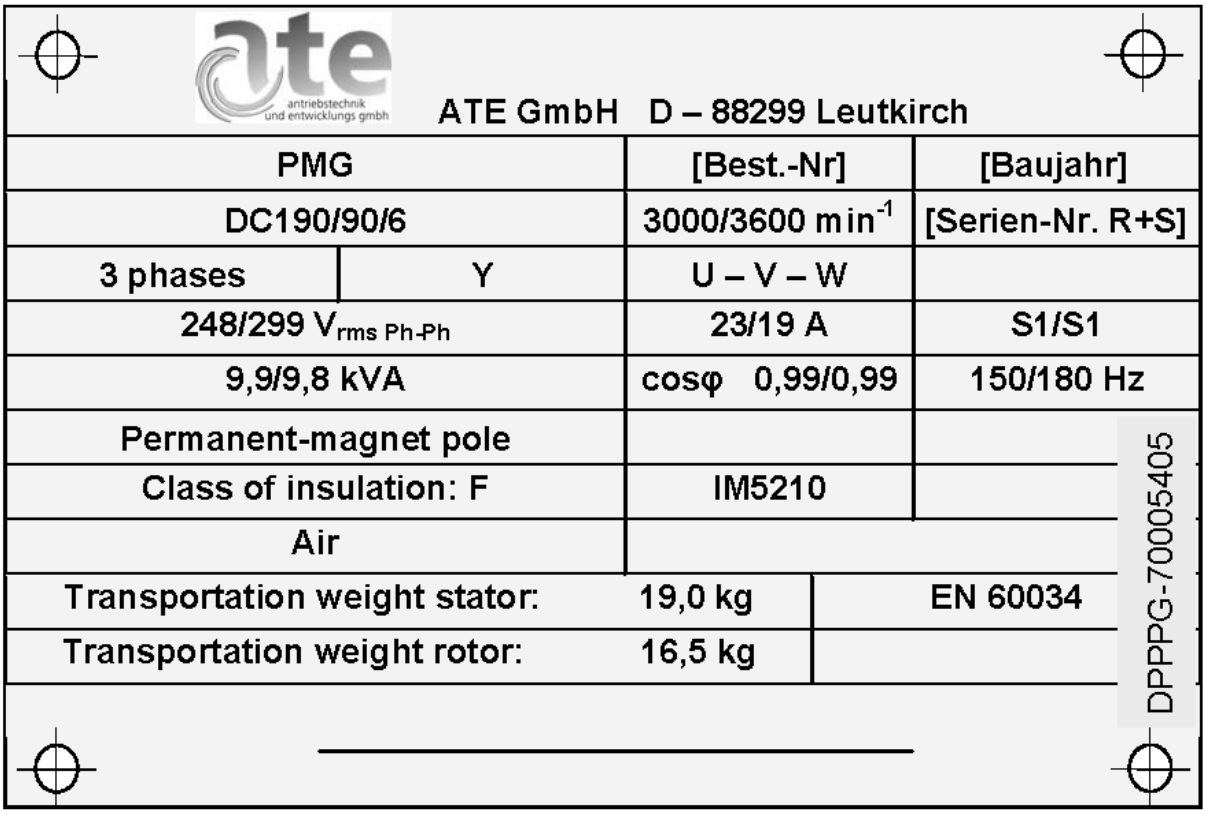
Pos. 50 und 60 (ohne Zeichnung)
lose dazu geliefert

REV.	DATE	CHANGE DESCRIPTION
B	2008-09-16	KABELAUSLEITUNG GEAENDERT
A		Erstausgabe

SIEMENS AG
POWER GENERATION

WEIGHT: KG	SCALE: 1:2	SPEC.: KUN351.00
DRAWN: 2008-03-02 RATHMANN	TITLE	
CHECKED: 2008-03-02 SCHMITT	MASZBILD HILFSERREGERMASCH.	
RELEASED: 2008-03-02 RATHMANN	OUTLINE PMG	
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ATE GmbH D – 88299 Leutkirch

PMG		[Best.-Nr]	[Baujahr]
DC190/90/6		3000/3600 min^{-1}	[Serien-Nr. R+S]
3 phases	Y	U – V – W	
248/299 $V_{rms\ Ph-Ph}$		23/19 A	S1/S1
9,9/9,8 kVA		cosφ 0,99/0,99	150/180 Hz
Permanent-magnet pole			
Class of insulation: F		IM5210	
Air			
Transportation weight stator:		19,0 kg	EN 60034
Transportation weight rotor:		16,5 kg	

DPPPG-70005405

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Rotor Grounding System

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Siemens AG
Energy Sector

Grounding brushes are fitted to the bearing or labyrinth ring to remove the static charges of the shaft train.

When grounding brushes ar fitted, the direction of rotation of the rotor must be observed. In anti-clockwise operation, brushes are to be mounted as showen in **fig. 1**; for clockwise operation, see **fig. 2**.

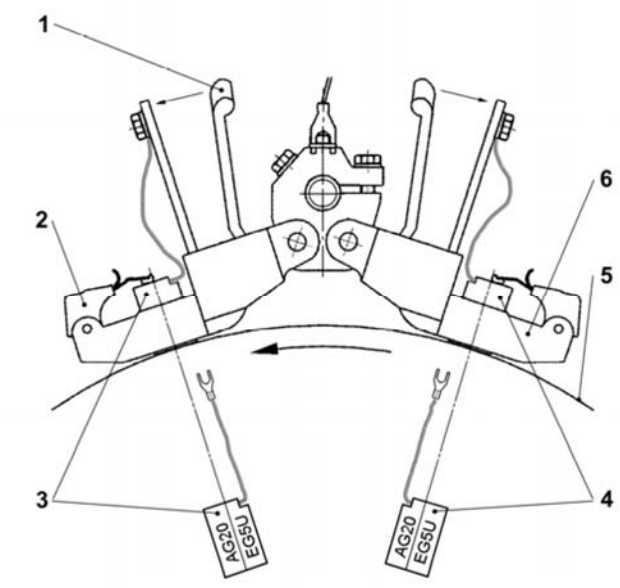


Fig. 1: Plug-in brush holder with grounding brushes in anti-clockwise operation

1 Handle lever (moveable)
2 Finger plate
3 Two–layer grounding brush (design A)
4 Two–layer grounding brush (design A)
5 Rotor surface
6 Plug-in brush holder

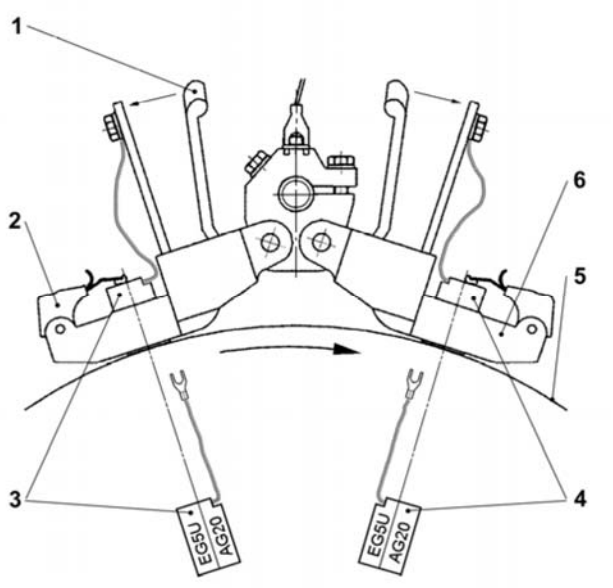


Fig. 2: Plug-in brush holder with grounding brushes in clockwise operation

1 Handle lever (moveable)
2 Finger plate
3 Two–layer grounding brush (design A)
4 Two–layer grounding brush (design A)
5 Rotor surface
6 Plug-in brush holder

The brush holders are arranged with 90° displacement. This arrangement ensures, that at least one brush will make contact with the rotating shaft train.

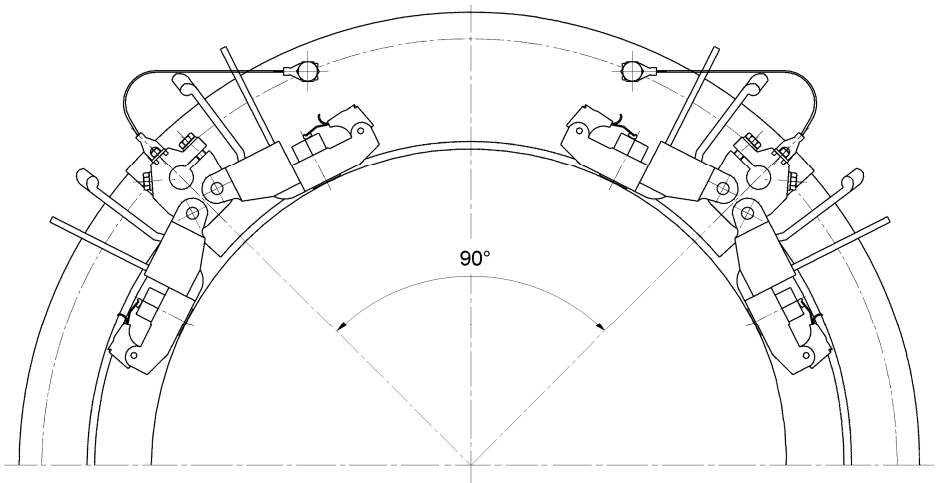


Fig. 3: Arrangement of plug-in brush holder with a 90° displacement

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Monitoring Vibration

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Manufacturer: **Bently Nevada Corporation**

Documentation title: **330500 Velomitor®**
330525 Velomitor® XA

User's Guide

Contents

Section 1: Operating Information
Section 2: Installation
Section 3: Maintenance
Section 4: Field Testing and Troubleshooting
Section 5: Specifications

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No. of pages: 30

Part Number 100076-01
Revision D, March 2004

330500 Velomitor®
330525 Velomitor® XA
User's Guide

BENTLY
Nevada





Bently Nevada Corporation has attempted to identify areas of risk created by improper installation and/or operation of this product. These areas of information are noted as **WARNING** or **CAUTION** for your protection and for the safe and effective operation of this equipment. Read all instructions before installing or operating this product. Pay particular attention to those areas designated by the following symbols.

CAUTION

A piezoelectric velocity transducer subjected to a sudden mechanical impulse may generate a low frequency signal that does not represent actual machinery vibration. This signal may change the state of alarm and/or danger relays.

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The following ways of contacting Bently Nevada are provided for those times when you cannot contact your local Bently Nevada representative:

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Telephone	1 775 782 3611 1 800 227 5514
Fax	1 775 215 2876
Internet	www.bently.com

Foreword

This manual describes the Bently Nevada Velomitor®, a piezo-velocity sensor, and contains instructions for its installation and maintenance. If you need additional assistance contact the nearest Bently Nevada Corporation office.

This manual is intended for technicians and engineers experienced in the use of electronic instrumentation and machinery monitoring equipment.

Section 1 describes the Velomitor®, tells how it works, and lists applications and optional accessories. This section also includes information on the Bently Nevada machinery monitoring systems that are compatible with the Velomitor®.

Section 2 gives instructions for receiving and inspecting the Velomitor®, choosing the proper monitoring points, and mounting the device. This section also shows how to install connecting cables.

Section 3 tells how to maintain the Velomitor® by describing the test procedures and equipment needed to verify that the device is operating properly.

Section 4 contains instructions for field testing and troubleshooting problems with the Velomitor® and compatible Bently Nevada monitoring systems.

Section 5 provides detailed specifications and sensitivity curves representing typical Velomitor® operation.

RELATED DOCUMENTS

3500/42M Proximitor®/Seismic Monitor Operation and Maintenance Manual, 143489-01

3300/55 Dual Velocity Monitor Maintenance Manual, 83965-01

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Section 1 — Operating Information

Application

Velocity sensors measure machinery casing vibration and are used on machines where using eddy current proximity transducers are not practical. Typical applications include pumps, electric motors, compressors, and fans.

The 330525 Velomitor xA is designed for applications where a transducer housing is either unnecessary or not desired.

Application Alert: Casing measurements may not be appropriate for some machinery protection applications.

If you measure the velocity of casing vibration to protect machinery, evaluate the usefulness of the measurement for each application. Most common machine malfunctions, such as unbalance or misalignment, occur on the rotor and originate as an increase (or at least a change) in rotor vibration. In order for any casing measurement alone to be effective for overall machine protection, a significant amount of rotor vibration must be faithfully transmitted to the machine casing or mounting location of the sensor.

Care should be exercised in the physical installation of the sensor on the bearing housing or machine casing. Section 2 tells how to install the sensor.

Application Alert: Improper installation may result in a decrease in the velocity sensor's amplitude and frequency response and/or the generation of false signals, which do not represent actual vibration.

Principle of Operation

The Velomitor® is a piezoelectric velocity sensor. The sensing element of the device is a piezoelectric ceramic shear-mode element and electronics. When subjected to machinery vibration, this system exerts a force on the piezoelectric ceramic, which generates a signal proportional to that force. This signal is amplified and integrated within the sensor to produce a low-noise output signal proportional to velocity.

Application Advisory: A piezoelectric velocity sensor subjected to a sudden mechanical impulse may generate a low frequency signal that does not represent actual machinery vibration. This signal may change the state of alarm and/or danger relays.

The Velomitor® is designed to monitor vibration in frequencies ranging from:

- 330500: 4.5 Hz to 5 kHz
- 330525: 4.5 Hz to 2 kHz

It has a calibrated sensitivity of 100 mV/in/s (4 mV/mm/s) and can measure velocities up to 50 in/sec pk (1270 mm/s pk). Its stainless steel casing protects it in highly corrosive environments. The operating temperature range is from -67°F to 250°F (-55°C to 121°C).

Traditional velocity sensors are composed of either a moving wire coil surrounding a fixed magnet or a fixed wire coil surrounding a moving magnet. The Velomitor® is more durable and accurate then traditional velocity sensors. Because the Velomitor® contains no moving parts, it is more durable and less sensitive to transverse motion than traditional seismic transducers. Its

piezoelectric sensing element and solid-state circuitry let the Velomitor® withstand years of continuous use.

The Velomitor® is a two wire device which requires an external power supply. The power supply must provide a DC voltage of 22 to 30 Volts and a current of 10 mA. A constant current diode must be used to limit the current to the sensor to 2.5 to 6 mA. A simple block diagram of the Velomitor® system appears in Figure 1-1.

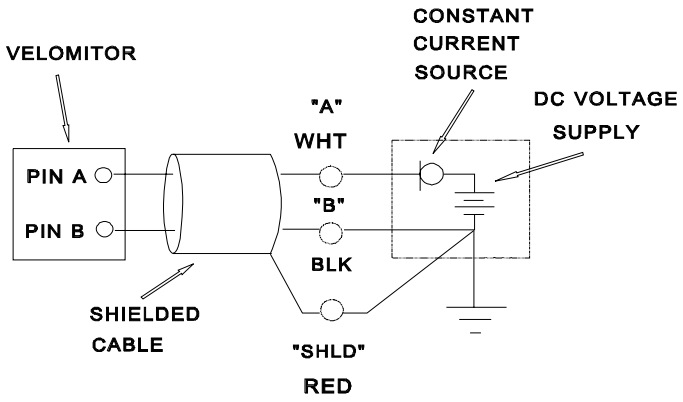


Figure 1-1.

The Velomitor® internal circuitry automatically sets the DC output bias when a constant current is supplied. The DC bias and AC signal appears between pins "A" and "B".

Application Alert: A constant current diode or other current regulating circuitry must be used to provide power to the Velomitor®. Failure to do so may result in damage to the device and/or improper operation.

Compatible Bently Nevada monitoring systems provide the power required by the Velomitor® without the need for additional external circuitry.

Ordering Options and Accessories

Velomitor® Options

When ordering a Velomitor® you may choose from the following list of options.

Table 1-1 Ordering Information

Part Number	Options		
330500	AA	BB	Description
	01		1/2 - 20 UNF P/N 89409-01
	02		M8 X 1 P/N 89410-01
	03		1/4 - 28 UNF P/N 89411-01
	04		1/4 - 20 UNC P/N 89412-01
	05		1/4 - 18 NPT P/N 89413-01
	06		5/8-18 UNF P/N 04300015
	07		3/8-16 UNC P/N 165025-01
		00	No Approvals
		04	Multiple Approvals

Part Number	Options	Description
330525	AA	
	00	No Approvals
	01	CSA Approvals
	02	ATEX Approvals

Mounting Adapters — Option AA

The base of the 330500 Velomitor® is machined with a 3/8-24 internal thread that will accommodate a variety of purchased or customer-manufactured mounting studs. Bently Nevada offers the 7 adapter studs listed in Table 1-1. You can order one stud with each transducer or purchase the studs separately. The Bently Nevada part numbers used for ordering separate adapter studs also appear in Table 1-1.

The base of the 330525 Velomitor® is machined with a ¼-18 NPT external thread.

Agency Approvals — Option BB

Consult with your local Bently Nevada sales representative for information regarding hazardous area approvals.

Compatible Monitoring Systems and Connections

The Velomitor® is compatible with the Bently Nevada 3500/42 Proximitor®/Seismic Monitor and 3300/55 Dual Velocity Monitor.

For more information on the 3500/42 and 3300/55 please reference Bently Nevada documents 143694 and 141516, respectively.

Connections are made to the "A" and "B" terminals of the Velomitor® through the terminal connector of the interconnect cable. At the monitor end of the cable, connect the cable "A" lead to the "A" terminal on the monitor and the "B" lead to the "B" terminal. The terminal connections appear in Figures 1-2 through 1-4. Refer to the 3500/42 and 3300/55 Monitor Manuals (p/n's 143489-01 and 83965-01, respectively) for further information.

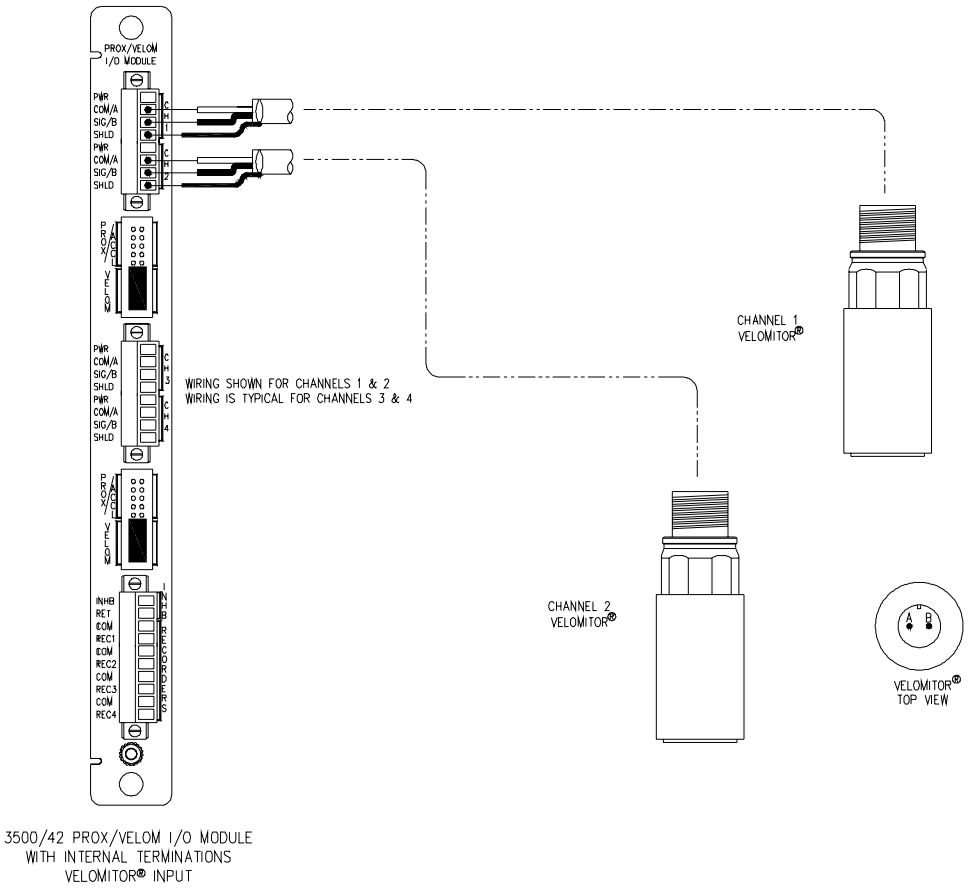


Figure 1-2. 3500/42 Monitor with Prox/Velom I/O Module

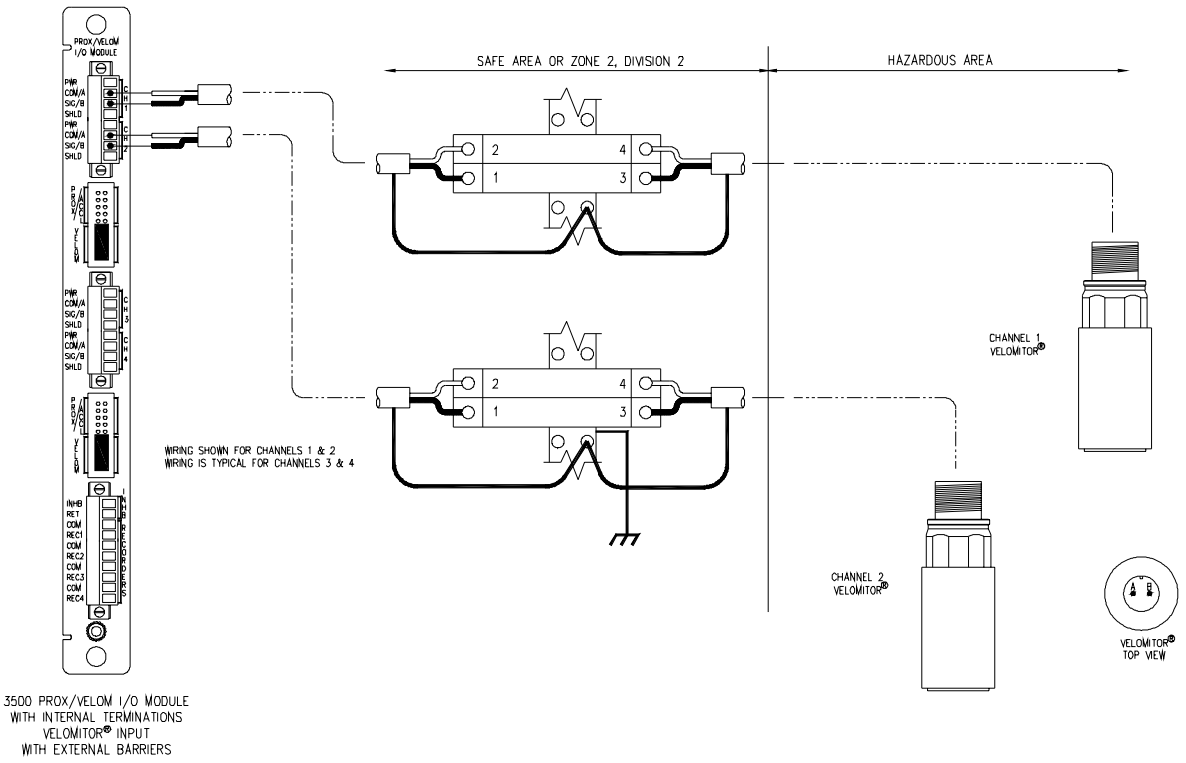


Figure 1-3. 3500/42 Monitor with Prox/Velom I/O Module with External Barriers

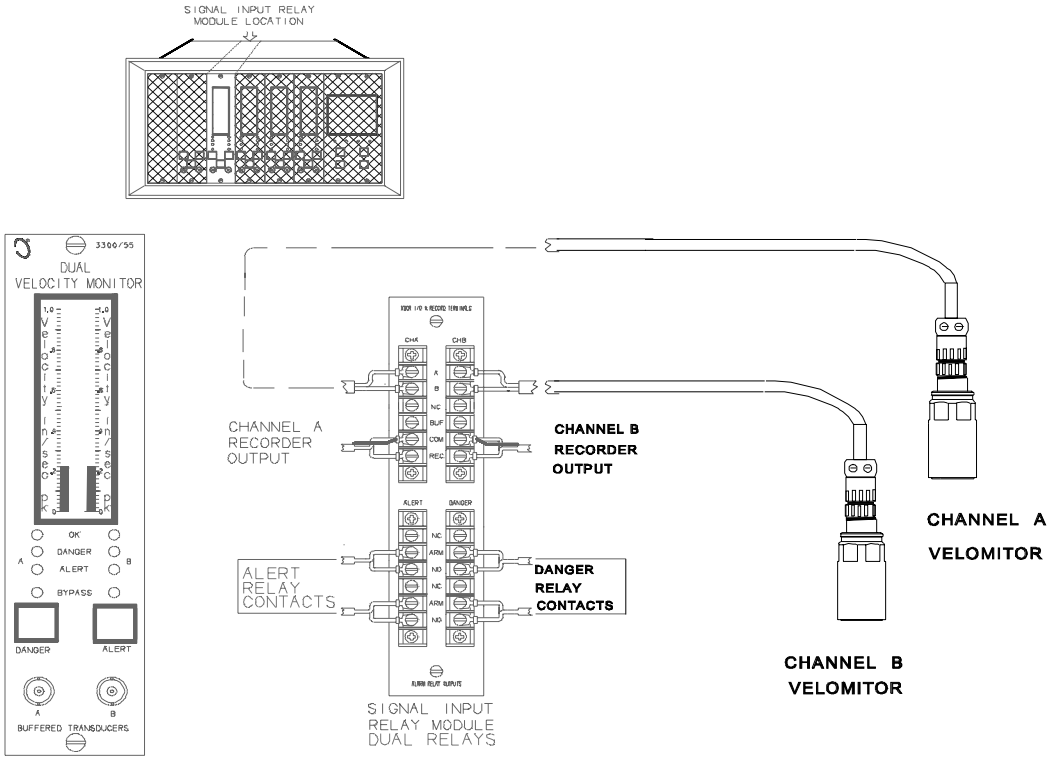


Figure 1-4. 3300 System Connections (3300/55 Monitor)

Cable Options

The Velomitor® requires a two-conductor cable. We recommend using shielded cable to minimize noise interference. Table 1-2 describes the Bently Nevada cables used with the 330500 Velomitor® and Table 1-3 describes the cables used with the 330525 Velomitor®. Figures 1-5 through 1-8 show the configuration of the cable and connector.

Table 1-2. 330500 Velomitor Interconnect Cable and Accessories

APPLICATION	P/N	CABLE DESCRIPTION
Standard Temperature Unarmored Cable	9571-AA	Shielded 22 AWG cable with moisture resistant female socket connector at transducer end, ring lugs at monitor end.
Standard Temperature Armored Cable	84661-AA	Same as 9571-AA but with flexible stainless steel armored cable.
Cable for use with weather-proof housing	89477-AA	Two conductor shielded cable with a connector adapted for use with the 21128 Velocity Transducer Housing Assembly.
Bulk Cable	02173006	Two conductor shielded 18 AWG bulk cable. Specify number of feet.
Spare Connector	00531061	Velomitor® Cable Connector
Spare Connector Clamp	00530574	Connector Clamp

Table 1-3. 330525 Velomitor Interconnect Cable and Accessories

APPLICATION	P/N	CABLE DESCRIPTION
Standard Temperature Armored Cable	106765-AA	Flexible Stainless Steel Armored Cable
Bulk Cable	02173007	Two conductor shielded 22 AWG bulk cable. Specify number of metres.
Spare Boot	03839144	Fluorosilicone Elastomer Boot
Spare Boot Clamps	03839142	Bottom Clamp
	03839143	Top Clamp

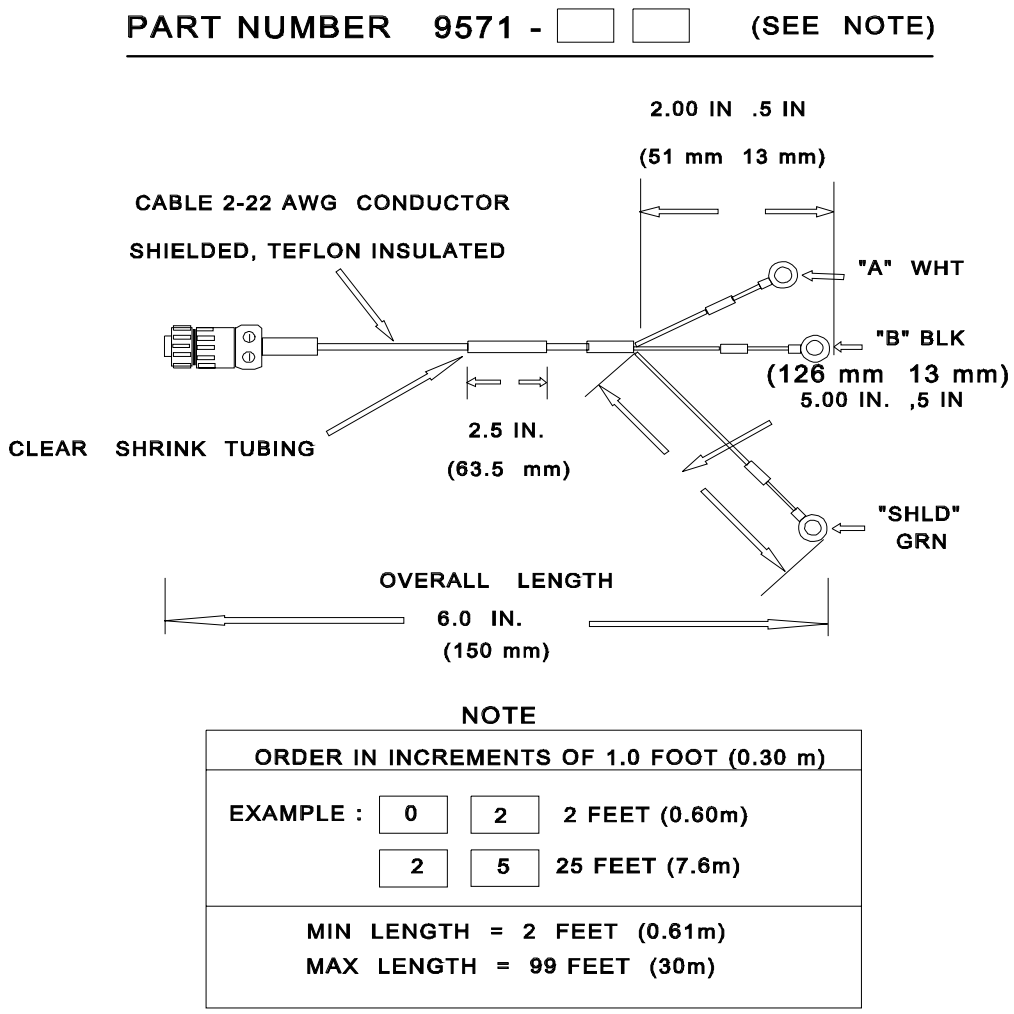


Figure 1-5. 9571 Cable for use with 330500 Velomitor

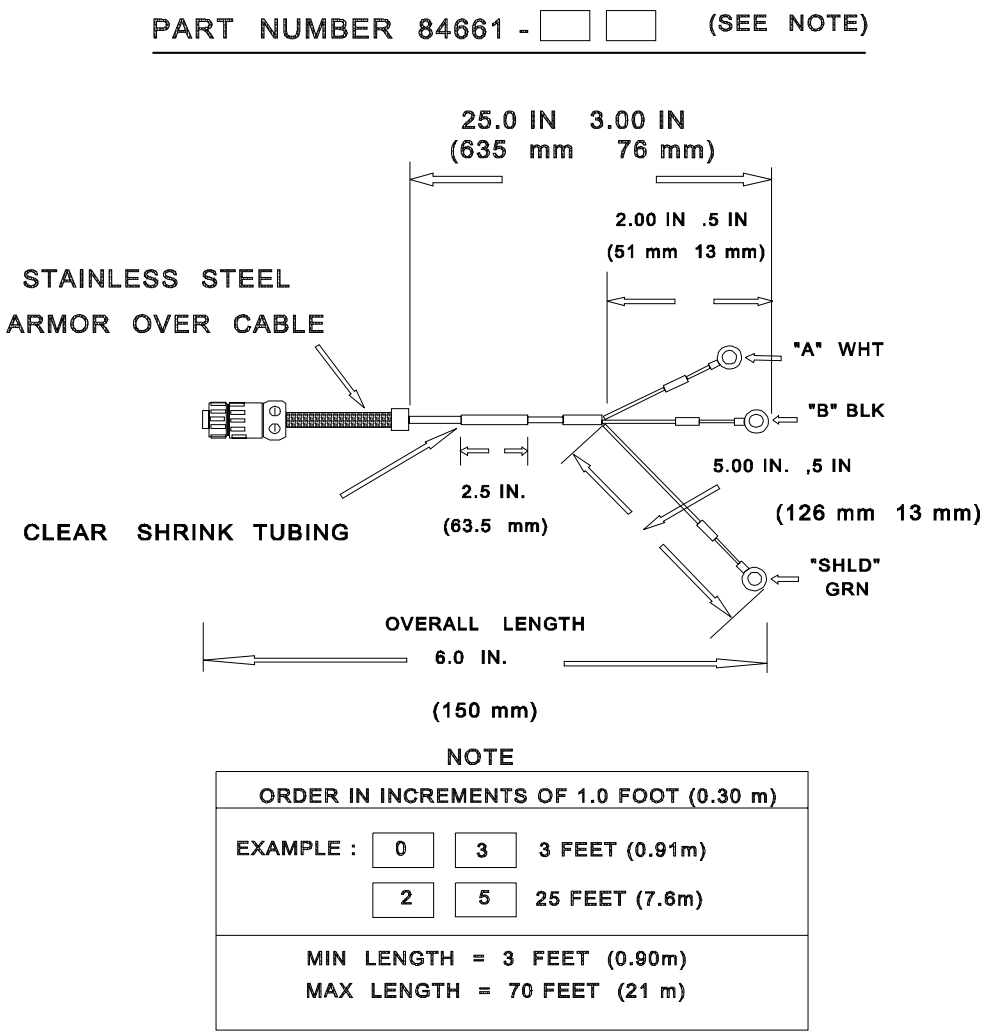


Figure 1-6. 84661 Cable for use with 330500 Velomitor

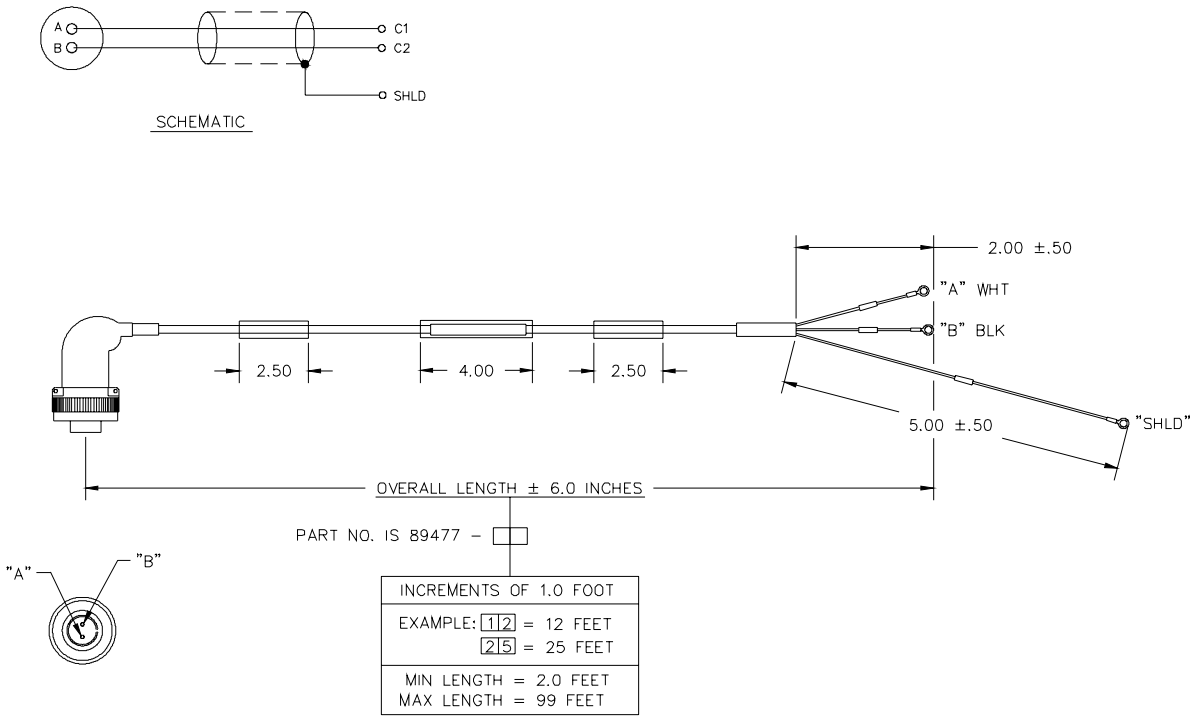


Figure 1-7. 89477 Cable for use with 330500 Velomitor

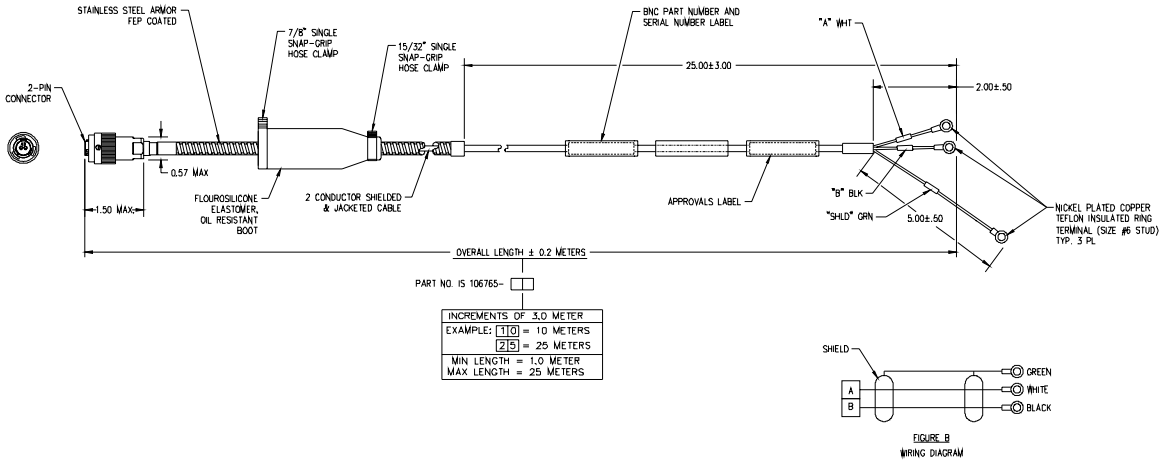


Figure 1-8. 106765 Cable for use with 330525 Velomitor

Transducer Accessories

ACCESSORY		BENTLY NEVADA PART NO.
Velocity Transducer Housing Assembly	Requires a 1/2 - 20 UNF Velomitor® adapter stud.	**21128**
Quick Connect Semi-permanent mounting method using permanently mounted bolts. Several bolts can be mounted and a single velocity transducer carried from bolt to bolt to measure vibration.	Requires a 1/2 - 20 UNF Velomitor® adapter stud.	**46122-01**
Super Mag 100 Quick temporary method for mounting a velocity transducer.	Requires a 1/4 - 28 UNF Velomitor® adapter stud.	**46000-01**
Junction Boxes Weather proof or explosion proof housing for making electrical connections to interconnect cables.		**03818016 (Body and Cover)** **03818022 (Cavity extension)** **03818065 (1/2 inch Conduit) (1.27 cm)** **03818066 (3/4 inch Conduit) (1.91 cm)**
Flexible Conduit 1/2 in. (1.27 cm) **3/4 in. (1.91 cm)** A convenient way to protect cables from moisture and abrasion.		**14847 - AA** **14848 - AA** AA - Specifies required length

(See Bently Nevada Catalog or your local Bently Nevada Sales Representative for details.)

Section 2 — Installation

Receiving Inspection

Inspect the components of the order as soon as you receive them to see if there was any damage during shipping. Keep all shipping forms and invoices. If any shipping damage is apparent, file a claim with the carrier and submit a copy to Bently Nevada LLC. Include all model numbers and serial numbers with the claim. We will either repair or replace damaged parts according to the terms and conditions of the sale.

The velocity sensor is shipped in a protective package and the connector will be protected with a plastic cap. The Velomitor® is a sensitive instrument and these precautions help to prevent damage during shipping.

Installing the Transducer

Positioning the Sensor

For optimum performance and accurate measurements the velocity sensor should be placed at a position on the machine casing that is most responsive to vibration. Proper placement is often dependent on the application. Bently Nevada offers Machinery Diagnostic Services, which can help determine the best place to mount the sensor for your application.

Mounting

Follow these steps to install the Velomitor®:

Step 1— Check that the ambient temperature and the temperature of the installation surface is within the temperature rating of the transducer.

Step 2— Applies to the 330500 Velomitor. Decide if you need a protective housing for the sensor. We recommend using the Velocity Transducer Housing Assembly (P/N 21128) if the Velomitor® or its connecting cable will be exposed to possible physical damage during maintenance operations or by operating in an environment containing solvents, corrosives, or excessive moisture.

Step 3— 330500 Velomitor: Check that the mounting site is flat, clean, and dry. The sensor requires a flat surface at least 1.25 inches in diameter. For the best results the roughness of the mounting surface should be no more than 32 microinch RMS and its flatness should be at least .0008 inches TIR.

330525 Velomitor: Check that the mounting site will be suitable for drilling and tapping a hole for a ¼-18 NPT thread. Consider the hole depth and casing thickness when selecting a mounting site for the transducer.

Step 4— 330500 Velomitor: Drill and tap the mounting hole to the dimensions required by the adapter stud. Drill the hole so that the sensitive axis of the transducer will be perpendicular to a tangential plane on the machine casing. For the best results the perpendicularity of the hole should be no more then ± 6 minutes.

330525 Velomitor: Drill and tap the mounting hole to the dimensions required by the ¼-18 NPT stud. Standard drill size and depth is 7/16-inch and 0.90 inch,

respectively. Drill the hole so that the sensitive axis of the transducer will be perpendicular to a tangential plane on the machine casing. For the best results, the perpendicularity of the hole should be no more than ±30 minutes. When hand tight, the mounting stud of the transducer will have 2 or 3 threads exposed.

Step 5— 330500 Velomitor only: Apply one drop of Loctite 242 or an equivalent adhesive to both ends of the mounting stud.

Step 6— 330500 Velomitor only: Apply a small portion of Sperry Multi Purpose Ultrasonic Couplant (P/N 04567900) to the mounting surface.

Step 7— 330500 Velomitor: With the adapter stud tightened to the Velomitor® torque the sensor to the machine case to 40 in-lb (4.5 N.m).

330525 Velomitor: Using a Crescent or socket wrench, tighten the 330525 Velomitor to the mounting site ¼ to ½ turn past hand tight engagement. This corresponds to a mounting torque of approximately 400 in-lb.

Installing Connecting Cable

Routing Cable (330500)

Bently Nevada LLC supplies connecting cables with ring lugs or military-type circular connectors. The cable connector must be compatible with the Velomitor® connector.

When installing the connecting cable, route it away from the moving components of the machine and avoid sharp corners. To minimize noise, avoid routing cables in the same cable tray with high voltage power lines. Tie the cable to a stationary part of the machine to prevent it from whipping and eventual failure. Prevent the cable from bending sharply, twisting, kinking, knotting, or straining. To prevent physical damage route the cable through conduit. Before pulling cable through conduit, protect the connector or terminals by wrapping them with tape or a similar covering. Be sure that the cable does not rub against rough or sharp surfaces.

Application Alert: Improper routing of cables through conduit can cause frayed wiring, which may result in a short or loss of signal.

Routing Cable (330525)

Bently Nevada LLC supplies connecting cables with military-type circular connectors. The cable connector must be compatible with the 330525 Velomitor connector. The 106765-AA cable assembly includes a quick connect/disconnect connector and clamps to secure and seal the splash-resistant boot.

The cable assembly comes with the top clamp secured in position and the bottom clamp is looped around the boot. Open the clamps with a small screwdriver by prying the teeth of the clamps apart. Slide the boot back to reveal the connector. The cable assembly can now be easily installed on the transducer. Once the connector is engaged, slide the boot down over the connector assembly and top of the transducer. The groove on the inside bottom of the boot should fit neatly over the lip above the hex flats. The grooves on the outside of the boot at the top and bottom indicate the placement of the clamps. Secure the clamps with pliers.

Routing Conduit

To route cable through conduit, connect one end of the conduit to the protective enclosure or other structure in which the monitor is mounted. Connect the other end of the conduit rigidly to a structure near the Velomitor®. If the cable must be routed inside lubrication oil lines, be sure it will not be subjected to temperatures exceeding its specified operating range.

Routing Armored Cable

If the cable is not routed inside conduit, use armored cable and secure it to supporting surfaces with clips or similar devices. Route the cable through protected areas to reduce the chance of damage. Connect one end of the armor directly to the enclosure or other structure in which the monitor is mounted. Connect the other end of the armor rigidly to a structure near the Velomitor®. The recommended minimum bend radius for armored cable is 1.5 inches (38.1 mm).

Sealing the Connecting Cable

When conduit-enclosed cable is routed through oil or gaseous environments, seal the ends of the conduit to prevent leakage into the protected enclosure. Table 2-1 describes the strategies that should be used to seal conduit and the differential pressures at which they apply.

Table 2-1. Conduit Sealing Techniques

Differential Pressure	Seal Type
less than one atmosphere	ZY5 cable seal similar to Bently Nevada P/N 10076-AA or duct seal putty.
greater than one atmosphere	Special interconnecting cable. (Contact Bently Nevada for details.)

Bently Nevada cable seals protect against splash and abrasion but they do not protect against immersion. Contact Bently Nevada if greater protection is required.

Section 3 — Maintenance

This section shows how to check the performance of the Velomitor®. Table 3-1 lists the recommended maintenance equipment. If the equipment is not available, contact the nearest Bently Nevada LLC field office, or return the transducer to the factory or a testing laboratory for testing.

Table 3-1. Recommended Maintenance Equipment

Recommended Equipment	Specification
MB Dynamics Model PM50 Exciter Shake Table	
MB Dynamics, Model 2250 Power Amplifier	
Krohn-Hite Model 1200A Function Generator (Bently Nevada P/N 02280852)	
Tektronix 2235 Oscilloscope, Bently Nevada P/N 02280741	
Bently Nevada LLC Model 330180-50-00 Proximitor® Model 330101-00-08-10-02-00 Probe Model 330130-040-00-00 Extension Cable	
Power Supply, Bently Nevada TK15	-24.0 Vdc with minimum output current of 20 mA and less than 5 mV peak-peak noise
AISI 4140 Steel Target Material	0.030 inch (0.762 mm) thick, 0.85 inch (21.6 mm) diameter, 16 µin pp (0.41 µm pp)
3 mA (Motorola P/N 1N5309) current diode Bently Nevada P/N 00643485	

Test Setup

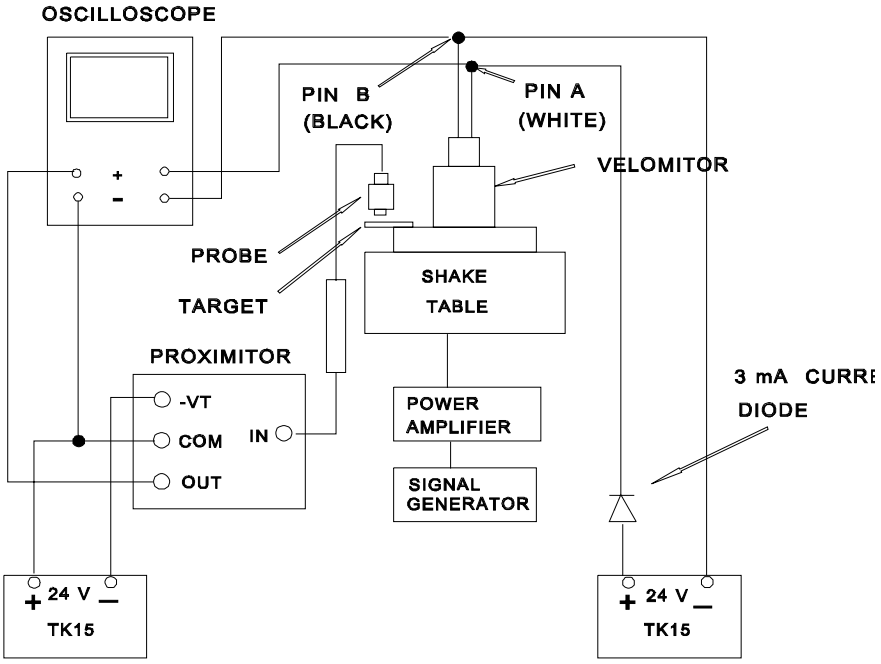


Figure 3-1

Step 1— Connect test equipment as shown in Figure 3-1.

Step 2— Mount the 4140 steel target to the shake table so that it is rigidly attached to the moving armature as shown in Figure 3-2.

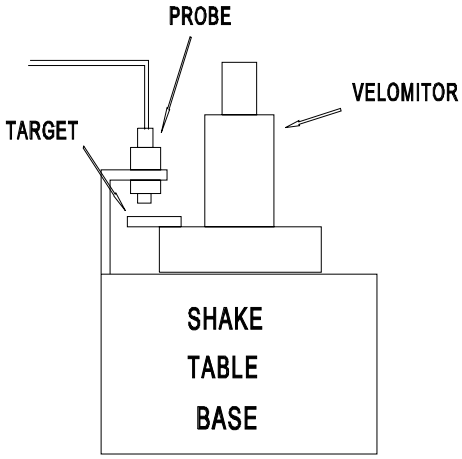


Figure 3-2

Step 3— Mount a 3300 XL 8mm, 1 meter probe (P/N 330101) such that it is isolated from the motion of the shake table.

Step 4— Connect the probe to a four meter extension cable (P/N 330130-040-00-00) and Proximitor® (P/N 330180-50-00).

Step 5— Apply -24 Vdc power to the Proximitor® and monitor the output with a voltmeter or oscilloscope.

Note: The accuracy of the system can be improved by mounting the probe and target on the same axis as the sensitive axis of the Velomitor® and by verifying that there is no mechanical resonance in the probe or target fixture at the frequency of calibration (100 Hz).

Step 6— Mount the velocity sensor to be checked on the shake table and tighten by hand.

Step 7— Adjust the probe-to-target gap so that the Proximitor® output is at midrange, -10.0 ± 0.5 Vdc.

Step 8— Connect the velocity transducer to the oscilloscope or voltmeter as shown in Figure 3-1.

Performance Test Procedure

Step 1— Set the signal generator to 100 ± 1 Hz and adjust the power amplifier gain so that the Proximitor® output is .318 ± .003 volts peak-to-peak (0.112 ± 0.001 volt RMS). This signal corresponds to a peak-to-peak displacement of 0.00159 inches (0.0404 mm) and a peak-to-peak velocity of 1.0 inch per second (25.4 mm/s).

Step 2— Verify that the output of the velocity sensor is between .095 and .105 volts peak-to-peak (.0336 to .0371 volts RMS). If the output is not in this range, return the unit to the factory.

Polarity Test Procedure

Use this test to verify the proper phase response. Any out of phase response will adversely affect machinery balancing.

Step 1— Connect the cable as shown in the setup in Figure 3-1.

Step 2— Set the time base on the oscilloscope to 20 milliseconds/division.

Step 3— Hold the velocity sensor in hand and tap the bottom. Observe that the wave-form on the oscilloscope first goes positive as shown in Figure 3-3. If it goes negative first, return the unit to the factory for replacement.

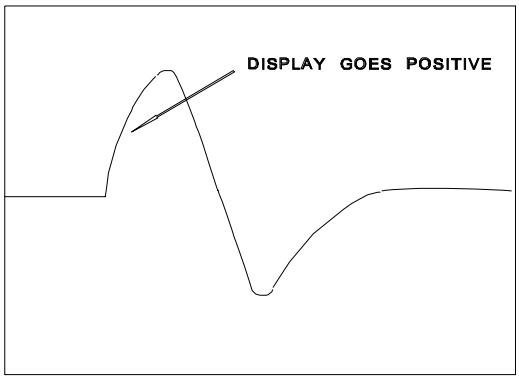


Figure 3-3

Section 4 — Field Testing and Troubleshooting

Use the following procedure to test an installed Velomitor® and isolate a suspected malfunction. The Velomitor® is a hermetically sealed unit with no adjustments or field repairable components. If you determine that the Velomitor® is not functioning properly, return it to a factory authorized repair center for further evaluation and disposition.

When the Velomitor® is used with a Bently Nevada monitoring system, a sensor fault is indicated when the monitor's OK LED goes OFF. A fault may be due to a sensor malfunction or a malfunction in the field wiring. Before troubleshooting a suspected problem, check that the sensor has been correctly installed, that all connections are secured and in the proper locations. If the sensor is properly installed, use the following steps to help identify the problem.

Fault Indication #1 Cause/Solution

Bently Nevada Monitor OK LED is off

Monitor Power is off.
Check that the monitor power supply is plugged in and power is on.

Interconnect cable is disconnected, connected loosely, or connected to the wrong monitor.
Verify that the sensor is connected to the correct monitor and to the correct monitor terminals. Check that the screws are tight.

Interconnect cable is not connected, connection is loose at the sensor, or sensor is open/shorted.
Verify that the sensor is connected either visually or by measuring the DC bias voltage between terminals “A” and “B” on the monitor (with the cable connected to the sensor and monitor). The absolute value should be 12±3 Vdc. If the measured DC bias voltage is not within the values indicated and the interconnect cable has been verified not to be a problem (by using the next two steps), then the sensor may be damaged.

Interconnect Cable is Damaged: Shorted
Visually inspect the interconnect cable for apparent damage. Disconnect the interconnect cable at both ends and measure the resistance between the two conductors, "A" to "B". If intermittent or shorted, replace the cable.

Interconnect Cable is Damaged: Open
Disconnect the interconnect cable at both ends. Then short the two conductors together at one end and measure the resistance of the cable at the other end. If open circuited, replace the cable.

Fault Indication #2 Cause/Solution

Unusually low vibration with non-machine related low level, broad band noise.

Sensor signal is not isolated, is shorted to the case or has noise coupled to the signal.

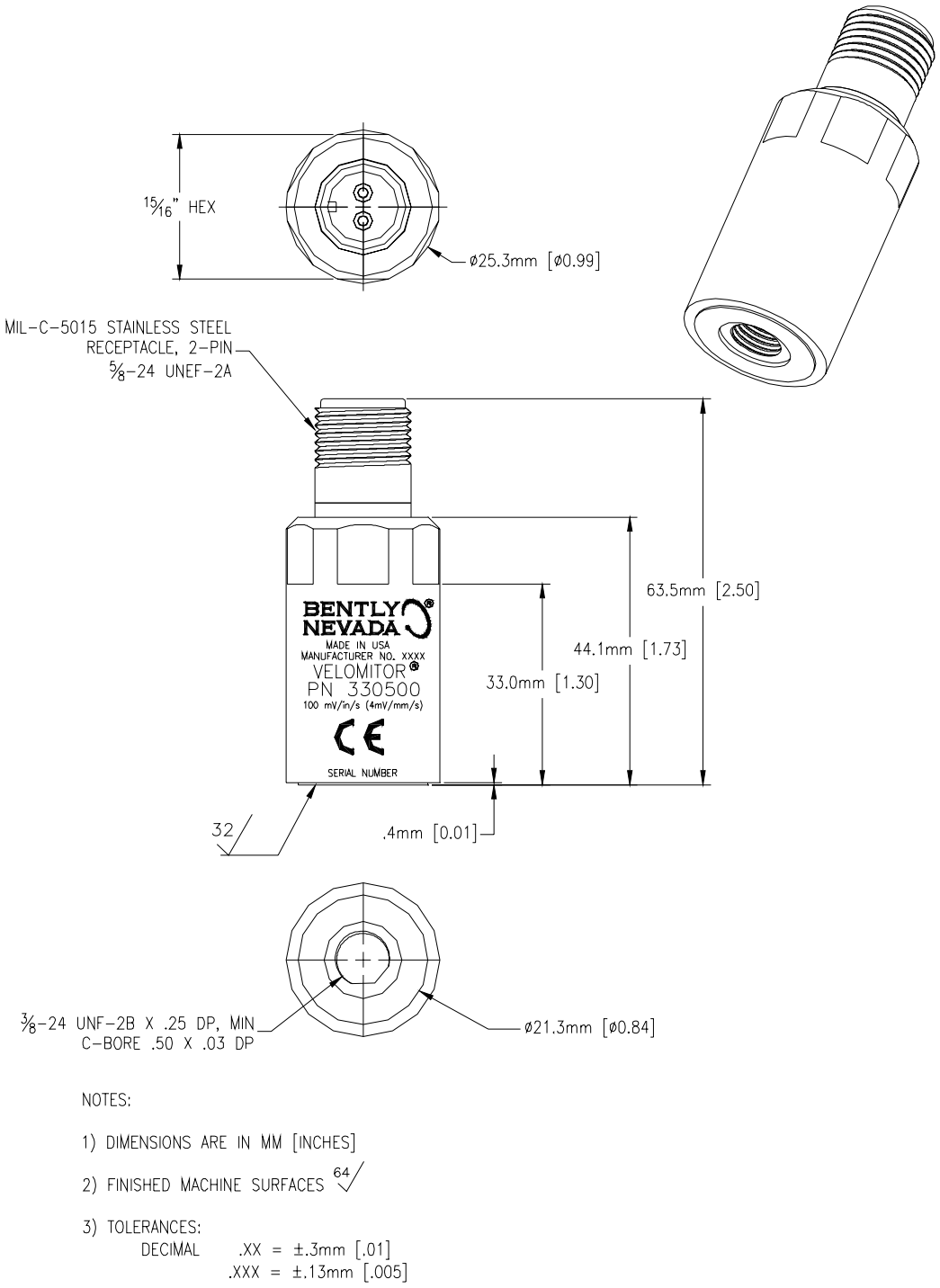
Measure the resistance between the "A" terminal and case and "B" terminal and case of the transducer. If the resistance is not 1 MΩ or greater then replace the sensor.

Section 5 — Specifications

Parameters are specified at 77° F (25° C) unless otherwise indicated.

	330500 Velomitor	330525 Velomitor xA
Electrical		
Sensitivity	100 mV/in/s (4 mV/mm/s) ±5% at 100 Hz	
Frequency Response	±0.9 dB, 6.0 Hz to 2.5 kHz ±3.0 dB, 4.5 Hz to 5.0 kHz	±0.9 dB, 6.0 Hz to 1.0 kHz ±3.0 dB, 4.5 Hz to 2.0 kHz
Velocity Range	50 in/s, peak	
Transverse Sensitivity	<5% of axial sensitivity	
Amplitude Linearity	±2% to 6.0 in/s, peak	
Mounted Resonant Frequency	12 kHz, minimum	
Power Requirements	DC Voltage: -22 to –30 Vdc Bias Current: 2.5 to 6.0 mA	
Output Bias Voltage	-12.0±3.0 Vdc, referenced to pin A	
Dynamic Output Impedance	<2400 Ω	
Broadband Noise Floor	<160 µin/s (0.004 mm/s)	
Grounding	Case Isolated	
Maximum Cable Length	1000 ft (305 m) with no signal degradation	
Environmental		
Operating Temperature Range	-67° F to 250° F (-55° to 121° C)	
Shock Limit	5000 g's, peak	
Humidity Limit	100% Relative (hermetically sealed)	
Mechanical		
Weight	5.3 oz, typical	
Dimensions	See Figures 5-1 and 5-2	
Case Material	304L Stainless Steel	316L Stainless Steel
Connector	2 pin Mil-C-5015, hermetically sealed, 304 stainless steel shell	2 pin Mil-C-26482, hermetically sealed, 304 stainless steel shell
Mounting Torque	40 in-lbs (4.5 N-m)	400 in-lbs (45.3 N-m)
Polarity	Pin A goes positive with respect to Pin B when the sensor case motion is toward the connector.	
Note: Operation outside the specified limits will result in false readings or loss of machine monitoring.		

Mechanical Drawing (330500)



NOTES:

1) DIMENSIONS ARE IN MM [INCHES]

2) FINISHED MACHINE SURFACES 64

3) TOLERANCES:
DECIMAL .XX = ±.3mm [.01]
.XXX = ±.13mm [.005]

Figure 5-1

Mechanical Drawing (330525)

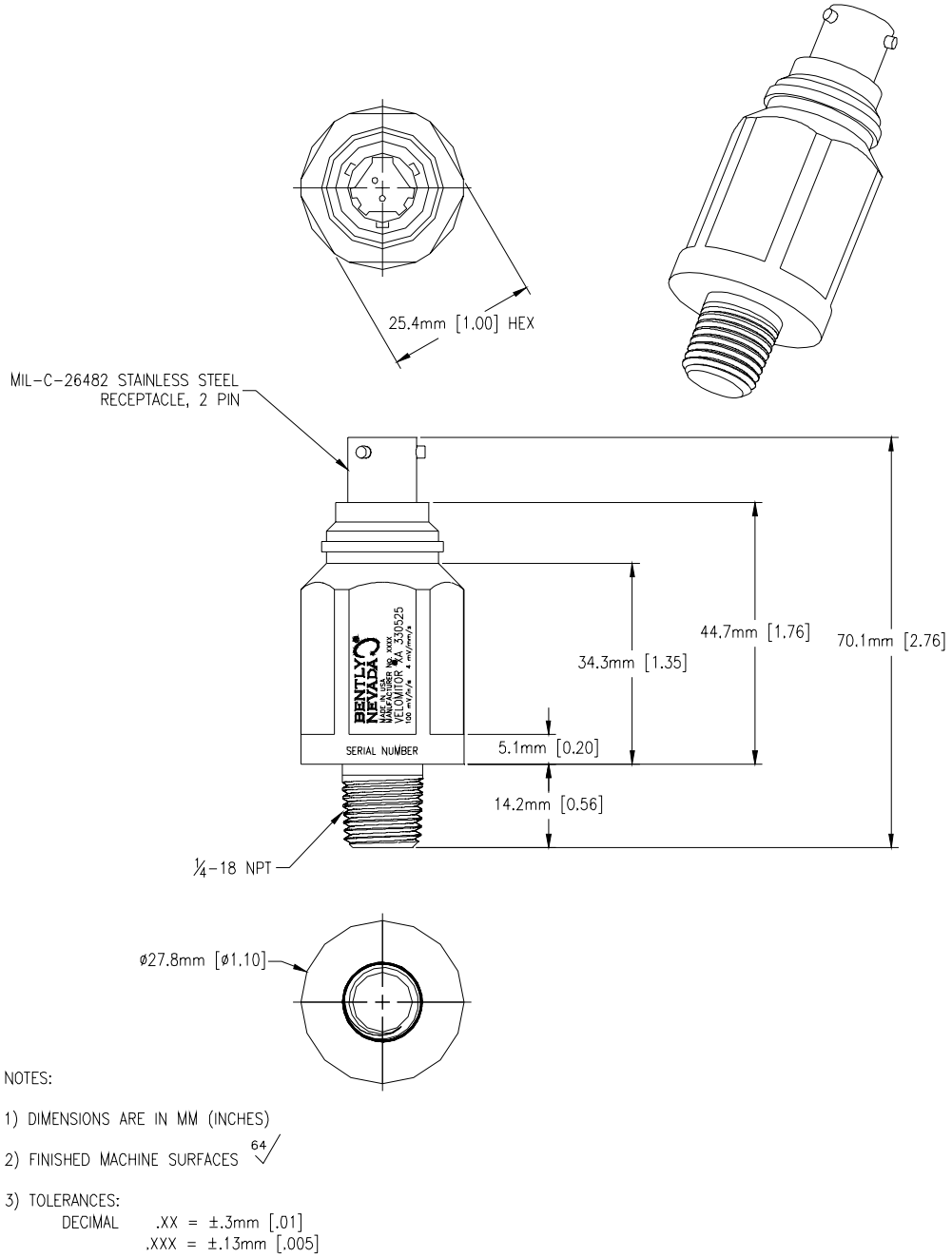


Figure 5-2

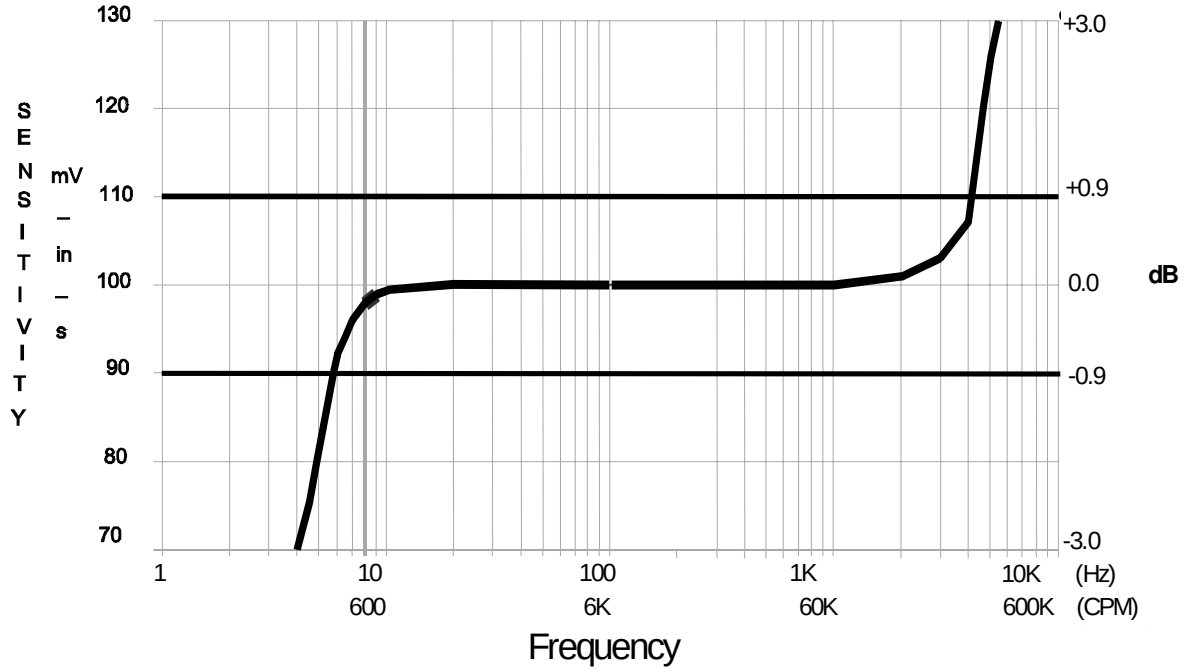


Figure 5-3 Velomitor® Frequency Response

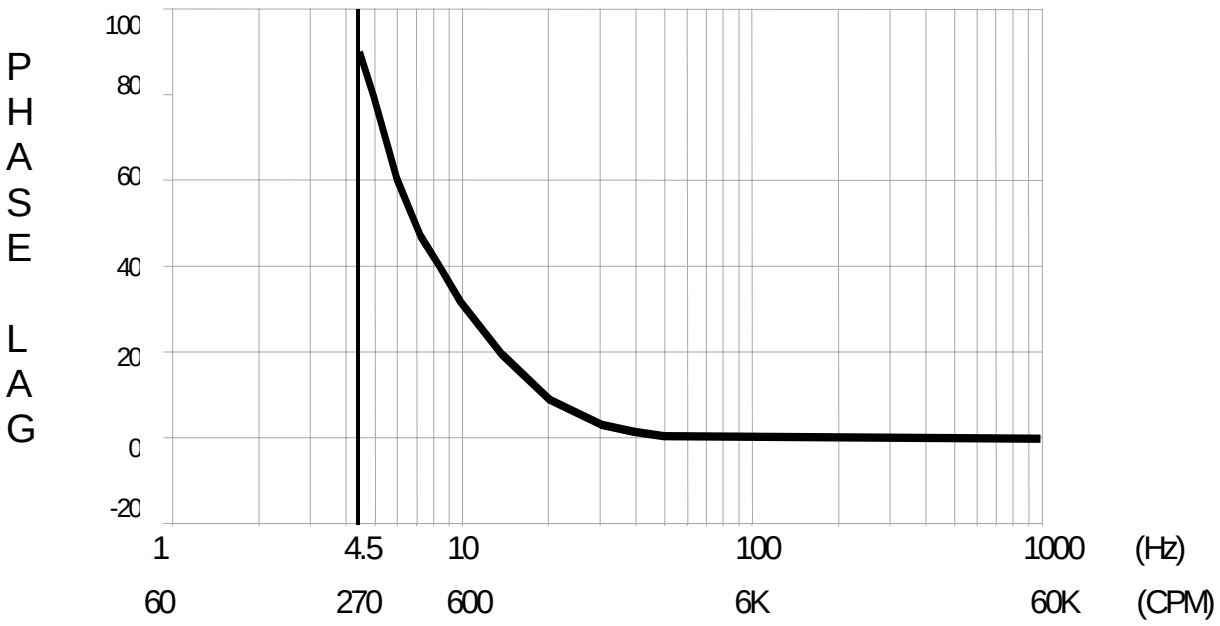


Figure 5-4 Velomitor® Phase Response

Manufacturer: **Bently Nevada Corporation**

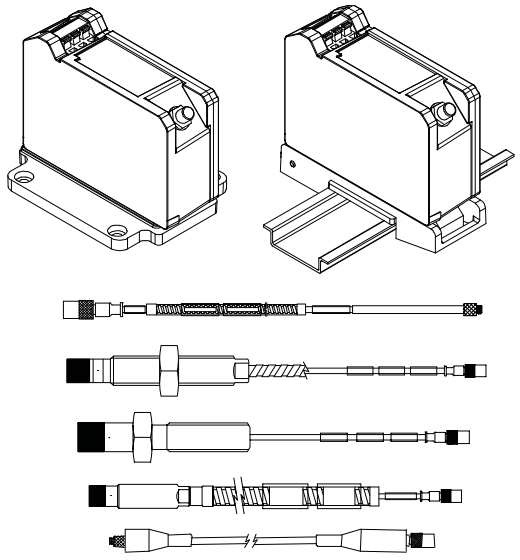
Documentation title: **Proximity Transducer System 3300 XL**
Installation Manual
Certificates of Compliance

No. of pages: 98

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Installation Manual

Bently Nevada™ Asset Condition Monitoring



3300 XL 8mm & 3300 5mm Proximity Transducer System

imagination at work

Part Number 141078-01
Rev. K (11/07)

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The following are trademarks of the legal entities cited:

Teflon is a trademark of E. I. du Pont de Nemours and Company.

Contact Information

The following contact information is provided for those times when you cannot contact your local representative:

Mailing Address	1631 Bently Parkway South Minden, Nevada USA 89423 USA
Telephone	1.775.782.3611 1.800.227.5514
Fax	1.775.215.2873
Internet	www.ge-energy.com/bently

Additional Information

Notice:

This manual does not contain all the information required to operate and maintain the product. Refer to the following manuals for other required information.

Installing the Transducer

Best Practices Document - Proximity Probes and Related Accessories: The Installation and Application of Eddy Current Proximity Transducers.

Guidelines for Grounding (Earthing) Bently Nevada Rotating Machinery Information Systems.

Installation of Electrical Equipment in Hazardous Areas.

Considerations when using Eddy Current Proximity Probes for Overspeed Protection Applications.

"Glitch": Definition of and Methods for Correction, Including Shaft Burnishing to Remove Electrical Runout.

Transducer Installation Accessories

31000/32000 Proximity Probe Housing Manual (Part Number 124200-01).

31000/32000 Proximity Probe Housing Data Sheet (Part Number 141610-01)

Housings for Proximitor® Sensors and Interface Modules Data Sheet (Part Number 141599-01)

3300 XL Monitor and Transducer Verification Kits Data Sheet (Part Number 141196-01)

Electrical and Mechanical Runout

API 670, Fourth Edition, Sections 6.1.1 (Location and Orientation – Radial Shaft Vibration Probes) and 6.1.2 (Location and Orientation – Axial Position Probes. Available from the American Petroleum Institute, Publications and Distribution, 1220 L Street NW, Washington DC, 20005, USA.

Reference (133055-01)

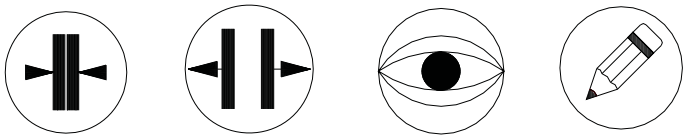
Bently Nevada Glossary.

Product Disposal Statement

Customers and third parties, who are not member states of the European Union, who are in control of the product at the end of its life or at the end of its use, are solely responsible for the proper disposal of the product. No person, firm, corporation, association or agency that is in control of product shall dispose of it in a manner that is in violation of any applicable federal, state, local or international law. Bently Nevada LLC is not responsible for the disposal of the product at the end of its life or at the end of its use.

Symbols

Procedures in this manual use the following symbols:



Connect Disconnect Observe Record Value

European CE mark for the Bently Nevada 3300 XL Transducer System

In this Document

is a list of the 3300 XL Transducer Assemblies that have the CE mark, applicable standards used for certification, and installation instructions required for compliance.

Proximity Transducer Systems

are electronic devices typically used in industrial applications. The 3300 XL Transducer System has been certified using the same Technical Construction File (TCF) and Declaration of Conformity as the 3300 8mm Transducer System because they are similar in design and application. The 3300 XL Proximity Transducer System consists of a Proximitor® Sensor, Proximity Probe, and Extension Cable.

TCF through TUV Rheinland of North America

A Technical Construction File has been prepared through TUV Rheinland of North America (TUV Rheinland File Number: P9472350.07). The Certificate of Compliance is for Directive 89/336/EEC (EMC Directive). The applicable Generic Norms are: EN50081-2 and EN50082-2.

Installation Instructions

These instructions are an addition to the Installation Instructions in Section 2.

Proximity Probes

All probe cases must have a solid connection to earth ground.

Compliant Systems and Component Part Numbers

#	Model	Model Numbers
1	3300 XL 8mm and 3300 5mm	330180, 330101*, 330102*, 330103*, 330104*, 330105*, 330106*, 330140, 330141, 330145, 330171, 330172, 330173, 330174, 330191, 330192, 330193, 330194, 330195, 330196, 330197, 330198, 330255, 330130, and 330190**

Includes all options and all approval versions of the base model numbers listed

*--Pre XL probes and cables may be used as part of a CE XL system.

**--any proximity probe, or extension cable that works correctly with the listed module.

Testing and Test Levels

Title	Test Levels	Criteria (See Note 6)
EN 55011 Emissions	Emission Class A	N/A
EN 61000-4-2 ESD	4 kV; 8 kV See Note 1	A
ENV 50140 (EN61000-4-3) Radiated RFI	10 V/m See Note 2	A
ENV 50204 Radiated RFI	10 V/m See Note 3	A
EN 61000-4-4 EFT	2 kV See Note 4	B
ENV 50142 (EN61000-4-5) Surge	0.5 kV See Note 4	A
ENV 50141 (EN 61000-4-6) Conducted RFI	10 V See Note 5	B
EN 61000-4-8 Magnetic Fields	30 A/m, 50 Hz	A

Notes for the table "Testing and Test Levels"

1. Discharge method: Contact; Air

2. 80-1000 MHz sweep with 80% 1 kHz sine wave amplitude modulation

3. 900 MHz dwell with 100% 200 Hz square wave modulation

4. Lines tested: I/O

5. 150 kHz-80 MHz sweep with 80% 1 kHz sine wave amplitude modulation

6. For the purposes of the 3300 XL 8mm and 3300 5mm System CE certification, the following criteria are defined as follows:

- Criteria A: Transducer system will output less than one third of a 3mil p-p meter scale (less than 1 mil p-p) and will return to steady state after test completion.
- Criteria B: Transducer system may react in any manner during test, but must self recover after test completion.
- Criteria C: N/A

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1. System Description

1.1 Transducer Systems

The 3300 XL 8 mm Proximity Transducer System consists of:

- a 3300 XL 8 mm probe
- a 3300 XL extension cable[1]
- a 3300 XL Proximitor® Sensor[2]

The 3300 XL 8 mm system represents our most advanced performance in an eddy current proximity transducer system. The standard 3300 XL 8 mm system is also 100% compliant with the American Petroleum Institute's (API) 670 Standard (4th Edition) for such transducers. All 3300 XL 8 mm Proximity Transducer Systems achieve this level of performance while allowing complete interchangeability of probe, extension cable, and Proximitor Sensor without the need for individual component matching or bench calibration.

Each component of the 3300 XL 8 mm Transducer System is backward compatible and interchangeable[4] with other non-XL 3300 series 5 and 8 mm transducer system components[5]. This includes the 3300 5 mm probe, which is used when an 8 mm probe is too large for the available mounting space[4, 5, and 6].

The 3300 5mm Proximity Transducer System consists of:

- a 3300 5 mm probe [5, 6, 7]
- a 3300 XL extension cable[1]
- a 3300 XL Proximitor® Sensor[2]

Like the 3300 XL 8mm, the 3300 5mm system also provides an accurate, stable signal output over a wide temperature range while allowing complete interchangeability of probe, extension cable, and Proximitor Sensor without the need for individual component matching or bench calibration.

Both systems provide an output voltage directly proportional to the distance between the probe tip and the observed conductive surface. They are capable of both static (position) and dynamic (vibration) measurements, and are primarily used for vibration and position measurement applications on fluid-film bearing machines, as well as Keyphasor® measurement and speed measurement applications[3].

1.2 Proximitor® Sensor

The 3300 XL Proximitor Sensor incorporates numerous improvements over previous designs. Its physical packaging permits high-density DIN-rail installation. It can also be mounted in a traditional panel mount configuration, where it shares an identical "footprint" to older 4-hole mounted 3300 Proximitor Sensor. The mounting base for either option provides electrical isolation, eliminating the need for separate isolator plates. The 3300 XL Proximitor Sensor is highly immune to radio frequency interference, allowing installation in fiberglass housings without adverse effects from nearby radio frequency signals. Improved RFI/EMI immunity allows the 3300 XL Proximitor Sensor to achieve European CE mark approvals without requiring special shielded conduit or metallic housings, resulting in lower installation costs and complexity.

The 3300 XL's SpringLoc terminal strips require no special installation tools and facilitate faster, more robust field wiring connections by eliminating screw-type clamping mechanisms that can loosen.

1.3 Proximity Probe and Extension Cable

The 3300 XL probe and XL extension cable also reflect improvements over previous designs. A patented TipLoc™ molding method provides a more robust bond between the probe tip and the probe body. The probe's cable is more securely attached as well, incorporating a patented CableLoc™ design that provides 330 N (75 lbf) pull strength where the probe cable attaches to the probe tip.

3300 XL 8 mm Probes and XL Extension Cables can also be ordered with an optional FluidLoc® cable option. This option prevents oil and other liquids from leaking out of the machine through the cable's interior.

1.4 Connectors

The 3300 XL 8mm and 3300 5mm probe, extension cable, and Proximitor Sensor have corrosion-resistant, gold-plated ClickLoc connectors. These connectors require only finger-tight torque (connectors will "click"), and the specially engineered locking mechanism prevents the connectors from loosening. They do not require any special tools for installation or removal.

3300 XL 8 mm Probes and Extension Cables can also be ordered with connector protectors already installed. Connector protectors can also be supplied separately for installation in the field (such as when the cable must be run through restrictive conduit). Connector protectors are recommended for all installations and provide increased environmental protection[8].

1.5 Extended Temperature Range Applications

An Extended Temperature Range (ETR) Probe and Extension Cable are available for applications where either the probe lead or extension cable may exceed the 177 °C (350 °F) temperature specification. The Extended Temperature Range Probe has an extended temperature rating for up to 260 °C (500 °F) for the probe lead and connector. The probe tip must remain below 177 °C (350 °F). The Extended Temperature Range Extension Cable is also rated for up to 260 °C (500 °F). Both the ETR probe and cable are compatible with standard temperature probes and cables. For example, you can utilize an ETR probe with the 330130 extension cable. The ETR system uses the standard 3300 XL Proximitor Sensor. When using any ETR component as part of your system, the accuracy is limited to the accuracy of the ETR system.

Notes:

1. 1-metre systems do not use an extension cable.
2. Proximitor® Sensors are supplied by default from the factory calibrated to AISI 4140 steel. Calibration to other target materials is available upon request.
3. Consult Bently Nevada Applications Note *Considerations when using Eddy Current Proximity Probes for Overspeed Protection Applications* when considering this transducer system for tachometer or overspeed measurements.
4. 3300 XL 8 mm components are both electrically and physically interchangeable with non-XL 3300 5 and 8 mm components. Although the packaging of the 3300 XL Proximitor® Sensor differs from its predecessor, it is designed to fit in the same 4-hole mounting pattern when used with the 4-hole mounting base, and will fit within the same mounting space specifications (when minimum permissible cable bend radius is observed).
5. When XL and non-XL 3300-series 5 and 8 mm system components are mixed, system performance is limited to the specifications for the non-XL 3300 5 and 8 mm Transducer System.
6. A 5 mm probe uses smaller physical packaging while providing the same linear range as a 3300 XL 8 mm probe (ref 141194-01); however, it does not permit reduced side view clearances or tip-to-tip spacing requirements compared to an XL 8 mm probe. It is used when physical (not electrical) constraints preclude the use of an 8 mm probe, such as mounting between thrust bearing pads or other constrained spaces. When narrow side view probes are required, use the 3300 XL NSv™ probe and extension cable with the 3300 XL NSv Proximitor® Sensor (refer to Specifications and Ordering Information p/n 147385-01).
7. XL 8 mm probes provide a thicker encapsulation of the probe coil in the molded PPS plastic probe tip. This results in a more rugged probe than the 3300 5 mm probe. The larger diameter of the probe body also provides a stronger, more robust case. Bently Nevada®, LLC recommends the use of XL 8 mm probes when possible to provide optimal robustness against physical abuse.
8. Silicone tape is also provided with each 3300 XL extension cable and can be used instead of connector protectors. Silicone tape is not recommended in applications where the probe-to-extension cable connection will be exposed to turbine oil.

1.6 Receiving, Inspecting, and Handling the System

The probe, extension cable and Proximitor Sensor are shipped as separate units and must be interconnected at the installation site by the user. Carefully remove all equipment from the shipping containers and inspect the equipment for shipping damage. If shipping damage is apparent, file a claim with the carrier and submit a copy to the nearest Bently Nevada LLC office. Include part numbers and serial numbers on all correspondence. If no damage is apparent and the equipment is not going to be used immediately, return the equipment to the shipping containers and reseal until ready for use.

Store the equipment in an environment free from potentially damaging conditions such as high temperature or a corrosive atmosphere. See on page 42 for environmental specifications.

1.7 Customer Service

We maintain numerous Sales and Service offices worldwide. To locate the office nearest you, visit our website http://www.bently.com. Here, you can also find specifications on all standard product offerings.

Support for products and services should be directed to one of these departments:

For product quotations, product applications, product ordering, scheduling on-site services, and questions regarding existing orders, please contact your nearby Bently Nevada, LLC Sales sales and service office.

For general product pricing, delivery, or other ordering information, contact your local BN office or contact Customer Service Department, Minden, Nevada, USA Phone: 1-775-215-1011 Fax: 1-775-215-2873.

For technical questions or problems regarding our products, contact our Technical Support Staff at:

techsupport@bently.com

or at the following locations:

Technical Support (North America)
Phone: 1-775-782-1818 Fax: 1-775-215-2890

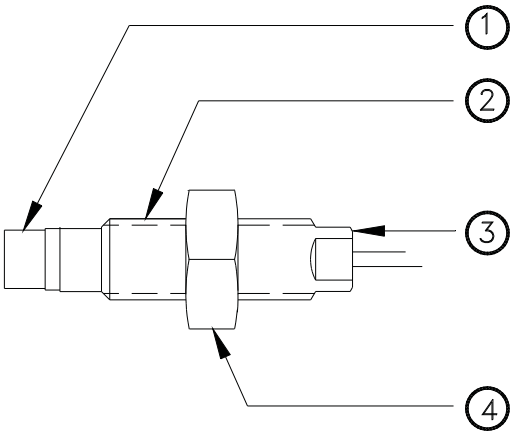
Technical Support (UK)
Phone: (44) 1925 818504 Fax: (44) 1925 817819

2. Installation

This section contains a checklist of items that you must consider when you install a 3300 XL Transducer system.

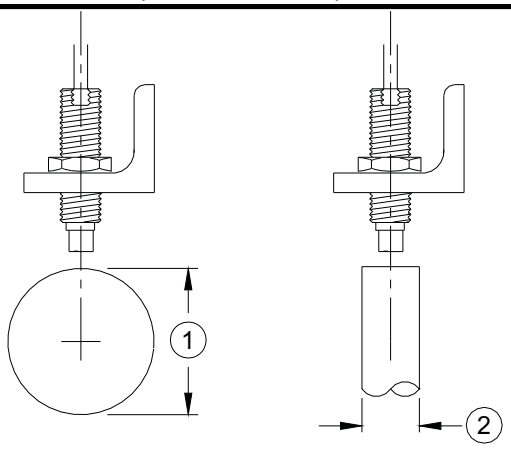
2.1 Installing the Probe

The following figures show the probe sizes and the minimum values for probe separation, side clearance and target configuration. Refer to Table 4-6 on page 41 for proper torque and the dimensions of the thread.



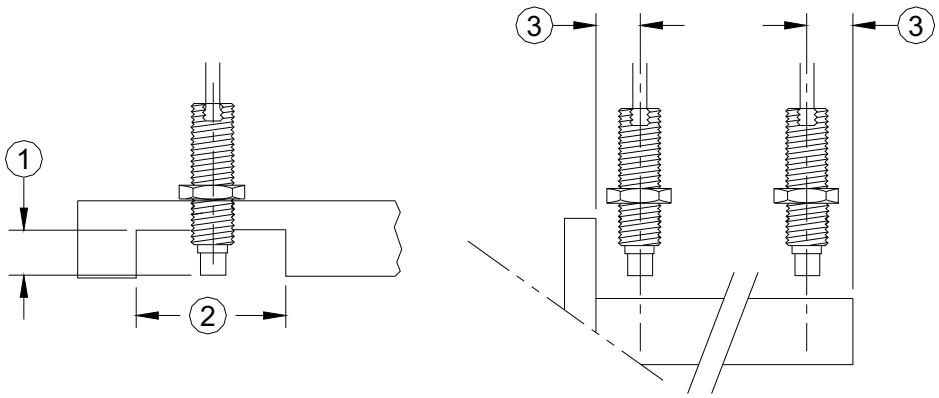
Callout	Description	XL 8 mm probe	5 mm probe
1	Probe tip	8 mm	5 mm
2	Thread types	M10x1, 3/8-24, or unthreaded	M8x1 or 1/4-28
3	Wrench Flats	8 mm or 5/16 in	7 mm or 7/32 in
4	Lock nut	17 mm or 9/16 in Hex	13 mm or 7/16 Hex

Figure 2-1: Probe Dimensions



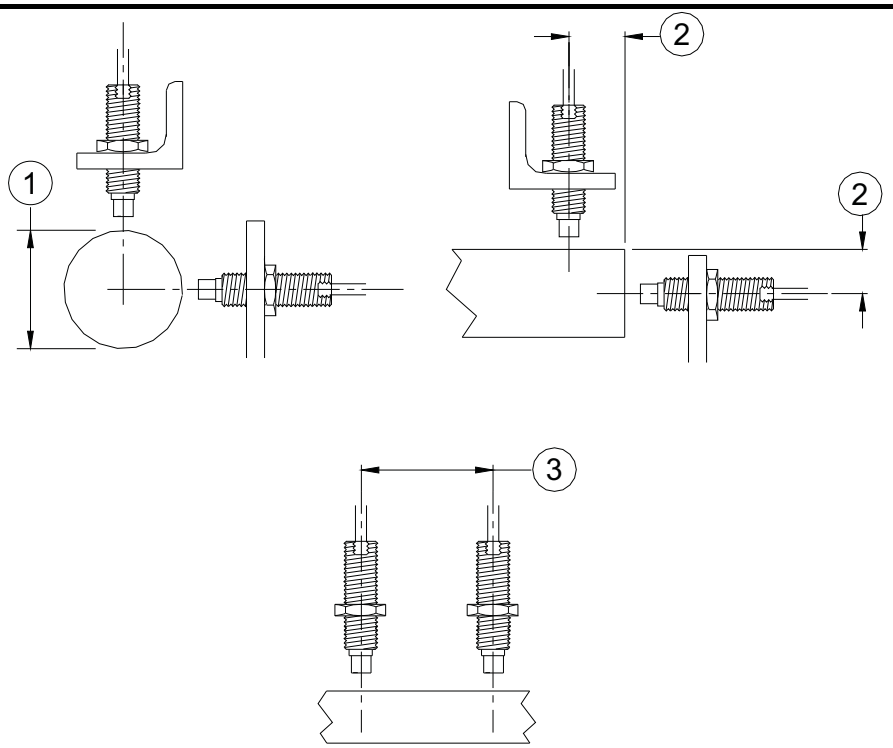
1. 76.2 mm (3.00 in) minimum (See Note 1 below)
2. 15.2 mm (0.60 in) minimum

Figure 2-2: 5mm and XL 8mm Probe Target Sizes



1. 6.4 mm (0.25 in) minimum
2. 17.8 mm (0.70 in) minimum
3. 8.9 mm (0.35 in) minimum

Figure 2-3: 5mm and XL 8mm Probe Mounting Dimensions



1. 50.8 mm (2.00 in) minimum (See Note 2 below)
2. 16.0 mm (0.63 in) minimum
3. 40.6 mm (1.60 in) minimum

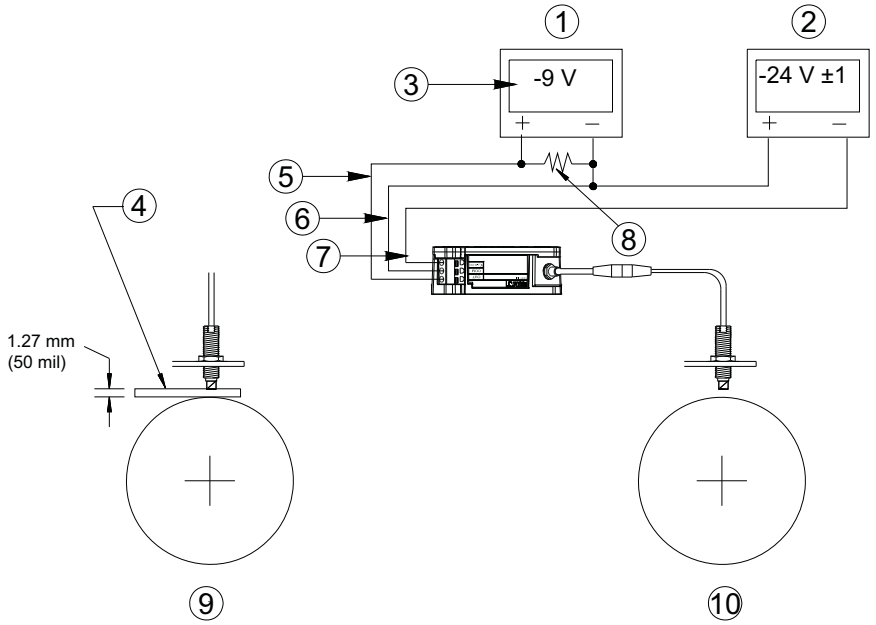
Figure 2-4: 5mm and XL 8mm Probe-to-Probe Separation Due To Cross Talk

NOTES

1. At or below 76.2 mm (3.00 in), scale factor will increase as the target size is reduced per performance specification 159484. See the application advisory below.
2. At or below 50.8 mm (2.00 in), cross talk will produce a small vibration signal per performance specifications 159484, due to cross talk.

Application Advisory
Mounting dimensions and target size affect the scale factor of proximity transducer systems. The minimum recommended dimensions above were chosen to minimize error yet retain flexibility for different mounting situations.

Adjust the distance between the probe tip and the shaft using one of the methods shown in Figure 2-5. The electrical method for setting the probe gap is preferred.



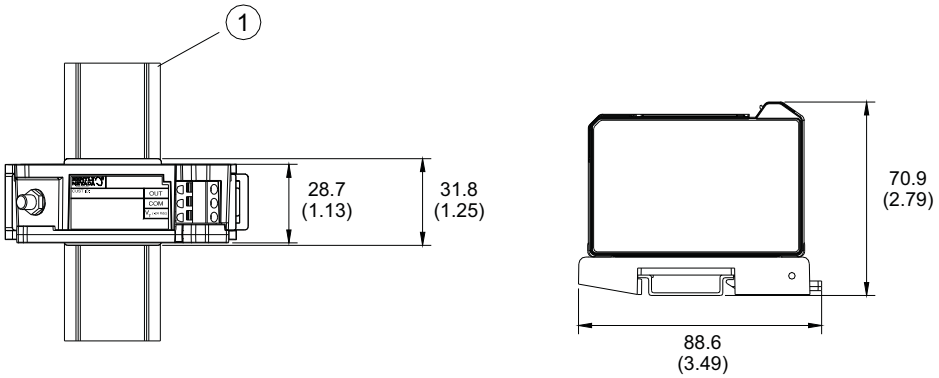
1. Voltmeter
2. Power supply
3. Voltage at center of the linear range (typically –9 V)
4. Space
5. OUT
6. COM
7. V_T
8. 10 kΩ, 1% resistor
9. Mechanical method
10. Electrical method

Figure 2-5: Methods for Setting the Probe Gap

2.2 Mounting the Proximitor® Sensor

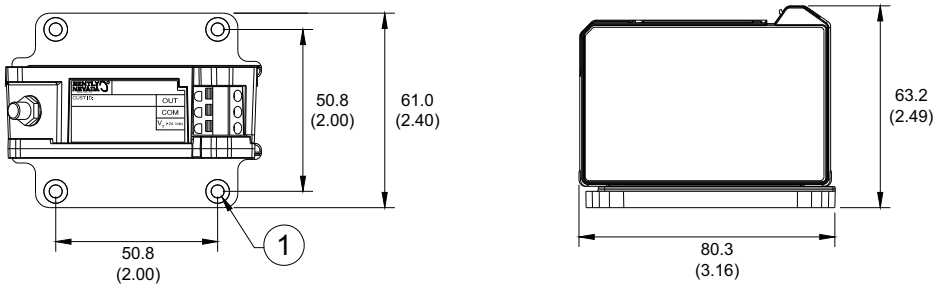
Mount the Proximitor Sensor in a location that is compatible with its environmental specifications (see Environmental Limits on page 42).

Consider the local electrical codes and the presence of hazardous or explosive gas at the installation site. (Refer to the document *Installation of Electrical Equipment in Hazardous Areas.)*



1. 35mm Din Rail

Figure 2-6: DIN Rail Mount Dimensions

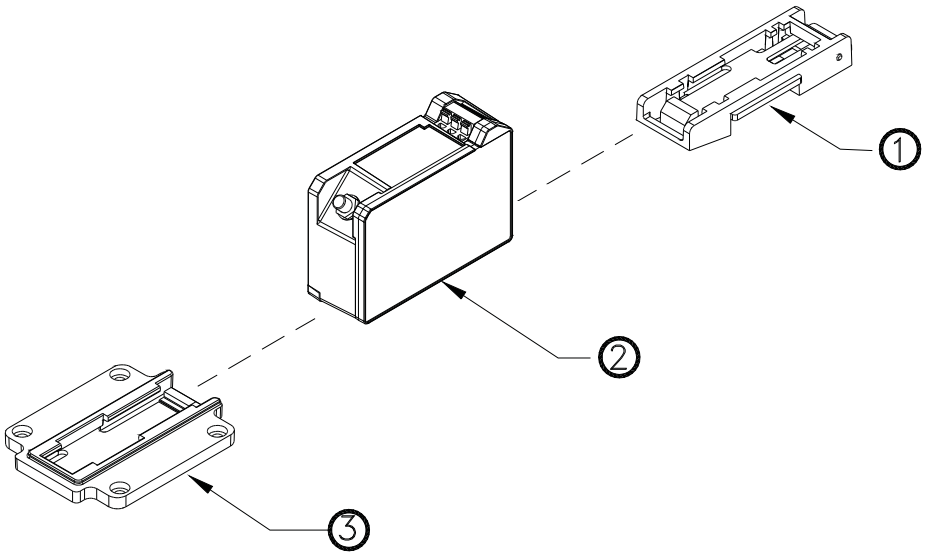


1. 4.0 mm (0.158 in) for M3.5 or #6 screw

Figure 2-7: Panel Mount Dimensions

2.3 Interchangeable Mounting Feet

The mounting feet for the 3300 XL Proximitor Sensor are interchangeable. If you purchase a Proximitor Sensor with one mounting option (either the DIN mount option or the panel mount option) you can change the mounting hardware simply by replacing the mounting foot that is currently on the Proximitor Sensor with the other type of mounting foot.



1. DIN Mount Part (part number 138493-01)
2. 3300 XL Proximitor® Sensor
3. Panel Mount Part (part number 138492-01)

Figure 2-8: Mounting Foot Options

2.4 Mounting the Proximitor® Sensor with DIN Mount Part

To mount the 3300 XL Proximitor Sensor with a DIN Mount Part on a DIN rail:

1. Install the Proximitor Sensor into the DIN Mount Part (if not already installed) as shown in Figure 2-9.

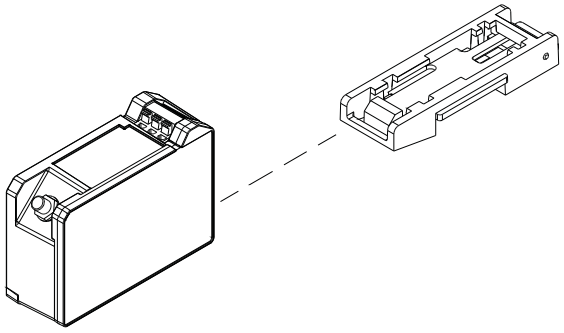
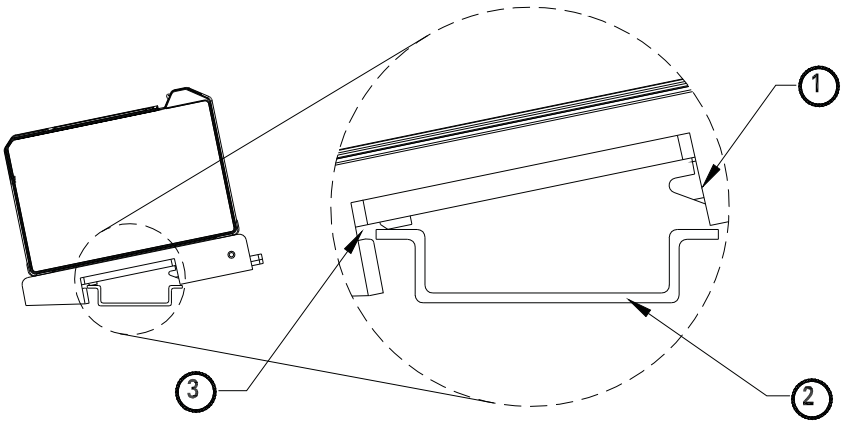


Figure 2-9: Installing the DIN Rail Mounting Foot

2. Examine the under side of the DIN Mounting Foot. This part has a spring-loaded clip on one side and two protrusions that will catch the edge of the DIN rail on the other side. You must install the side with the two protrusions so that the edge of the DIN rail fits into the gap as shown in Figure 2-10.



1. Spring-loaded clip
2. DIN rail
3. Edge of DIN rail must fit into this gap

Figure 2-10: Inserting the Mounting Foot Onto the DIN Rail

3. Push down on the Proximitor Sensor as shown in Figure 2-11 until the unit "snaps" into place. The unit is now installed.

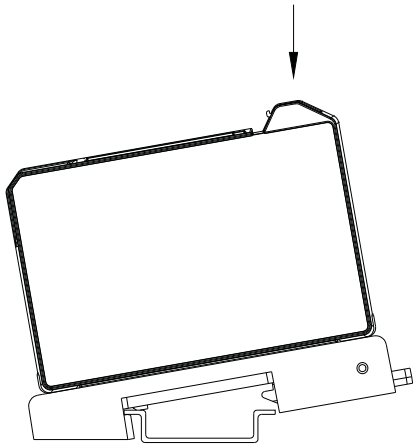


Figure 2-11: Snapping the Sensor Onto the DIN Rail

2.5 Removing the Proximitor Sensor from the DIN Rail

Use a regular screwdriver to remove the Proximitor Sensor from the DIN rail by using a regular screwdriver to unclip the unit from the rail.

Insert a regular screwdriver into the rear of the spring-loaded clip (see Figure 2-12). Push the top of the screwdriver towards the Proximitor Sensor to pry the spring-loaded clip back so that you can remove the Proximitor Sensor from the DIN rail.

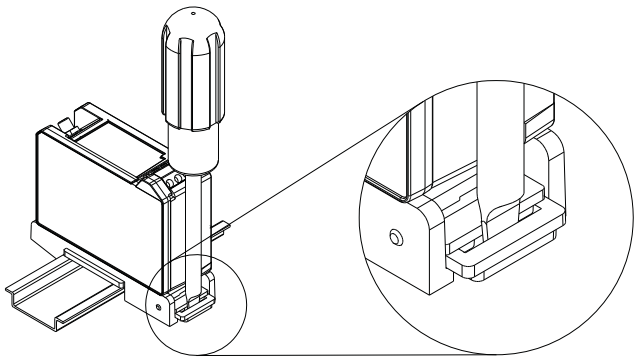


Figure 2-12: Retracting the Spring-Loaded Clip

2.6 Termination of Field Wiring in the Terminal Block

1. Strip the insulation from the field wiring you will install into the terminal block. The recommended strip length is 10 mm (0.4 in.).
2. You must twist the conductor strands together before installing the field wire into the terminal block (see Figure 2-13). We highly recommended that you tin the conductor strands as well.

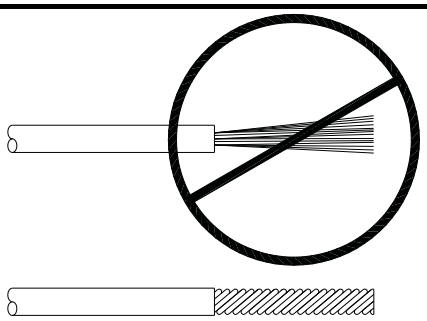
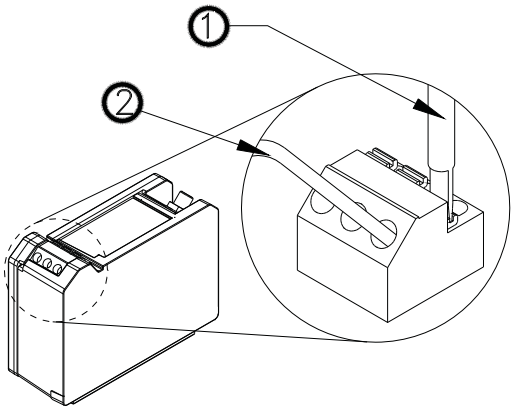


Figure 2-13: Proper Preparation of Wire Strands

3. The terminal block can accommodate field wiring conductor sizes of 0.2 – 1.5 mm^2 (16 – 24 AWG).

4. Use a small regular screwdriver to push down the orange lever that corresponds to the position in the terminal block where you will install the field wire and insert the field wire (see Figure 2-14).



1. Small screwdriver
2. Field wiring

Figure 2-14: Inserting Field Wiring Into Proximitor

To remove the field wire push down on the orange lever and pull on the field wire to remove it from the terminal block. If the field wiring uses a stranded wire and a strand break off inside the terminal block, turn the Proximitor Sensor upside down while pushing down the orange lever and remove the strand from the terminal block.

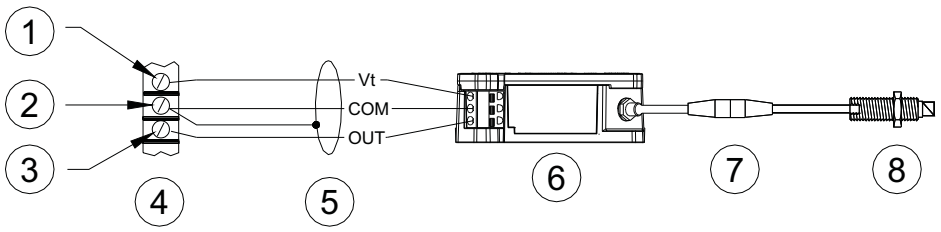
2.7 Routing the Extension Cable and Field Wiring

Route the extension cable using the following guidelines.

- Verify that the sum of the extension cable and probe lead lengths equal the Proximitor Sensor system length. (For example, a 9-metre Proximitor Sensor will work with an 8-metre extension cable and a 1-metre probe.)

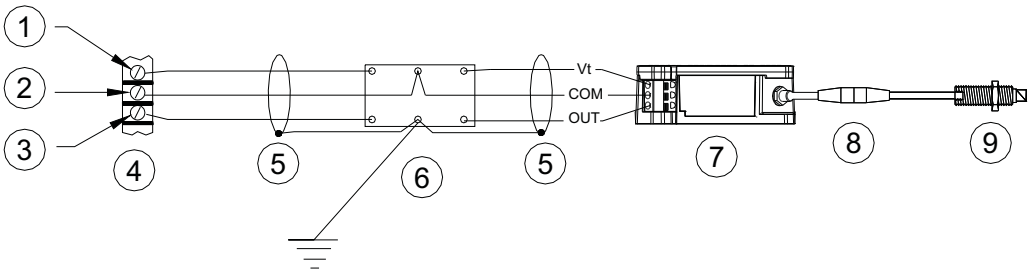
- Use the system color identification to verify component compatibility for all system components. For the 3300 XL 8 mm system and 3300 5 mm probe, components will be marked with a blue color code.
- Use mounting clips or similar devices to secure the extension cable to supporting surfaces.
- Identify the probe and both ends of the extension cable by inserting labels under the clear Teflon® sleeves and applying heat to shrink the tubing.
- Join the coax connectors between the Proximitor Sensor, extension cable and probe lead. Tighten connectors to finger tight.
- Use either a connector protector or self-fusing silicone tape to insulate the connection between the probe lead and the extension cable. **Do not use self-fusing silicone tape to insulate a connection at locations that may expose the silicone tape to turbine oil.**
- If the probe is in a part of the machine that is under pressure or vacuum, use appropriate cable seals and terminal boxes to seal the hole where the extension cable exits the machine.

Use Figure 2-15and Figure 2-16 to connect the field wiring between the Proximitor Sensor and the monitoring instruments. (Refer to the documents *Guidelines for Grounding (Earthing) Bently Nevada Rotating Machinery Information System* and *Installation of Electrical Equipment in Hazardous Areas*.)



1. Transducer power
2. Common (ground)
3. Input signal
4. Monitor terminal strip
5. Cable shield
6. Proximitor sensor
7. Connector protector
8. Probe

Figure 2-15: Installation With No Barriers or With 3300/3500 Internal Barriers



1. Transducer power
2. Common (ground)
3. Input signal
4. Monitor terminal strip
5. Cable shield
6. External barrier
7. Proximitor sensor
8. Connector protector
9. Probe

Figure 2-16: Installation With External Barriers

3. Maintenance and Troubleshooting

This section shows how to verify that the system is operating properly and identify parts of the system that are not working properly.

When properly installed and verified the 3300 XL Transducer System (probe, cable and Proximitor Sensor) does not need calibration or verification at regular intervals. If the monitor OK light (green) indicates a NOT OK condition (i.e., the light is **not** illuminated), then

- a fault has occurred in the field wiring/transducer system/power source,
- the probe is too close to target,
- the probe is detecting other material than the target,
- the target material is not AISI 4140, or
- the probe is too far from the target.

We recommend the following practices to ensure continued satisfactory operation of your 3300 XL system. Verify operation using the scale factor verification method on the following page, if you

- replace any of the system components (probe, cable or Proximitor Sensor),
- remove and reinstall or move and remount any of the components,
- determine that any of the components are damaged, or
- overhaul the machine being monitored.

Please note that a sudden change in the output of the transducer system or other output that is not consistent with the associated machinery's trended data is, in most instances, not a transducer problem but a machinery problem. You can verify the transducer system under these conditions at your discretion.

Under harsh operating conditions some users prefer to verify all transducers at a regular interval. As noted above, the 3300 XL Transducer System does not require this. Users who wish to verify the system on a regular interval should use an interval consistent with their own practices and procedures, which may or may not be based upon ISO 10012-1 "Quality Assurance Requirements for Measuring Equipment" (section 4.11).

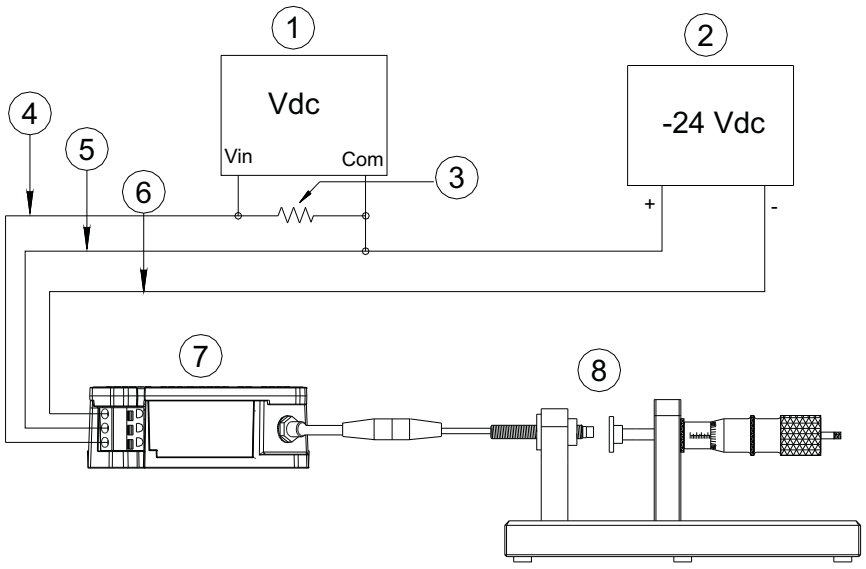
For target materials other than AISI 4140 steel and for other special applications, contact your local sales office.

NOTE
Hazardous location areas must be free of hazardous materials before any maintenance or troubleshooting can be performed.

The scale factor verification requires the following instruments and equipment:

- Digital multimeter
- Spindle micrometer
- 10 kΩ fixed resistor
- Power supply (-24 Vdc ± 1 V)

The scale factor verification uses the test setup shown in Figure 3-1.

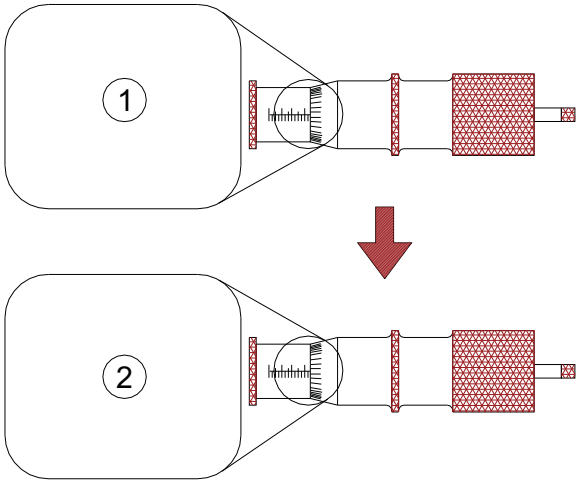


1. Multimeter
2. Power supply
3. 10 kΩ resistor
4. OUT
5. COM
6. VT
7. Proximitor sensor
8. Probe, target, and spindle micrometer

Figure 3-1: Scale Factor Verification Test Setup

3.1 Scale Factor Verification

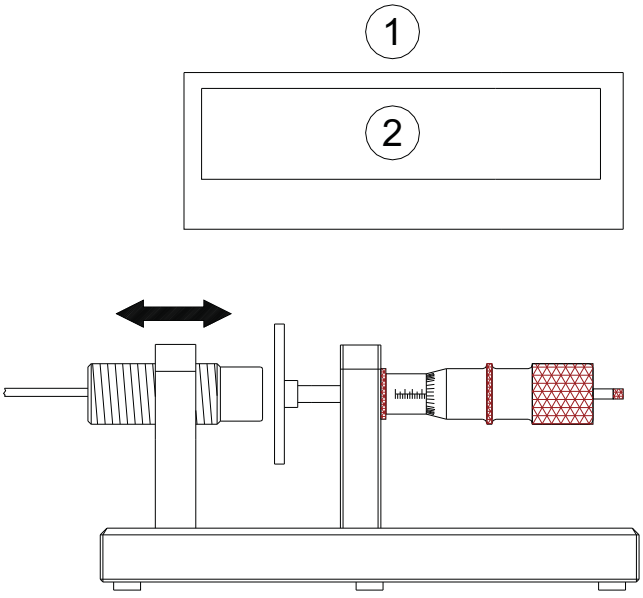
1. Compensate for mechanical backlash and adjust the spindle micrometer for electrical zero.



1. 0.46 mm (18 mils)
2. 0.50 mm (20 mils)

Figure 3-2: Adjusting Spindle Micrometer for Electrical Zero

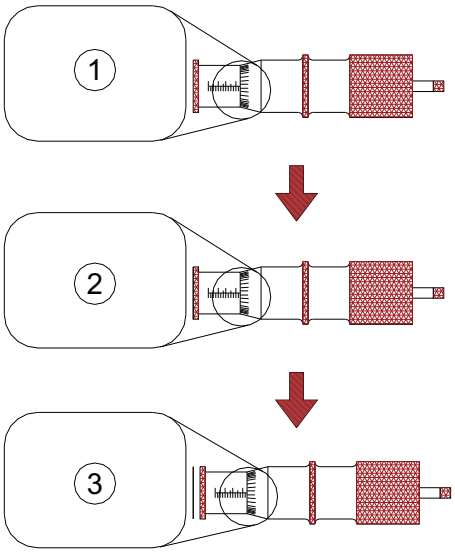
2. Adjust the gap to electrical zero by moving the probe.



1. Multimeter
2. –3.00 Vdc ± 0.1 Vdc

Figure 3-3: Adjusting Gap for Electrical Zero

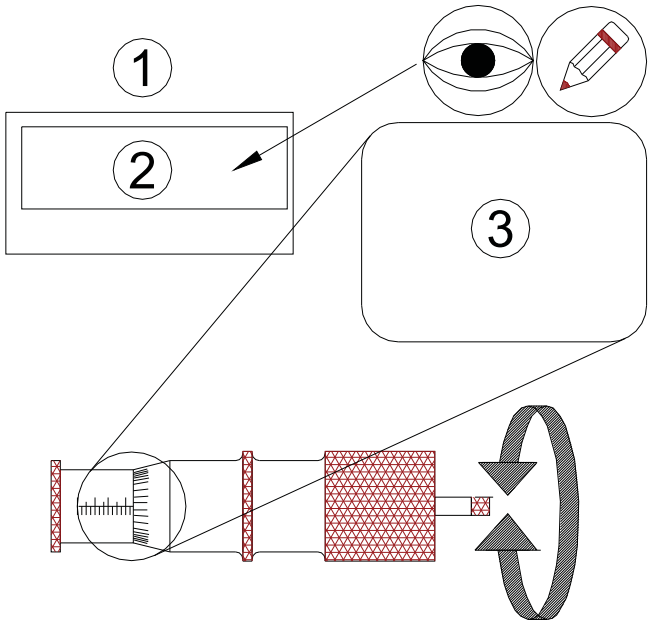
3. Compensate for mechanical backlash in the micrometer and adjust to the start of the linear range.



1. 0.50 mm (20 mils)
2. 0.20 mm (8 mils)
3. 0.25 mm (10 mils)

Figure 3-4: Compensating for Mechanical Backlash

4. Record voltages in Table 3-1 and calculate Incremental Scale Factors (ISFs) and Average Scale Factor (ASF) using the equations given below.



1. Multimeter
2. Vdc_n reading
3. Increments: 0.25 mm (10 mils)

Figure 3-5: Adjusting Spindle Micrometer for Recording Voltages

Table 3-1: Table for Recording Measurement Voltages

N	Adjust Micrometer to...		Record Voltages	Calculate Scale Factor	
	mm_n	mil_n	Vdc_n	ISF_n (Incremental Scale Factor)	$Vdiff_n$ (Difference Voltage)
1	0.25	10	>>		>>
2	0.50	20	>>	>>	>>
3	0.75	30	>>	>>	>>
4	1.00	40	>>	>>	>>
5	1.25	50	>>	>>	>>
6	1.50	60	>>	>>	>>
7	1.75	70	>>	>>	>>
8	2.00	80	>>	>>	>>
9	2.25	90	>>	>>	>>
>> = Enter values into these cells				**ASF (Average Scale Factor)**	
				>>	

$$ISF_{n\,(V/mm)} = \frac{Vdc_{n-1} \quad Vdc_n}{0.25} \qquad ASF_{(V/mm)} = \frac{Vdc_{0.25mm} \quad Vdc_{2.25mm}}{2}$$

$$ISF_{n\,(mV/mil)} = \frac{Vdc_{n-1} \quad Vdc_n}{0.01} \qquad ASF_{(mV/mil)} = \frac{Vdc_{10mil} \quad Vdc_{90mil}}{0.08}$$

$$Vdiff_n = Vdc_n + (mm_n \bullet 7.87) \qquad Vdiff_n = Vdc_n + (mil_n \bullet 0.2)$$

5. Use the following formula to determine maximum Deviation from Straight Line (DSL):

$$DSL(mm) = \frac{Vdif\,(max) \quad Vdif\,(min)}{15.74} = _____ mm$$

$$DSL(mil) = \frac{Vdif\,(max) \quad Vdif\,(min)}{0.4} = _____ mil$$

If the ISF or DSL of the system is out of tolerance, contact Bently Nevada LLC for further information on possible calibration problems.

The preceding pages indicate scale factor verification using a TK-3. This is suitable for rough verification. For API 670 system verification a more precise micrometer and target must be used. There are two different 3300 XL Micrometer Kits that you can use to verify the calibration of Bently Nevada transducer systems or to check the scale factor of specific shafts. Both micrometer kits will work with Bently Nevada eddy current transducers ranging in size from the 3300 XL NSv™ Transducer System up to the 3300 XL 11 mm Transducer Systems. Both micrometer kits also have options for either a metric or English micrometer.

The **3300 XL Precision Micrometer** (part number 330185) is a highly accurate verification device. You should use this device when performing acceptance testing on our transducer systems. All of our transducer systems have a specified linear range and average scale factor (ASF). The transducer systems also have a maximum deviation from straight line (DSL) and ISF tolerances for ambient and extended temperatures. The 3300 XL Precision Micrometer comes with a high precision 4140 steel target to make precise measurements and verify whether the transducer system is working properly and within published specifications.

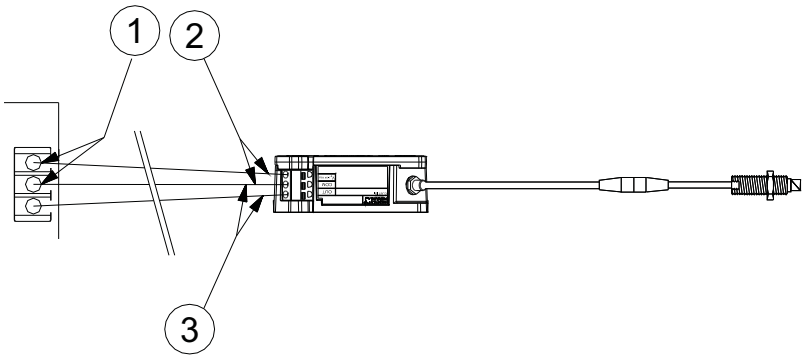
The **3300 XL Shaft Micrometer** (part number 330186) is used to check the scale factor of the transducer system directly on your shaft. You can compare the scale factor of your transducer system with that of a 4140 steel target supplied by Bently Nevada LLC to check whether errors in the measurement are due to runout, target material or a problem in the transducer system.

3.2 Troubleshooting

This section shows how to interpret a fault indication and isolate faults in an installed transducer system. Before beginning this procedure, be sure that you have installed the system correctly and properly secured all connectors in the correct locations.

When a malfunction occurs, locate the appropriate fault, check the probable causes for the fault indication and follow the given procedures to isolate and correct the fault. Use a digital voltmeter to measure voltage. If you find faulty transducers, contact your local sales and service office for assistance.

The troubleshooting procedures use measured voltages as shown in Figure 3-6, Table 3-2, and Table 3-3:



1. V_{PS}
2. V_{XDCR}
3. V_{SIG}

Figure 3-6: Troubleshooting Voltages

Table 3-2. Symbols for Measured Voltages

Symbol	Meaning	Voltage measured between...
V_{SIG}	Signal voltage from the transducer	OUT and COM
V_{PS}	Power supply voltage	Power Source and Common
V_{XDCR}	Supply voltage at transducer	$-V_T$ and COM

NOTE
V_{SIG}, V_{PS}, and V_{XDCR} are all negative voltage values.

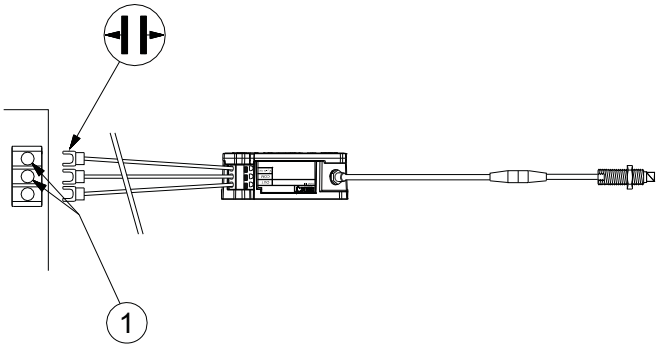
Table 3-3: Definitions

Symbol	Definition	Example
A > B	"A" value is more positive than "B"	-21 > -23
A < B	"A" value is more negative than "B"	-12 < -5
A = B	"A" same value (or very close) to "B"	-24.1 = -24.0

3.3 Fault Type 1: V_{XDCR} > -17.5 Vdc or V_{XDCR} < -26 Vdc

Possible causes:

- Faulty power source
- Faulty field wiring
- Faulty Proximitor Sensor



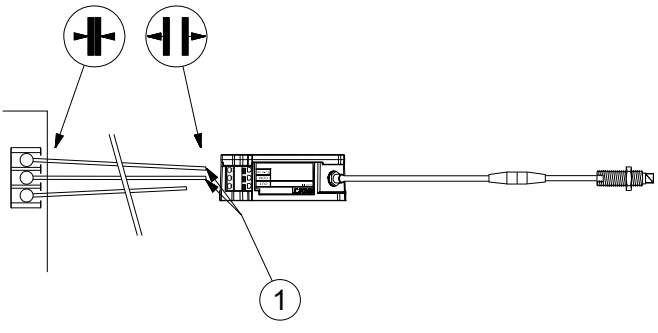
1. V_{PS}

Figure 3-7: Fault Type 1 Measurement 1

Measure V_{PS}: Is V_{PS} > -23 Vdc or V_{PS} < -26 Vdc?

Yes: Faulty power supply.

No: Go to next step.



1. V_{XDCR}

Figure 3-8: Fault Type 1 Measurement 2

Measure V_{XDCR}: Is V_{XDCR} > -23 Vdc or V_{XDCR} < -26 Vdc?

Yes: Faulty Field wiring.

No: Faulty Proximitor Sensor.

3.4 Fault Type 2: V_{SIG} = O Vdc

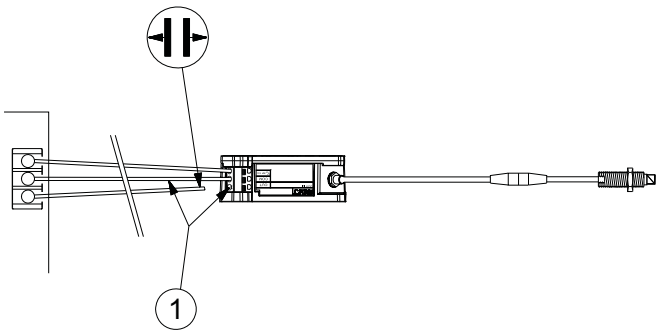
Possible causes:

- Incorrect power source voltage
- Short circuit in field wiring
- Short circuit at Proximitor Sensor terminal connection
- Faulty Proximitor Sensor

Does fault condition type 1 exist?

Yes: Use the procedure for fault type 1

No: Go to the next step



1. V_{SIG}

Figure 3-9: Fault Type 2 Measurement

Measure V_{SIG}: Is V_{SIG} = 0 Vdc?

No: Incorrect power source voltage or short in field wiring or short at Proximitor Sensor terminal connection.

Yes: Faulty Proximitor® Sensor.

3.5 Fault Type 3: -1 Vdc < V_{SIG} < 0 Vdc

Possible causes:

- Probe is incorrectly gapped (too close to target)

- Incorrect power source voltage
- Faulty Proximitor Sensor
- Probe is detecting other material than target (counter bore or machine case)
- Short or open circuit in a connector (dirty or wet) or loose connectors
- Short or open circuit in the probe
- Short or open circuit in extension cable

Does fault condition type 1 exist?

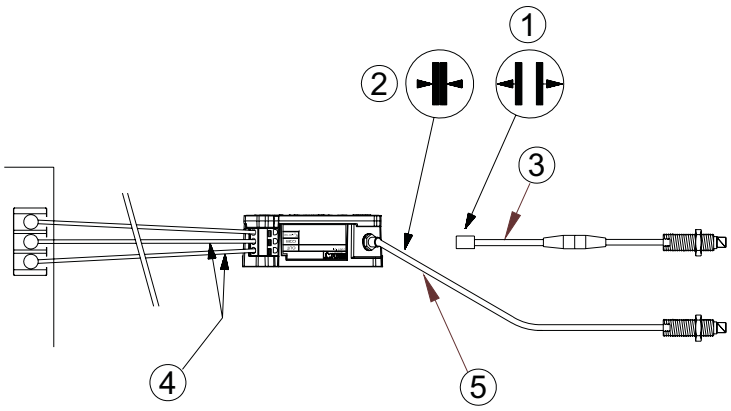
Yes: Use the procedure for fault type 1

No: Go to the next step

Is the probe gapped correctly? Are counter bore dimensions correct? (See Installing the Probe on page 5.)

No: Regap the probe or check counter bore. Retest system.

Yes Go to the next step.



1. Step 1
2. Step 2
3. Original probe extension cable
4. VSIG
5. Known good probe with correct length cable (open gap with probe held away from conductive material

Figure 3-10: Fault Type 3 Measurement 1

Measure V_{SIG}: Is $V_{SIG} < V_{XDCR} + 1$ Vdc?

No: Faulty Proximitor Sensor

Yes: Go to next step

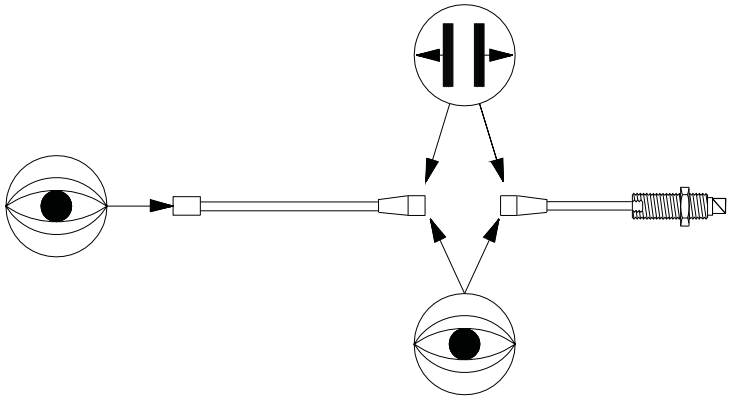
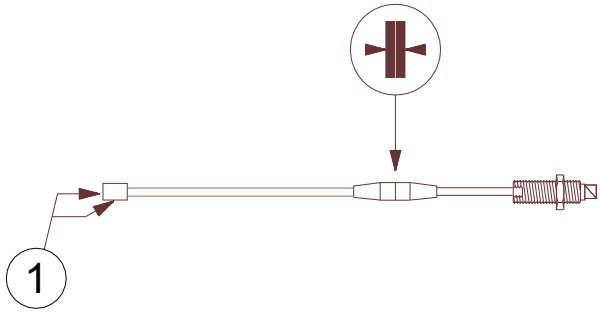


Figure 3-11: Fault Type 3 Measurement 2

Inspect for clean connection: Is the connection dirty, rusty, or a poor connection?

Yes: Clean the connector using isopropyl alcohol or electronic terminal cleaner, reassemble and retest the system.

No: Go to the next step.



1. R_{TOTAL}

Figure 3-12: Fault type 3 Measurement 3

Measure resistance R_{TOTAL}: Is R_{TOTAL} within specifications?

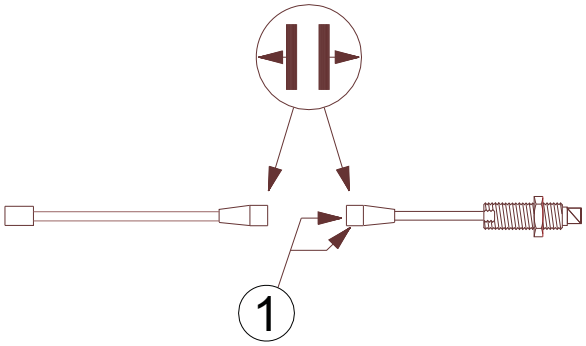
1 m system: Go to the next step.

5 m system: $8.75 \pm 0.70\ \Omega$

9 m System: $9.87 \pm 0.90\ \Omega$

Yes: Retest original system

No: Go to the next step



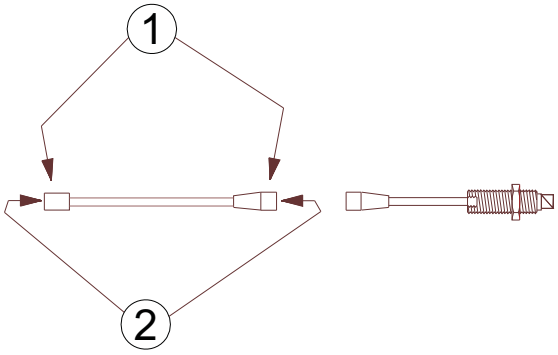
1. R_{PROBE}

Figure 3-13: Fault Type 3 Measurement 4

Measure resistance, R_{PROBE}: Is R_{PROBE} within specifications (see Table 4-1: Probe Nominal DC Resistance (R_{PROBE}) on page 31).

No: Faulty probe

Yes: Go to next step



1. R_{JACKET}
2. R_{CORE}

Figure 3-14: Fault Type 3 Measurement 5

Measure the resistance, R_{JACKET} and R_{CORE}: Is the resistance within specifications (see "Table 4-2: Extension Cable Nominal DC Resistance" on 32).

No: Faulty extension cable

Yes: Retest the original system

3.6 Fault Type 4: $V_{XDCR} < V_{SIG} < V_{XDCR} + 2.5$ Vdc

Possible causes:

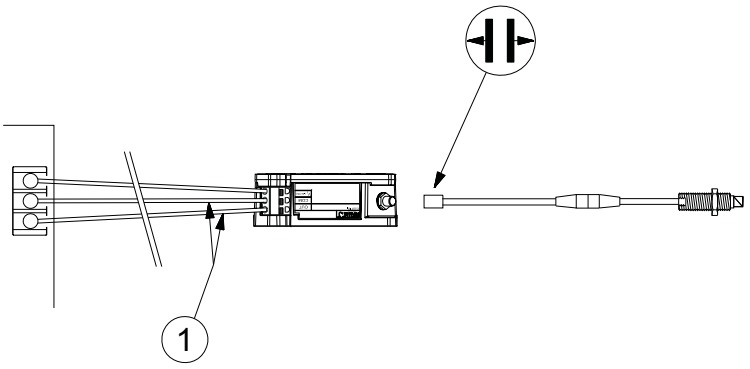
- Faulty Proximitor Sensor

- Probe is incorrectly gapped (too far from target)

Does fault condition type 1 exist?

Yes: Use the procedure for fault type 1

No: Go to the next step



1. V_{SIG}

Figure 3-15: Fault Type 4 Measurement

Measure V_{SIG}: Is $-1.2 < V_{SIG} < -0.3$ Vdc?

No: Faulty Proximitor sensor

Yes: Reconnect the system. Regap the probe. Retest the system.

3.7 Fault Type 5: $V_{SIG} = V_{XDCR}$

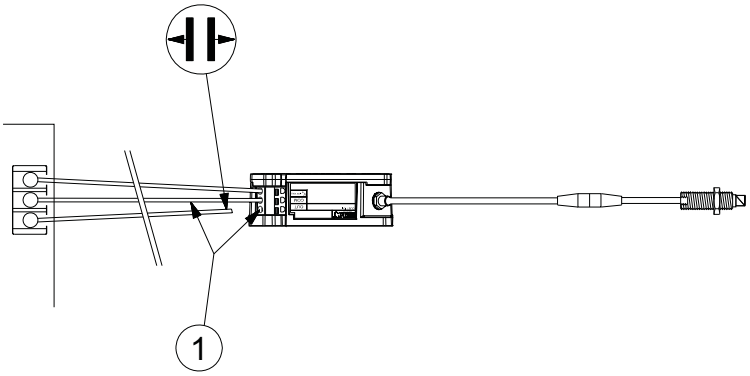
Possible causes:

- Incorrect power source voltage
- Faulty Proximitor Sensor
- Faulty field wiring (between Out and V_T)

Does fault condition type 1 exist?

Yes: Use the procedure for fault type 1

No: Go to the next step



1. V_{SIG}

Figure 3-16: Fault Type 5 Measurement

Measure V_{SIG}: Is $V_{SIG} = V_{XDCR}$?

Yes: Faulty Proximitor Sensor

No: Faulty field wiring (short between Out and V_T)

Bently Nevada LLC performs failure analysis on all returned transducers that are in warranty. We use the information gained during analysis of failed products to improve our current and future products. If you encounter a part that has failed, return the part with a brief description of the product application and symptoms observed to Bently Nevada headquarters in Minden, Nevada for analysis:

Bently Nevada LLC

Attn: Product Repair Department

1631 Bently Parkway South

Minden, Nevada 89423 USA

4. System Specifications

Unless otherwise noted, the following specifications are for a 3300 XL 8/5 mm Proximitor Sensor, extension cable and XL 8 mm or 3300 5 mm probe between +18 °C and +27 °C (+64 °F to +80 °F), with a -24 Vdc power supply, a 10 kΩ load, an AISI 4140 steel target, and a probe gapped at 1.27 mm (50 mils). Performance characteristics are applicable for systems that consist solely of 3300 XL 8 mm or 3300 5 mm components. The system accuracy and interchangeability specifications do not apply when using a transducer system calibrated to any target other than a Bently Nevada AISI 4140 steel target.

4.1 Electrical

Proximitor Sensor Input

Accepts one non-contacting 3300-series 5 mm, **or** 3300 XL 8 mm Proximity Probe and XL Extension Cable.

Power

Requires -17.5 Vdc to -26 Vdc without barriers at 12 mA maximum consumption, -23 Vdc to -26 Vdc with barriers. Operation at a more positive voltage than -23.5 Vdc can result in reduced linear range.

Supply Sensitivity

Less than 2 mV change in output voltage per volt change in input voltage.

Output resistance

50 Ω

Table 4-1: Probe Nominal DC Resistance (R_{PROBE})

Probe Length (Meters)	**Resistance from the Center Conductor to the Outer Conductor** (R_{PROBE}) (ohms)
0.5	7.45 ± 0.50
1.0	7.59 ± 0.50
1.5	7.73 ± 0.50

Probe Length (Meters)	**Resistance from the Center Conductor to the Outer Conductor** (R_{PROBE}) (ohms)
2.0	7.88 ± 0.50
5.0	8.73 ± 0.70
9.0	9.87 ± 0.90

Table 4-2: Extension Cable Nominal DC Resistance

Length of Extension Cable (Meters)	**Resistance from Center Conductor to Center Conductor (R_{CORE}) (ohms)**	**Resistance from Outer Conductor to Outer Conductor (R_{JACKET}) (ohms)**
3.0	0.66 ± 0.10	0.20 ± 0.04
3.5	0.77 ± 0.12	0.23 ± 0.05
4.0	0.88 ± 0.13	0.26 ± 0.05
4.5	0.99 ± 0.15	0.30 ± 0.06
7.0	1.54 ± 0.23	0.46 ± 0.09
7.5	1.65 ± 0.25	0.49 ± 0.10
8.0	1.76 ± 0.26	0.53 ± 0.11
8.5	1.87 ± 0.28	0.56 ± 0.11

Extension cable capacitance

69.9 pF/m (21.3 pF/ft) typical

Field wiring

0.2 to 1.5 mm^2 (16 to 24 AWG). Recommend using three-conductor shielded triad cable. Maximum length of 305 metres (1,000 feet) between the 3300 XL Proximitor Sensor and the monitor. See the frequency and phase response graphs in Figure 6-11 through Figure 6-14 for signal roll off at high frequencies when using longer field wiring lengths.

Linear Range

2 mm (80 mils). Linear range begins at approximately 0.25 mm (10 mils) from target

and is from 0.25 to 2.3 mm (10 to 90 mils) (approximately –1 to –17 Vdc).

Recommended Gap Setting

1.27 mm (50 mils)

Incremental Scale Factor (ISF)

XL 8 mm standard 5- or 1-metre system

7.87 V/mm (200 mV/mil) ±5% including interchangeability error when measured in increments of 0.25 mm (10 mils) over the 80 mil linear range from 0 to +45 °C (+32 °F to +113 °F).

XL 8 mm standard 9-metre system

7.87 V/mm (200 mV/mil) ±6.5% including interchangeability error when measured in increments of 0.25 mm (10 mils) over the 80 mil linear range from 0 to +45 °C (+32 °F to +113 °F).

3300 5 mm standard 1-, 5- and 9-metre systems

7.87 V/mm (200 mV/mil) ±6.5% typical, including interchangeability error when measured in increments of 0.25 mm (10 mils) over the linear range.

Extended Temperature Range (ETR) 5 and 9 metre systems

7.87 V/mm (200 mV/mil) ±6.5% including interchangeability error when measured in increments of 0.25 mm (10 mils) over the 80 mil linear range from 0 to +45 °C (+32 °F to +113 °F).

Deviation from best fit straight line (DSL)

XL 8 mm standard 1 or 5metre system

Less than ±0.025mm (±1 mil) with components at 0 °C to +45 °C (+32 °F to +113 °F).

XL 8 mm standard 9metre system:

Less than ±0.038mm (±1.5 mil) with components at 0 °C to +45 °C (+32 °F to +113 °F).

3300 5 mm standard 1, 5 and 9metre systems

Less than ±0.038mm (±1.5 mil) with components at 18 °C to 27 °C (64 °F to 80 °F)

Extended Temperature Range 5 and 9metre systems

Less than ±0.038mm (±1.5 mil) with components at 0 °C to +45 °C (+32 °F to +113 °F).

XL 8 mm and 3300 5 mm standard 1- and 5-metre system performance over extended temperatures

Over a probe temperature range of –35 °C to +120 °C (-31 °F to +248 °F) with the Proximitor Sensor and extension cable between 0 °C to +45 °C (+32 °F to +113 °F), the ISF remains within ±10% of 7.87 V/mm (200 mV/mil) and the DSL remains within ±0.076 mm (±3 mils).

Over a Proximitor Sensor and extension cable temperature range of –35 °C to +65 °C (-31 °F to +149 °F) with the probe between 0 °C to +45 °C (+32 °F to +113 °F), the ISF remains

within ±10% of 7.87 V/mm (200 mV/mil) and the DSL remains within ±0.076 mm (±3 mils).

XL 8 mm and 3300 5 mm standard 9metre system performance over extended temperatures

Over a probe temperature range of –35 °C to +120 °C (-31 °F to +248 °F) with the Proximitor Sensor and extension cable between 0 °C to +45°C (+32 °F to +113 °F), the ISF remains within ±18% of 7.87 V/mm (200 mV/mil) and the DSL remains within ±0.152 mm (±6 mils).

Over a Proximitor Sensor and extension cable temperature range of –35 °C to +65 °C (-31 °F to +149 °F) with the probe between 0 °C to +45 °C (+32 °F to +113 °F), the ISF remains within ±18% of 7.87 V/mm (200 mV/mil) and the DSL remains within ±0.152 mm (±6 mils).

Extended Temperature Range system performance over extended temperatures

Over a probe and extension cable temperature range of –35 °C to + 260 °C (-31 °F to +500 °F) with the Proximitor Sensor between 0 °C to +45 °C (+32 °F to +113 °F), the ISF remains within ±18% of 7.87 V/mm (200 mV/mil) and the DSL remains within ±0.152 mm (±6 mils).

Frequency Response

0 to 10 kHz: +0, -3 dB, with up to 305 metres (1000 feet) of field wiring.

Minimum Target Size

15.2 mm (0.6 in) diameter (flat target)

Shaft Diameter

Measurements on shaft diameters smaller than 50 mm (2 in) usually require close spacing of radial vibration or axial position transducers with the potential for their electromagnetic emitted fields to interact with one another (cross-talk), resulting in erroneous readings. Take care to maintain minimum separation of transducer tips, generally at least 40 mm (1.6 in) for axial position measurements or 38 mm (1.5 in) for radial vibration measurements. Radial vibration or position measurements on shaft diameters smaller than 76.2 mm (3 in) will generally change the scale factor.

Minimum

50.8 mm (2 in)

Recommended minimum

76.2 mm (3 in)

Effects of 60 Hz Magnetic Fields Up to 300 Gauss

See Table 4-3

Table 4-3: Output Voltages in mil pp/gauss

Gap	5-metre XL Proximitor Sensor	9-metre XL Proximitor Sensor	Probe	Ext. Cable
10 mil	0.0119	0.0247	0.0004	0.0004
50 mil	0.0131	0.0323	0.0014	0.0014
90 mil	0.0133	0.0348	0.0045	0.0045

Electrical Classification

Complies with the European CE mark.

Hazardous Area Approvals

NOTE
Multiple approvals for hazardous areas certified by Canadian Standards Association (CSA/NRTL/C) in North America and by Baseefa (2001) in Europe.

North America

Ex ia IIC T4/T5; Class I Zone 0 or Class 1 Division 1; Groups A, B, C, and D, when installed with intrinsically safe zener barriers per drawing 141092 or when installed with galvanic isolators.

Ex nA IIC T4/T5 Class I Zone 2 or Class I, Division 2, Groups A, B, C, and D when installed without barriers per drawing 140979.

T5 @ Ta = -35 °C to +85 °C.

T4 @ Ta = -51 °C to +100 °C.

Europe

II 1 G EEx ia IIC T4/T5. EC certificate number BAS99ATEX1101, when installed per drawing 141092.

II 3 G EEx nAII T4/T5. EC certificate number BAS99ATEX3100U,when installed per drawing 140979.

T5 @ Ta = -35 °C to +85 °C.

T4 @ Ta = -51 °C to +100 °C.

IEC Ex

3300 XL Proximitor Sensor, ia

IECEx BAS04.0055X

Ex ia IIC T4 / T5 (-51ºC ≤ Ta ≤ +100ºC / -35ºC ≤ Ta ≤ +85ºC)

Terminal Block Connections

Ui= -28V Ci = 0

Ii= 140mA Li =10µH

Pi= 0.84W

Coaxial Connection

Ui = -28V Ci= 5.7nF

Ii = 140mA Li = 0.85mH

Pi = 0.84W

Load Parameters

The capacitance and either the inductance or the inductance to resistance (L/R) ratio of the load connected to the probe coaxial terminal, must not exceed the following values in Table 4-4

Table 4-4: Proximitor Sensor Load Parameters

Group	Capacitance µF	Inductance mH	L/R Ratio µH/Ω
IIC	0.077	0.99	35
IIB	0.644	7.41	142
IIA	2.144	15.6	295

Installation of the XL Proximitor Sensor must minimize the risk of impact or friction with other metallic surfaces.

3300 XL Proximitor Sensor, nA

IECEx BAS04.0057X

AEx nA II T4 / T5 (-51ºC ≤ Ta ≤ +100ºC / -35ºC ≤ Ta ≤ +85ºC)

The terminals must be provided with a level of protection of at least IP54.

Ui = -28V

3300 XL 8mm and 3300 5 mm Eddy Current Probes, ia

IECEx BAS04.0056

AEx ia IIC Temperature Classification per Table 4-5.

Ui = -28V Ci = 1.5nF

Ii = 140mA Li = 200µH

Pi =0.84W

3300 XL 8mm and 3300 5mm Eddy Current Probes, nA

IECEx BAS04.0058X

Ex nA II Temperature Classification per Table 4-5.

Must be supplied from a voltage limited source.

EEx nA for Zone 2, Group IIC, EC certificate number BAS99ATEX3100U.

Table 4-5: Aex ia IIC Temperature Classification

Temperature Classification	Ambient Temperature (Probe Only)
T1	-51ºC to +232ºC
T2	-51ºC to +177ºC
T3	-51ºC to +120ºC
T4	-51ºC to +80ºC
T5	-51ºC to +40ºC

4.2 Mechanical

Probe Tip Material

Polyphenylene sulfide (PPS).

Probe Case Material

Forward Mount and Smooth Case Probes

AISI 304 stainless steel (SST)

Reverse Mount Probes

AISI 303 SST

Probe Cable Specifications

XL 8 mm standard cable

75 Ω triaxial, fluoroethylene propylene (FEP) insulated probe cable in the following total probe lengths: 0.5, 1, 1.5, 2, 5, or 9 metres.

3300 5 mm standard cable

75 Ω coaxial, fluoroethylene propylene (FEP) insulated probe cable in the following total probe lengths: 0.5, 1, 2, 5, or 9 metres.

Extended Temperature Range cable

75 Ω triaxial, perfluoroalkoxy (PFA) insulated probe cable in the following total probe lengths: 0.5, 1, 1.5, 2, 5, or 9 metres.

Extension Cable Material

75 Ω triaxial, fluoroethylene propylene (FEP) insulated.

Extended Temperature Range (ETR) Extension Cable Material

75 Ω triaxial, perfluoroalkoxy (PFA) insulated.

Proximitor Sensor Material

A380 aluminum

System Length

5 or 9 metres including extension cable, or 1 metre.

Standard Probe and Extension Cable Armor (optional)

Flexible AISI 302 or 304 SST with FEP outer jacket.

Extended Temperature Range Probe and Extension Cable Armor (optional)

Flexible AISI 302 or 304 SST with PFA outer jacket.

XL 8 mm and ETR Tensile Strength (maximum rated)

330 N (75 lbf) probe case to probe lead. 270 N (60 lbf) at probe lead to extension cable connectors.

3300 5 mm Tensile Strength (maximum rated)

220 N (50 lbf) probe case to probe lead. 220 N (50 lbf) probe lead to extension cable connectors.

Connector material

Gold-plated brass and gold-plated beryllium copper.

Table 4-6: Probe Case Torque Specifications

Probe case torque:	Maximum Rated	Recommended
Standard forward-mounted XL 8 mm probes (3/8-24, M10x1)	33.9 N•m (300 in•lbf)	11.2 N•m (100 in•lbf)
Standard forward-mounted 3300 probes (1/4-28, M8x1)	7.3 N•m (65 in•lbf)	5.1 N•m (45 in•lbf)
Standard forward-mount XL 8 mm probes - first three threads (3/8-24, M10x1)	22.6 N•m (200 in•lbf)	7.5 N•m (66 in•lbf)
Reverse mount probes	22.6 N•m (200 in•lbf)	7.5 N•m (66 in•lbf)

Connector-to-connector torque

See Table 4-7 for recommended torque.

Table 4-7: Recommended Connector-to-Connector Torque

Connector Type	Tightening Instructions
Two 3300 XL gold "click" type connectors	Finger tight
One non-XL stainless steel connector and one 3300 XL connector	Finger tight plus 1/8 turn using pliers

Maximum torque

0.565 N•m (5 in•lbf)

Minimum Bend Radius

25.4 mm (1.0 in)

Total System Mass (typical)

0.7 kg (1.5 lbm)

Probe

323 g (11.4 oz)

Extension Cable

34 g/m (0.4 oz/ft)

Armored Extension cable

103 g/m (1.5 oz/ft)

Proximitor Sensor

246 g (8.7 oz)

4.3 Environmental Limits

4.3.1 Probe Temperature Range

Operating and Storage Temperature

Standard probe

-51 °C to +177 °C (-60 °F to +351 °F)

Extended Temperature Range

Probe tip

-51 °C to +177 °C (-60 °F to +351 °F)

Probe cable and connector

-51 °C to +260 °C (-60 °F to +500 °F)

NOTE
Exposing the probe to temperatures below –34 °C (-30 °F) may cause premature failure of the pressure seal.

4.3.2 Extension Cable Temperature Range

Operating and Storage Temperature

Standard cable

-51 °C to +177 °C (-60 °F to +351 °F)

Extended Temperature Range cable

-51 °C to +260 °C (-60 °F to +500 °F)

4.3.3 Proximitor Sensor Temperature Range

Operating Temperature

-35 °C to +85 °C (-31 °F to +185 °F)

Storage Temperature

-51 °C to +100 °C (-60 °F to +212 °F)

Relative Humidity

Less than a 3% change in Average Scale Factor (ASF) when tested in 93% humidity in accordance with IEC standard 68-2-3 for up to 56 days.

Probe Pressure

3300 XL 8 mm and 3300 5 mm probes are designed to seal differential pressure between the probe tip and case. The probe sealing material consists of a Fluorocarbon O-ring. Probes are not pressure tested prior to shipment. Contact our custom design department if you require a test of the pressure seal for your application.

Application Advisory
It is the responsibility of the customer or user to ensure that all liquids and gases are contained and safely controlled should leakage occur from a proximity probe. In addition, solutions with high or low pH values may erode the tip assembly of the probe causing media leakage into surrounding areas. Bently Nevada®, LLC will not be held responsible for any damages resulting from leaking 3300 XL 8 mm or 3300 5 mm proximity probes. In addition, 3300 XL 8 mm or 3300 5 mm proximity probes will not be replaced under the service plan due to probe leakage.

4.4 Patents

Components or procedures described in one or more of the following patents apply to this product: 5,016,343; 5,126,664; 5,351,388; and 5,685,884.

5. System Ordering Information

5.1 3300 XL 8 mm Proximity Probes

3300 XL 8 mm Probe, 3/8-24 UNF thread, without armor[3]
330101-AXX-BXX-CXX-DXX-EXX

3300 XL 8 mm Probe, 3/8-24 UNF thread, with armor[3]
330102-AXX-BXX-CXX-DXX-EXX

A: Unthreaded Length Option

Order in increments of 0.1 in

Maximum unthreaded length: 8.8 in

Minimum unthreaded length: 0.0 in

Example: 0 4 = 0.4 in

NOTE
Unthreaded length must be at least 0.8 inches less than the case length.

.

B: Overall Case Length Option

Order in increments of 0.1 in

Maximum case length: 9.6 in

Minimum case length: 0.8 in

Example: 2 4 = 2.4 in

C: Total Length Option

0 5	0.5 metre (1.6 feet)
1 0	1.0 metre (3.3 feet)
1 5	1.5 metres (4.9 feet)
2 0	2.0 metres (6.6 feet)
5 0	5.0 metres (16.4 feet)[1]
9 0	9.0 metres (29.5 feet)

D: Connector and Cable-Type Option

0 1	Miniature coaxial ClickLoc™ connector with connector protector, standard cable
0 2	Miniature coaxial ClickLoc connector, standard cable
1 1	Miniature coaxial ClickLoc connector with connector protector, FluidLoc® cable

1 2 Miniature coaxial ClickLoc connector, FluidLoc cable

E: Agency Approval Option

0 0 Not required

0 5 Multiple Approvals

5.2 3300 XL 8 mm Proximity Probes, Metric

3300 XL 8 mm Probe, M10 x 1 thread, without armor[3]
330103-AXX-BXX-CXX-DXX-EXX

3300 XL 8 mm Probe, M10 x 1 thread, with armor[3]
330104-AXX-BXX-CXX-DXX-EXX

A: Unthreaded Length Option

Order in increments of 10 mm.

Maximum unthreaded length: 230 mm

Minimum unthreaded length: 0 mm

Example: 0 6 = 60 mm

NOTE
Unthreaded length must be at least 20 mm less than the case length.

B: Overall Case Length Option

Order in increments of 10 mm.

Maximum length: 250 mm

Minimum length: 20 mm

Example: 0 6 = 60 mm

C: Total Length Option

0 5 0.5 metre (1.6 feet)

1 0 1.0 metre (3.3 feet)

1 5 1.5 metres (4.9 feet)

2 0 2.0 metres (6.6 feet)

5 0 5.0 metres (16.4 feet) [1]

9 0 9.0 metres (29.5 feet)

D: Connector and Cable-Type Option

0 1 Miniature coaxial ClickLoc connector with connector protector, standard cable

0 2 Miniature coaxial ClickLoc connector, standard cable

1 1 Miniature coaxial ClickLoc connector with connector protector, FluidLoc cable

1 2 Miniature coaxial ClickLoc connector, FluidLoc cable

E: Agency Approval Option

0 0 Not required

0 5 Multiple Approvals

5.3 3300 XL 8 mm Reverse Mount Probes

3/8-24 UNF Threads[3]
330105-02-12-CXX-DXX-EXX

M10 x 1 Threads[3]
330106-05-30-CXX-DXX-EXX

C: Total Length Option

0 5 0.5 metre (1.6 feet)

1 0 1.0 metre (3.3 feet)

1 5 1.5 metre (4.9 feet)

2 0 2.0 metres (6.6 feet)

5 0 5.0 metres (16.4 feet) [1]

9 0 9.0 metres (29.5 feet)

D: Connector Option

0 2 Miniature ClickLoc coaxial connector

1 2 Miniature ClickLoc coaxial connector, FluidLoc cable

NOTE
The FluidLoc cable options –10 and –12 are not necessary on the vast majority of 330105 and 330106 installations due to the presence of the probe sleeve. Consider carefully the application before ordering the FluidLoc cable options

E: Agency Approval Option

0 0 Not required

0 5 Multiple Approvals

5.4 3300 XL 8 mm Proximity Probes, Smooth Case

3300 XL 8 mm Probe without armor[2]
330140-AXX-BXX-CXX-DXX

3300 XL 8 mm Probe with armor[2]
330141-AXX-BXX-CXX-DXX

A: Overall Case Length Option

Order in increments of 0.1 in

Maximum length: 9.6 in

Minimum length: 0.8 in

Example: 2 4 = 2.4 in

B: Total Length Option

0 5	0.5 metre (1.6 feet)
1 0	1.0 metre (3.3 feet)
1 5	1.5 metres (4.9 feet)
2 0	2.0 metres (6.6 feet)
5 0	5.0 metres (16.4 feet) [1]
9 0	9.0 metres (29.5 feet)

C: Connector and Cable-Type Option

0 1	Miniature coaxial ClickLoc connector with connector protector, standard cable
0 2	Miniature coaxial ClickLoc connector, standard cable
1 1	Miniature coaxial ClickLoc connector with connector protector, FluidLoc cable
1 2	Miniature coaxial ClickLoc connector, FluidLoc cable

D: Agency Approval Option

0 0	Not required
0 5	Multiple Approvals

5.5 3300 XL 8 mm Extended Temperature Range (ETR) Proximity Probes

3300 XL 8 mm ETR Probe, 3/8-24 UNF thread, without armor
330191-AXX-BXX-CXX-DXX

3300 XL 8 mm ETR Probe, 3/8-24 UNF thread, with armor
330192-AXX-BXX-CXX-DXX

A: Unthreaded Length Option

Order in increments of 0.1 in

Maximum unthreaded length: 8.8 in

Minimum unthreaded length: 0.0 in

Example: 1 5 = 1.5 in

NOTE
Unthreaded length must be at least 0.8 inches less than the case length.

B: Overall Case Length Option

Order in increments of 0.1 in

Maximum case length: 9.6 in

Minimum case length: 0.8 in

Example: 2 5 = 2.5 in

C: Total Length Option

0 5 0.5 metre (1.6 feet)

1 0 1.0 metre (3.3 feet)

1 5 1.5 metre (4.9 feet)

2 0 2.0 metres (6.6 feet)

5 0 5.0 metres (16.4 feet)[1]

9 0 9.0 metres (29.5 feet)

D: Agency Approval Option

0 0 Not required

0 5 Multiple Approvals

5.6 3300 XL 8 mm Extended Temperature Range (ETR) Proximity Probes, Metric

3300 XL 8 mm Probe, M10 x 1 thread, without armor
330193-AXX-BXX-CXX-DXX

3300 XL 8 mm Probe, M10 x 1 thread, with armor
330194-AXX-BXX-CXX-DXX

A: Unthreaded Length Option

Order in increments of 10 mm.

Maximum unthreaded length: 230 mm

Minimum unthreaded length: 0 mm

Example: 0 6 = 60 mm

NOTE
Unthreaded length must be at least 20 mm less than the case length.

B: Overall Case Length Option

Order in increments of 10 mm.

Maximum length: 250 mm

Minimum length: 20 mm

Example: 0 6 = 60 mm

C: Total Length Option

0 5 0.5 metre (1.6 feet)

1 0 1.0 metre (3.3 feet)

1 5 1.5 metres (4.9 feet)

2 0 2.0 metres (6.6 feet)

5 0 5.0 metres (16.4 feet) [1]

9 0 9.0 metres (29.5 feet)

D: Agency Approval Option

0 0 Not required

0 5 Multiple Approvals

5.7 3300 XL 8 mm Extended Temperature Range (ETR) Reverse Mount Probes

3/8-24 UNF Threads
330195-02-12-CXX-DXX

M10 x 1 Threads
330196-05-30-CXX-DXX

C: Total Length Option

0 5 0.5 metre (1.6 feet)

1 0 1.0 metre (3.3 feet)

1 5 1.5 metre (4.9 feet)

2 0 2.0 metres (6.6 feet)

5 0 5.0 metres (16.4 feet) [1]

9 0 9.0 metres (29.5 feet)

D: Agency Approval Option

0 0 Not required

0 5 Multiple Approvals

5.8 3300 XL 8 mm Extended Temperature Range (ETR) Proximity Probes, Smooth Case

3300 XL 8 mm Probe without armor[2]
330197-AXX-BXX-CXX

3300 XL 8 mm Probe with armor[2]
330198-AXX-BXX-CXX

A: Overall Case Length Option

Order in increments of 0.1 in

Maximum length: 9.6 in

Minimum length: 0.8 in

Example: 3 5 = 3.5 in

B: Total Length Option

0 5	0.5 metre (1.6 feet)
1 0	1.0 metre (3.3 feet)
1 5	1.5 metres (4.9 feet)
2 0	2.0 metres (6.6 feet)
5 0	5.0 metres (16.4 feet) [1]
9 0	9.0 metres (29.5 feet)

C: Agency Approval Option

0 0	Not required
0 5	Multiple Approvals

5.9 3300 5 mm Proximity Probes

3300 5 mm Probe, 1/4-28 UNF thread, without armor
330171-AXX-BXX-CXX-DXX-EXX

3300 5 mm Probe, 1/4-28 UNF thread, with armor
330172-AXX-BXX-CXX-DXX-EXX

A: Unthreaded Length Option

Order in increments of 0.1 in

Maximum unthreaded length: 8.8 in

Minimum unthreaded length: 0.0 in

Example: 0 4 = 0.4 in

NOTE
Unthreaded length must be at least 0.8 inches less than the case length.

B: Overall Case Length Option

Order in increments of 0.1 in

Maximum case length: 9.6 in

Minimum case length: 0.8 in

Example: 2 4 = 2.4 in

C: Total Length Option

0 5 0.5 metre (1.6 feet)

1 0 1.0 metre (3.3 feet)

2 0 2.0 metres (6.6 feet)

5 0 5.0 metres (16.4 feet)[1]

9 0 9.0 metres (29.5 feet)

D: Connector and Cable-Type Option

0 1 Miniature coaxial ClickLoc connector with connector protector, standard cable

0 2 Miniature coaxial ClickLoc connector, standard cable

E: Agency Approval Option

0 0 Not required

0 5 Multiple Approvals

5.10 3300 5 mm Proximity Probes, Metric

3300 5 mm Probe, M8 x 1 thread, without armor
330173-AXX-BXX-CXX-DXX-EXX

3300 5 mm Probe, M8 x 1 thread, with armor
330174-AXX-BXX-CXX-DXX-EXX

A: Unthreaded Length Option

Order in increments of 10 mm.

Length configuration:

Maximum unthreaded length: 230 mm

Minimum unthreaded length: 0 mm

Example: 0 6 = 60 mm

NOTE
Unthreaded length must be at least 20 mm less than the case length.

B: Overall Case Length Option

Order in increments of 10 mm.

Maximum length: 250 mm

Minimum length: 20 mm

Example: 0 6 = 60 mm

C: Total Length Option

0 5 0.5 metre (1.6 feet)

1 0 1.0 metre (3.3 feet)

2 0 2.0 metres (6.6 feet)

5 0 5.0 metres (16.4 feet) [1]

9 0 9.0 metres (29.5 feet)

D: Connector and Cable-Type Option

0 1 Miniature coaxial ClickLoc connector with connector protector, standard cable

0 2 Miniature coaxial ClickLoc connector, standard cable

E: Agency Approval Option

0 0 Not required

0 5 Multiple Approvals

5.11 3300 XL Proximitor Sensor

330180-AXX-BXX

A: Total Length and Mounting Option

1 0 1.0 metre (3.3 feet) system length, panel mount

1 1 1.0 metre (3.3 feet) system length, DIN mount

1 2 1.0 metre (3.3 feet) system length, no mounting hardware

5 0 5.0 metres (16.4 feet) system length, panel mount

5 1 5.0 metres (16.4 feet) system length, DIN mount

5 2 5.0 metres (16.4 feet) system length, no mounting hardware

9 0 9.0 metres (29.5 feet) system length, panel mount

9 1 9.0 metres (29.5 feet) system length, DIN mount

9 2 9.0 metres (29.5 feet) system length, no mounting hardware

B: Agency Approval Option

0 0 Not required

0 5 Multiple approvals

5.12 3300 XL Extension Cable

330130-AXXX-BXX-CXX

NOTE
Make sure that the extension cable length and the probe length, when added together, equal the Proximitor Sensor total length.

Option Descriptions

A: Cable Length Option

0 3 0 3.0 metres (9.8 feet)

0 3 5 3.5 metres (11.5 feet)

0 4 0 4.0 metres (13.1 feet)

0 4 5 4.5 metres (14.8 feet)

0 7 0 7.0 metres (22.9 feet)

0 7 5 7.5 metres (24.6 feet)

0 8 0 8.0 metres (26.2 feet)

0 8 5 8.5 metres (27.9 feet)

B: Connector Protector and Cable Option

0 0 Standard cable

0 1 Armored cable

0 2 Standard cable with connector protectors

0 3 Armored cable with connector protectors

1 0 FluidLoc cable

1 1 Armored FluidLoc cable

1 2 FluidLoc cable with connector protectors

1 3 Armored FluidLoc cable with connector protectors

C: Agency Approval Option

0 0 Not required

0 5 Multiple Approvals

5.13 3300 XL Extended Temperature Range (ETR) Extension Cable

330190-AXXX-BXX-CXX

NOTE
Make sure that the extension cable length and the probe length, when added together, equal the Proximitor Sensor total length.

A: Cable Length Option

- **0 3 0** 3.0 metres (9.8 feet)
- **0 3 5** 3.5 metres (11.5 feet)
- **0 4 0** 4.0 metres (13.1 feet)
- **0 4 5** 4.5 metres (14.8 feet)
- **0 7 0** 7.0 metres (22.9 feet)
- **0 7 5** 7.5 metres (24.6 feet)
- **0 8 0** 8.0 metres (26.2 feet)
- **0 8 5** 8.5 metres (27.9 feet)

B: Cable Option

- **0 0** Standard cable
- **0 1** Armored cable

C: Agency Approval Option

- **0 0** Not required
- **0 5** Multiple Approvals

5.14 Mounting Brackets

5.14.1 Aluminum Probe Clamp Bracket

The aluminum clamp bracket is an unthreaded mounting bracket designed for use with the smooth case probes (330140, 330141, 330197 and 330198). After gapping the probe, tighten the clamp bracket by tightening the screws. The mounting screws have pre-drilled holes for safety wire.

Order Number 137491-AXX

A: Mounting Screw Option

- **0 1** 10-24 UNC-2A mounting screws

0 2 M5 x 0.8-6g mounting screws

5.14.2 Aluminum probe threaded mounting bracket

The aluminum probe threaded mounting bracket is the standard mounting bracket for most 3300 and 3300 XL probe installations. The -01 and -02 options are supplied with two 10-24 UNC-2A mounting screws. The -03 and -04 options are supplied with two M5 x 0.8-6g mounting screws. The mounting screws have pre-drilled holes for safety wire.

Order Number 137492-AXX

A: Thread Size

0 1 3/8-24

0 2 1/4-28

0 3 M8 x 1

0 4 M10 x 1

5.14.3 Phenolic threaded probe mounting bracket

We recommend the phenolic threaded mounting bracket if your installation requires additional electric isolation from the mounting location (as in some generator and electrical motor bearing locations). The -01 and –02 options are supplied with two 10-24 UNC-2A mounting screws. The -03 and -04 options are supplied with two M5 x 0.8-6g mounting screws. The mounting screws have pre-drilled holes for safety wire.

Order Number 27474-AXX

A: Thread Size

0 1 3/8-24

0 2 1/4-28

0 3 M8 x 1

0 4 M10 x 1

5.15 Accessories

141078-01

Manual

175751

3300XL Multi-Purpose Stainless Steel Housing.
12”x12”x6”

176467

3300XL Multi-Purpose Stainless Steel Housing.
12”x8”x6”

02120015

Bulk field wire. 1.0 mm^2 (18 AWG), 3 conductor, twisted, shielded cable with drain wire. Specify length in feet.

138492-01

Replacement panel-mount mounting pad.

138493-01

Replacement DIN-mount mounting pad.

148722-01

3300 XL Test Plug. The 3300 XL Test Plug is contains three small test pins attached to three color-coded wires 1 metre in length, each terminated in a banana plug. The three-pin adapter plugs into the test pin holes on 3300 XL-style Proximitor Sensors. It is used to check the performance of the Proximitor Sensor from the test pin holes in the terminal strip without requiring the removal of the field wiring.

04310310

3300 XL Proximitor Sensor Panel-mount Screw. Package includes one 6-32 UNC thread forming mounting screw. (Supplied standard with 3300 XL Multi-Purpose housings when panel mount transducer option is ordered).

03200006

Silicone self-fusing tape. A 9.1 metre (10 yard) roll of silicone tape to protect connectors. It is easy to install and provides excellent electrical isolation and protection from the environment. It is not recommended for use inside the casing of the machine.

40113-02

Standard Connector Protector Kit. Connector Protector Kit for 3300 XL 8 mm probes and extension cables, including connector protectors and installation tools.

40113-03

5 mm/NSv Connector Protector Kit. Connector Protector Kit for 3300 5 mm probes, including connector protectors and installation tools.

136536-01

Connector Protector Adapter. Allows connector protector installation tools manufactured prior to 1998 to be used with 75 Ω ClickLoc connectors.

40180-02

Standard Connector Protectors. Package contains 10 pairs of connector protectors for 3300 XL 8 mm probes and 3300 XL extension cables.

40180-03

5 mm/NSv Connector Protectors. Package contains 10 pairs of connector protectors for 3300 5 mm probes.

03839410

Standard Connector Protector - Male. Male connector protectors are installed onto the 3300 XL extension cable and attach to the female connector protector on the probe, providing environmental protection of connectors.

03839420

Standard Connector Protector - Female. Female connector protectors are installed onto the 3300 XL probe lead and attach to the male connector protector on the 3300 XL extension cable, providing environmental protection of connectors. Also placed on the 3300 XL extension cable to slide over the connection to the Proximitor® Sensor and protect it from the environment.

03800001

5mm/NSv Connector Protector - Female. Placed onto 3300 5 mm probe leads; attaches to the male connector protector on the extension cable to provide environmental protection of connectors.

04301007

3/8-24 Probe Lock Nut with safety wire holes. Single probe lock nut with two holes drilled through the nut in order to secure the lock nut in place with safety wire.

04301008

M10 x 1 Probe Lock Nut with safety wire holes. Single probe lock nut with two holes drilled through the nut in order to secure the lock nut in place with safety wire.

330153-01

3300 XL Connector Kit. Used on 3300 XL 8 mm probes and 3300 XL extension cables. Contains one pair of male and female ClickLoc connectors, two color-coded sleeves, two pieces of slit FEP tubing, and one strip of silicone tape.

330153-04

3300 5 mm Connector Kit. Used on 3300 5 mm probes. Contains one male ClickLoc connector, one color-coded sleeve, one piece of slit FEP tubing, and one strip of silicone tape.

330153-09

3300 XL ETR Connector Kit. Used on ETR 3300 XL 8 mm probes and 3300 ETR XL extension cables. Contains one pair of male and female ClickLoc connectors, two color-coded sleeves, two pieces of high temperature slit FEP tubing, and one strip of silicone tape.

163356

Connector Crimp Tool Kit. Includes one set of multiconnector inserts and connector installation instructions. Compatible only with 330153 connector kits or with probes shipped in 2003 or later with ClickLoc connectors uninstalled. Supplied with carrying case.

Notes:

1. 5-metre probes are designed for use with the 5-metre Proximitor Sensor only.
2. Mounting clamps must be ordered separately for 330140, 330141, 330197, and 330198.
3. For a shorter delivery time, order commonly stocked probes. Currently, stocked probes consist of the following part numbers:

   330101-00-08-05-02-00, 330101-00-08-05-02-05, 330101-00-08-10-02-00, 330101-00-08-10-02-05, 330101-00-12-10-02-00, 330101-00-12-10-02-05, 330101-00-16-10-02-00, 330101-00-16-10-02-05, 330101-00-20-05-02-00, 330101-00-20-10-02-00, 330101-00-20-10-02-05, 330101-00-30-10-02-00, 330101-00-30-10-02-05, 330101-00-40-05-02-00, 330101-00-40-10-02-00, 330101-00-40-10-02-05, 330101-00-60-10-02-00, 330101-00-60-10-02-05, 330102-00-20-10-02-00, 330103-00-02-10-02-05, 330103-00-03-10-02-05, 330103-00-04-10-02-00, 330103-00-04-50-02-00, 330103-00-05-10-02-00, 330103-00-06-10-02-00, 330104-00-06-10-02-00, 330104-01-05-50-02-00, 330105-02-12-05-02-00, 330105-02-12-05-02-05, 330105-02-12-10-02-00, 330105-02-12-10-02-05, 330106-05-30-05-02-00, 330106-05-30-05-02-05, 330106-05-30-10-02-00 and 330106-05-30-10-02-05.

6. System Graphs and Dimensional Drawings

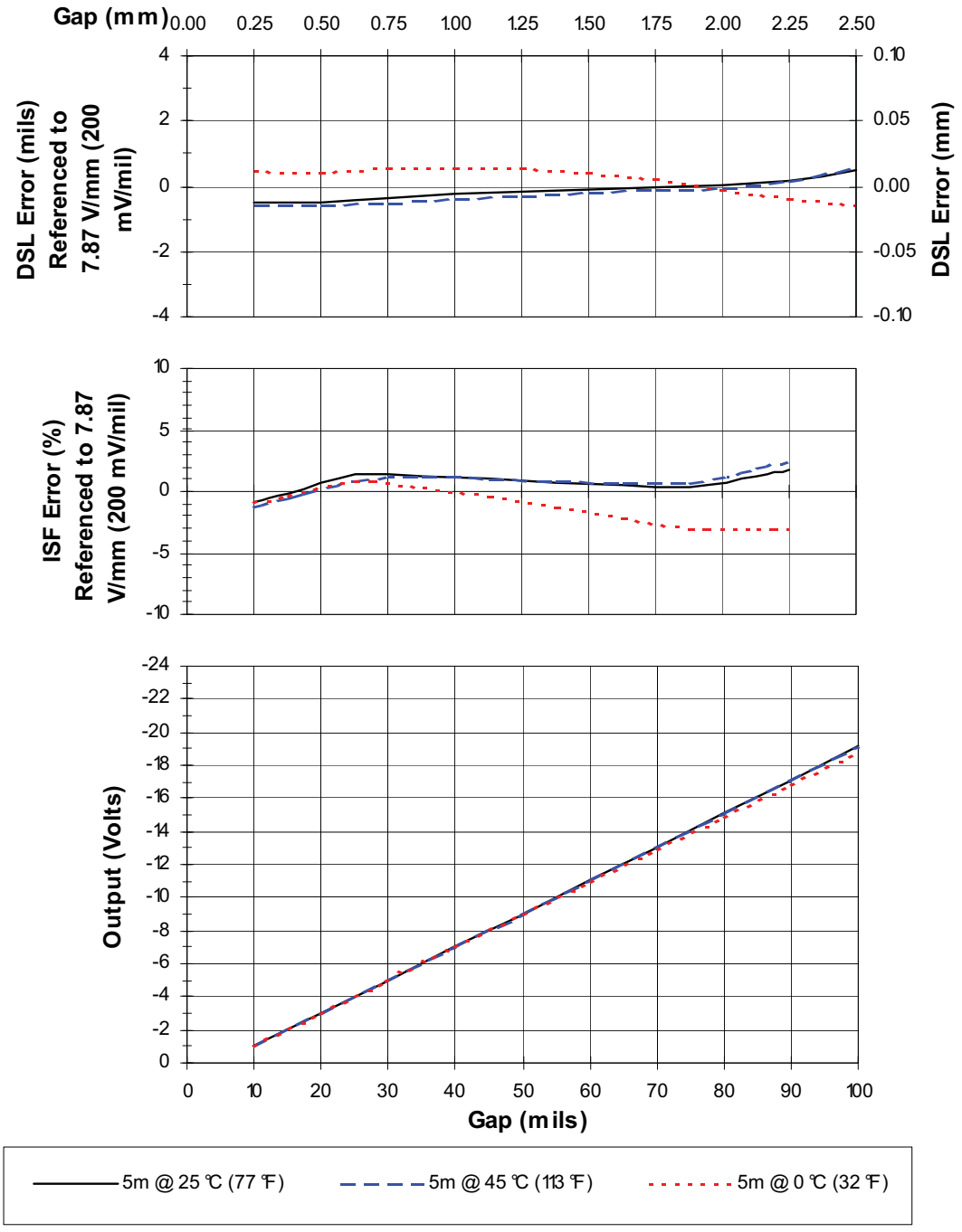


Figure 6-1: Typical 3300 XL 8mm 5m or 1m System over API 670 Testing Range

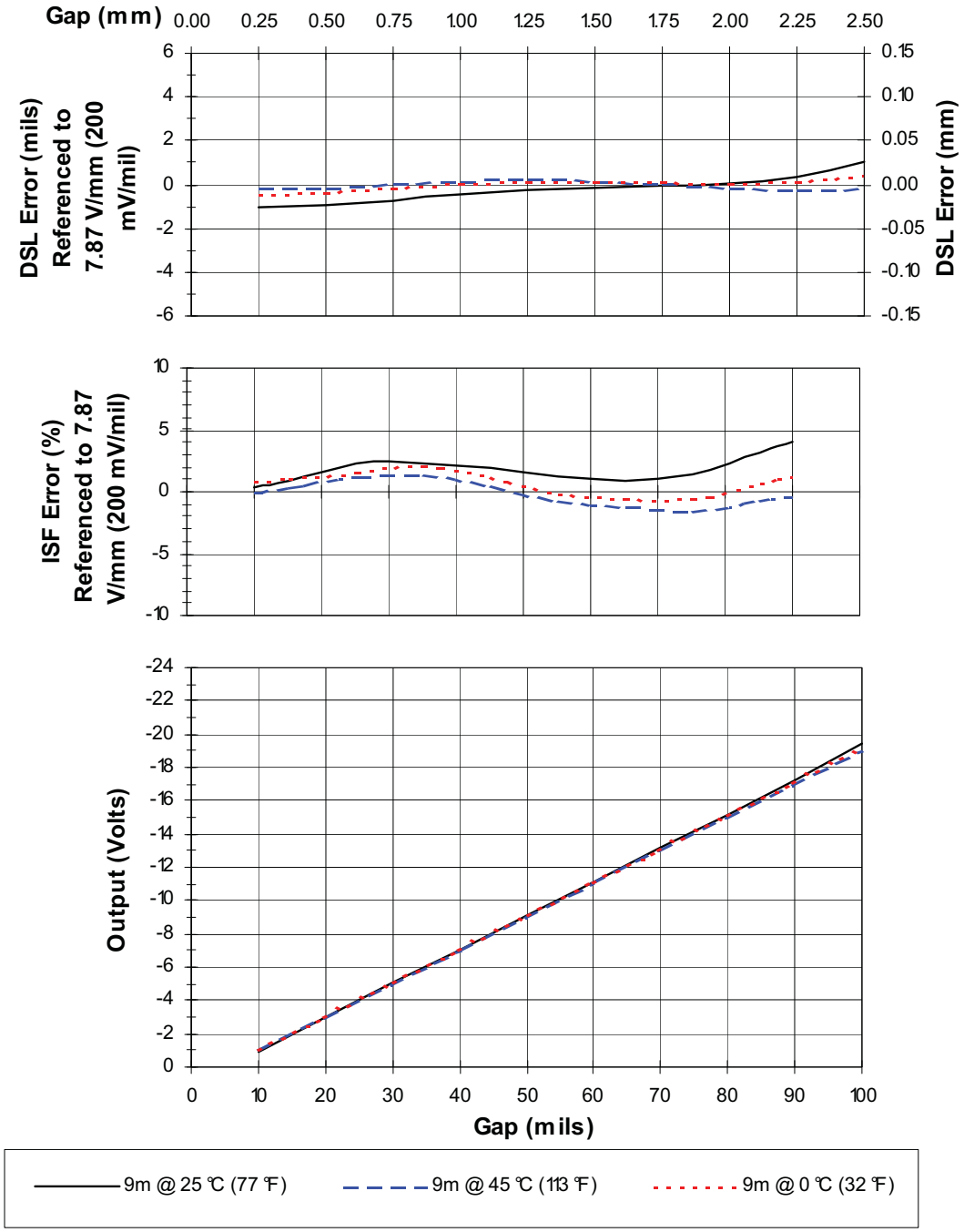


Figure 6-2: Typical 3300 XL 8mm 9m System over API 670 Testing Range

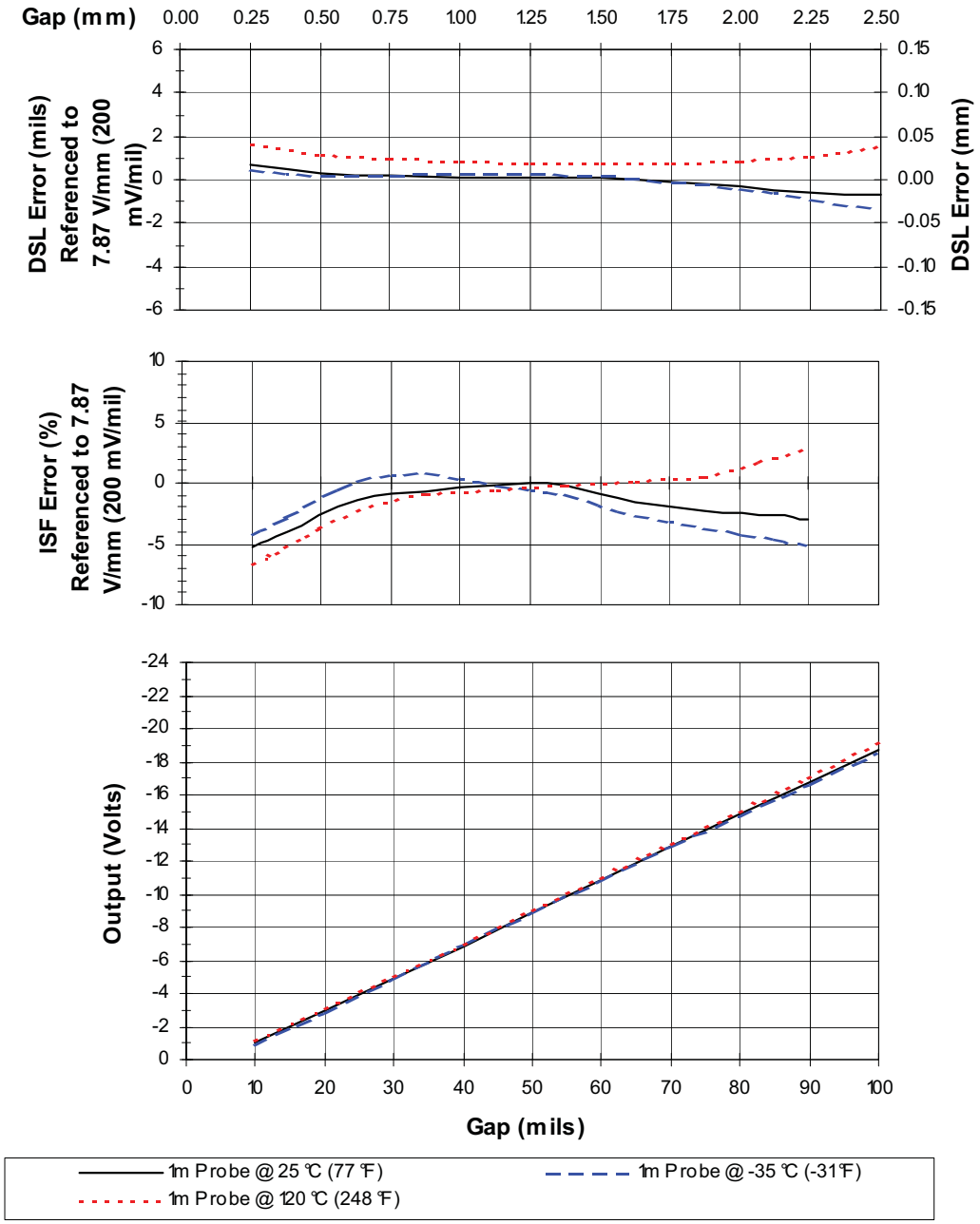


Figure 6-3: Typical 3300 XL 8mm Probe over API 670 Operating Range

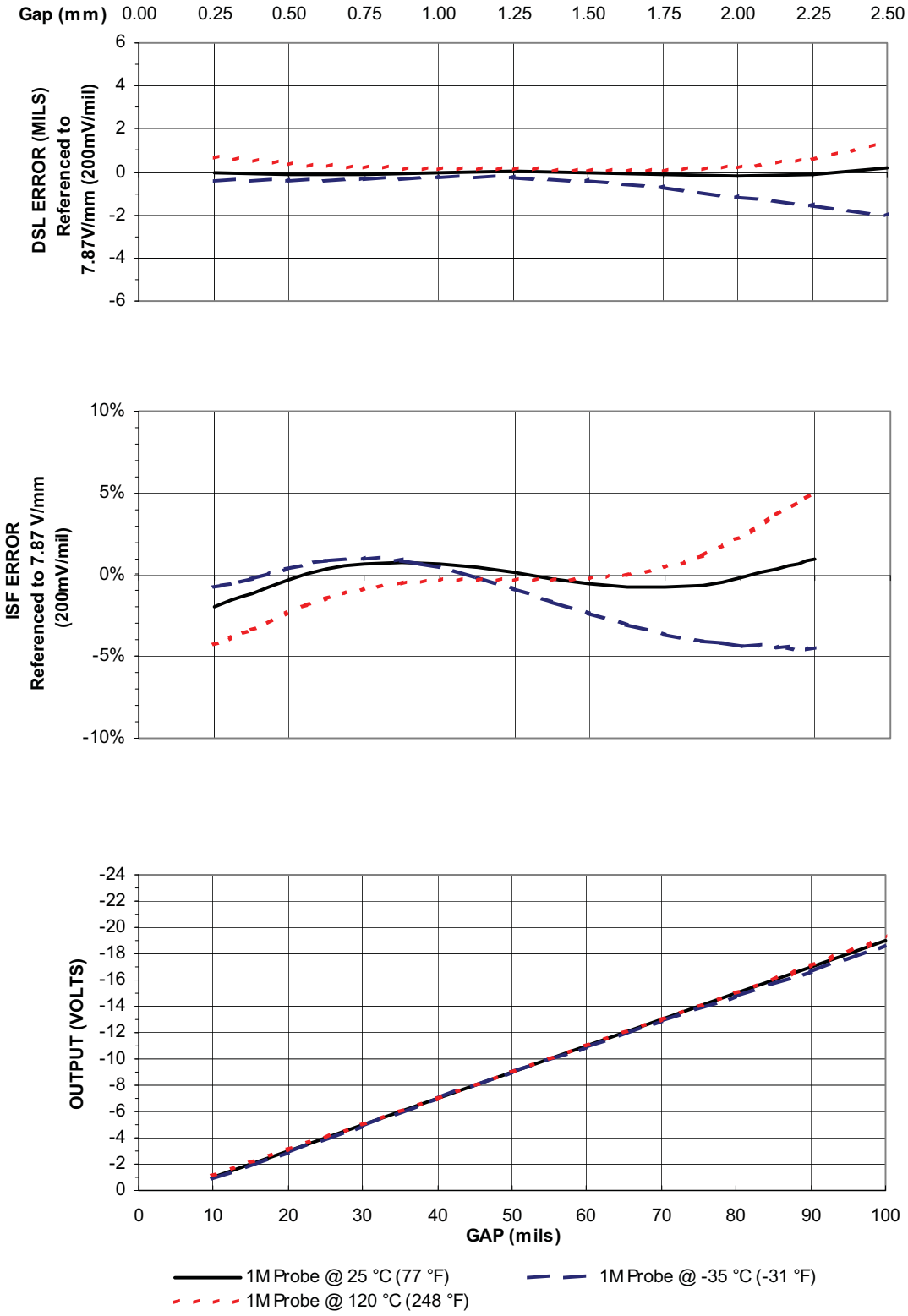


Figure 6-4: Typical 3300 5mm Probe over API 670 Operating Range

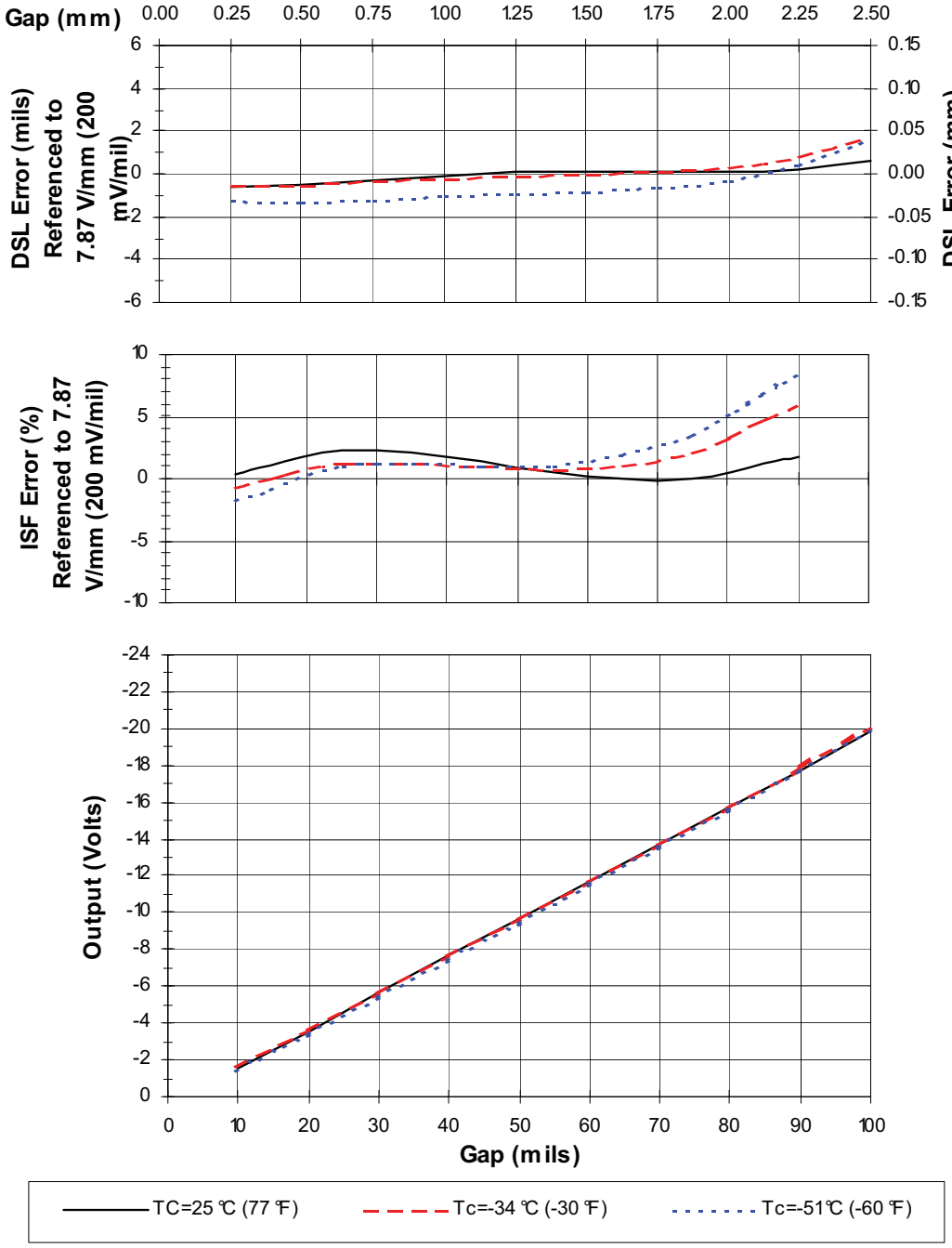


Figure 6-5: Typical 3300 XL 8mm 5m Proximitor Sensor with 4m Extension Cable @ Tc (Probe is at 25 °C)

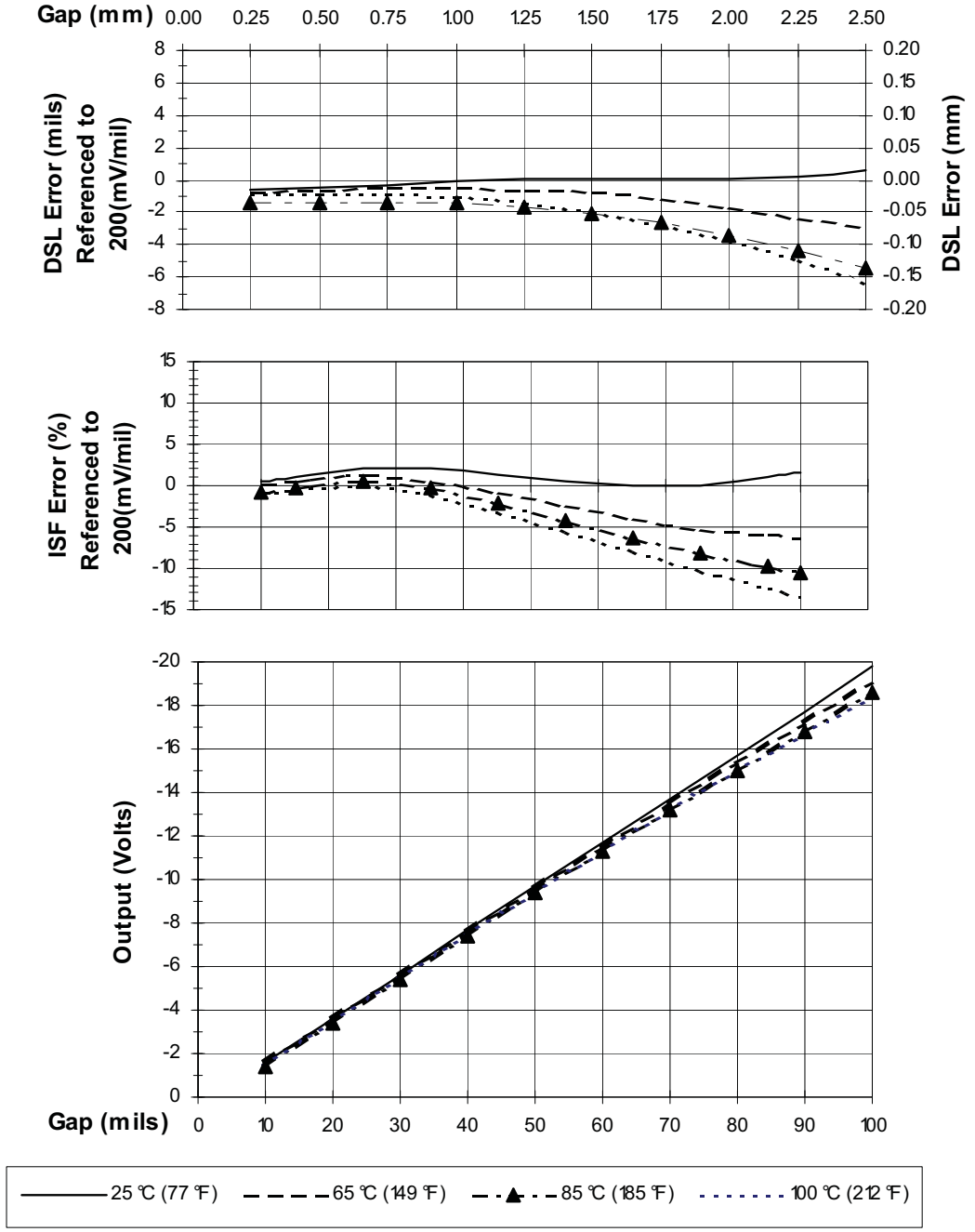


Figure 6-6: Typical 3300 XL 8mm 5m Proximitor Sensor with 4m Extension Cable @ Th (Probe is at 25°C)

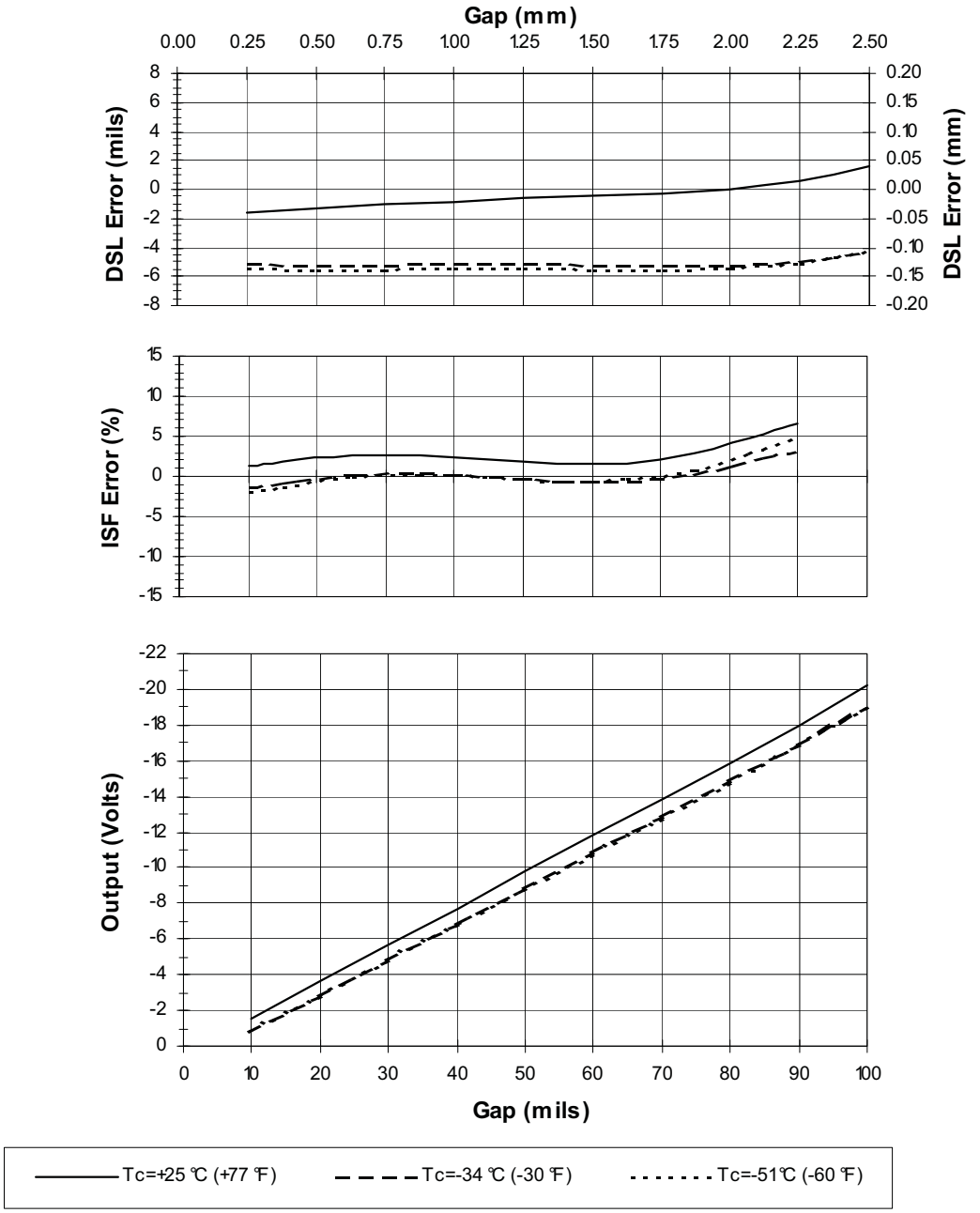


Figure 6-7: Typical 3300 XL 8mm 9m Proximitor Sensor with 8m Extension Cable @ Tc (Probe is at 25 °C)

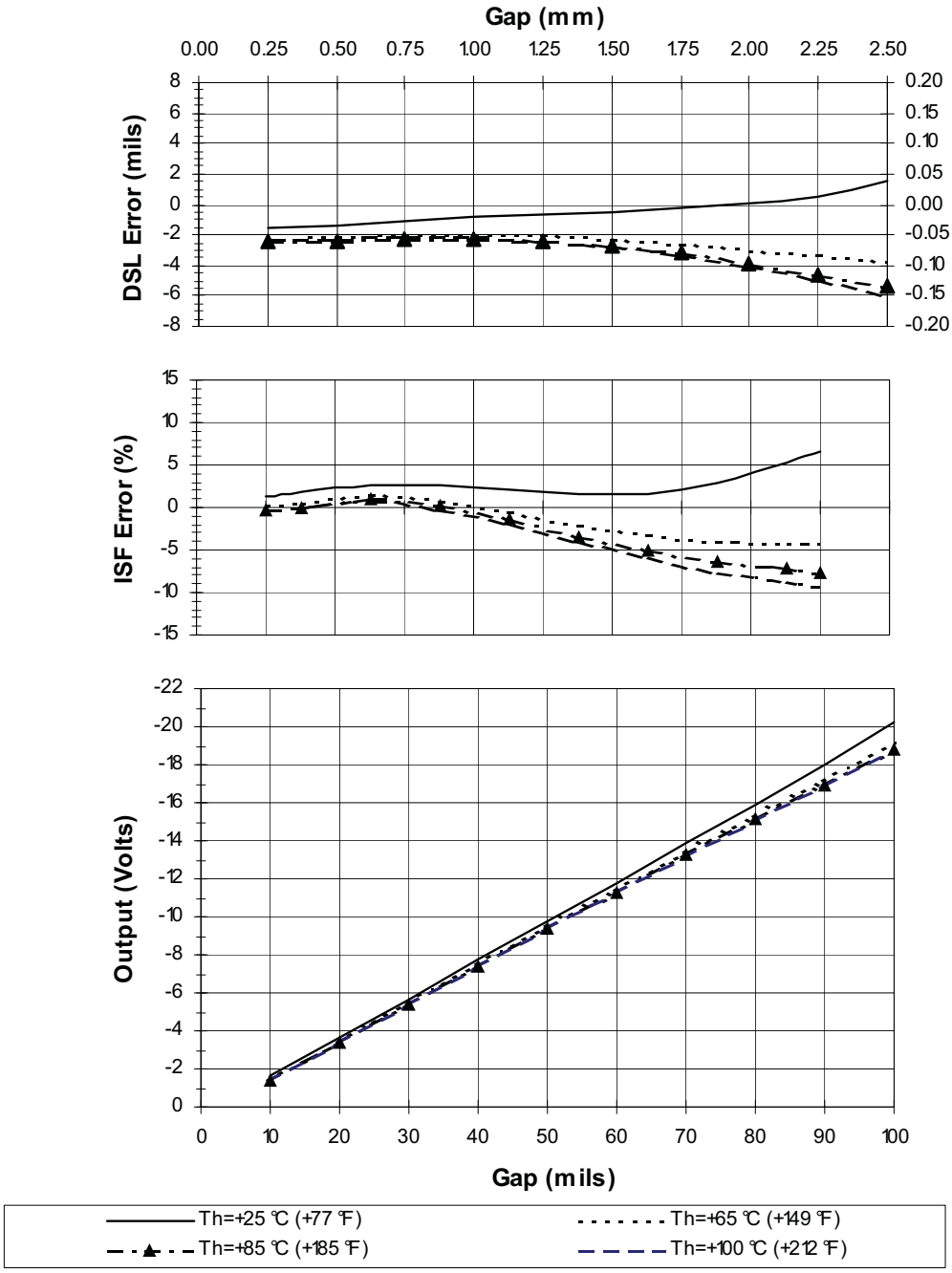


Figure 6-8: Typical 3300 XL 8mm 9m Proximitor Sensor with 8m Extension Cable @ Th (Probe is at 25 °C)

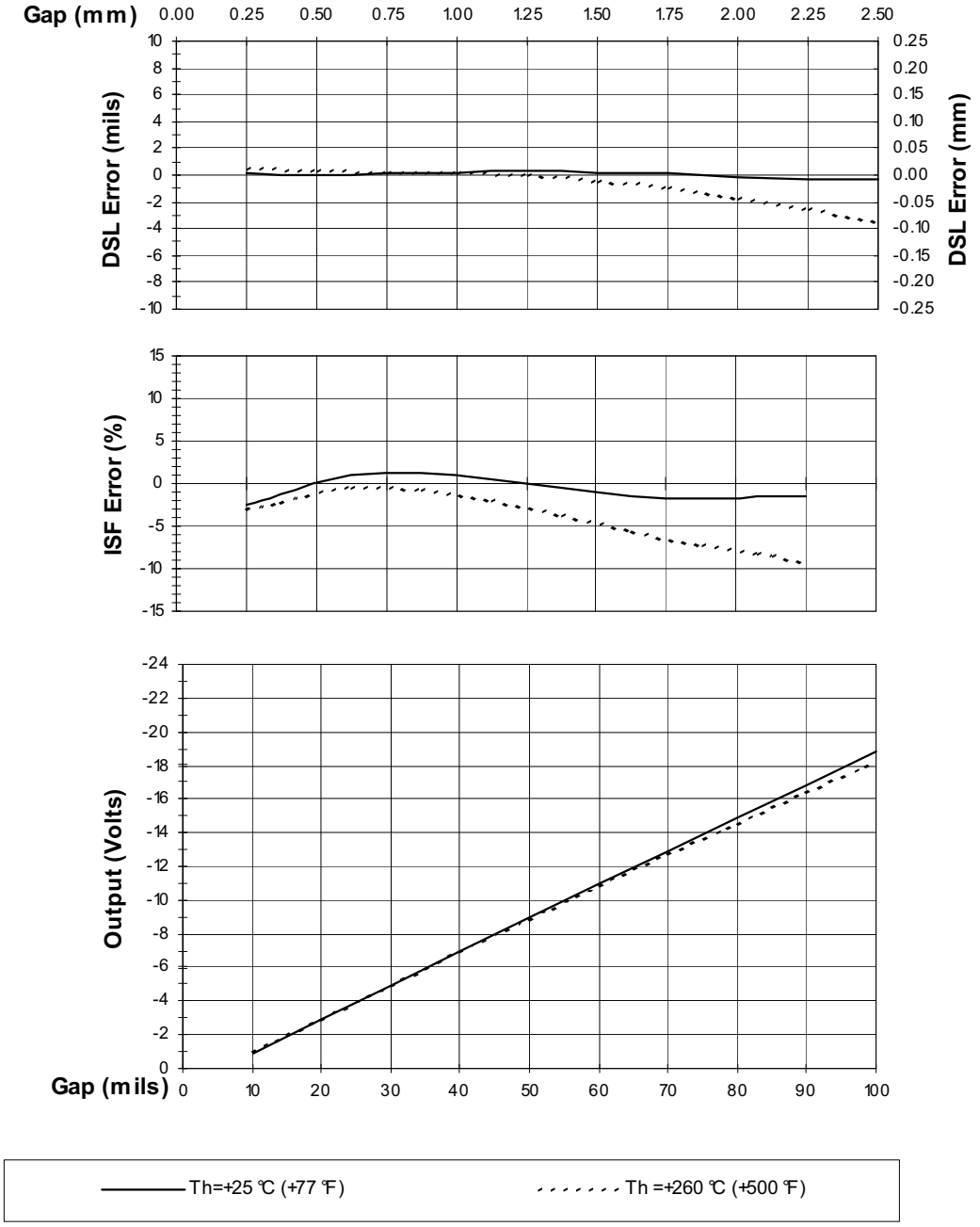


Figure 6-9: Typical 3300 XL Extended Temperature Range Probe and 4m Extended Temperature Range Extension Cable @ Th (Proximitor Sensor and probe tip with 1 foot of cable are at +25 °C)

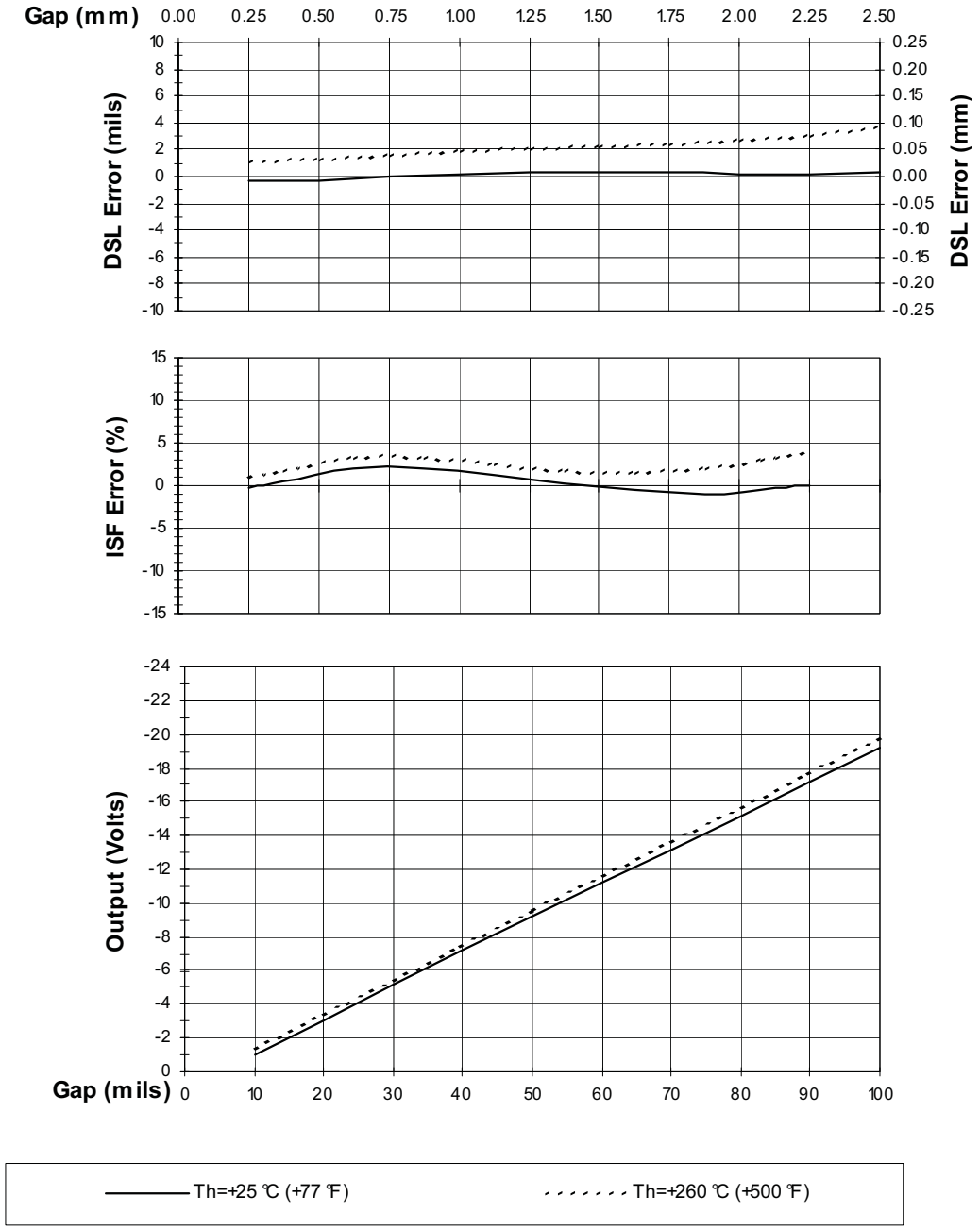


Figure 6-10: Typical 3300 XL Extended Temperature Range Probe and 8m Extended Temperature Range Extension Cable @ Th (Proximitor Sensor and probe tip with 1 foot of cable are at +25 °C)

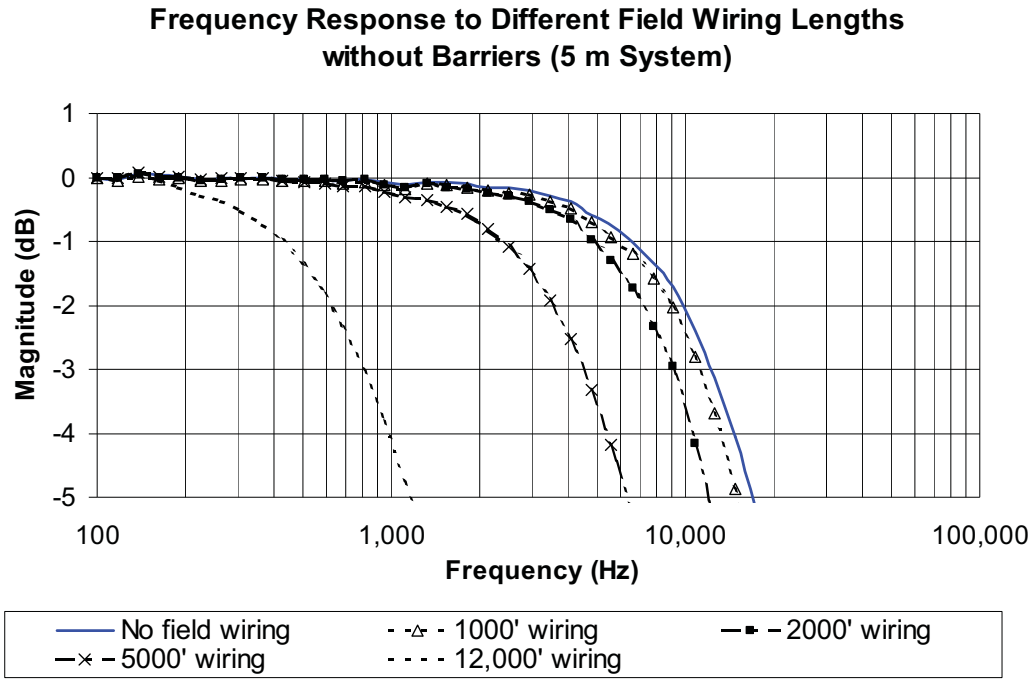


Figure 6-11: Frequency Response, typical 3300 XL 8mm 5m or 1m System with varying lengths of field wiring attached, no barriers

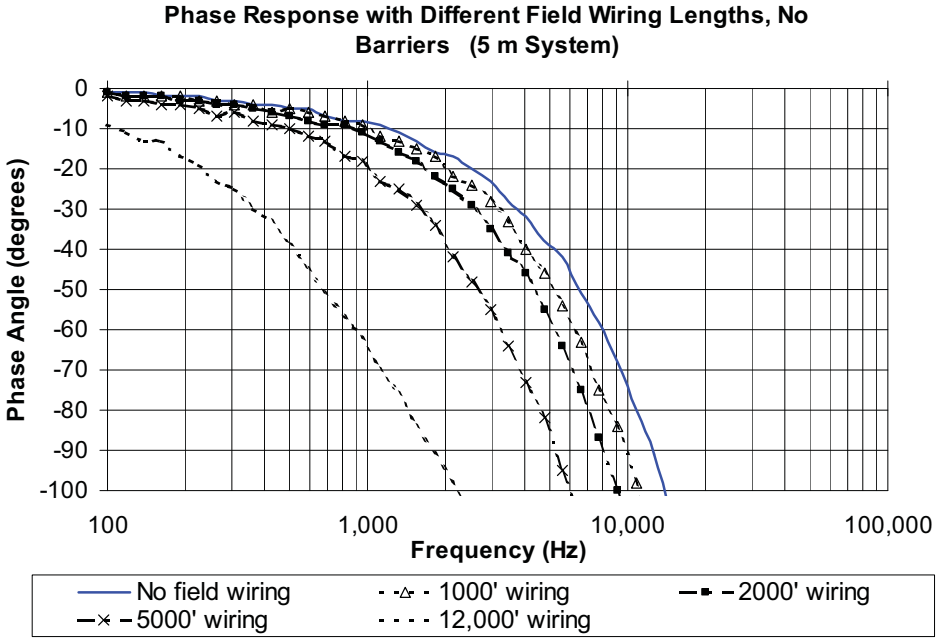


Figure 6-12: Phase Response, typical 3300 XL 8mm 5m or 1m System with varying lengths of field wiring attached, no barriers

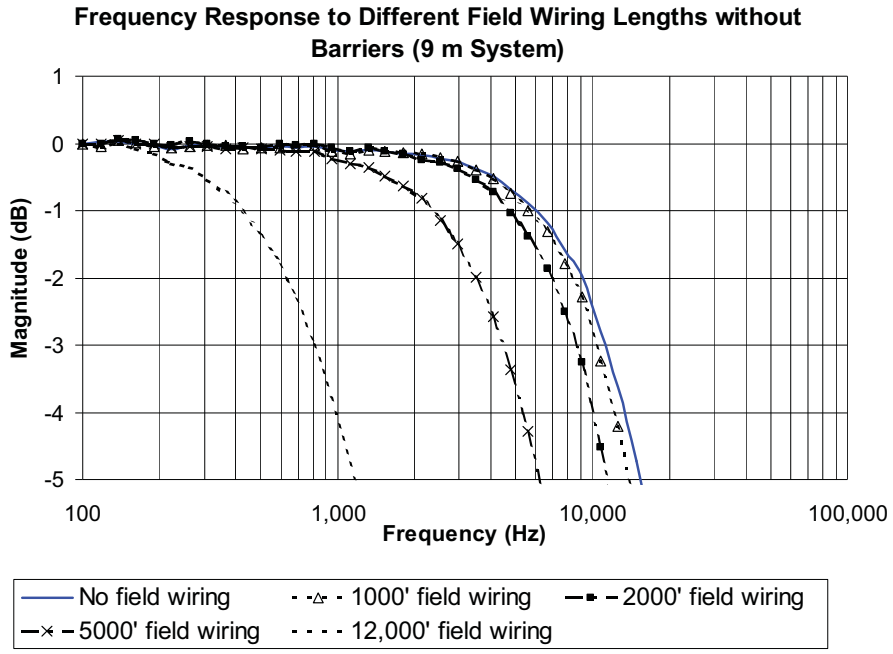


Figure 6-13 Frequency Response, typical 3300 XL 8mm 9m System with varying lengths of field wiring attached, no barriers

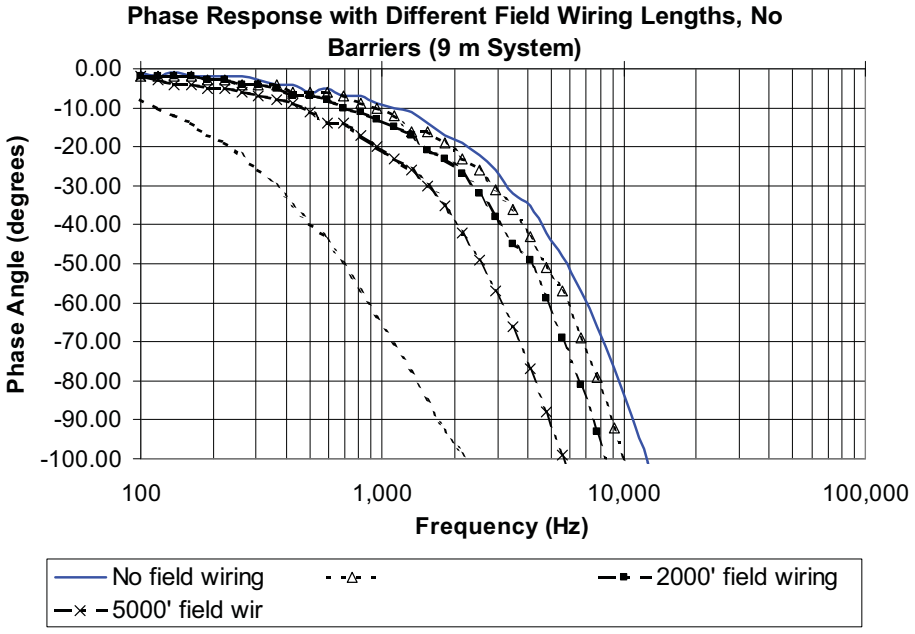
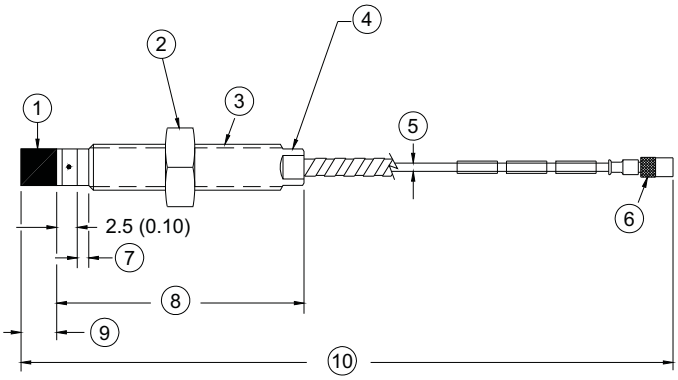


Figure 6-14: Phase Response, typical 3300 XL 8mm 9m System with varying lengths of field wiring attached, no barriers



1. 8.0 (0.31) diameter probe tip
2. 14.3 (9/16) for 3/8-24 threads[2]; 17.0 (0.67) for M10 threads[2]
3. Case thread
4. 8 (5/15) wrench flats, 4 each
5. 75Ω cable
   - 3.7 (0.15) maximum outside diameter
   - 3.9 (0.16) maximum diameter for FluidLoc cable
   - 7.6 (0.30) outside diameter for armor
   - 9.0 (0.35) maximum diameter for armor ferrule
6. Miniature male coaxial connector, 7.23 (0.285) maximum outside diameter "D"
7. Unthreaded length "A"
8. Case length "B"
9. 6.0 (0.236) maximum
10. Total length[3] "C", +30%, -0%

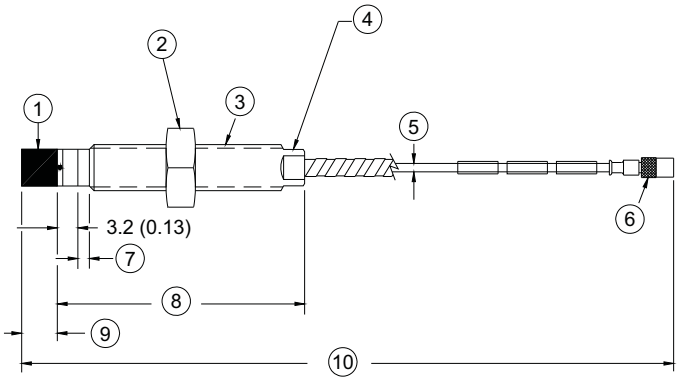
Figure 6-15: 3300 XL 8mm Proximity Probes, Standard Mount

330101 and 330191, 3/8-24 UNF-2A, without armor [7]

330102 and 330192, 3/8-24 UNF-2A, with armor [6]

330103 and 330193, M10X1 thread, without armor [7]

330104 and 330194, M10X1 thread, with armor [6]



1. 5.2 (0.21) diameter probe tip
2. 11.1 (7/16) for 3/8-24 threads[2]; 13.0 (0.51) for M10 threads[2]
3. Case thread
4. 5.6 (7.32) wrench flats for 1/4-28 threads, 7.0 (0,28) for M8 threads, 4 each
5. 75Ω cable
   2.8 (0.11) maximum outside diameter
   7.6 (0.30) outside diameter for armor
   9.0 (0.35) maximum diameter for armor ferrule
6. Miniature male coaxial connector, 7.23 (0.285) maximum outside diameter "D"
7. Unthreaded length "A"
8. Case length "B"
9. 6.0 (0.236) maximum
10. Total length[8] "C", +30%, -0%

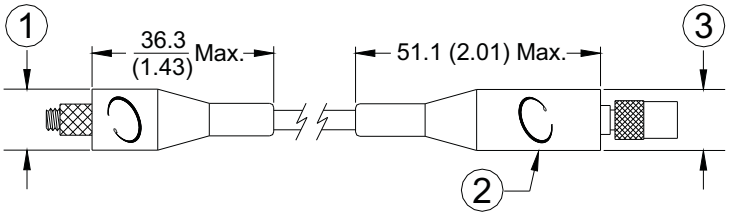
Figure 6-16: 3300 5mm Proximity Probes

330171, 1/4-28 UNF-2A, without armor [7]

330172 , 1/4-28 UNF-2A, with armor [6]

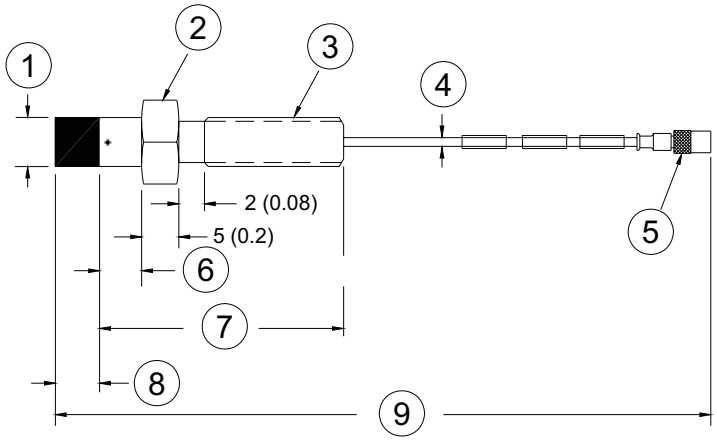
330173, M8X1 thread, without armor [7]

330174, M8X1 thread, with armor [6]



1. 12 (0.47) diameter maximum
2. Connector protector (fluorosilicone material)
3. 12 (0.47) diameter maximum

Figure 6-17: Installed Connector Protectors

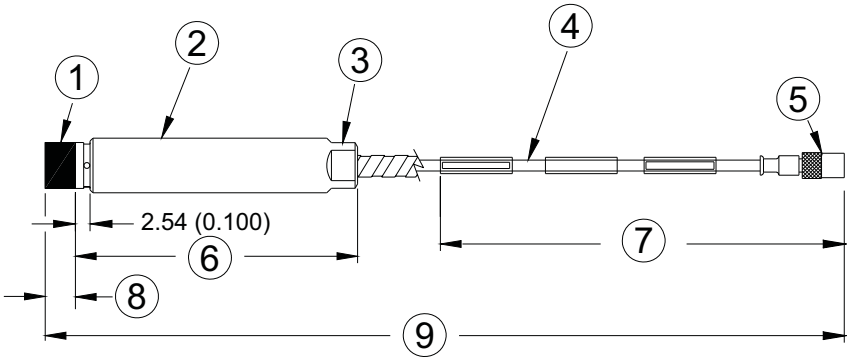


1. 8.0 (0.31) diameter probe tip
2. 7/16 or M10 hexagonal
3. Case thread
4. 75Ω cable, 3.7 (0.15) outside diameter
5. Miniature male coaxial connector, 7.23 (0.285) maximum outside diameter "D"
6. Unthreaded length "A"
7. Case length "B" 30 (1.2)
8. 6.0 (0.236) maximum
9. Total length[3] "C", +30%, -0%

Figure 6-18: 3300 XL 8mm Proximity Probes, Reverse Mount [4, 7]

330105 and 330195, 3/8-24 UNF-2A threads

330106 and 330196, M10X1 threads

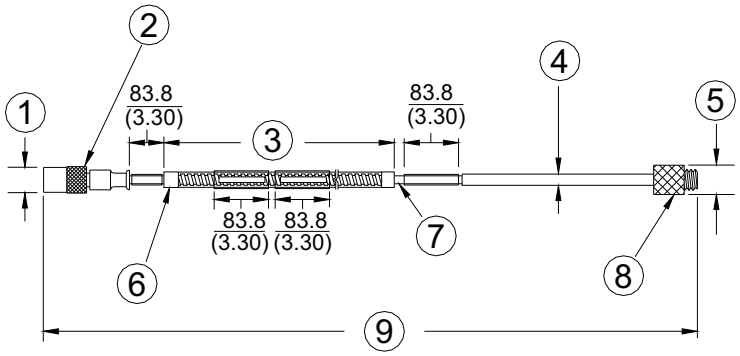


1. 8.0 (0.31) diameter probe tip
2. 9.6 (0.38) maximum diameter
3. 7.9 (0.31) wrench flats, 4 each
4. 75Ω cable, 3.68 (0.145) maximum diameter
5. 3.9 (0.16) maximum diameter for FluidLoc cable
6. 8.0 (0.315) outsided diameter for armor
7. 9.0 (0.35) maximim diameter for armor ferrule
8. Miniature male coaxial connector, 7.23 (0.285) maximum outside diameter
9. Case length "A"
10. 349.25 (13.720) maximum
11. 6.0 (0.236) maximum
12. Cable length[3]

Figure 6-19: 3300 XL 8mm Proximity Probes, Smooth Case

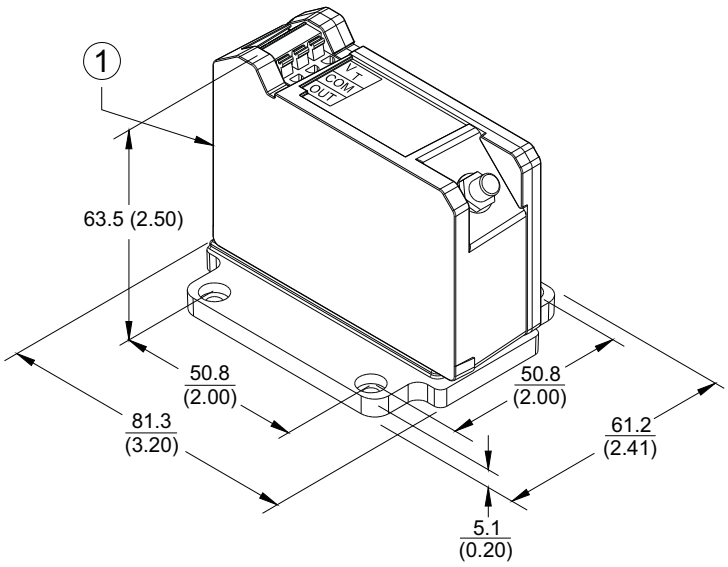
330140 and 330197, without armor [7]

330141 and 330198, with armor [6]



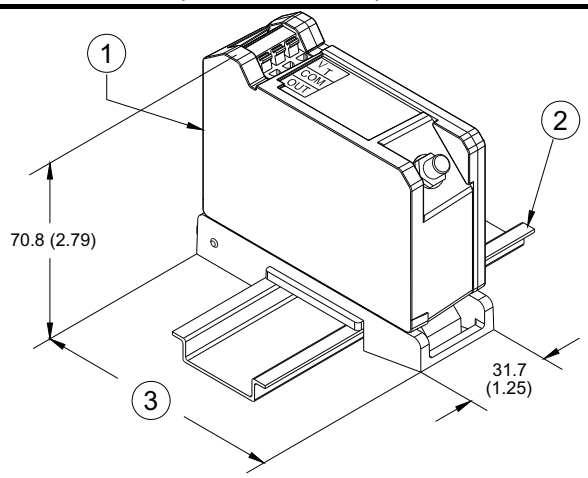
1. 7.2 (0.285) maximum diameter
2. Miniature male coaxial connector
3. FEP or PFA coated armor6, armor length 300 (11.8) less than cable length
4. 75Ω cable, 3.68 (0.145) maximum outside diameter
   (0.16) maximum diameter for FluidLoc cable
   (0.30) outside diameter for armor
   (0.35) maximum diameter for armor ferrule
5. 7.2 (0.285) maximum diameter
6. Stainless steel ferrules, 8.4 (0.33) diameter
7. FEP or PFA insulated triaxial cable
8. Miniature female coaxial connector
9. Cable length +20%, -0%

Figure 6-20: 330130, 3300 XL Extension Cable (FEP armor and insulation) 330190, 3300 XL ETR Extension Cable (PFA armor and insulation)



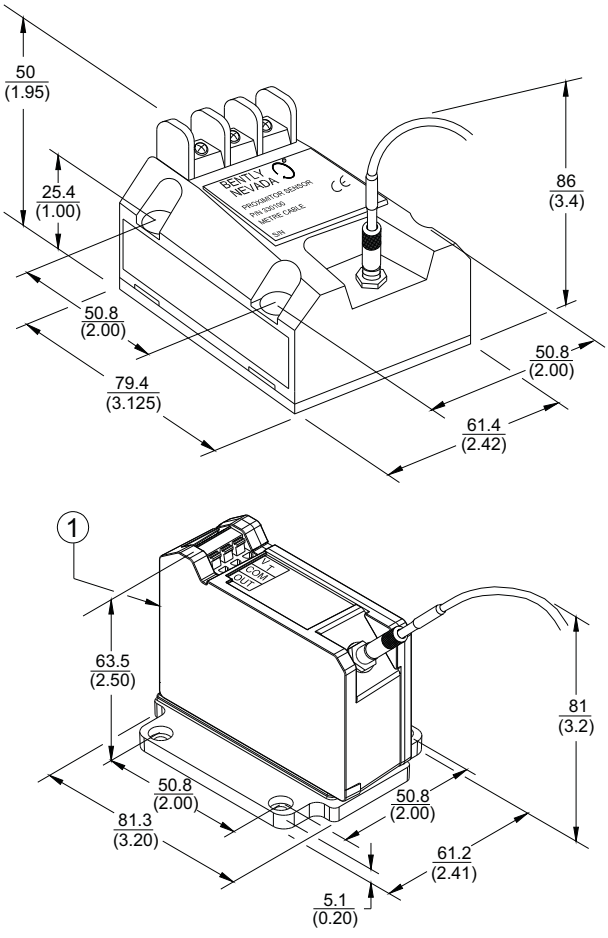
1. Mounting option “A”, options –50 or -90

Figure 6-21: Panel Mount 3300 XL Proximitor Sensor



1. Mounting option "A", options –51 or –91
2. 35mm DIN rail (not included)
3. 89.4 (3.52) [Additional 3.05 (0.120) require to remove DIN rail

Figure 6-22: DIN Mount 3300 XL Proximitor Sensor



1. Mounting option "A", options –50 or -90

Figure 6-23: Physical mounting characteristics showing interchangeability of 3300 and 3300 XL Proximitor Sensors when 4-hole mounting option is used[8]

Notes:

- All dimensions on figures are in millimetres (inches) unless otherwise noted.
- Standard mount 8 mm probes supplied with 17 mm or 9/16 inch lock nut.
- Probes ordered with 5 or 9 metre integral cables have a length tolerance of +20%, -0%.
- Reverse mount probes not available with armor or connector protector options.
- Letters inside quotation marks on figures refer to probe ordering options.
- Stainless steel armor is supplied with FEP outer jacket for standard probes, PFA outer jacket for ETR probes.
- FEP jacket is standard non-armored portion of the cable for standard probes, PFA jacket on non-armored portion for ETR probes.
- Use M3.5 or #6 screws for panel-mount Proximitor® Sensors (screws provided when purchasing Bently Nevada housings).

7. Micrometer Specifications and Ordering Information

7.1 Mechanical

Target Buttons

AISI 4140 Alloy Steel, 30.5 mm (1.20 in) diameter flat target. Contact your local sales office for details on special target materials.

Casing Material

3300 XL Precision Micrometer:

Fiberglass and Plastic.

3300 XL Shaft Micrometer

ABS Plastic.

Micrometer specifications:

Table 7-1: 3300 XL Precision Micrometer:

Part number	Resolution	Accuracy	Range
330185-01	0.000020 in	± 0.000015 in	0-1 in
330185-02	0.0005 mm	± 0.0004 mm	0-25 mm

Table 7-2: 3300 XL Shaft Micrometer

Part number	Resolution	Accuracy	Range
330186-01	0.001 in	±0.0001 in	0-1 in
300186-02	0.01 mm	±0.003 mm	0-25 mm

Size

3300 XL Precision Micrometer (case dimensions)

Height

226 mm (8.9 in)

Width

274 mm (10.8 in)

Length

356 mm (14.0 in)

3300 XL Shaft Micrometer (case dimensions)

Height

152 mm (6.0 in)

Width

246 mm (9.7 in)

Length

356 mm (14.0 in)

Total System Mass

3300 XL Precision Micrometer:

6.8 kg (15.0 lbm)

3300 XL Shaft Micrometer:

2.8 kg (6.2 lbm)

7.2 Ordering Information

7.2.1 3300 XL Precision Micrometer
330185-AXX

A: Scale Units

0 1	Micrometer in English units	(0-1 in)
0 2	Micrometer in metric units	(0-25 mm)

7.2.2 3300 XL Shaft Micrometer
330186- AXX
Option Descriptions

A: Scale Units

0 1	Micrometer in English units	(0-1 in)
0 2	Micrometer in metric units	(0-25 mm)

NOTE

The 3300 shaft micrometer and precision micrometer come with probe mounting adapters for 1/4 inch, 3/8 inch, 1/2 inch, 5/8 inch, M8, M10, M14 and M16 probe thread sizes.

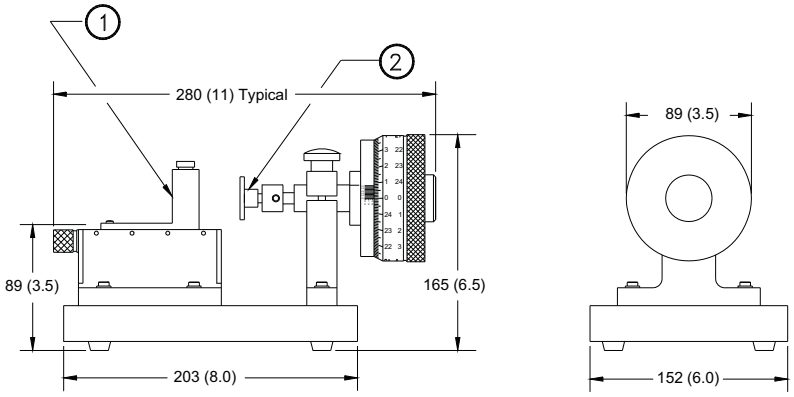
7.2.3 Accessories

Table 7-3: Accessory Part Numbers and Descriptions

Part Number	Description
138751-01	3300 XL Precision Micrometer Instruction Sheet
140273-01	3300 XL Shaft Micrometer Instruction Sheet
27505-01	Target button: A replacement 4140 target button that comes standard with the 3300 XL shaft micrometer. There can be a variation of up to 5% in the average scale factor (ASF) between each target button.
136534-01	High Precision target button: A replacement 4140 target button that comes standard with the 3300 XL precision micrometer. There can be a variation of up to 0.6% in the Average Scale Factor (ASF) between each target button.
02200218	Shaft Micrometer Strap: A replacement strap for the 3300 XL Shaft Micrometer.
49478-01	Probe mounting adapter, suitable for M5 threads.
49478-02	Probe mounting adapter, 1/4 inch threads.
49478-03	Probe mounting adapter, M8 threads.
49478-04	Probe mounting adapter, M10 threads.
49478-05	Probe mounting adapter, 3/8 inch threads.
49478-06	Probe mounting adapter, M11 threads.
49478-07	Probe mounting adapter, 1/2 inch threads.
49478-08	Probe mounting adapter, M14 threads.
49478-09	Probe mounting adapter, 5/8 inch threads.
49478-10	Probe mounting adapter, M16 threads.

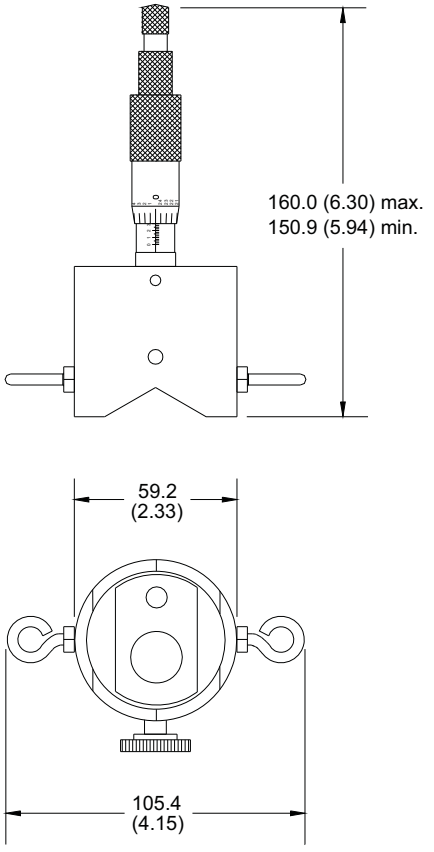
7.3 Dimensional Drawings

Note: Dimensions for figures are in millimetres (inches)



1. Collets to fit both metric and English 5mm, 8mm, and 14mm probes
2. Removable AISI 4140 target

Figure 7-1: 3300 XL Precision Micrometer



i.

Figure 7-2 - 3300 XL Shaft Micrometer

Certificate of Compliance

Certificate: 1109248 (LR 26744-222) **Master Contract:** 150368

Project: 2602032 **Date Issued:** February 15, 2013

Issued to: **Bently Nevada Inc**

1631 Bently Pky S
Minden, NV 89423
USA
Attention: Byron Hunt

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.

Eshwar Kashyap

Issued by: Eshwar Kashyap

PRODUCTS

CLASS 2258 04 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe, Entity - For Hazardous Locations

Class I, Zone 0; Ex ia IIC T1…T5 Ga:

Class I, Groups A, B, C and D; Class II, Groups E, F and G; Class III:

• 3300XL & 7200 Series Proximitor Sensor, Models 330180-xx-xx, 330780-xx-xx, 330980-xx-xx, 330850-xx-xx, 330878-xx-xx, 144181-xx and 18745-xx-xx (suffixes denote cable length and certification body), housed in Certified proximitor housing, P/N 330181-xx-xx (suffixes denote transducer type, conduit fittings, gland plate thickness and terminal block), connected with, 190, 300, 3000, 3300 and 7200 Series probes. Intrinsically safe when connected to Certified barriers per installation Dwg 141092. Temperature Codes T5, Ta= -35°C to 85°C or T4, Ta= -51°C to 100°C for Proximitor Sensor, and T1, Ta= -51°C to 232°C; T2, Ta= -51°C to 177°C; T3, Ta= -51°C to 120°C; T4, Ta= -51°C to 80°C; T5, Ta= -51°C to 40°C for the probes.

Note: The 3300 XL & 7200 Series Proximitor Sensors maybe optionally supplied without the above referenced proximitor housing for Ex ia IIC or Class I, Groups A, B, C and D installation where its suitability as determined by the local Inspection Authority.

Certificate: 1109248 (LR 26744-222) **Master Contract:** 150368

Project: 2602032 **Date Issued:** February 15, 2013

CLASS 2258 84 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe Entity - For Hazardous Locations - CERTIFIED TO U.S. STANDARDS

Class I, Groups A, B, C and D; Class II, Groups E, F and G; Class III:

• 3300 XL & 7200 Series Proximitor Sensor, Models 330180-xx-xx, 330780-xx-xx, 330980-xx-xx, 330850-xx-xx, 330878-xx-xx, 144181-xx and 18745-xx-xx (suffixes denote cable length and certification body), housed in Certified proximitor housing, P/N 330181-xx-xx (suffixes denote transducer type, conduit fittings, gland plate thickness and terminal block), connected with 190, 300, 3000, 3300 and 7200 Series probes. Intrinsically safe when connected to Certified barriers per installation Dwg 141092. Temperature Codes T5, Ta= -35°C to 85°C or T4, Ta= -51°C to 100°C for Proximitor Sensor, and T1, Ta= -51°C to 232°C; T2, Ta= -51°C to 177°C; T3, Ta= -51°C to 120°C; T4, Ta= -51°C to 80°C; T5, Ta= -51°C to 40°C for the probes.

Note: The 3300 XL & 7200 Series Proximitor Sensors maybe optionally supplied without the above referenced proximitor housing for Class I, Zone 0, Group IIC or Class I, Groups A, B, C and D installation where its suitability as determined by the local Inspection Authority.

CLASS 2258 03 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe and Non-Incendive Systems - For Hazardous Locations

Class I, Zone 2; Ex nA IIC T1…T5 Gc:

Class I, Div. 2, Groups A, B, C and D:

• 3300XL & 7200 Series Proximitor Sensor, Models 330180-xx-xx, 330780-xx-xx, 330980-xx-xx, 330850-xx-xx, 330878-xx-xx, 144181-xx and 18745-xx-xx (suffixes denote cable length and certification body), housed in Certified proximitor housing, P/N 330181-xx-xx (suffixes denote transducer type, conduit fittings, gland plate thickness and terminal block), connected with, 190, 300, 3000, 3300 and 7200 Series probes. Non-Incendive circuit when connected per installation Dwg. 140979. Temperature Codes T5, Ta= -35°C to 85°C or T4, Ta= -51°C to 100°C for Proximitor Sensor, and T1, Ta= -51°C to 232°C; T2, Ta= -51°C to 177°C; T3, Ta= -51°C to 120°C; T4, Ta= -51°C to 80°C; T5, Ta= -51°C to 40°C for the probes.

CLASS 2258 83 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe and Non-Incendive Systems - For Hazardous Locations - CERTIFIED TO U.S. STANDARDS

Class I, Div. 2, Groups A, B, C and D:

• 3300 XL & 7200 Series Proximitor Sensor, Models 330180-xx-xx, 330780-xx-xx, 330980-xx-xx, 330850-xx-xx, 330878-xx-xx, 144181-xx and 18745-xx-xx (suffixes denote cable length and certification body), housed in

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Project: 2602032 **Date Issued:** February 15, 2013

Certified proximitor housing, P/N 330181-xx-xx (suffixes denote transducer type, conduit fittings, gland plate thickness and terminal block), connected with 190, 300, 3000, 3300 and 7200 Series probes. Non-Incendive circuit when connected per installation Dwg 140979. Temperature Codes T5, Ta= -35°C to 85°C or T4, Ta= -51°C to 100°C for Proximitor Sensor, and T1, Ta= -51°C to 232°C; T2, Ta= -51°C to 177°C; T3, Ta= -51°C to 120°C; T4, Ta= -51°C to 80°C; T5, Ta= -51°C to 40°C for the probes.

APPLICABLE REQUIREMENTS

C22.2 No 0 - M1991	General Requirements - Canadian Electrical Code Part II.
CSA Std. C22.2 No 25-1966	Enclosures for Use in Class II, Groups E, F and G Hazardous Locations
C22.2 No 142 - M1987	Process Control Equipment.
C22.2 No 157 - M1992	Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations.
C22.2 No 213 - M1987	Non-Incendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations.
CAN/CSA-C22.2 No. 60079-0:11	Explosive Atmospheres - Part 0: Equipment - General requirements
CAN/CSA-C22.2 No. 60079-11:11	Explosive Atmospheres – Part 11: Equipment protection by intrinsic safety "i"
CAN/CSA-C22.2 No. 60079-15:12	Electrical apparatus for explosive gas atmospheres - Part 15: Construction, test and marking of type of protection “n” electrical apparatus
UL 913, 7Th Ed.	Intrinsically Safe Apparatus and Associated Apparatus for use in Class I, II, III, Division 1, Hazardous (Classified) Locations.
UL Std. No 916 - 4th Ed.	Energy Management Equipment
ANSI/ISA-12.12.01-2010	Non-incendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations

Supplement to Certificate of Compliance

Certificate: 1109248 **Master Contract:** 150368

The products listed, including the latest revision described below, are eligible to be marked in accordance with the referenced Certificate.

Product Certification History

Project	Date	Description
2602032	Feb 15, 2013	Acceptance of test data from CSA custom test report 150368-2418692 for use of alternate labels.
2545092	Oct 4, 2012	Update to include the latest standards as well as several revised drawings.
2117662	Feb 5, 2009	Update to include Proximitor Sensor Model 144181-xx, added similar 3300 Series probes 137383 and 147038-01, and minor report and drawing revisions.
2068039	Sep 23, 2008	Update to add sensor probe 137383 & update revised drawings
1878232	Mar 29, 2007	Update to Report to Separately List Non-Incendive Circuits Under Class No. 2258 03/83
1834427	Jan 24, 2007	Update to Cover Alt. Encapsulant
1676429	Jun 10, 2005	Update to Report to Include P/N's
1673624	May 16, 2005	Update to Report to Cover Minor Drawings Revisions
1552612	May 11, 2004	Update to Report 1109248 to cover minor dwg revision- Haz Loc.
1479877	Sep 24, 2003	Report update to replace schematic dwgs with dwg. 165341.
1437644	May 6, 2003	Update to Report 150368 - 1109248 to Cover Alternative Probes per dwg 142491/L - for Installation in Hazardous Locations, Legacy File 26744

Certificate of Compliance

Certificate: 70123413 **Master Contract:** 150368 (026744_C_000)

Project: 70123413 **Date Issued:** 2017-03-02

Issued to: **Bently Nevada Inc**
1631 Bently Pky S
Minden, Nevada 89423
USA

Attention: Tonya Woods

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.

Issued by: *Behzad Nejad*
Behzad Nejad, P.Eng.

PRODUCTS
CLASS - C225804 - PROCESS CONTROL EQUIPMENT-Intrinsically Safe, Entity - For Hazardous Locations
CLASS - C225884 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe, Entity-- For Hazardous Locations - Certified to US Standards

Ex ia IIC T5…T1 Ga
Class I, Zone 0, AEx ia IIC T5…T1 Ga
Class I, Division 1, Groups A, B, C and D; T5…T1
Class II, Groups E, F and G; Class III

- Proximity Probe/ Eddy Current Probe series 3000, 3300/3300XL, 7200:

Temperature Code
T1 @ Ta = -55°C to +232°C
T2 @ Ta = -55°C to +177°C
T3 @ Ta = -55°C to +120°C
T4 @ Ta = -55°C to +80°C
T5 @ Ta = -55°C to +40°C

Entity Parameters
Ui = -28V
Ii = 140mA
Pi = 0.91W
Ci = 1.5nF
Li = 610µH

"Intrinsically safe when connected per installation Dwg 141092"

Specific Conditions of Use:

i. The exposed plastic surface of the Probes with 50mm diameter, under certain extreme circumstances, may generate, an ignition-capable level of electrostatic charge. Therefore this version of the equipment shall not be installed in a location where the external conditions are conducive to the build-up of electrostatic charge on the plastic surface. In addition, the equipment shall only be cleaned with a damp cloth. This is particularly important if the equipment is installed in a Zone 0 location.
ii. The end user is to ensure appropriate earthing upon installation.

CLASS 2258 02 - PROCESS CONTROL EQUIPMENT - For Hazardous Locations
CLASS 2258 82 - PROCESS CONTROL EQUIPMENT - For Hazardous Locations - Certified to US Standards

Ex nA IIC T5…T1 Gc
Class I, Zone 2, AEx nA IIC T5…T1 Gc
Class I, Division 2, Groups A, B, C and D; T5…T1

- Proximity Probe/ Eddy Current Probe series 3000, 3300/3300XL, 7200:

- Temperature Code
T1 @ Ta = -55°C to +232°C
T2 @ Ta = -55°C to +177°C
T3 @ Ta = -55°C to +120°C
T4 @ Ta = -55°C to +80°C
T5 @ Ta = -55°C to +40°C

Rating
Ui = -28V
Ii = 140mA

"Non-Incendive circuit when connected per installation Dwg 140979"

Specific Conditions of Use:

i. This product is not resistant to light as required by clause 7.3 of IEC 60079-0:2011, therefore, it shall only be installed in a location where it is not exposed to direct sunlight or any other source of ultra-violet (UV) light.
ii. The connector shall not be disconnected while the circuit is live unless the area is known to be non-hazardous.
iii. The end user is to ensure appropriate earthing upon installation.

Certificate: 70123413 **Master Contract:** 150368

Project: 70123413 **Date Issued:** 2017-03-02

APPLICABLE REQUIREMENTS

C22.2 No. 0 - M91	General Requirements - Canadian Electrical Code Part II.
C22.2 No 142 - M1987	Process Control Equipment.
C22.2 No 213 - 16	Non-Incendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations.
CAN/CSA-C22.2 No. 60079-0:11	Explosive Atmospheres - Part 0: Equipment - General requirements
CAN/CSA-C22.2 No. 60079-11:14	Explosive Atmospheres – Part 11: Equipment protection by intrinsic safety "i"
CAN/CSA-C22.2 No. 60079-15:16	Electrical apparatus for explosive gas atmospheres - Part 15: Construction, test and marking of type of protection “n” electrical apparatus
UL 913, 7Th Ed.	Intrinsically Safe Apparatus and Associated Apparatus for use in Class I, II, III, Division 1, Hazardous (Classified) Locations.
UL Std. No 916 - 4th Ed.	Energy Management Equipment
ANSI/ISA-12.12.01-2015	Non-incendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations
ANSI/UL 60079-0:13	Electrical Apparatus for Explosive Gas Atmospheres - Part 0: General Requirements
ANSI/UL 60079-11:13	Electrical apparatus for Explosive Gas Atmospheres - Part 11: Intrinsic Safety “i”
ANSI/UL 60079-15:12	Electrical apparatus for Explosive Gas Atmospheres - Part 15: Type of Protection “n”

MARKINGS

- CSA Monogram with C-US indicator;
- Submittor Identification;
- Certificate reference;
- Model Number;
- Serial Number, Date Code or Month and Year of Manufacture;
- Name or Mark of the certificate issuer, year and certificate number (CSA 17.70123413);
- Hazardous Location Designation;
- Electrical Ratings;
- Ambient temperature range;
- Reference to installation drawing 141092 & 140979.

Supplement to Certificate of Compliance

Certificate: 70123413 **Master Contract:** 150368 (026744_C_000)

The products listed, including the latest revision described below, are eligible to be marked in accordance with the referenced Certificate.

Product Certification History

Project	Date	Description
70123413	2017-03-02	Full assessment for the Proximity Probe/ Eddy Current Probe series 3000, 3300/3300XL, 7200 for CSA-c-us for the markings: Class I, Zone 0, A/Ex ia IIC T5…T1 Ga, Class I, Division 1, Groups A, B, C, D, & Class II Division 1, Group E, F and G & Group III, Class I, Zone 2, A/Ex nA IIC T5…T1 Gc and Class I, Div 2 Group A, B, C, D.

Wiring Diagrams

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SIEMENS
ENERGY SECTOR
GN ERF (Erfurt plant)

AUXILIARY WIRING DIAGRAMS GENERATOR

PROJECT	VILNIUS Biomass
ORDER NUMBER	EG000367
PURCHASER	
FINAL CUSTOMER/USER	Vilniaus Kogeneracine Jegaine
DATE OF ISSUE	2017, Dec. 19

Revision A 2017, Dec. 19
Revision B 2018, Apr. 16
Revision C 2018, Nov. 15

NUMBER OF PAGES 79

INFORMATION ABOUT CHANGES

no.	sh. index	Date	Name	Description of changes
1	a	19.12.2017	Möbius	first release for customer
2	b	16.04.2018	Rabe	V20 added; MTB adapted; first workshop release
3	c	15.11.2018	Rabe	revision as built
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	3	TABLE OF CONTENTS	Revision C	15.11.2018	19.12.2017	Rabe
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+LIST	8	CONSUMER LIST	Revision B	16.04.2018	19.12.2017	Rabe
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+CABLING	16	CABLING ANTICONDENSATION HEATER LOCATION DIAGRAM	Revision B	16.04.2018	19.12.2017	Rabe
+CABLING	17	CABLING EXCITER LOCATION DIAGRAM			19.12.2017	
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+V20MKD10GA010	31	JUNCTION BOX VIBRATION MOUNTING PLATE TURBINE END			19.12.2017	
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+V20MKD20GA010	36	JUNCTION BOX VIBRATION RELATIVE SHAFT VIBRATION NON DRIVE END		19.12.2017	
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+V20MKA10GE050	59	NEUTRAL SIDE CUBICLE ANTICONDENSATION HEATER	Revision B 16.04.2018	19.12.2017	Rabe
+V20MKA10GE050	60	Klemmenplan : =+V20MKA10GE050-X1		19.12.2017	
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+V20MKA10GE040	76	Klemmenplan : =+V20MKA10GE040-X1		19.12.2017	
+V20MKD10GA020	77	JUNCTION BOX ROTOR EARTHING MOUNTING PLATE		19.12.2017	
+V20MKD10GA020	78	JUNCTION BOX ROTOR EARTHING		19.12.2017	
+V20MKD10GA020	79	Klemmenplan : =+V20MKD10GA020-X0		19.12.2017	

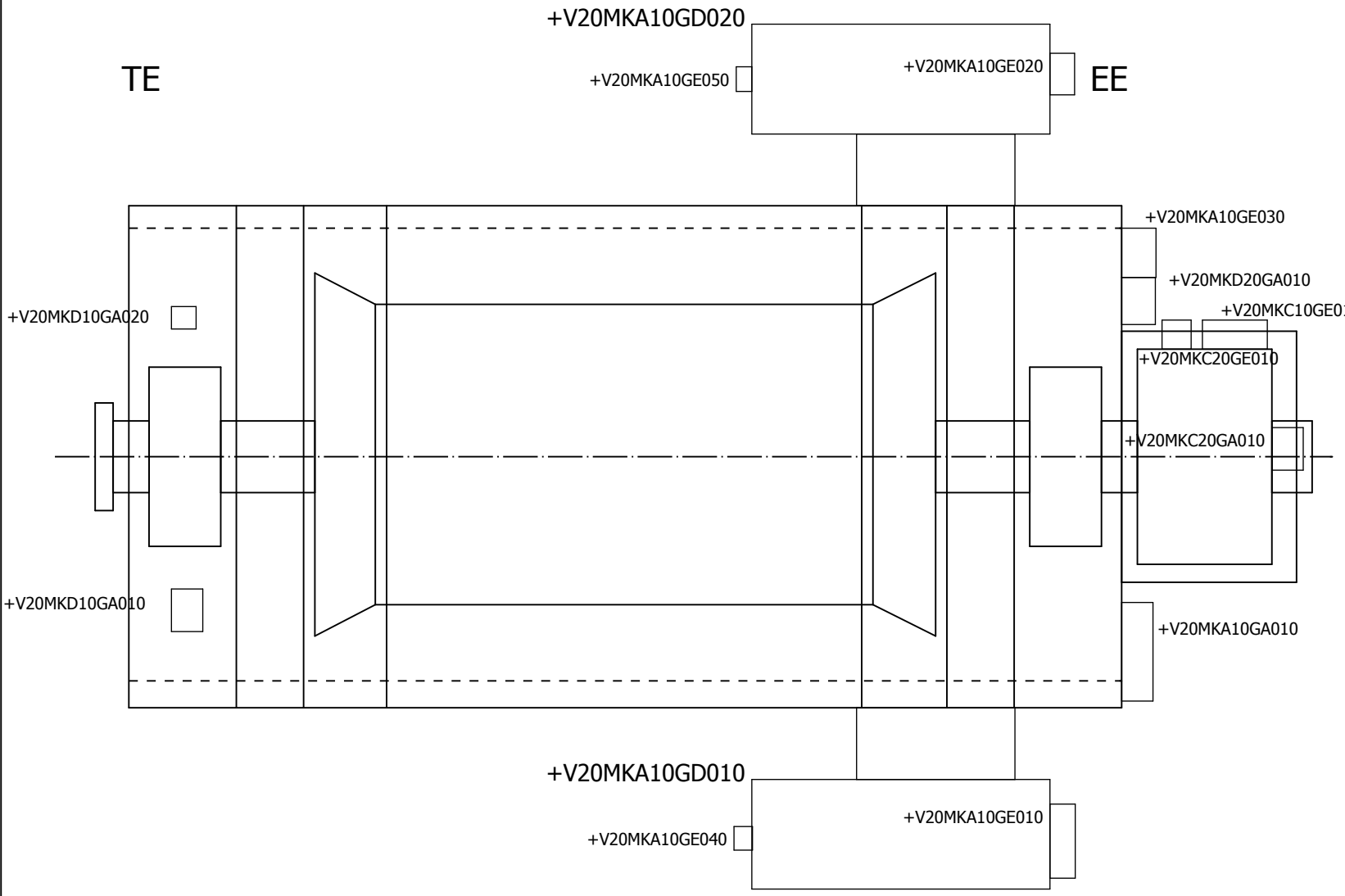
KKS	DESCRIPTION	TYPE	MANUFACTURER
=V20MKA10CT010-B1	STATOR SLOT THERMOMETER 1	4-123317	TMG
=V20MKA10CT020-B1	STATOR SLOT THERMOMETER 2	4-123317	TMG
=V20MKA10CT030-B1	STATOR SLOT THERMOMETER 3	4-123317	TMG
=V20MKA10CT011-B1	STATOR SLOT THERMOMETER 4	4-123317	TMG
=V20MKA10CT021-B1	STATOR SLOT THERMOMETER 5	4-123317	TMG
=V20MKA10CT031-B1	STATOR SLOT THERMOMETER 6	4-123317	TMG
=V20MKA10CT012-B1	STATOR SLOT THERMOMETER 7	4-123317	TMG
=V20MKA10CT022-B1	STATOR SLOT THERMOMETER 8	4-123317	TMG
=V20MKA10CT032-B1	STATOR SLOT THERMOMETER 9	4-123317	TMG
=V20MKA10CT013-B1	STATOR SLOT THERMOMETER 10 SPARE	4-123317	TMG
=V20MKA10CT023-B1	STATOR SLOT THERMOMETER 11 SPARE	4-123317	TMG
=V20MKA10CT033-B1	STATOR SLOT THERMOMETER 12 SPARE	4-123317	TMG
=V20MKD10CT010-B1	BEARING METAL THERMOM. TE	WQ 0232-PVDF	TMG
=V20MKD20CT010-B1	BEARING METAL THERMOM. EE	WQ 0232-PVDF	TMG
=V20MKA10CT050-B1	COLD AIR THERMOMETER TE	WQ 0233	TMG
=V20MKA10CT055-B1	COLD AIR THERMOMETER EE	WQ 0233	TMG
=V20MKA10CT060-B1	WARM AIR THERMOMETER	WQ 0233	TMG
=V20MKA10CT062-B1	WARM AIR TEMPERATURE EXCITER	WQ 0233	TMG

KKS	DESCRIPTION	TYPE	MANUFACTURER
=V20MKA10CL110-B1	LEAKAGE WATER SENSOR TE ALARM	SITRANS LVL100 (7ML5745-1BA42-1BA0)	SIEMENS
=V20MKA10CL111-B1	LEAKAGE WATER SENSOR TE TRIP	SITRANS LVL100 (7ML5745-1BA42-1BA0)	SIEMENS
=V20MKA10CL120-B1	LEAKAGE WATER SENSOR EE ALARM	SITRANS LVL100 (7ML5745-1BA42-1BA0)	SIEMENS
=V20MKA10CL121-B1	LEAKAGE WATER SENSOR EE TRIP	SITRANS LVL100 (7ML5745-1BA42-1BA0)	SIEMENS
=V20MKD10CY011-B1	REL. SHAFT VIBRATION SENSOR TE-X	330106-05-30-05-02-00	BENTLY NEVADA
=V20MKD10CY011-A1	PROXIMITOR 9m, 200mV/mil	330180-91-00	BENTLY NEVADA
=V20MKD10CY012-B1	REL. SHAFT VIBRATION SENSOR TE-Y	330106-05-30-05-02-00	BENTLY NEVADA
=V20MKD10CY012-A1	PROXIMITOR 9m, 200mV/mil	330180-91-00	BENTLY NEVADA
=V20MKD20CY011-B1	REL. SHAFT VIBRATION SENSOR EE-X	330106-05-30-05-02-00	BENTLY NEVADA
=V20MKD20CY011-A1	PROXIMITOR 9m, 200mV/mil	330180-91-00	BENTLY NEVADA
=V20MKD20CY012-B1	REL. SHAFT VIBRATION SENSOR EE-Y	330106-05-30-05-02-00	BENTLY NEVADA
=V20MKD20CY012-A1	PROXIMITOR 9m, 200mV/mil	330180-91-00	BENTLY NEVADA
=V20MKD10CY010-B1	ABSOL. BEARING VIBRATION SENSOR TE-A	330500-02-00	BENTLY NEVADA
=V20MKD10CY020-B1	ABSOL. BEARING VIBRATION SENSOR TE-B	330500-02-00	BENTLY NEVADA
=V20MKD10CY030-B1	ABSOL. BEARING VIBRATION SENSOR TE-C	330500-02-00	BENTLY NEVADA
=V20MKD20CY010-B1	ABSOL. BEARING VIBRATION SENSOR EE-A	330500-02-00	BENTLY NEVADA
=V20MKD20CY020-B1	ABSOL. BEARING VIBRATION SENSOR EE-B	330500-02-00	BENTLY NEVADA
=V20MKD20CY030-B1	ABSOL. BEARING VIBRATION SENSOR EE-C	330500-02-00	BENTLY NEVADA
=V20MKD10CY013-B1	KEYPHASOR	330106-05-30-05-02-00	BENTLY NEVADA
=V20MKD10CY013-A1	PROXIMITOR 9m, 200mV/mil	330180-91-00	BENTLY NEVADA
=V20MKA10AH110-E01	HEATER TE	ERCH III/38	Schniewindt
=V20MKA10AH110-E02	HEATER EE	ERCH III/38	Schniewindt

Consumer List

no.	KKS	Description	Rated Power	Rated Voltage	400V 50Hz	230V 50Hz	24V DC		Start	Operation	Standstill	Notes
1	=V20MKA10AH110-E01	GENERATOR HEATER TE	1600 W	400V 50Hz	1600 W				1600 W		1600 W	
2	=V20MKA10AH110-E02	GENERATOR HEATER EE	1600 W	400V 50Hz	1600 W				1600 W		1600 W	
3	=V20MKC10AH110-E01	EXCITER HEATER	100 W	200V 50Hz	100 W				100 W		100 W	
4	=V20MKC10AH110-E02	EXCITER HEATER	100 W	200V 50Hz	100 W				100 W		100 W	
5	=V20MKA10AH111-E101/E102	MTB NEUTRAL SIDE HEATER	300W	200V 50Hz		300 W			300 W	300 W	300 W	
6	=V20MKA10AH111-E103/E104	MTB LINE SIDE HEATER	300W	200V 50Hz		300 W			300 W	300 W	300 W	
7	=V20MKA10CL110-111	LEAKAGE WATER SENSOR TE	1 W	24V DC			1 W		1 W	1 W	1 W	
8	=V20MKA10CL120-121	LEAKAGE WATER SENSOR EE	1 W	24V DC			1 W		1 W	1 W	1 W	
9												
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30	**TOTAL ELECTRICAL CONSUMPTION [W]**				**3400 W**	**600 W**	**2 W**		**4002 W**	**602 W**	**4002 W**	

TOP VIEW - SCHEMATICAL DRAWING



+V20MKA10GA010
JUNCTION BOX MEASURING

+V20MKD10GA010
JUNCTION BOX VIBRATION MEASUREMENT TE

+V20MKD20GA010
JUNCTION BOX VIBRATION MEASUREMENT EE

+V20MKA10GE030
JUNCTION BOX VOLTAGE

+V20MKC20GE010
JUNCTION BOX EXCITER FIELD; HEATER

+V20MKC20GA010
JUNCTION BOX ROTOR GROUND FAULT DETECTION

+V20MKC10GE010
JUNCTION BOX PERMANENT MAGNET GENERATOR

+V20MKD10GA020
JUNCTION BOX ROTOR EARTHING

+V20MKA10GD010
LINE SIDE CUBICLE

+V20MKA10GE010
LINE SIDE CUBICLE JUNCTION BOX

+V20MKA10GE040
LINE SIDE CUBICLE JUNCTION BOX HEATER

+V20MKA10GD020
NEUTRAL SIDE CUBICLE

+V20MKA10GE020
NEUTRAL SIDE CUBICLE JUNCTION BOX

+V20MKA10GE050
NEUTRAL SIDE CUBICLE JUNCTION BOX HEATER

b	16.04.2018	Rabe	Date	19.12.2017	VILNIUS Biomass	
			Drawn	Möbius		
			Appr.	Rabe		
REVISION	Date	Name	NORM		Replacement for	Replaced by

SIEMENS
ENERGY SECTOR

AUXILIARY JUNCTION BOXES
OVERVIEW
SCHEMATICAL DRAWING

=
+ CABLING

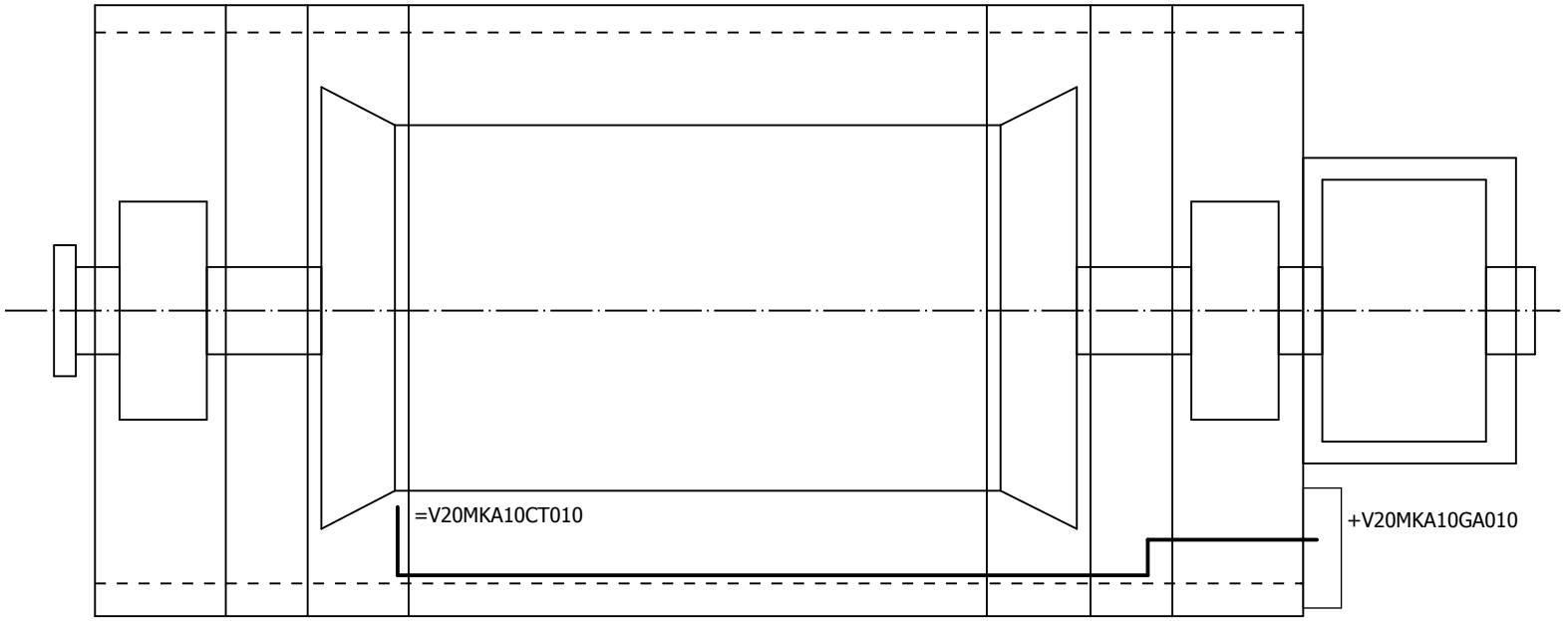
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TOP VIEW - SCHEMATICAL DRAWING

TE

EE



+V20MKA10GA010
JUNCTION BOX MEASURING

REMARKS FOR ASSEMBLY AT FACTORY

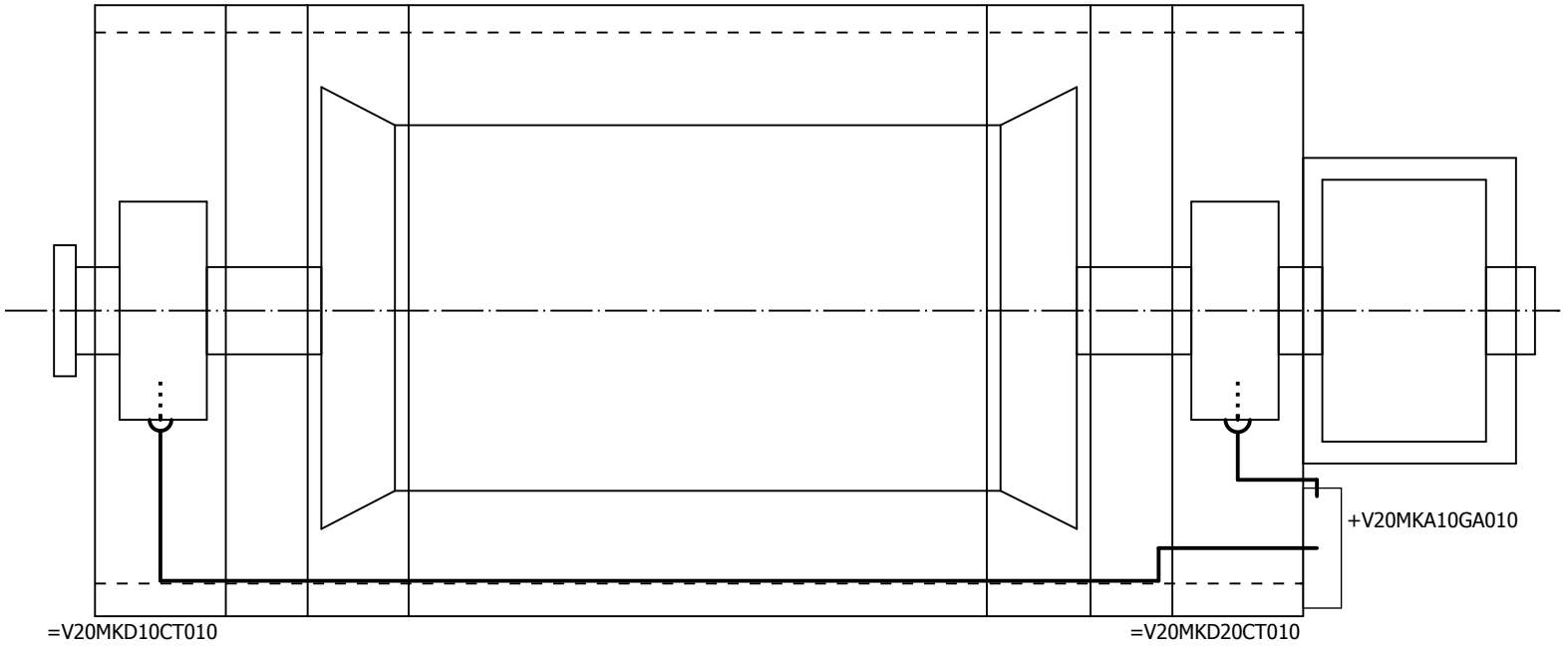
Check all devices after mounting

REMARKS FOR ASSEMBLY AT SITE

NONE

			Date	19.12.2017	VILNIUS Biomass		SIEMENS ENERGY SECTOR	CABLING STATOR SLOT THERMOMETER LOCATION DIAGRAM	=	
			Drawn	Möbius					+ CABLING	
			Appr.	Rabe				EG000367	DPPPG-70152441	Page 10
REVISION	Date	Name	NORM		Replacement for	Replaced by				Pg. 79

TOP VIEW - SCHEMATICAL DRAWING



REMARKS FOR ASSEMBLY AT FACTORY

Check all devices after mounting

RTD WITH PLUG CONNECTOR

+V20MKA10GA010
JUNCTION BOX MEASURING

REMARKS FOR ASSEMBLY AT SITE

NONE

			Date	19.12.2017	VILNIUS Biomass	
			Drawn	Möbius		
			Appr.	Rabe		
REVISION	Date	Name	NORM		Replacement for	Replaced by

SIEMENS
ENERGY SECTOR

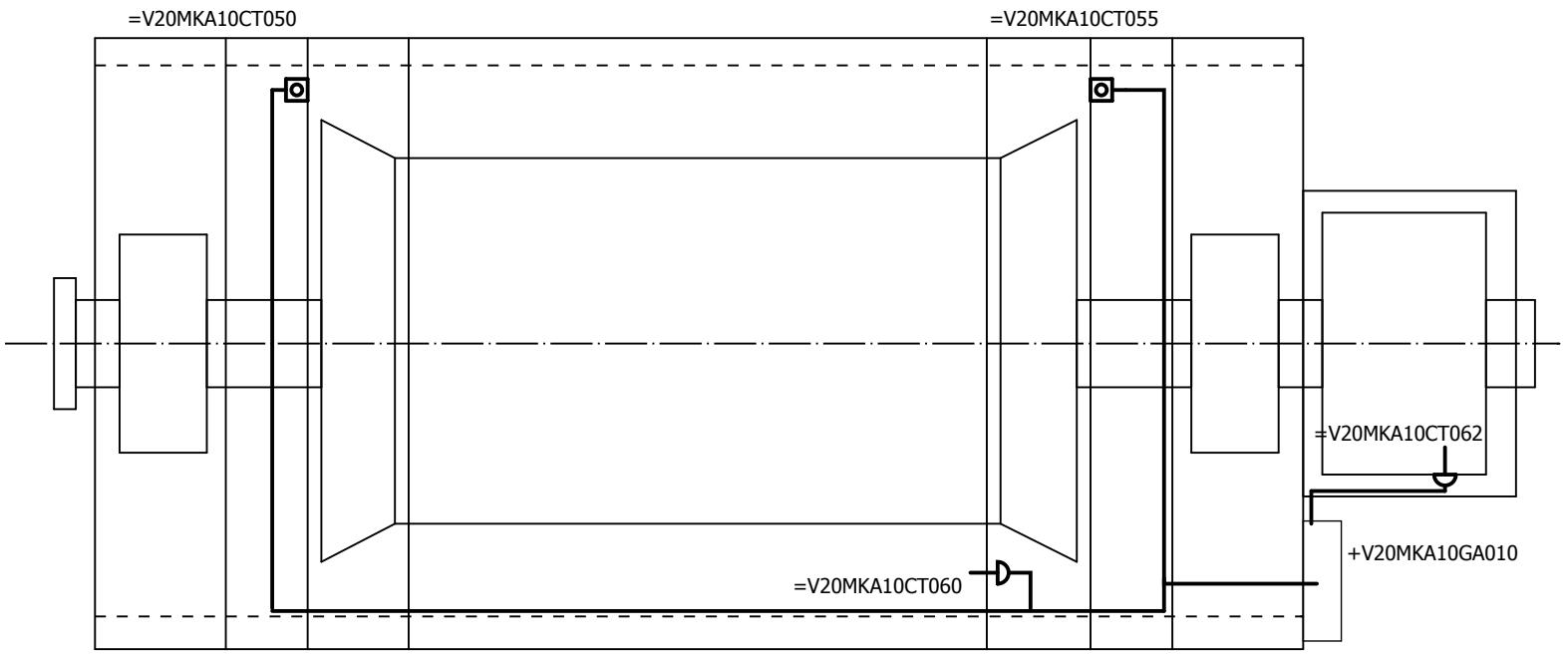
CABLING
BEARING THERMOMETER
LOCATION DIAGRAM

EG000367 | DPPPG-70152441

=
+ CABLING

Page 11
Pg. 79

TOP VIEW - SCHEMATICAL DRAWING



+V20MKA10GA010
JUNCTION BOX MEASURING

REMARKS FOR ASSEMBLY AT FACTORY

Check all devices after mounting

WITH ANGLE BRACKET

IN THREADED HOLE G 1/2"

REMARKS FOR ASSEMBLY AT SITE

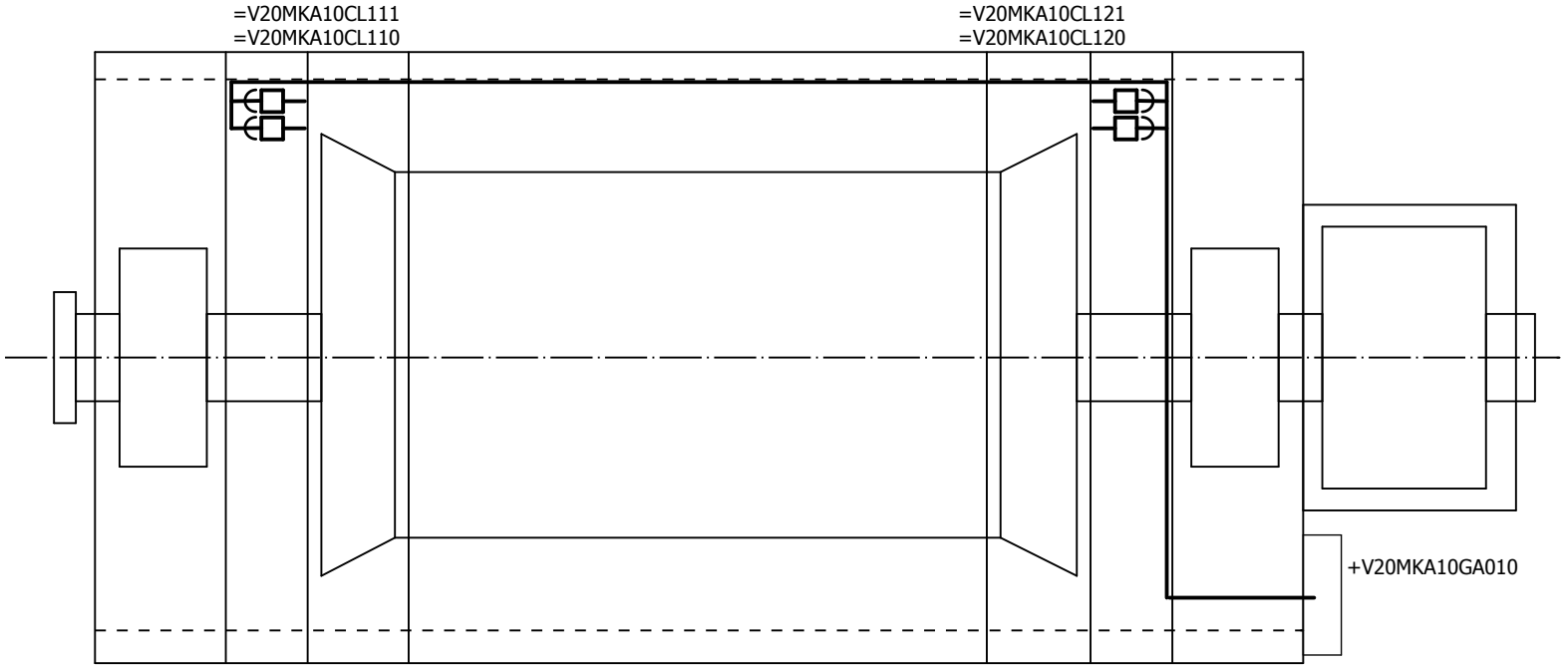
NONE

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	CABLING AIR THERMOMETER LOCATION DIAGRAM	=	
			Drawn	Möbius				+ CABLING	
			Appr.	Rabe				EG000367	DPPPG-70152441
REVISION	Date	Name	NORM		Replacement for	Replaced by		Page	12
								Pg.	79

TOP VIEW - SCHEMATICAL DRAWING

TE

EE



REMARKS FOR ASSEMBLY AT FACTORY

Check all devices after mounting

Leakage water detector SITRANS LVL100
in leakage water collector of cooler

● HAN 3A PLUG

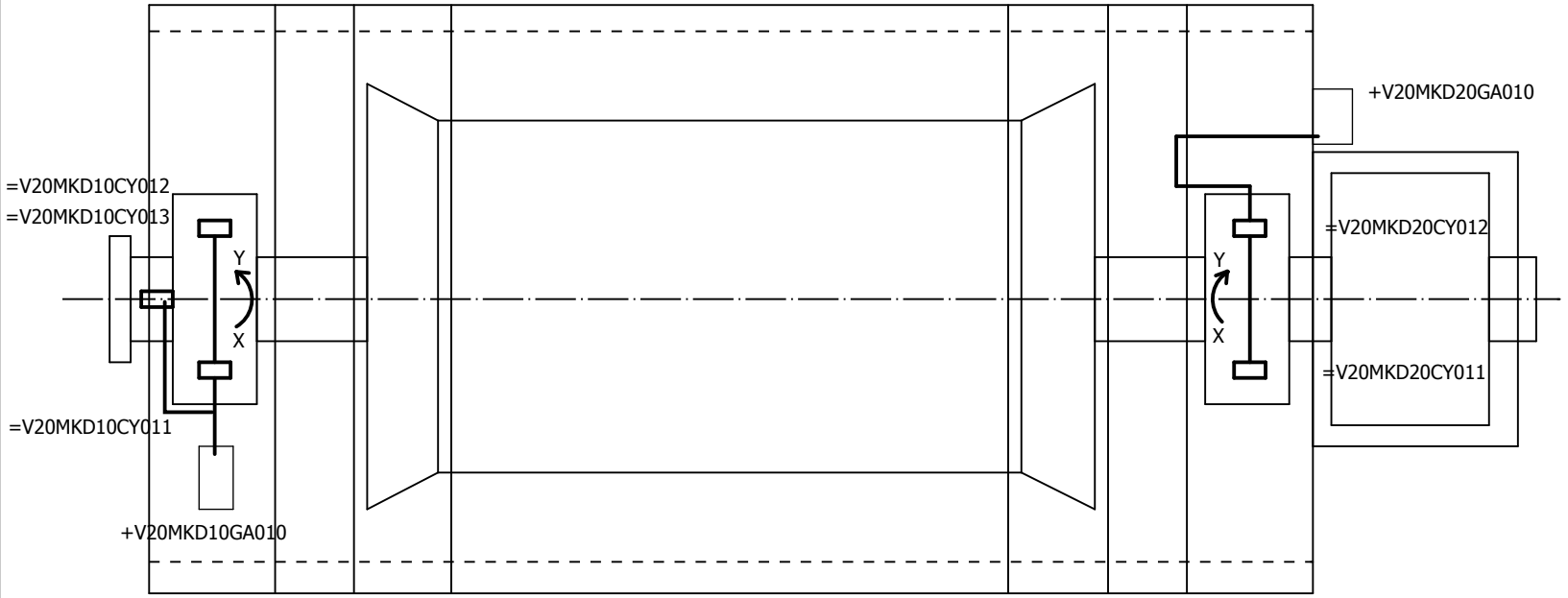
+V20MKA10GA010
JUNCTION BOX MEASURING

REMARKS FOR ASSEMBLY AT SITE

CONNECT PLUG CONNECTORS TO
LEAKAGE WATER ELECTRODES

			Date	19.12.2017	VILNIUS Biomass		SIEMENS ENERGY SECTOR	CABLING LEAKAGE WATER DETECTION LOCATION DIAGRAM	=	
			Drawn	Möbius					+ CABLING	
			Appr.	Rabe					EG000367	DPPPG-70152441
REVISION	Date	Name	NORM		Replacement for	Replaced by			Page	13
									Pg.	79

TOP VIEW - SCHEMATICAL DRAWING



REMARKS FOR ASSEMBLY AT FACTORY

Check all devices after mounting

PROBE HOUSING
PROXIMITORS ARRANGED IN JUNCTION BOX

+V20MKD10GA010
JUNCTION BOX VIBRATION MEASUREMENT TE

+V20MKD20GA010
JUNCTION BOX VIBRATION MEASUREMENT EE

REMARKS FOR ASSEMBLY AT SITE

NONE

c	15.11.2018	Rabe	Date	19.12.2017	VILNIUS Biomass	
			Drawn	Möbius		
			Appr.	Rabe		
REVISION	Date	Name	NORM		Replacement for	Replaced by

SIEMENS
ENERGY SECTOR

CABLING
RELATIVE SHAFT VIBRATION
LOCATION DIAGRAM

=
+ CABLING

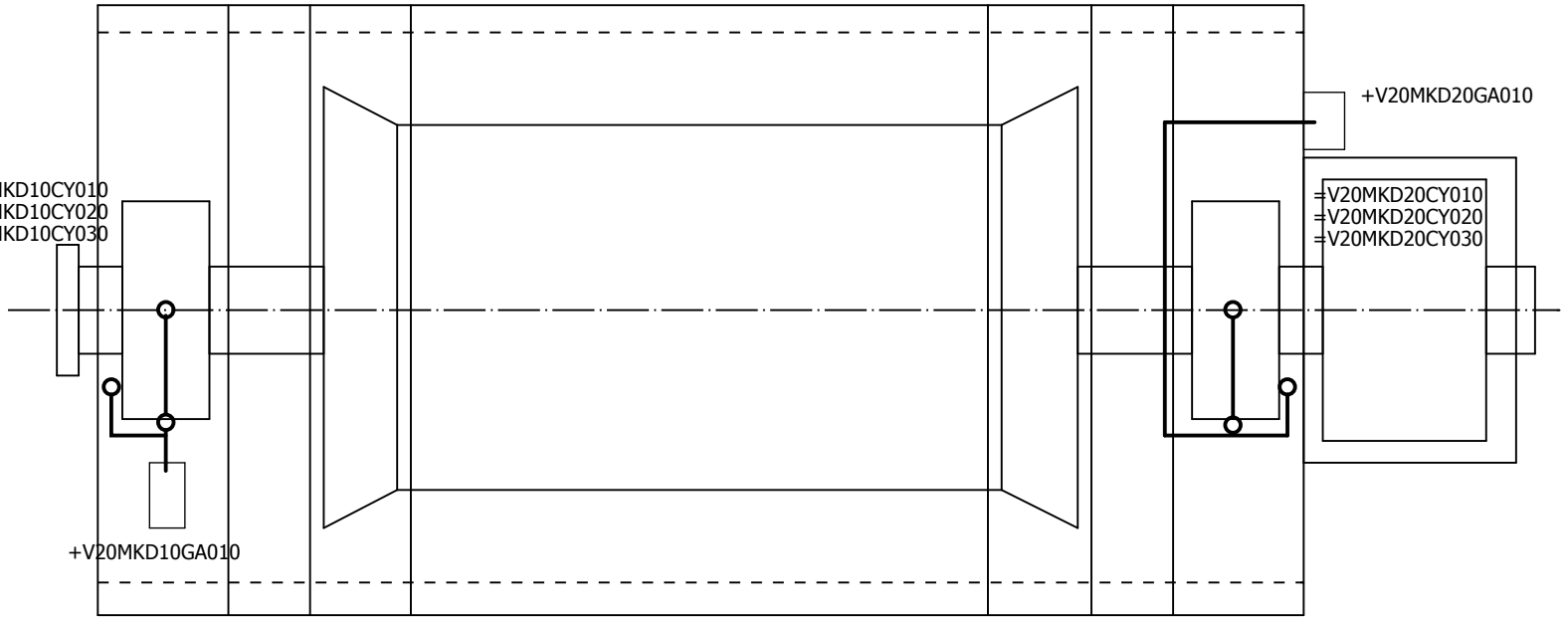
EG000367 | DPPPG-70152441

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Pg. 79

TOP VIEW - SCHEMATICAL DRAWING

TE

EE



REMARKS FOR ASSEMBLY AT FACTORY

Check all devices after mounting

+V20MKD10GA010
JUNCTION BOX VIBRATION MEASUREMENT TE

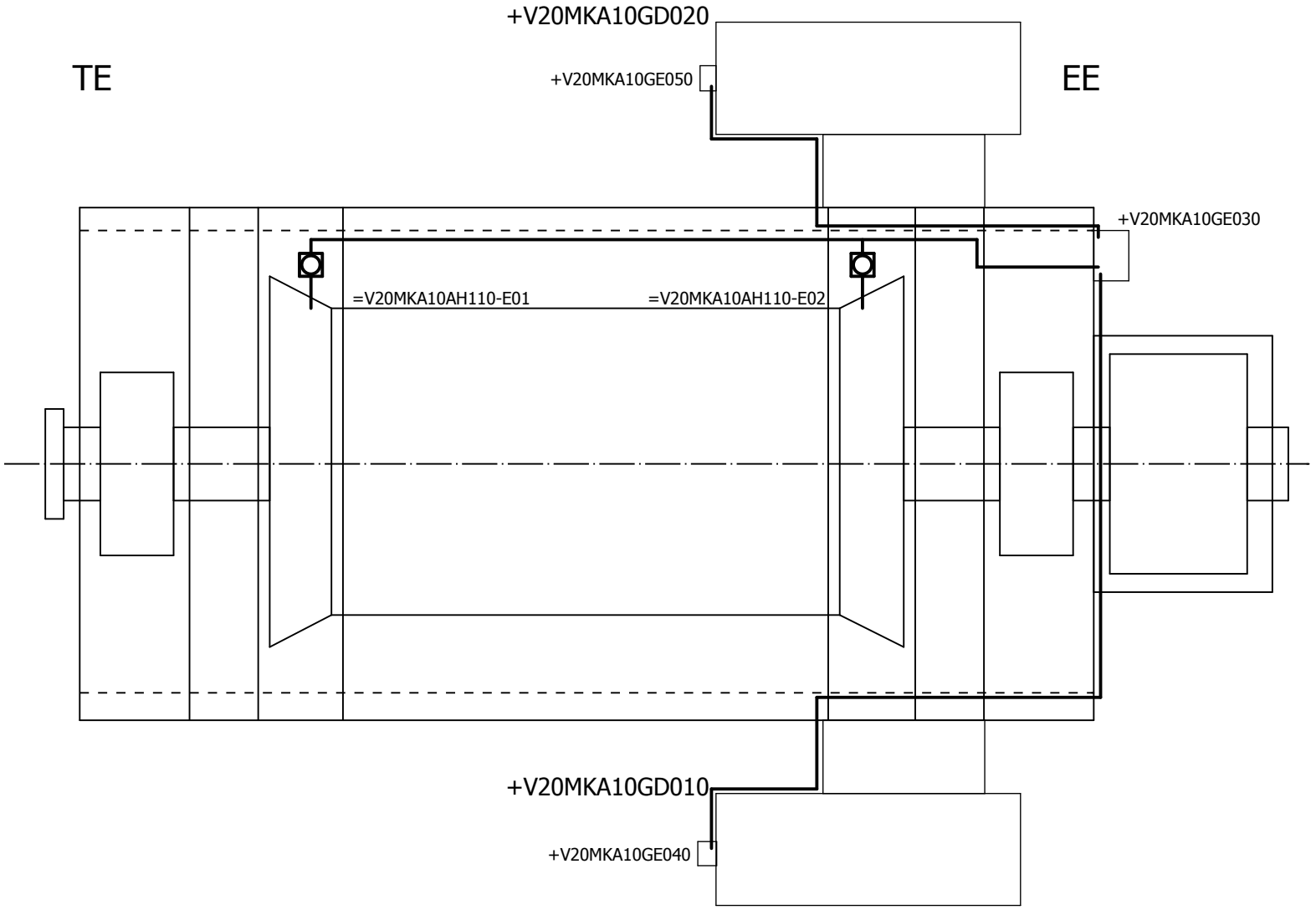
+V20MKD20GA010
JUNCTION BOX VIBRATION MEASUREMENT EE

REMARKS FOR ASSEMBLY AT SITE

NONE

c	15.11.2018	Rabe	Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	CABLING ABSOL. BEARING VIBRATION LOCATION DIAGRAM	=	
			Drawn	Möbius				+ CABLING	
			Appr.	Rabe			EG000367	DPPPG-70152441	Page 15
REVISION	Date	Name	NORM		Replacement for	Replaced by			Pg. 79

TOP VIEW - SCHEMATICAL DRAWING



REMARKS FOR ASSEMBLY AT FACTORY

Check all devices after mounting

WITH ANGLE BRACKET

+V20MKA10GE030
JUNCTION BOX VOLTAGE

+V20MKA10GD010
LINE SIDE CUBICLE

+V20MKA10GE040
LINE SIDE CUBICLE JUNCTION BOX HEATER

+V20MKA10GD020
NEUTRAL SIDE CUBICLE

+V20MKA10GE050
NEUTRAL SIDE CUBICLE JUNCTION BOX HEATER

REMARKS FOR ASSEMBLY AT SITE

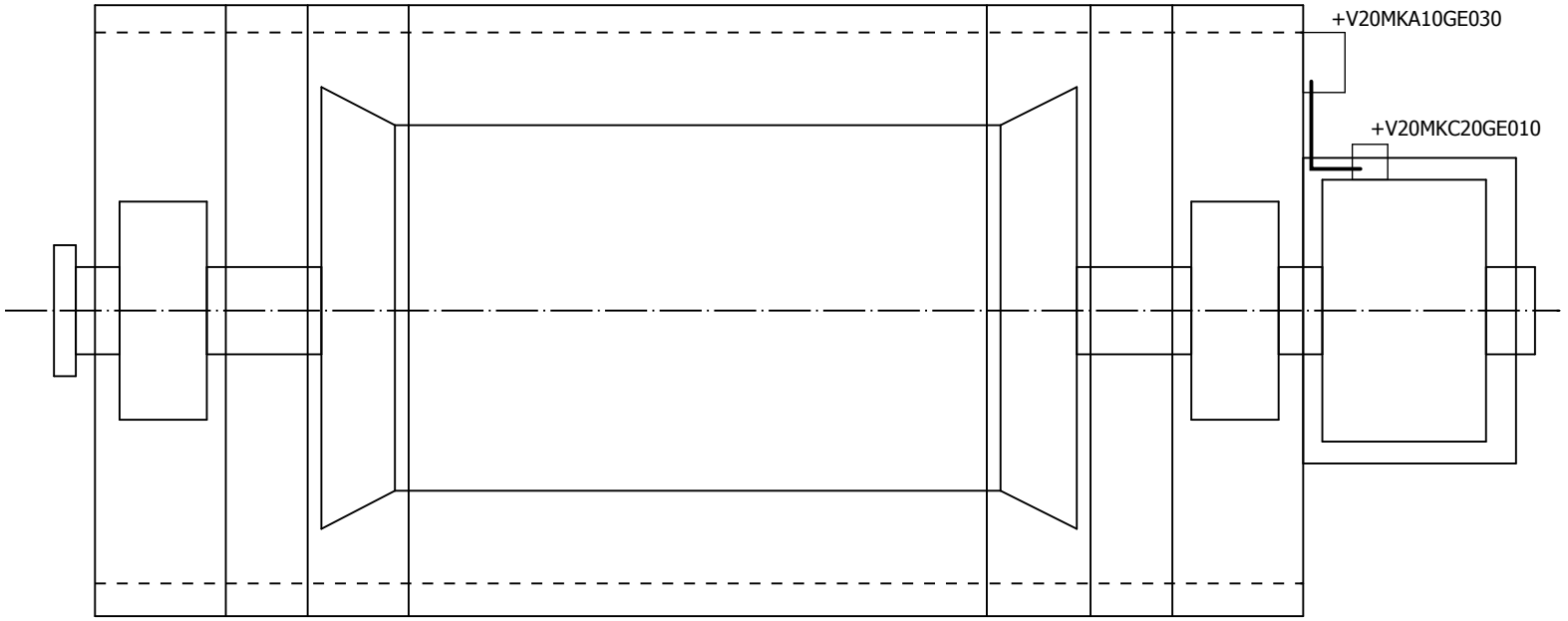
NONE

b	16.04.2018	Rabe	Date	19.12.2017	VILNIUS Biomass		SIEMENS ENERGY SECTOR	CABLING ANTICONDENSATION HEATER LOCATION DIAGRAM	=	
			Drawn	Möbius					+ CABLING	
			Appr.	Rabe					EG000367	DPPPG-70152441
REVISION	Date	Name	NORM		Replacement for	Replaced by			Page	16
									Pg.	79

TOP VIEW - SCHEMATICAL DRAWING

TE

EE



REMARKS FOR ASSEMBLY AT FACTORY

Check all devices after mounting

+V20MKA10GE030
JUNCTION BOX VOLTAGE

+V20MKC20GE010
JUNCTION BOX EXCITER FIELD; HEATER

REMARKS FOR ASSEMBLY AT SITE

NONE

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	CABLING EXCITER LOCATION DIAGRAM	=	
			Drawn	Möbius				+ CABLING	
			Appr.	Rabe				EG000367 DPPPG-70152441	Page 17
REVISION	Date	Name	NORM		Replacement for	Replaced by			Pg. 79

MANUFACTURER HÄWA
STANDARD CASING
40/40/20
DEGREE OF PROTECTION
IP66

TAPPED HOLES IN REAR WALL
(SIEMENS)

FLANGE PLATE AT
BOTTOM
(CUSTOMER)

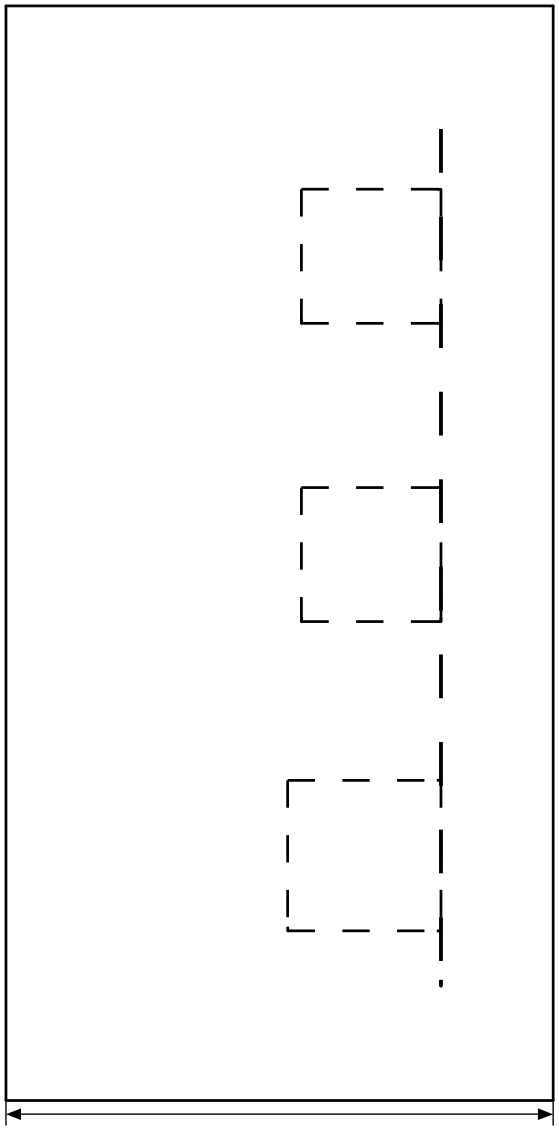
MOUNTING RAIL
TS 35 (EN60715)

ALL DIMENSIONS IN MM

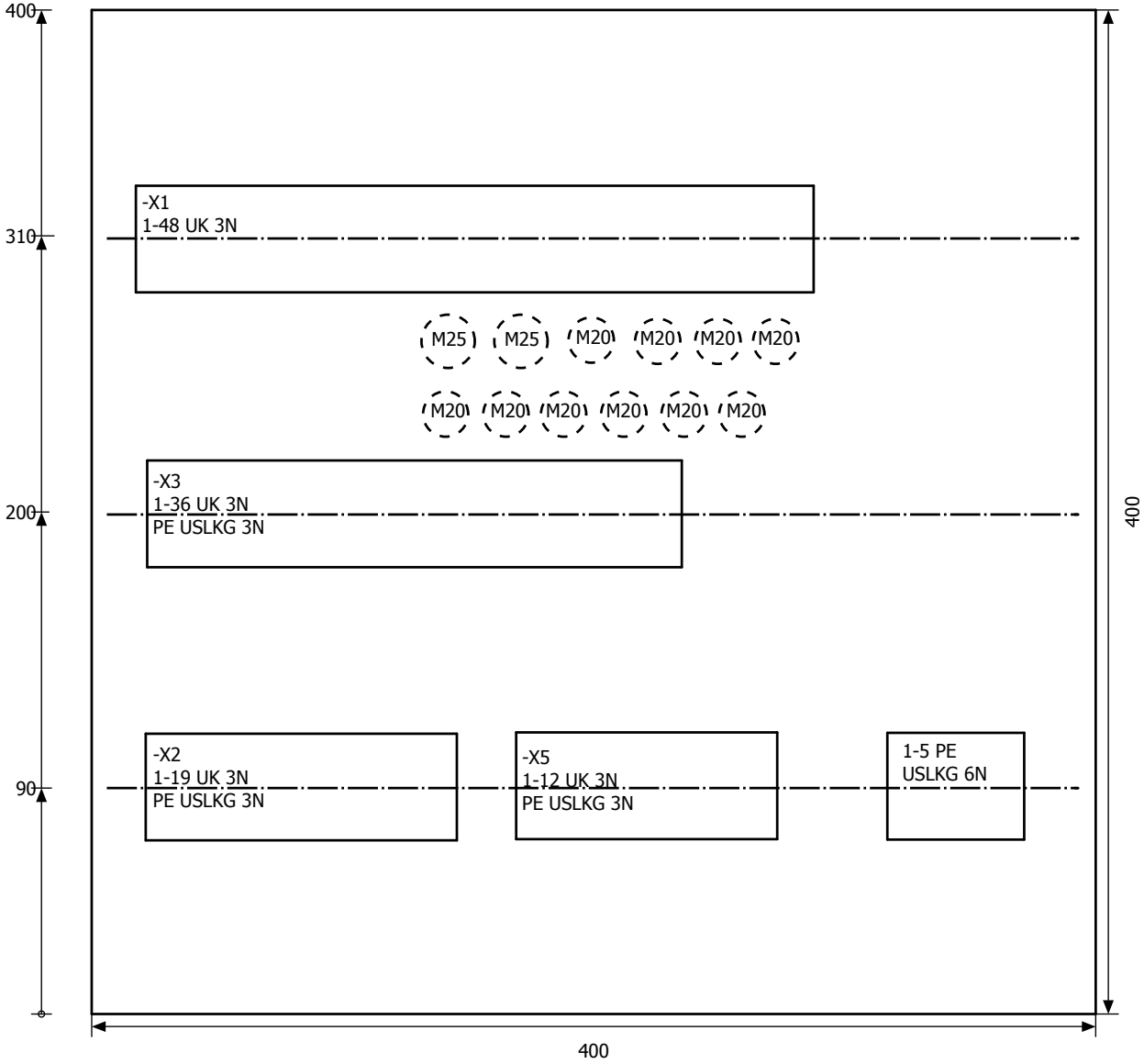
COLOUR: RAL 7035

SCALE 1:2(A3)

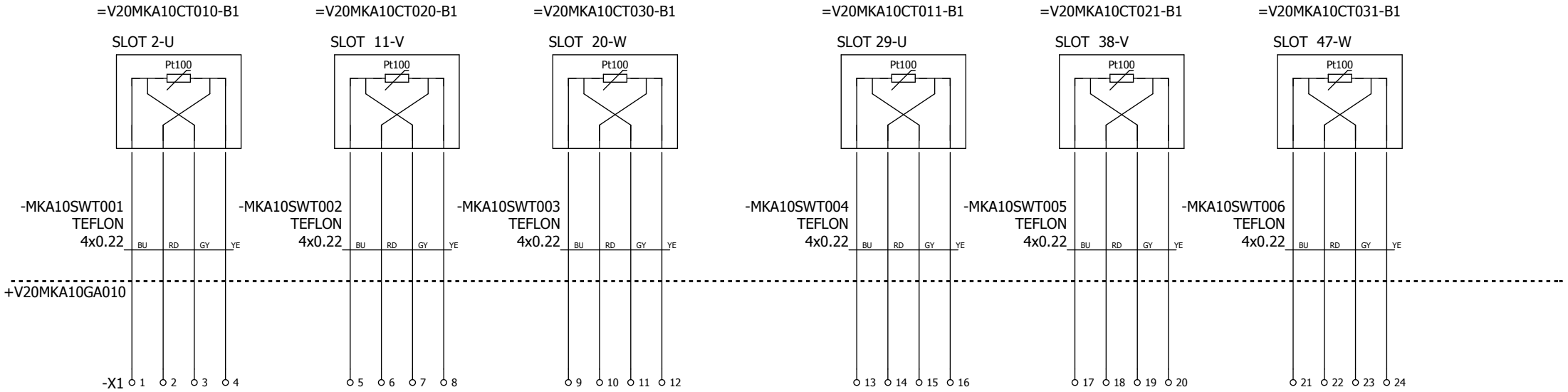
VIEW ON RIGHT HAND SIDE



FRONT VIEW WITHOUT COVER



b	16.04.2018	Rabe	Date	19.12.2017	VILNIUS Biomass		SIEMENS ENERGY SECTOR	JUNCTION BOX MEASURING MOUNTING PLATE	DPPPG-70160082	=
			Drawn	Möbius						+ V20MKA10GA010
			Appr.	Rabe					EG000367	DPPPG-70152441
REVISION	Date	Name	NORM		Replacement for	Replaced by				Page 18 / Pg. 79



b	16.04.2018	Rabe	Date	19.12.2017	VILNIUS Biomass	
			Drawn	Möbius		
			Appr.	Rabe		
REVISION	Date	Name	NORM		Replacement for	Replaced by

SIEMENS
ENERGY SECTOR

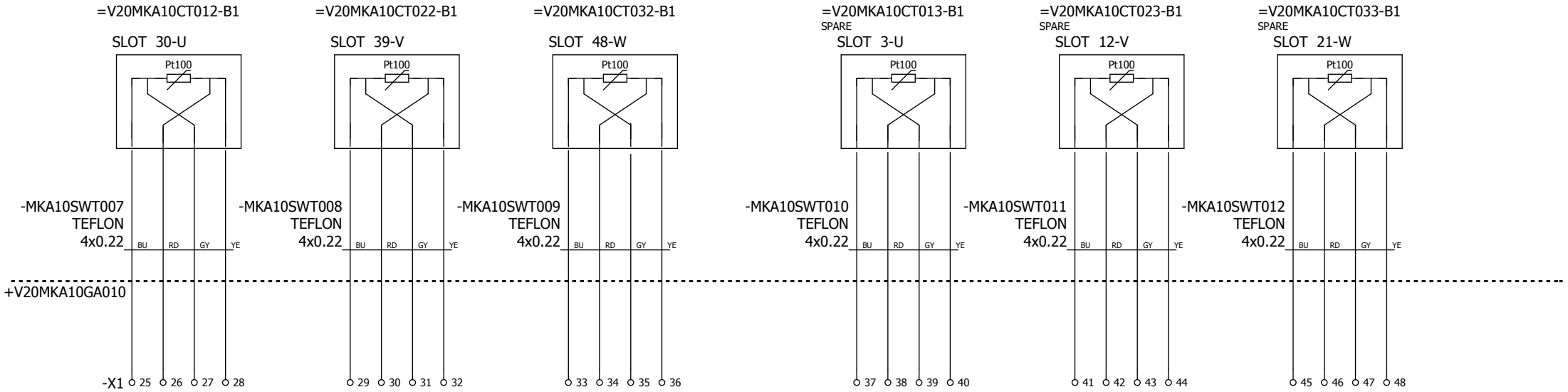
JUNCTION BOX MEASURING
STATOR WINDING TEMPERATURE

DPPPG-70160082

EG000367 DPPPG-70152441

= + V20MKA10GA010

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Pg. 79



b	16.04.2018	Rabe	Date	19.12.2017	VILNIUS Biomass	
			Drawn	Möbius		
			Appr.	Rabe		
REVISION	Date	Name	NORM		Replacement for	Replaced by

SIEMENS
ENERGY SECTOR

JUNCTION BOX MEASURING
STATOR WINDING TEMPERATURE

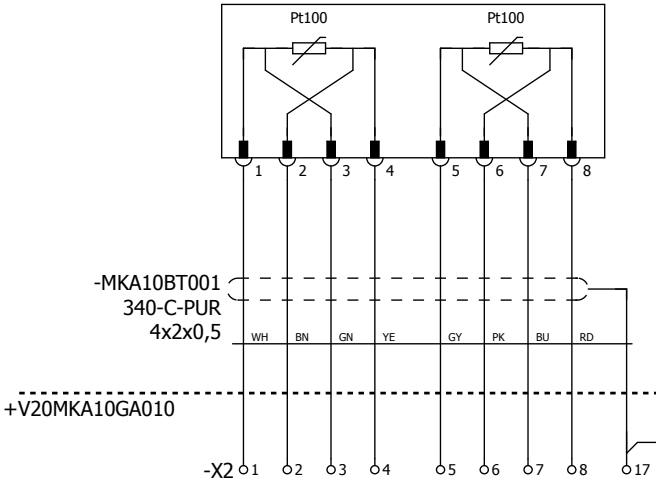
DPPPG-70160082

EG000367 | DPPPG-70152441

=
+ V20MKA10GA010

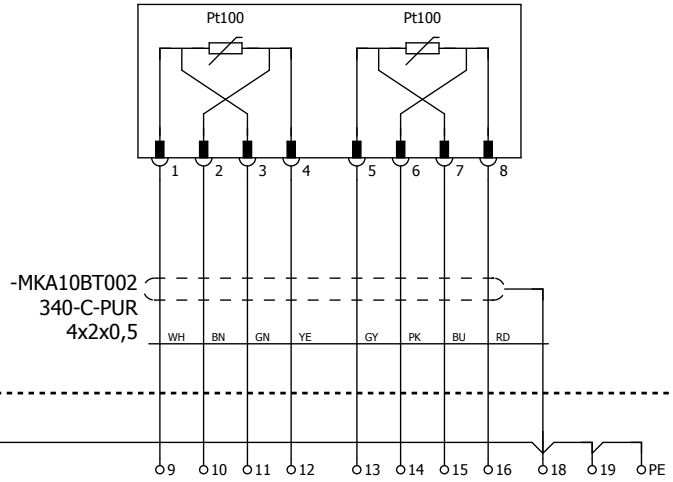
BEARING METAL TEMP. TE
DOUBLE ELEMENT

=V20MKD10CT010-B1



BEARING METAL TEMP. EE
DOUBLE ELEMENT

=V20MKD20CT010-B1



TE ... TURBINE END
EE ... EXCITER END

			Date	19.12.2017	VILNIUS Biomass	
			Drawn	Möbius		
			Appr.	Rabe		
REVISION	Date	Name	NORM		Replacement for	Replaced by

SIEMENS
ENERGY SECTOR

JUNCTION BOX MEASURING
BEARING TEMPERATURE

DPPPG-70160082

EG000367 | DPPPG-70152441

= + V20MKA10GA010

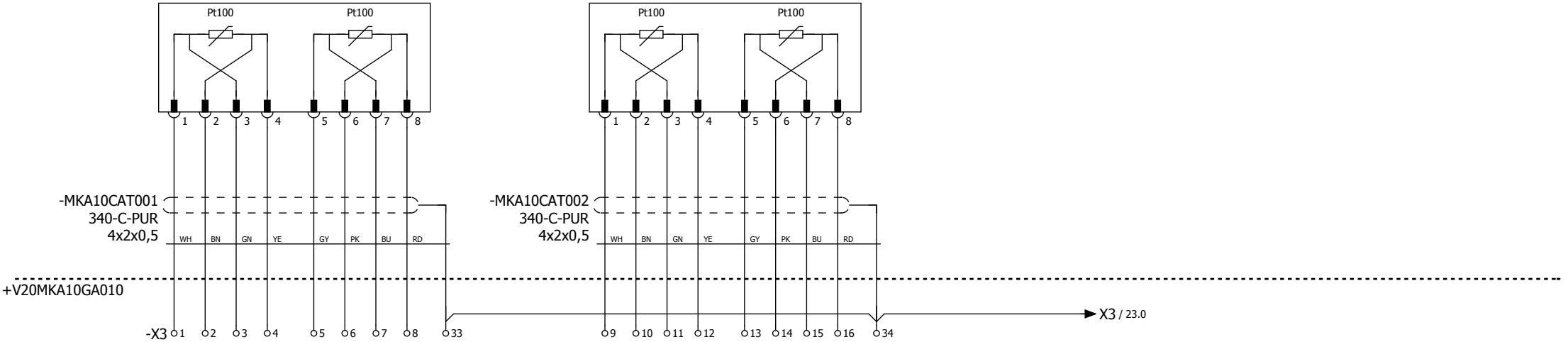
Page 21
Pg. 79

COLD AIR TEMP. TE
DOUBLE ELEMENT

=V20MKA10CT050-B1

COLD AIR TEMP. EE
DOUBLE ELEMENT

=V20MKA10CT055-B1



TE ... TURBINE END
EE ... EXCITER END

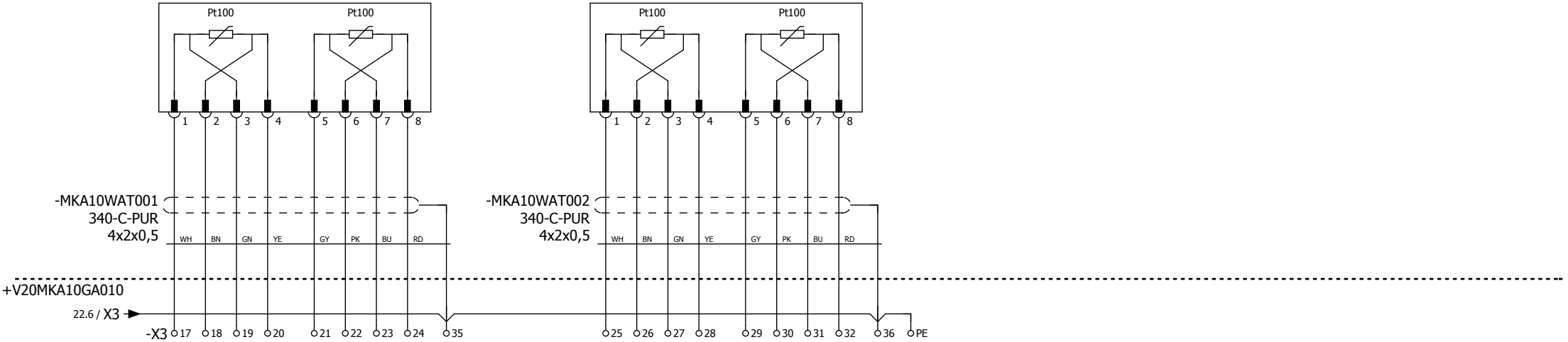
			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	JUNCTION BOX MEASURING COLD AIR TEMPERATURE	DPPPG-70160082	= + V20MKA10GA010
			Drawn	Möbius					
			Appr.	Rabe				EG000367 DPPPG-70152441	Page 22
REVISION	Date	Name	NORM		Replacement for	Replaced by			Pg. 79

WARM AIR TEMPERATURE
DOUBLE ELEMENT

=V20MKA10CT060-B1

WARM AIR TEMPERATURE EXCITER
DOUBLE ELEMENT

=V20MKA10CT062-B1

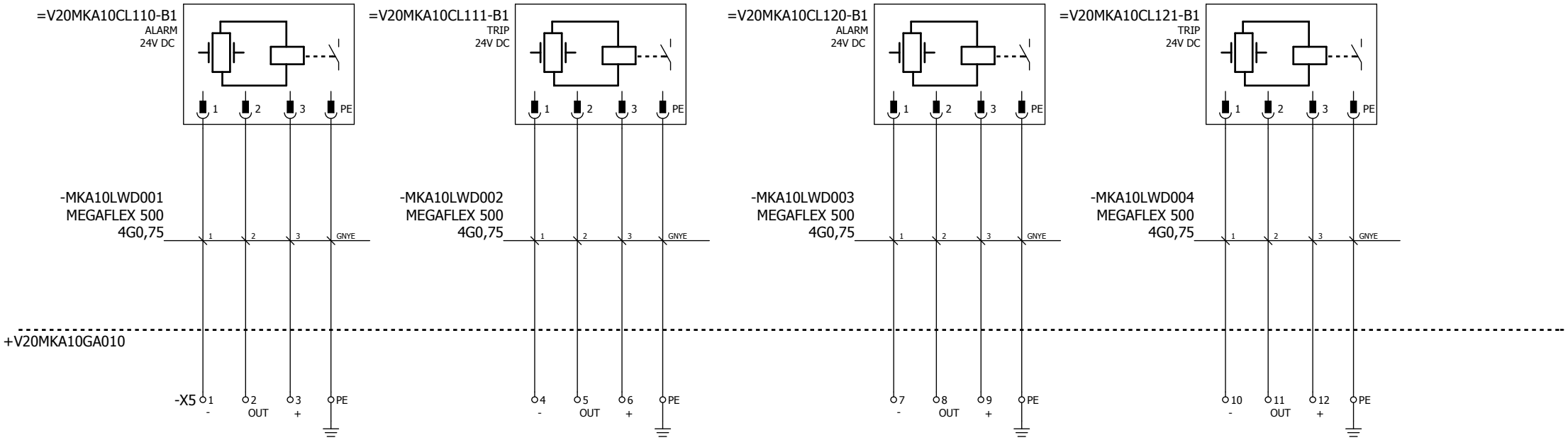


TE ... TURBINE END
EE ... EXCITER END

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	JUNCTION BOX MEASURING WARM AIR TEMPERATURE	DPPPG-70160082	= + V20MKA10GA010
			Drawn	Möbius					
			Appr.	Rabe				EG000367 DPPPG-70152441	Page 23
REVISION	Date	Name	NORM		Replacement for	Replaced by			Pg. 79

LEAKAGE WATER SENSOR TE

LEAKAGE WATER SENSOR EE



TE ... TURBINE END
EE ... EXCITER END

			Date	19.12.2017	VILNIUS Biomass	
			Drawn	Möbius		
			Appr.	Rabe		
REVISION	Date	Name	NORM		Replacement for	Replaced by

SIEMENS
ENERGY SECTOR

JUNCTION BOX MEASURING
LEAKAGE WATER DETECTION

DPPPG-70160082 | =
EG000367 | DPPPG-70152441 | + V20MKA10GA010

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Pg. 79

Terminal diagram

item designation	Lev.	no. cable	type cable	Terminal strip =+V20MKA10GA010-X1 destination A	terminal	link	terminal number	destination B	terminal	Lev.	no. cable	type cable	MKA10SWT001	MKA10SWT002	MKA10SWT003	MKA10SWT004	MKA10SWT005	MKA10SWT006	MKA10SWT007	MKA10SWT008	page / track
													TEFLON	TEFLON	TEFLON	TEFLON	TEFLON	TEFLON	TEFLON	TEFLON	
SLOT 2-U							1	=V20MKA10CT010-B1					BU								19 0
=							2	=V20MKA10CT010-B1					RD								19 1
=							3	=V20MKA10CT010-B1					GY								19 1
=							4	=V20MKA10CT010-B1					YE								19 1
SLOT 11-V							5	=V20MKA10CT020-B1						BU							19 2
=							6	=V20MKA10CT020-B1						RD							19 2
=							7	=V20MKA10CT020-B1						GY							19 2
=							8	=V20MKA10CT020-B1						YE							19 2
SLOT 20-W							9	=V20MKA10CT030-B1							BU						19 3
=							10	=V20MKA10CT030-B1							RD						19 3
=							11	=V20MKA10CT030-B1							GY						19 4
=							12	=V20MKA10CT030-B1							YE						19 4
SLOT 29-U							13	=V20MKA10CT011-B1								BU					19 5
=							14	=V20MKA10CT011-B1								RD					19 5
=							15	=V20MKA10CT011-B1								GY					19 5
=							16	=V20MKA10CT011-B1								YE					19 6
SLOT 38-V							17	=V20MKA10CT021-B1									BU				19 6
=							18	=V20MKA10CT021-B1									RD				19 6
=							19	=V20MKA10CT021-B1									GY				19 7
=							20	=V20MKA10CT021-B1									YE				19 7
SLOT 47-W							21	=V20MKA10CT031-B1										BU			19 8
=							22	=V20MKA10CT031-B1										RD			19 8
=							23	=V20MKA10CT031-B1										GY			19 8
=							24	=V20MKA10CT031-B1										YE			19 8
SLOT 30-U							25	=V20MKA10CT012-B1											BU		20 0
=							26	=V20MKA10CT012-B1											RD		20 1
=							27	=V20MKA10CT012-B1											GY		20 1
=							28	=V20MKA10CT012-B1											YE		20 1
SLOT 39-V							29	=V20MKA10CT022-B1												BU	20 2
=							30	=V20MKA10CT022-B1												RD	20 2
=							31	=V20MKA10CT022-B1												GY	20 2
=							32	=V20MKA10CT022-B1												YE	20 2

SEPARATION PLATE
SEPARATION WITH TS-K

Terminal diagram

item designation	Lev.	no. cable	type cable	destination A	terminal	link	terminal number	destination B	terminal	Lev.	no. cable	MKA10SWT009	MKA10SWT010	MKA10SWT011	MKA10SWT012	page / track
				Terminal strip =+V20MKA10GA010-X1												
SLOT 48-W						⊙	33	=V20MKA10CT032-B1								20 3
=						⊙	34	=V20MKA10CT032-B1			RD					20 3
=						⊙	35	=V20MKA10CT032-B1			GY					20 4
=						⊙	36	=V20MKA10CT032-B1			YE					20 4
SLOT 3-U						⊙	37	=V20MKA10CT013-B1				BU				20 5
=						⊙	38	=V20MKA10CT013-B1				RD				20 5
=						⊙	39	=V20MKA10CT013-B1				GY				20 5
=						⊙	40	=V20MKA10CT013-B1				YE				20 6
SLOT 12-V						⊙	41	=V20MKA10CT023-B1					BU			20 6
=						⊙	42	=V20MKA10CT023-B1					RD			20 6
=						⊙	43	=V20MKA10CT023-B1					GY			20 7
=						⊙	44	=V20MKA10CT023-B1					YE			20 7
SLOT 21-W						⊙	45	=V20MKA10CT033-B1						BU		20 8
=						⊙	46	=V20MKA10CT033-B1						RD		20 8
=						⊙	47	=V20MKA10CT033-B1						GY		20 8
=						⊙	48	=V20MKA10CT033-B1						YE		20 8
						○										
						○										
						○										
						○										
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SEPARATION PLATE
SEPARATION WITH TS-K

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	Klemmenplan : =+V20MKA10GA010-X1	DPPPG-70160082	= + V20MKA10GA010
			Drawn	Möbius					
			Appr.	Rabe				EG000367	DPPPG-70152441
REVISION	Date	Name	NORM		Replacement for	Replaced by			Page 26 Pg. 79

Terminal diagram

item designation	Lev.	no. cable	type cable	destination A	terminal	link	terminal number	destination B	terminal	Lev.	no. cable	MKA10BT001	MKA10BT002	page / track
				Terminal strip =+V20MKA10GA010-X2										
BEARING METAL TEMP. TE							1	=V20MKD10CT010-B1	1		WH			21 1
=							2	=V20MKD10CT010-B1	2		BN			21 1
=							3	=V20MKD10CT010-B1	3		GN			21 1
=							4	=V20MKD10CT010-B1	4		YE			21 1
=							5	=V20MKD10CT010-B1	5		GY			21 2
=							6	=V20MKD10CT010-B1	6		PK			21 2
=							7	=V20MKD10CT010-B1	7		BU			21 2
=							8	=V20MKD10CT010-B1	8		RD			21 2
BEARING METAL TEMP. EE							9	=V20MKD20CT010-B1	1			WH		21 4
=							10	=V20MKD20CT010-B1	2			BN		21 4
=							11	=V20MKD20CT010-B1	3			GN		21 5
=							12	=V20MKD20CT010-B1	4			YE		21 5
=							13	=V20MKD20CT010-B1	5			GY		21 5
=							14	=V20MKD20CT010-B1	6			PK		21 5
=							15	=V20MKD20CT010-B1	7			BU		21 6
=							16	=V20MKD20CT010-B1	8			RD		21 6
BEARING METAL TEMP. TE							17							21 2
BEARING METAL TEMP. EE							18							21 6
=							19							
=							PE							

SEPARATION PLATE
SEPARATION WITH TS-K

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	Klemmenplan : =+V20MKA10GA010-X2	DPPPG-70160082	=	
			Drawn	Möbius					+ V20MKA10GA010	
			Appr.	Rabe						
REVISION	Date	Name	NORM		Replacement for	Replaced by		EG000367	DPPPG-70152441	Page 27 Pg. 79

Terminal diagram

item designation	Lev.	no. cable	type cable	Terminal strip =+V20MKA10GA010-X3 destination A	terminal	link	terminal number	destination B	terminal	Lev.	no. cable	type cable	MKA10CAT001	MKA10CAT002	MKA10WAT001	MKA10WAT002	page / track
COLD AIR TEMP. TE							1	=V20MKA10CT050-B1	1				WH				22 1
=							2	=V20MKA10CT050-B1	2				BN				22 1
=							3	=V20MKA10CT050-B1	3				GN				22 1
=							4	=V20MKA10CT050-B1	4				YE				22 1
=							5	=V20MKA10CT050-B1	5				GY				22 2
=							6	=V20MKA10CT050-B1	6				PK				22 2
=							7	=V20MKA10CT050-B1	7				BU				22 2
=							8	=V20MKA10CT050-B1	8				RD				22 2
COLD AIR TEMP. EE							9	=V20MKA10CT055-B1	1					WH			22 3
=							10	=V20MKA10CT055-B1	2					BN			22 4
=							11	=V20MKA10CT055-B1	3					GN			22 4
=							12	=V20MKA10CT055-B1	4					YE			22 4
=							13	=V20MKA10CT055-B1	5					GY			22 4
=							14	=V20MKA10CT055-B1	6					PK			22 4
=							15	=V20MKA10CT055-B1	7					BU			22 5
=							16	=V20MKA10CT055-B1	8					RD			22 5
WARM AIR TEMPERATURE							17	=V20MKA10CT060-B1	1						WH		23 1
=							18	=V20MKA10CT060-B1	2						BN		23 1
=							19	=V20MKA10CT060-B1	3						GN		23 1
=							20	=V20MKA10CT060-B1	4						YE		23 1
=							21	=V20MKA10CT060-B1	5						GY		23 2
=							22	=V20MKA10CT060-B1	6						PK		23 2
=							23	=V20MKA10CT060-B1	7						BU		23 2
=							24	=V20MKA10CT060-B1	8						RD		23 2
WARM AIR TEMPERATURE EXCITER							25	=V20MKA10CT062-B1	1							WH	23 3
=							26	=V20MKA10CT062-B1	2							BN	23 4
=							27	=V20MKA10CT062-B1	3							GN	23 4
=							28	=V20MKA10CT062-B1	4							YE	23 4
=							29	=V20MKA10CT062-B1	5							GY	23 4
=							30	=V20MKA10CT062-B1	6							PK	23 4
=							31	=V20MKA10CT062-B1	7							BU	23 5
=							32	=V20MKA10CT062-B1	8							RD	23 5

SEPARATION PLATE
SEPARATION WITH TS-K

0	1	2	3	4	5	6	7	8	9

Terminal diagram

Terminal strip
=+V20MKA10GA010-X3

item designation	type cable	destination A	terminal	link	terminal number	destination B	terminal	type cable	340-C-PUR (MKA10CAT001)	340-C-PUR (MKA10CAT002)	340-C-PUR (MKA10WAT001)	340-C-PUR (MKA10WAT002)	page / track
COLD AIR TEMP. TE					33								22 2
COLD AIR TEMP. EE					34								22 5
WARM AIR TEMPERATURE					35								23 2
WARM AIR TEMPERATURE EXCITER					36								23 5
=					PE								

Column headings: Lev., no. cable (twice each)

SEPARATION PLATE
SEPARATION WITH TS-K

Terminal diagram

item designation	Lev.	no. cable	type cable	destination A	terminal	link	terminal number	destination B	terminal	Lev.	no. cable	type cable	MKA10LWD001 MEGAFLEX 500	MKA10LWD003 MEGAFLEX 500	MKA10LWD002 MEGAFLEX 500	MKA10LWD004 MEGAFLEX 500	page / track
				Terminal strip =+V20MKA10GA010-X5													
LEAKAGE WATER SENSOR TE							1	=V20MKA10CL110-B1	1				1				24 1
=							2	=V20MKA10CL110-B1	2				2				24 1
=							3	=V20MKA10CL110-B1	3				3				24 1
=							4	=V20MKA10CL111-B1	1								24 3
=							5	=V20MKA10CL111-B1	2								24 3
=							6	=V20MKA10CL111-B1	3								24 3
LEAKAGE WATER SENSOR EE							7	=V20MKA10CL120-B1	1					1			24 5
=							8	=V20MKA10CL120-B1	2					2			24 5
=							9	=V20MKA10CL120-B1	3					3			24 6
=							10	=V20MKA10CL121-B1	1								24 7
=							11	=V20MKA10CL121-B1	2								24 8
=							12	=V20MKA10CL121-B1	3								24 8
LEAKAGE WATER SENSOR TE							PE	=V20MKA10CL110-B1	PE				GNYE				24 2
=							PE	=V20MKA10CL111-B1	PE						GNYE		24 4
LEAKAGE WATER SENSOR EE							PE	=V20MKA10CL120-B1	PE					GNYE			24 6
=							PE	=V20MKA10CL121-B1	PE							GNYE	24 8

SEPARATION PLATE
SEPARATION WITH TS-K

			Date	19.12.2017	VILNIUS Biomass		SIEMENS ENERGY SECTOR	Klemmenplan : =+V20MKA10GA010-X5	DPPPG-70160082	= + V20MKA10GA010	
			Drawn	Möbius							
			Appr.	Rabe					EG000367	DPPPG-70152441	Page 30 Pg. 79
REVISION	Date	Name	NORM		Replacement for	Replaced by					

MANUFACTURER HÄWA
STANDARD CASING K12-30/20
DEGREE OF PROTECTION IP65

TAPPED HOLES

MOUNTING RAIL TS 35 (EN60715)

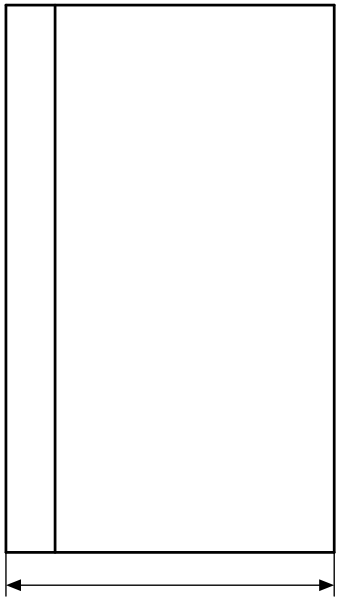
ALL DIMENSIONS IN MM

SCALE 1:2 (A3)

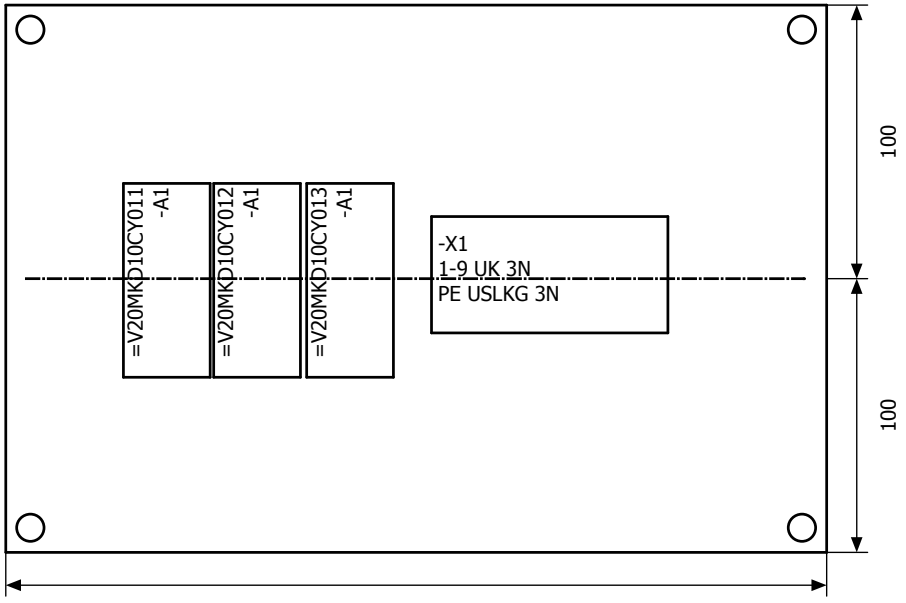
BOTTOM SIDE FOR CUSTOMER CONNECTION DRILLED AT SITE

COLOUR: RAL 7035

VIEW ON RIGHT HAND SIDE

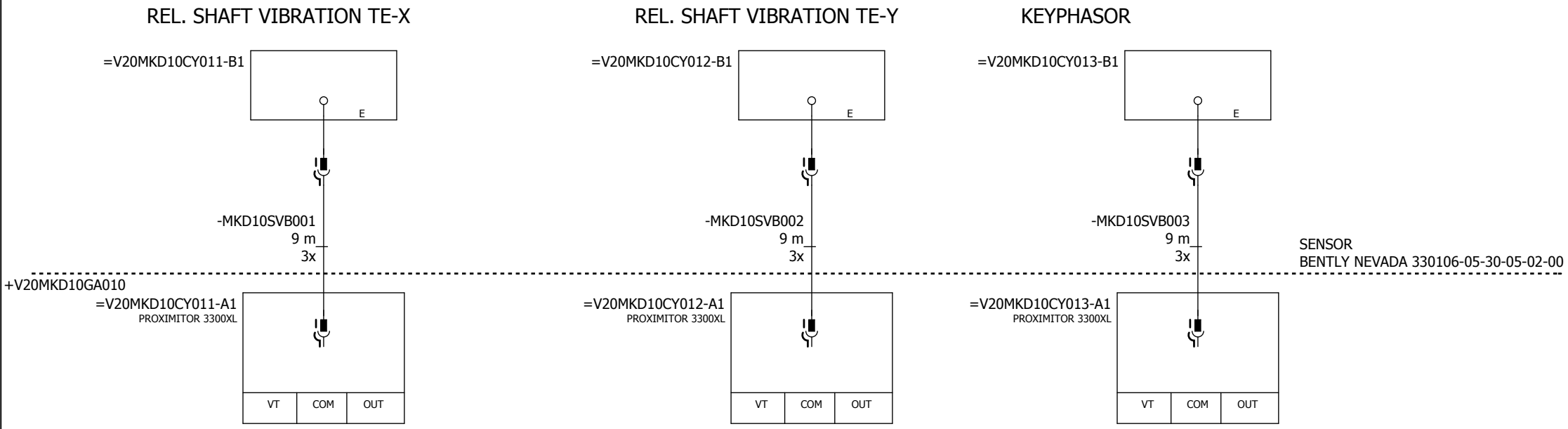


FRONT VIEW WITHOUT COVER



			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	JUNCTION BOX VIBRATION MOUNTING PLATE TURBINE END	DPPPG-70160083	= + V20MKD10GA010
			Drawn	Möbius					
			Appr.	Rabe				EG000367	DPPPG-70152441
REVISION	Date	Name	NORM		Replacement for / Replaced by				Page 31 / Pg. 79

BEARING TE



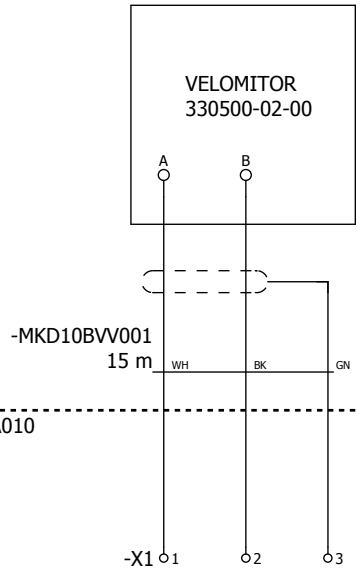
TE ... TURBINE END
EE ... EXCITER END

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	JUNCTION BOX RELATIVE SHAFT VIBRATION DRIVE END	DPPPG-70160083	=
			Drawn	Möbius					+ V20MKD10GA010
			Appr.	Rabe				EG000367	DPPPG-70152441
REVISION	Date	Name	NORM		Replacement for	Replaced by			Page 32 / Pg. 79

BEARING TE

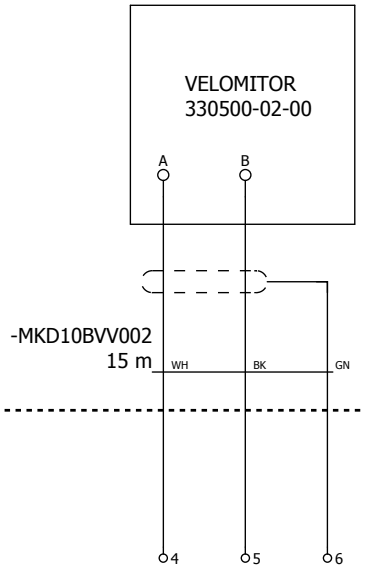
ABS. BEARING VIBRATION TE-A

=V20MKD10CY010-B1
VERTICAL



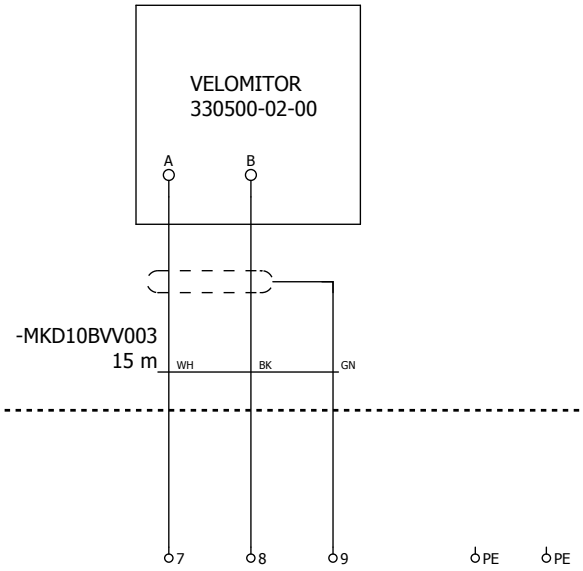
ABS. BEARING VIBRATION TE-B

=V20MKD10CY020-B1
HORIZONTAL



ABS. BEARING VIBRATION TE-C

=V20MKD10CY030-B1
AXIAL



TE ... TURBINE END
EE ... EXCITER END

b	16.04.2018	Rabe	Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	JUNCTION BOX MEASURING ABSOLUTE BEARING VIBRATION TURBINE END	DPPPG-70160083	=	
			Drawn	Möbius					+ V20MKD10GA010	
			Appr.	Rabe				EG000367	DPPPG-70152441	Page 33
REVISION	Date	Name	NORM		Replacement for	Replaced by				Pg. 79

Terminal diagram

item designation	Lev.	no. cable	type cable	destination A	terminal	link	terminal number	destination B	terminal	Lev.	no. cable	MKD10BVV001	MKD10BVV002	MKD10BVV003	page / track
				Terminal strip =+V20MKD10GA010-X1											
ABS. BEARING VIBRATION TE-A						⊙	1	=V20MKD10CY010-B1	A			WH			33 1
=						⊙	2	=V20MKD10CY010-B1	B			BK			33 1
=						⊙	3					GN			33 1
ABS. BEARING VIBRATION TE-B						⊙	4	=V20MKD10CY020-B1	A				WH		33 3
=						⊙	5	=V20MKD10CY020-B1	B				BK		33 4
=						⊙	6						GN		33 4
ABS. BEARING VIBRATION TE-C						⊙	7	=V20MKD10CY030-B1	A					WH	33 6
=						⊙	8	=V20MKD10CY030-B1	B					BK	33 6
=						⊙	9							GN	33 7
=						⊙	PE								
=						⊙	PE								
						○									
						○									
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SEPARATION PLATE
SEPARATION WITH TS-K

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	Klemmenplan : =+V20MKD10GA010-X1	DPPPG-70160083
			Drawn	Möbius				= + V20MKD10GA010
			Appr.	Rabe				
REVISION	Date	Name	NORM		Replacement for	Replaced by	EG000367	DPPPG-70152441

MANUFACTURER HÄWA
STANDARD CASING K12-30/20
DEGREE OF PROTECTION IP65

TAPPED HOLES

MOUNTING RAIL TS 35 (EN60715)

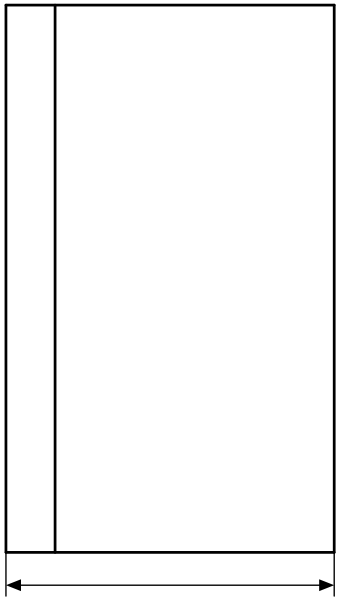
ALL DIMENSIONS IN MM

SCALE 1:2 (A3)

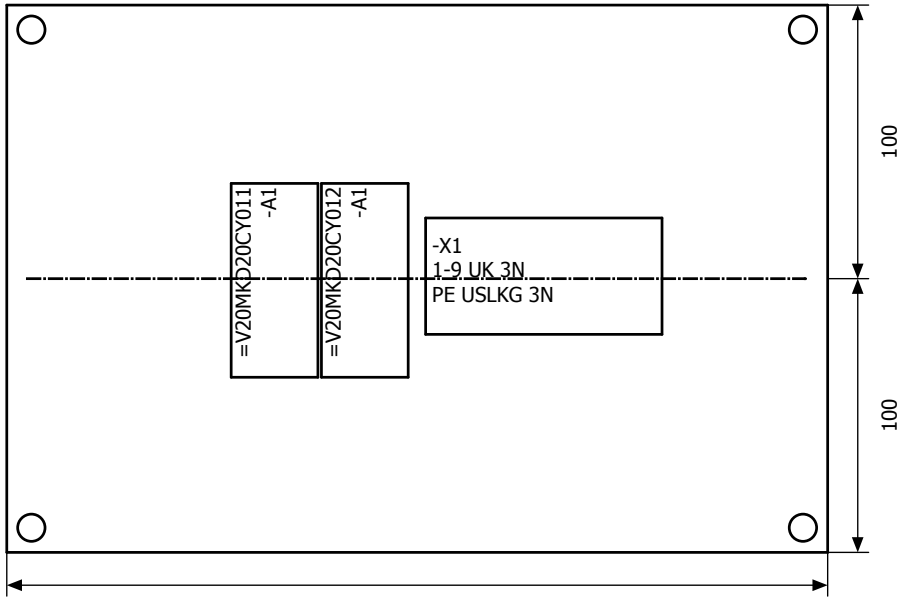
BOTTOM SIDE FOR CUSTOMER CONNECTION DRILLED AT SITE

COLOUR: RAL 7035

VIEW ON RIGHT HAND SIDE



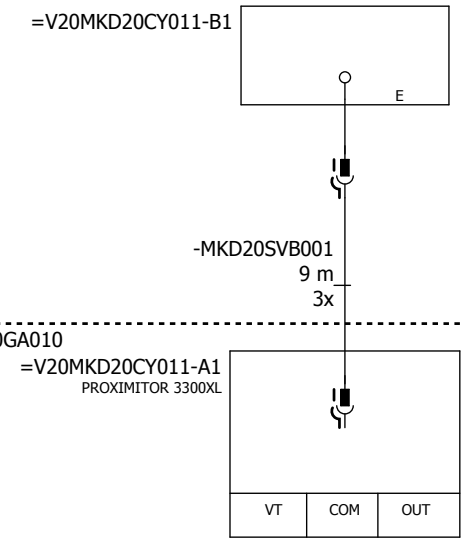
FRONT VIEW WITHOUT COVER



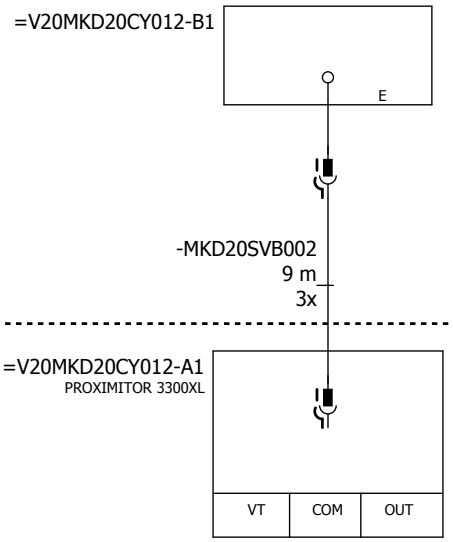
			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	JUNCTION BOX VIBRATION MOUNTING PLATE TURBINE END	=	
			Drawn	Möbius				+ V20MKD20GA010	
			Appr.	Rabe				EG000367 DPPPG-70152441	Page 35
REVISION	Date	Name	NORM		Replacement for	Replaced by			Pg. 79

BEARING EE

REL. SHAFT VIBRATION EE-X



REL. SHAFT VIBRATION EE-Y



SENSOR
BENTLY NEVADA 330106-05-30-05-02-00

PROXIMITOR 9m, 200µm pp
BENTLY NEVADA 330180-91-00

TE ... TURBINE END
EE ... EXCITER END

			Date	19.12.2017	VILNIUS Biomass	
			Drawn	Möbius		
			Appr.	Rabe		
REVISION	Date	Name	NORM		Replacement for	Replaced by

SIEMENS
ENERGY SECTOR

JUNCTION BOX VIBRATION
RELATIVE SHAFT VIBRATION
NON DRIVE END

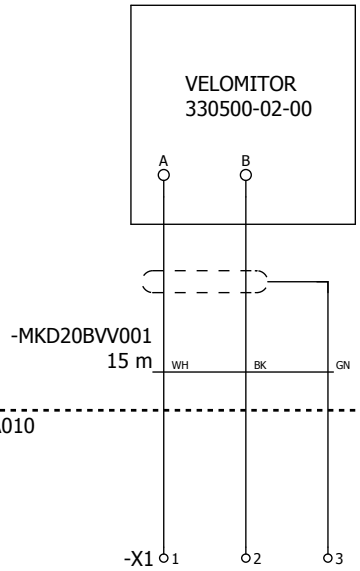
=
+ V20MKD20GA010

EG000367 | DPPPG-70152441

BEARING EE

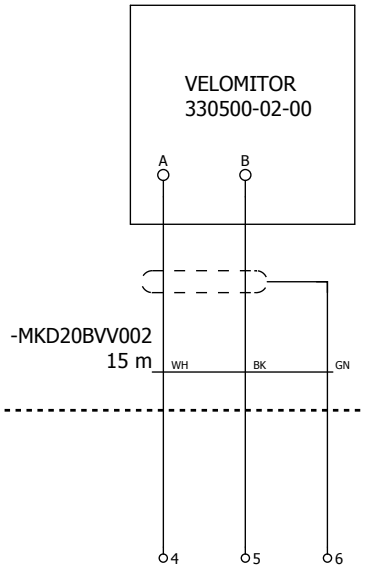
ABS. BEARING VIBRATION EE-A

=V20MKD20CY010-B1
VERTICAL



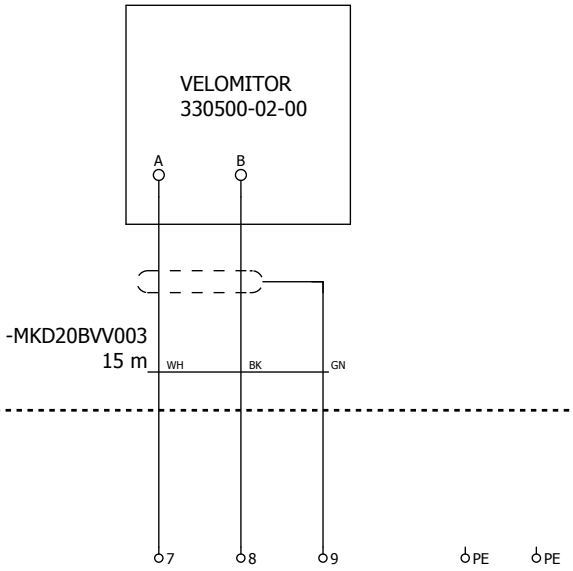
ABS. BEARING VIBRATION EE-B

=V20MKD20CY020-B1
HORIZONTAL



ABS. BEARING VIBRATION EE-C

=V20MKD20CY030-B1
AXIAL



+V20MKD20GA010

TE ... TURBINE END
EE ... EXCITER END

b	16.04.2018	Rabe	Date	19.12.2017	VILNIUS Biomass	
			Drawn	Möbius		
			Appr.	Rabe		
REVISION	Date	Name	NORM		Replacement for	Replaced by

SIEMENS
ENERGY SECTOR

JUNCTION BOX MEASURING
ABSOLUTE BEARING VIBRATION
EXCITER END

=
+ V20MKD20GA010

EG000367 | DPPPG-70152441

Page 37
Pg. 79

Terminal diagram

item designation	Lev.	no. cable	type cable	destination A	terminal	link	terminal number		destination B	terminal	Lev.	no. cable	MKD20BVV001	MKD20BVV002	MKD20BVV003	page / track
				Terminal strip =+V20MKD20GA010-X1												
ABS. BEARING VIBRATION EE-A						⊙	1		=V20MKD20CY010-B1	A			WH			37 1
=						⊙	2		=V20MKD20CY010-B1	B			BK			37 1
=						⊙	3						GN			37 1
ABS. BEARING VIBRATION EE-B						⊙	4		=V20MKD20CY020-B1	A				WH		37 3
=						⊙	5		=V20MKD20CY020-B1	B				BK		37 4
=						⊙	6							GN		37 4
ABS. BEARING VIBRATION EE-C						⊙	7		=V20MKD20CY030-B1	A					WH	37 6
=						⊙	8		=V20MKD20CY030-B1	B					BK	37 6
=						⊙	9								GN	37 7
=						⊙	PE									
=						⊙	PE									
						○										
						○										
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SEPARATION PLATE
SEPARATION WITH TS-K

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	Klemmenplan : =+V20MKD20GA010-X1	=
			Drawn	Möbius				+ V20MKD20GA010
			Appr.	Rabe				
REVISION	Date	Name	NORM		Replacement for	Replaced by	EG000367	DPPPG-70152441

MANUFACTURER HÄWA
STANDARD CASING K12-30/20
DEGREE OF PROTECTION IP65

TAPPED HOLES

MOUNTING RAIL TS 35 (EN60715)

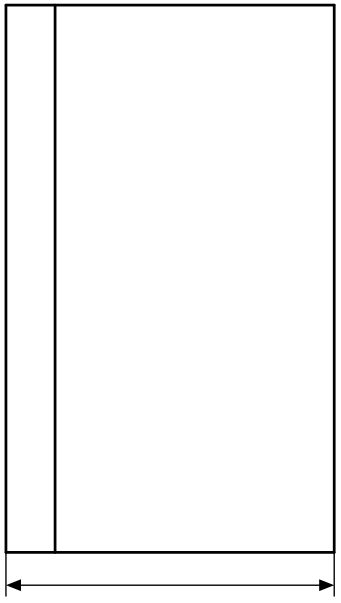
ALL DIMENSIONS IN MM

SCALE 1:2 (A3)

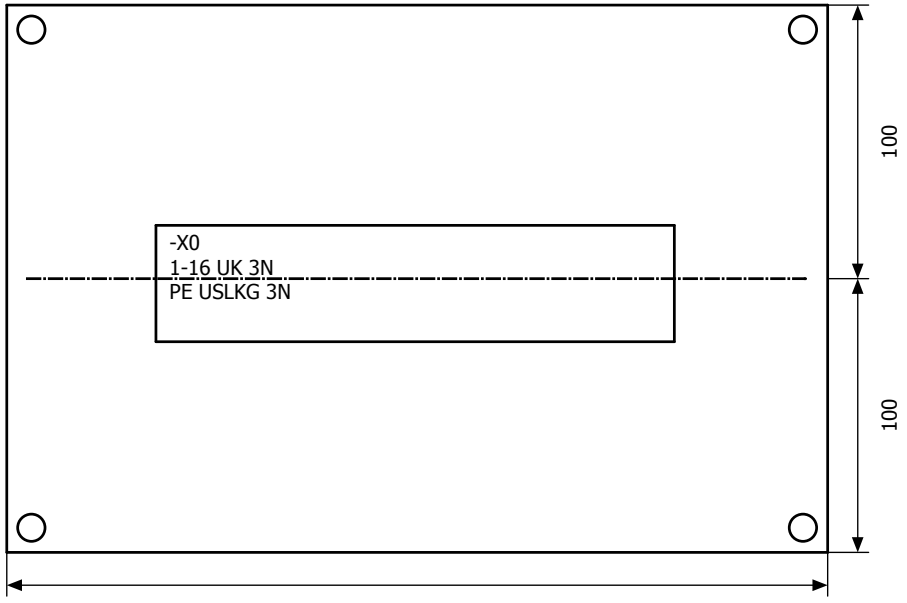
BOTTOM SIDE FOR CUSTOMER CONNECTION DRILLED AT SITE

COLOUR RAL 7035

VIEW ON RIGHT HAND SIDE



FRONT VIEW WITHOUT COVER



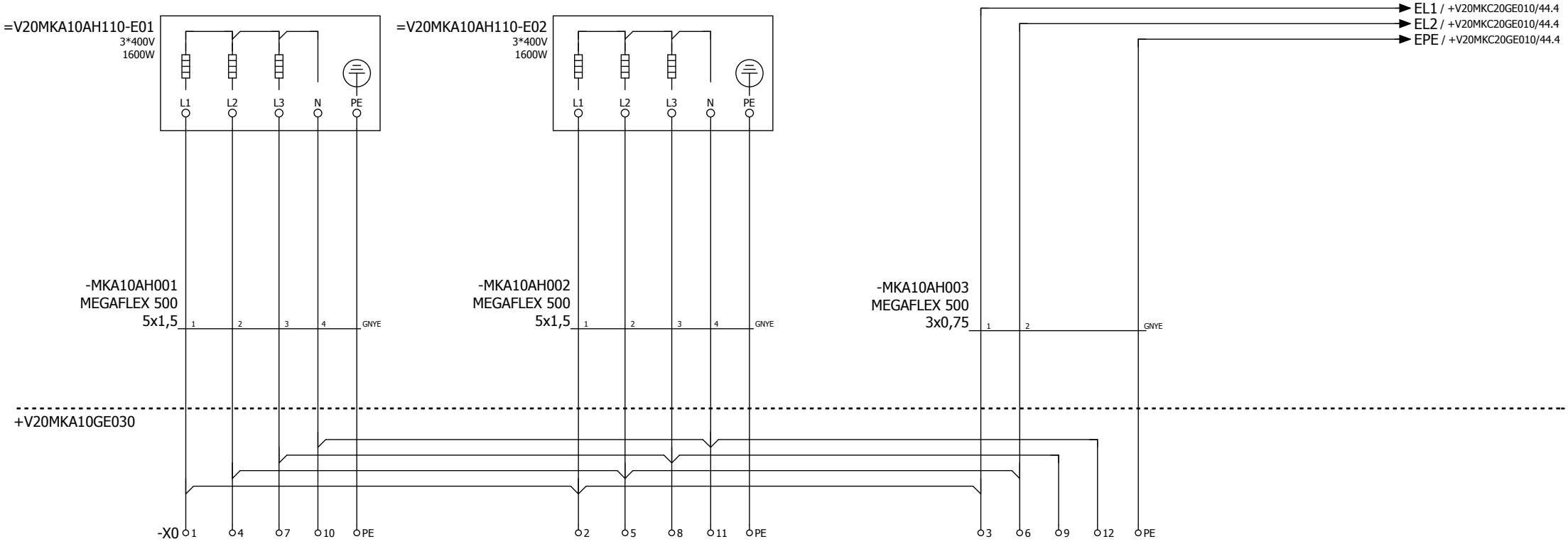
			Date	19.12.2017	VILNIUS Biomass		JUNCTION BOX VOLTAGE MOUNTING PLATE	DPPPG-70160084	=	
			Drawn	Möbius					+ V20MKA10GE030	
			Appr.	Rabe						
REVISION	Date	Name	NORM		Replacement for	Replaced by		EG000367	DPPPG-70152441	Page 39 / Pg. 79

SIEMENS
ENERGY SECTOR

GENERATOR HEATER TE

GENERATOR HEATER EE

TO EXCITER HEATER



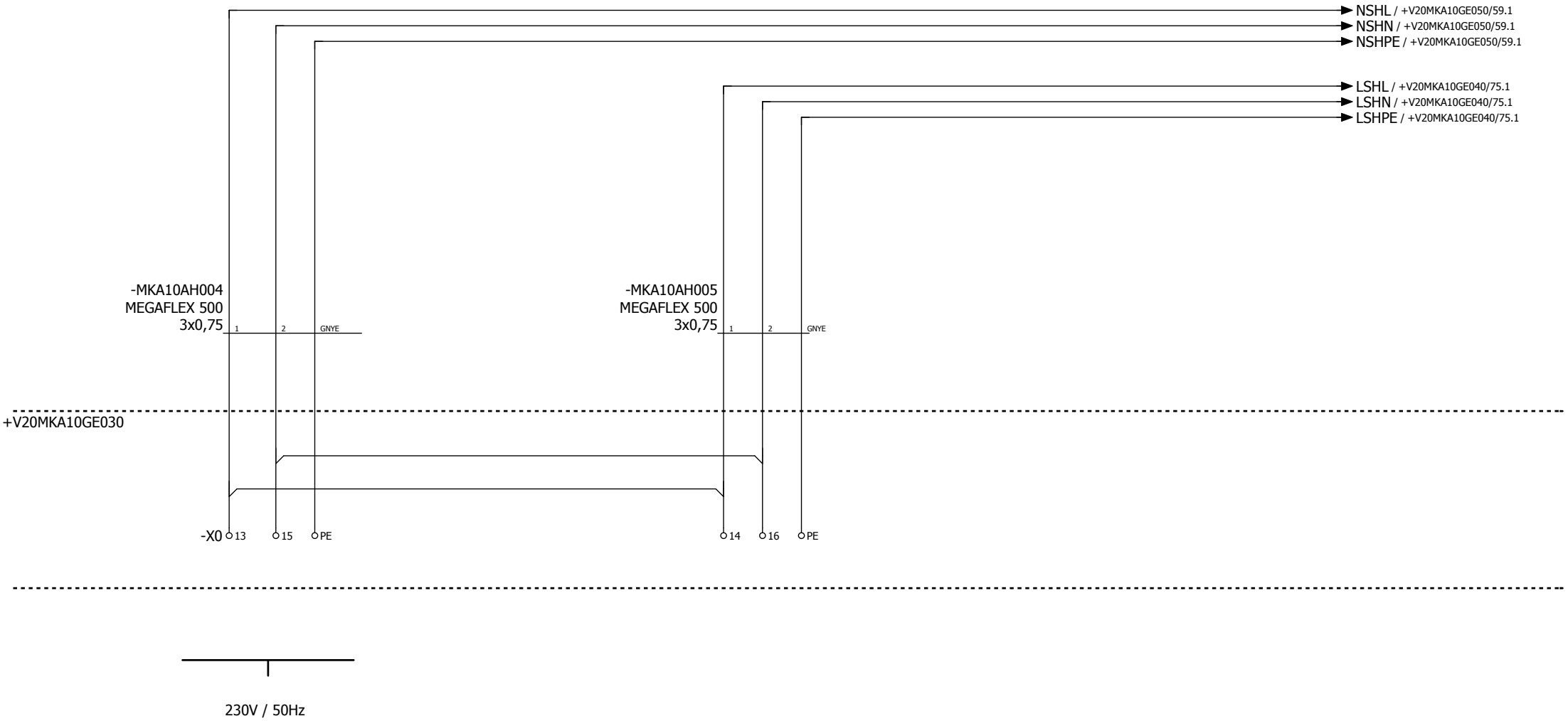
400V / 50Hz

TE ... TURBINE END
EE ... EXCITER END

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	JUNCTION BOX VOLTAGE	DPPPG-70160084	=
			Drawn	Möbius					+ V20MKA10GE030
			Appr.	Rabe					
REVISION	Date	Name	NORM		Replacement for	Replaced by		EG000367 DPPPG-70152441	Page 40 / Pg. 79

TO NSC HEATER

TO LSC HEATER



230V / 50Hz

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	JUNCTION BOX VOLTAGE	DPPPG-70160084	= + V20MKA10GE030
			Drawn	Möbius					
			Appr.	Rabe				EG000367 DPPPG-70152441	Page 41 Pg. 79
REVISION	Date	Name	NORM		Replacement for	Replaced by			

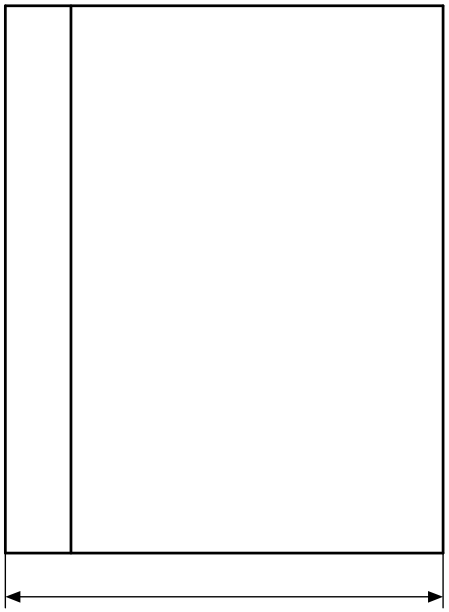
Terminal diagram

item designation	Lev.	no. cable	type cable	destination A	terminal	link	terminal number	destination B	terminal	Lev.	no. cable	type cable	MKA10AH001 MEGAFLEX 500	MKA10AH002 MEGAFLEX 500	MKA10AH003 MEGAFLEX 500	MKA10AH004 MEGAFLEX 500	MKA10AH005 MEGAFLEX 500	page / track
				Terminal strip =+V20MKA10GE030-X0														
GENERATOR HEATER TE							1	=V20MKA10AH110-E01	L1				1					40 1
GENERATOR HEATER EE							2	=V20MKA10AH110-E02	L1					1				40 3
TO EXCITER HEATER							3	+V20MKC20GE010-X41	1						1			44 4
GENERATOR HEATER TE							4	=V20MKA10AH110-E01	L2				2					40 1
GENERATOR HEATER EE							5	=V20MKA10AH110-E02	L2					2				40 3
TO EXCITER HEATER							6	+V20MKC20GE010-X41	3						2			44 6
GENERATOR HEATER TE							7	=V20MKA10AH110-E01	L3				3					40 1
GENERATOR HEATER EE							8	=V20MKA10AH110-E02	L3					3				40 4
TO EXCITER HEATER							9											
GENERATOR HEATER TE							10	=V20MKA10AH110-E01	N									40 2
GENERATOR HEATER EE							11	=V20MKA10AH110-E02	N									40 4
TO EXCITER HEATER							12											
TO NSC HEATER							13	+V20MKA10GE050-X1	1							1		59 4
TO LSC HEATER							14	+V20MKA10GE040-X1	1								1	75 4
TO NSC HEATER							15	+V20MKA10GE050-X1	3							2		59 5
TO LSC HEATER							16	+V20MKA10GE040-X1	3								2	75 5
GENERATOR HEATER TE							PE	=V20MKA10AH110-E01	PE				GNYE					40 2
GENERATOR HEATER EE							PE	=V20MKA10AH110-E02	PE					GNYE				40 4
TO EXCITER HEATER							PE	+V20MKC20GE010-X41	4						GNYE			44 7
TO NSC HEATER							PE	+V20MKA10GE050-X1	5							GNYE		59 6
TO LSC HEATER							PE	+V20MKA10GE040-X1	5								GNYE	75 6

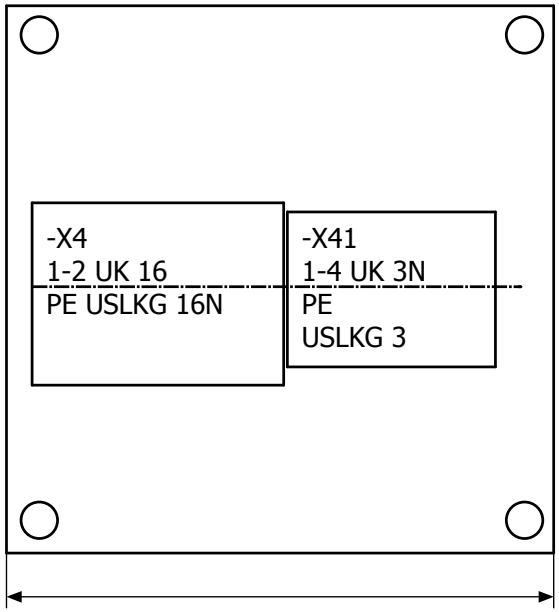
SEPARATION PLATE
SEPARATION WITH TS-K

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	Klemmenplan : =+V20MKA10GE030-X0	DPPPG-70160084	=	
			Drawn	Möbius					+ V20MKA10GE030	
			Appr.	Rabe				EG000367	DPPPG-70152441	Page 42
REVISION	Date	Name	NORM		Replacement for	Replaced by				Pg. 79

VIEW ON RIGHT HAND SIDE



FRONT VIEW WITHOUT COVER



MANUFACTURER HÄWA
STANDARD CASING K12-15/15
DEGREE OF PROTECTION IP65

TAPPED HOLES

MOUNTING RAIL TS 35 (EN60715)

ALL DIMENSIONS IN MM

SCALE 1:2 (A3)

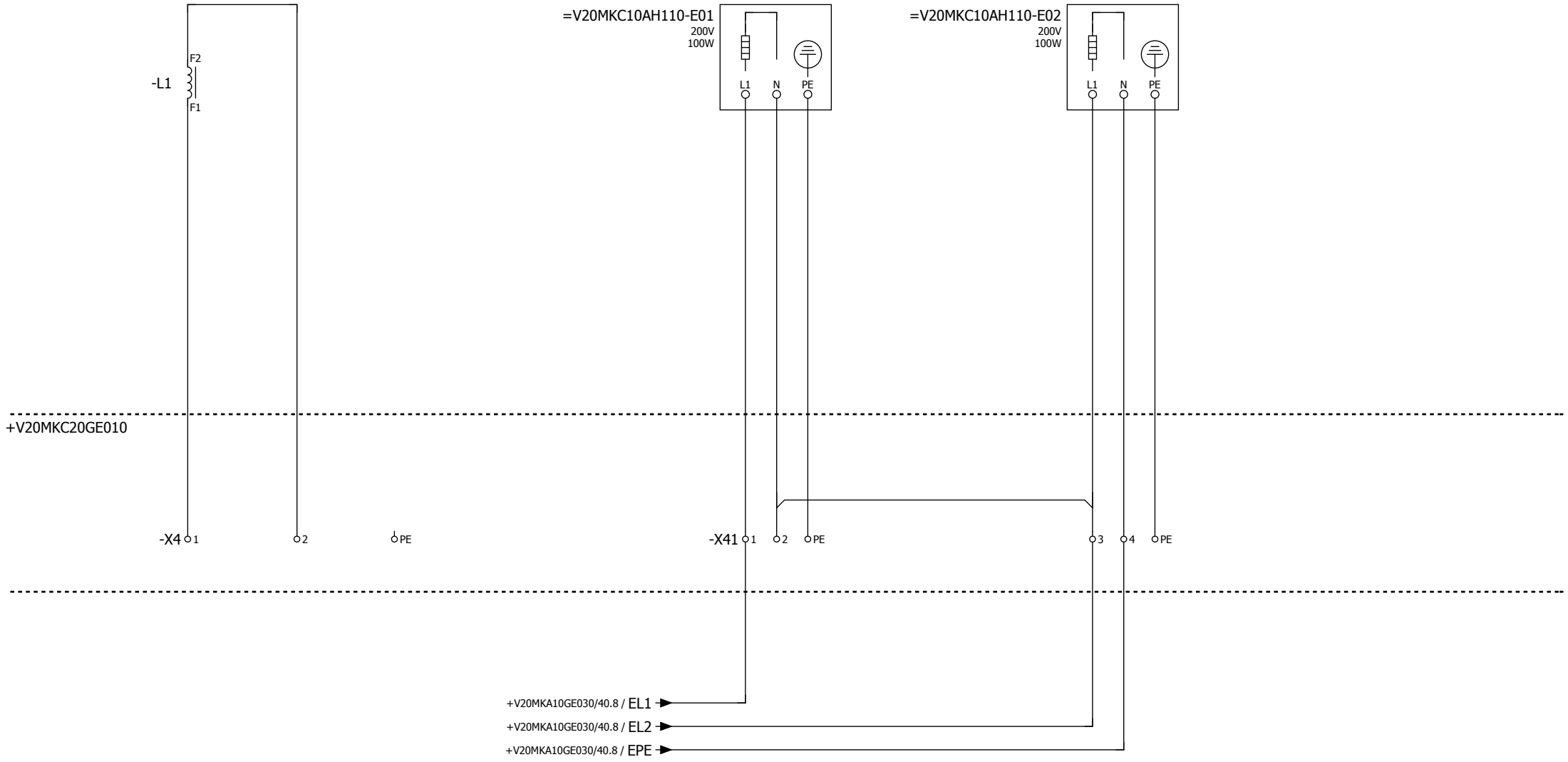
BOTTOM SIDE FOR CUSTOMER CONNECTION DRILLED AT SITE

COLOUR RAL 7035

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	JUNCTION BOX EXCITER FIELD; HEATER MOUNTING PLATE	DPPPG-70160085	= + V20MKC20GE010
			Drawn	Möbius					
			Appr.	Rabe				EG000367	DPPPG-70152441
REVISION	Date	Name	NORM		Replacement for	Replaced by			Page 43 Pg. 79

FIELD WINDING

EXCITER 2x HEATER



			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	JUNCTION BOX EXCITER FIELD; HEATER	DPPPG-70160085	=
			Drawn	Möbius					+ V20MKC20GE010
			Appr.	Rabe				EG000367	DPPPG-70152441
REVISION	Date	Name	NORM		Replacement for	Replaced by			Page 44 / Pg. 79

Terminal diagram

Terminal strip =+V20MKC20GE010-X4

item designation				Lev. / no. cable / type cable	destination A	terminal	link	terminal number		destination B	terminal	Lev. / no. cable / type cable									page / track
FIELD WINDING								1		-L1	F1										44 1
=								2		-L1	F2										44 1
=								PE													

SEPARATION PLATE
SEPARATION WITH TS-K

REVISION	Date	Name	Date: 19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	Klemmenplan : =+V20MKC20GE010-X4	DPPPG-70160085	=
			Drawn: Möbius					+ V20MKC20GE010
			Appr.: Rabe				EG000367	DPPPG-70152441
			NORM	Replacement for	Replaced by		Page 45	Pg. 79

Terminal diagram

item designation	MEGAFLEX 500 type cable	MKA10AH003 no. cable	Lev.	Terminal strip =+V20MKC20GE010-X41 destination A	terminal	link	terminal number	destination B	terminal	type cable	Lev.	page / track
EXCITER 2x HEATER	1			+V20MKA10GE030-X0	3		1	=V20MKC10AH110-E01	L1			44 4
=							2	=V20MKC10AH110-E01	N			44 4
=	2			+V20MKA10GE030-X0	6		3	=V20MKC10AH110-E02	L1			44 6
=	GNYE			+V20MKA10GE030-X0	PE		4	=V20MKC10AH110-E02	N			44 7
=							PE	=V20MKC10AH110-E01	PE			44 5
=							PE	=V20MKC10AH110-E02	PE			44 7

SEPARATION PLATE
SEPARATION WITH TS-K

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	Klemmenplan : =+V20MKC20GE010-X41	DPPPG-70160085
			Drawn	Möbius				= + V20MKC20GE010
			Appr.	Rabe				
REVISION	Date	Name	NORM		Replacement for	Replaced by	EG000367	DPPPG-70152441 Page 46 Pg. 79

MANUFACTURER HÄWA
STANDARD CASING K12-20/20
DEGREE OF PROTECTION IP65

TAPPED HOLES

MOUNTING RAIL TS 35 (EN60715)

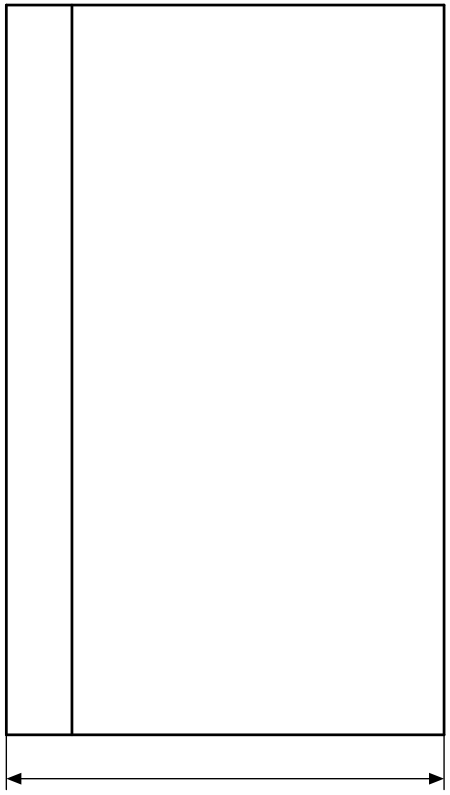
ALL DIMENSIONS IN MM

SCALE 1:2 (A3)

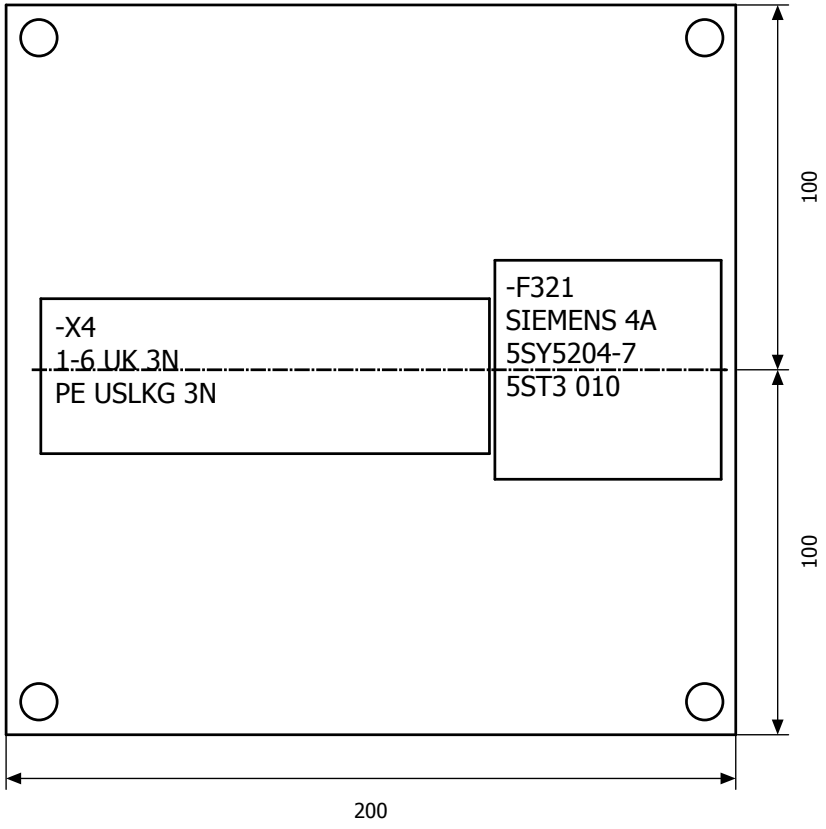
BOTTOM SIDE FOR CUSTOMER CONNECTION DRILLED AT SITE

COLOUR RAL 7035

VIEW ON RIGHT HAND SIDE

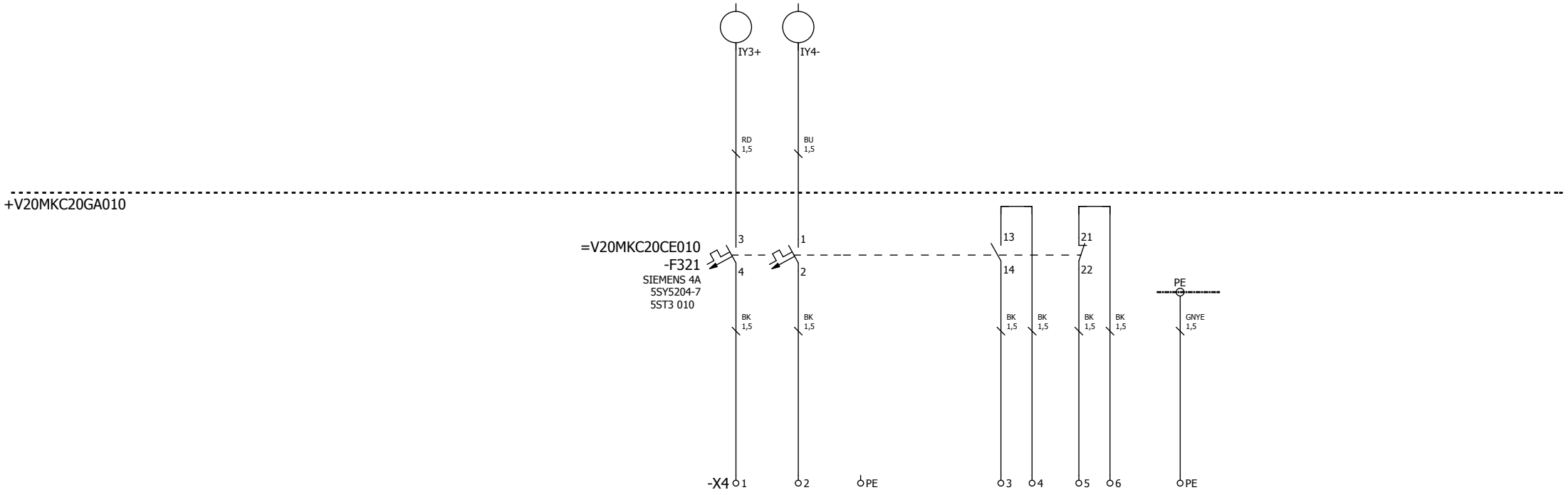


FRONT VIEW WITHOUT COVER



			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	JUNCTION BOX ROTOR EARTH FAULT DETECTION MOUNTING PLATE	DPPPG-70160086	= + V20MKC20GA010
			Drawn	Möbius					
			Appr.	Rabe				EG000367	DPPPG-70152441
REVISION	Date	Name	NORM		Replacement for	Replaced by			Page 47 Pg. 79

EXCITATION VOLT. MEASUREMENT



			Date	19.12.2017	VILNIUS Biomass		SIEMENS ENERGY SECTOR	JUNCTION BOX ROTOR EARTH FAULT DETECTION	DPPPG-70160086	= + V20MKC20GA010
			Drawn	Möbius						
			Appr.	Rabe					EG000367	DPPPG-70152441
REVISION	Date	Name	NORM		Replacement for	Replaced by				Page 48 Pg. 79

Terminal diagram

item designation	Lev.	no. cable	type cable	destination A	terminal	link	terminal number	destination B	terminal	Lev.	no. cable	type cable	1,5 mm²	page / track
				Terminal strip =+V20MKC20GA010-X4										
EXCITATION VOLT. MEASUREMENT							1	=V20MKC20CE010-F321	4				BK	48 4
=							2	=V20MKC20CE010-F321	2				BK	48 4
=							3		14				BK	48 6
=							4		13				BK	48 6
=							5		22				BK	48 6
=							6		21				BK	48 6
=							PE							
=							PE		PE				GNYE	48 7

SEPARATION PLATE
SEPARATION WITH TS-K

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	Klemmenplan : =+V20MKC20GA010-X4	DPPPG-70160086
			Drawn	Möbius				= + V20MKC20GA010
			Appr.	Rabe				
REVISION	Date	Name	NORM		Replacement for	Replaced by	EG000367	DPPPG-70152441

Page 49
Pg. 79

MANUFACTURER HÄWA
STANDARD CASING K12-40/20
DEGREE OF PROTECTION IP65

TAPPED HOLES

MOUNTING RAIL TS 35 (EN60715)

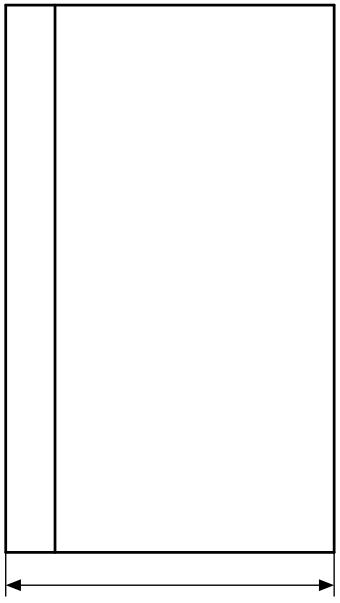
ALL DIMENSIONS IN MM

SCALE 1:2 (A3)

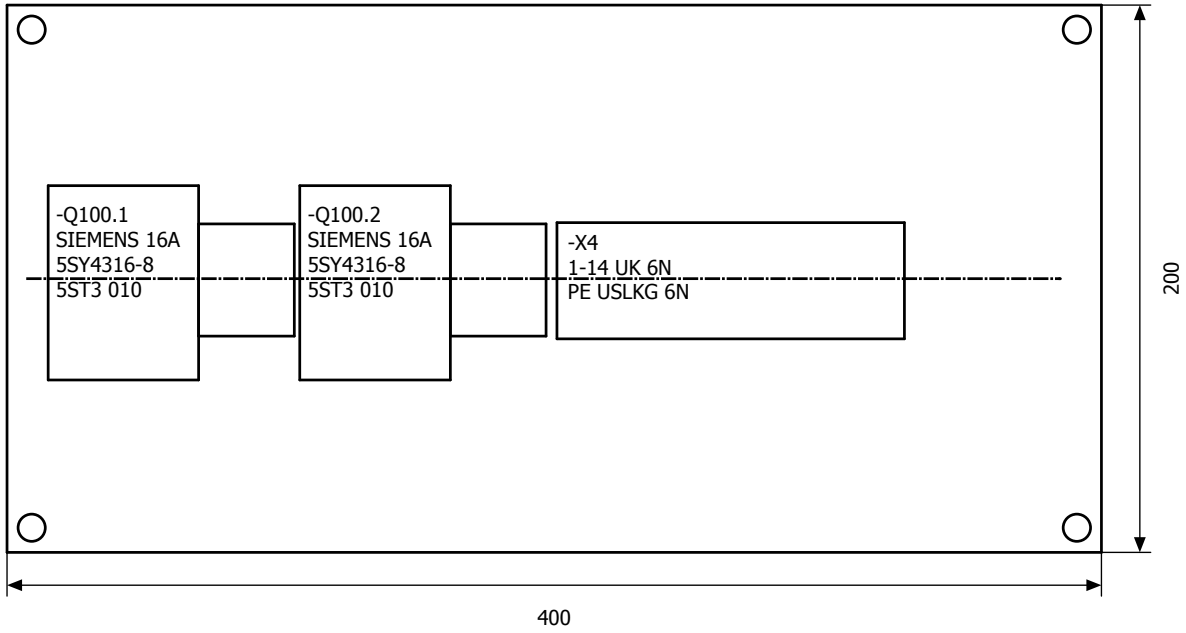
BOTTOM SIDE FOR CUSTOMER CONNECTION DRILLED AT SITE

COLOUR RAL 7035

VIEW ON RIGHT HAND SIDE

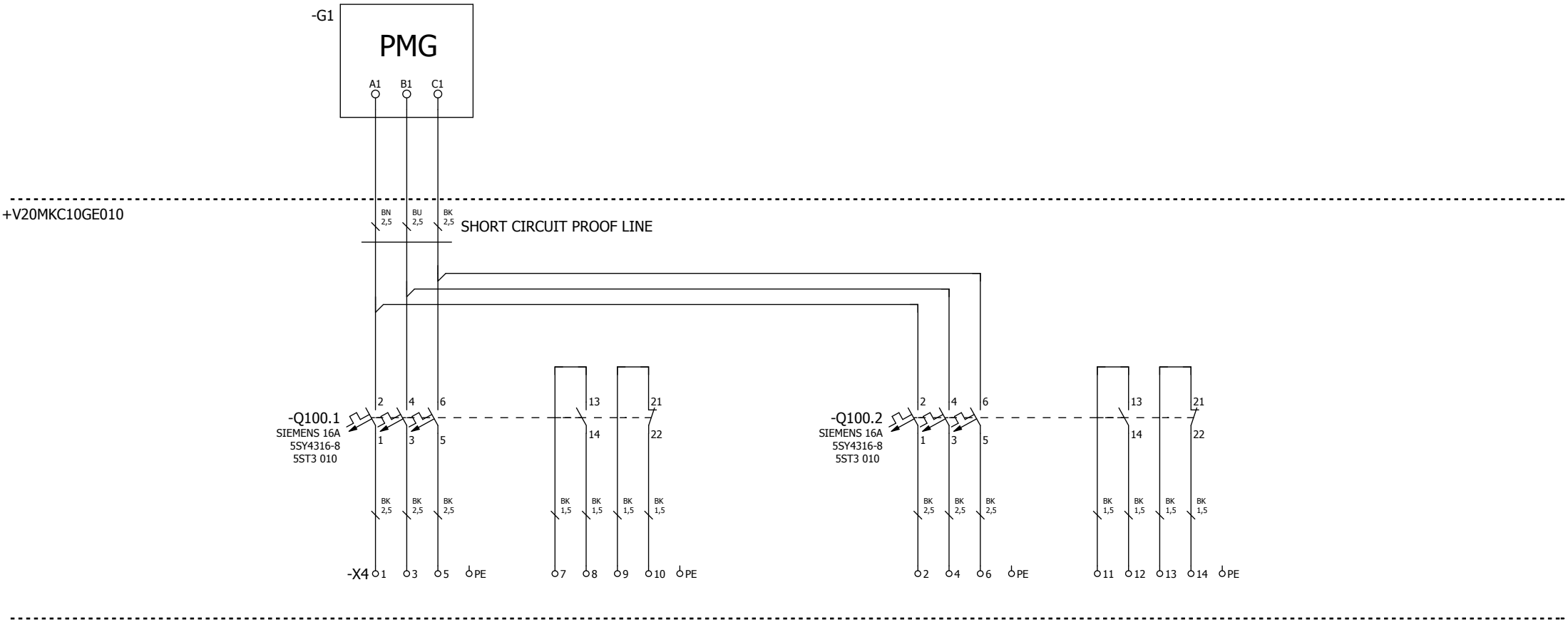


FRONT VIEW WITHOUT COVER



			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	JUNCTION BOX PERMANENT MAGNET GENERATOR MOUNTING PLATE	DPPPG-70160087	= + V20MKC10GE010
			Drawn	Möbius					
			Appr.	Rabe				EG000367	DPPPG-70152441
REVISION	Date	Name	NORM		Replacement for	Replaced by			Page 50 Pg. 79

PILOT EXCITER



			Date	19.12.2017	VILNIUS Biomass	
			Drawn	Möbius		
			Appr.	Rabe		
REVISION	Date	Name	NORM		Replacement for	Replaced by

SIEMENS
ENERGY SECTOR

JUNCTION BOX
PERMANENT MAGNET GENERATOR

DPPPG-70160087

EG000367 DPPPG-70152441

= + V20MKC10GE010

Terminal diagram

Terminal strip
=+V20MKC10GE010-X4

item designation	Lev. / no. cable / type cable	destination A	terminal	link	terminal number	destination B	terminal	Lev. / no. cable / type cable	1,5 mm²	2,5 mm²	page	track
PILOT EXCITER					1	-Q100.1	1			BK	51	2
=					2	-Q100.2	1			BK	51	5
=					3	-Q100.1	3			BK	51	2
=					4	-Q100.2	3			BK	51	5
=					5	-Q100.1	5			BK	51	2
=					6	-Q100.2	5			BK	51	5
=					7	-Q100.1	13		BK		51	3
=					8	-Q100.1	14		BK		51	3
=					9	-Q100.1	21		BK		51	4
=					10	-Q100.1	22		BK		51	4
=					11	-Q100.2	13		BK		51	7
=					12	-Q100.2	14		BK		51	7
=					13	-Q100.2	21		BK		51	7
=					14	-Q100.2	22		BK		51	7
=					PE							
=					PE							
=					PE							
=					PE							

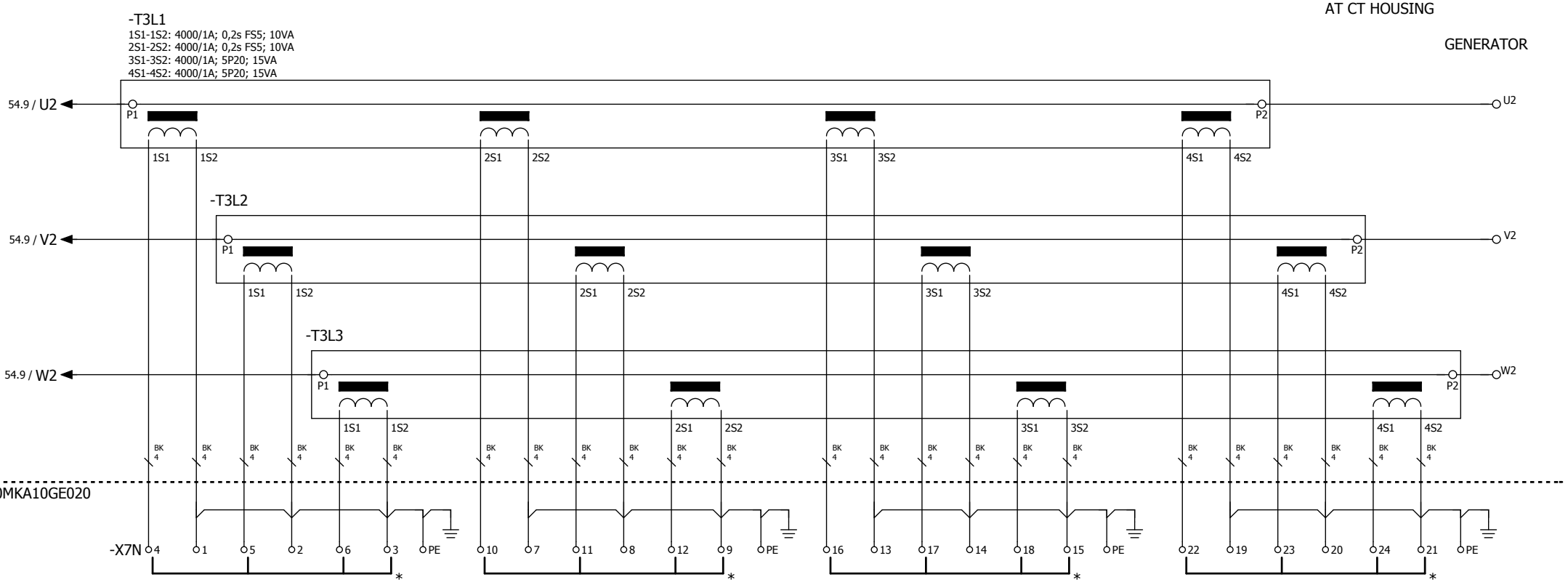
SEPARATION PLATE
SEPARATION WITH TS-K

MEDIUM VOLTAGE COMPARTMENT
NEUTRAL SIDE

+V20MKA10GD020

CT CORES ARE EARTHED
ON SECONDARY SIDE
BY EARTHING SCREWS
AT CT HOUSING

GENERATOR



MEASURING

MEASURING

GENERATOR PROTECTION
AND SYNCHRONIZATION CUBICLE

GENERATOR PROTECTION
AND SYNCHRONIZATION CUBICLE

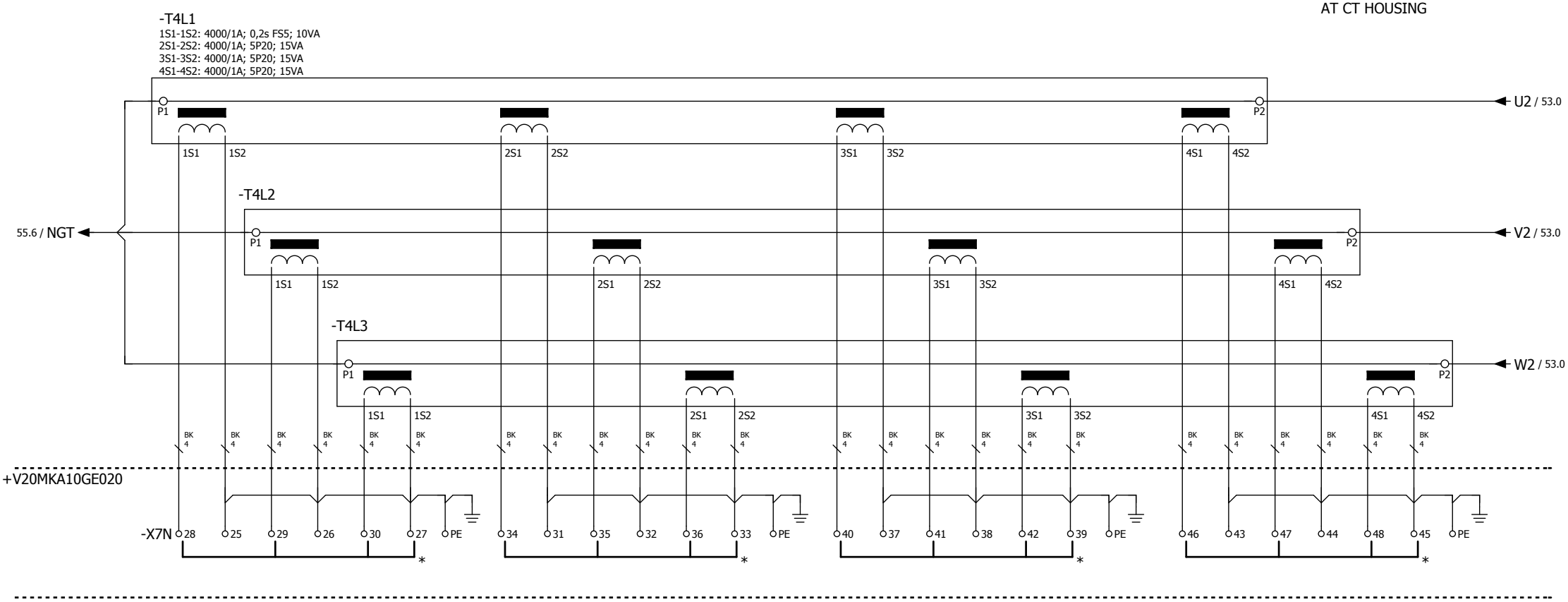
* REMOVE LINKS DURING ERECTION OR COMMISSIONING

b	16.04.2018	Rabe	Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	NEUTRAL SIDE CUBICLE CURRENT TRANSFORMER	=	
			Drawn	Möbius				+ V20MKA10GE020	
			Appr.	Rabe				EG000367	DPPPG-70152441
REVISION	Date	Name	NORM		Replacement for	Replaced by		Page	53
								Pg.	79

MEDIUM VOLTAGE COMPARTMENT NEUTRAL SIDE

+V20MKA10GD020

CT CORES ARE EARTHED
ON SECONDARY SIDE
BY EARTHING SCREWS
AT CT HOUSING



MEASURING

GENERATOR PROTECTION
AND SYNCHRONIZATION CUBICLE

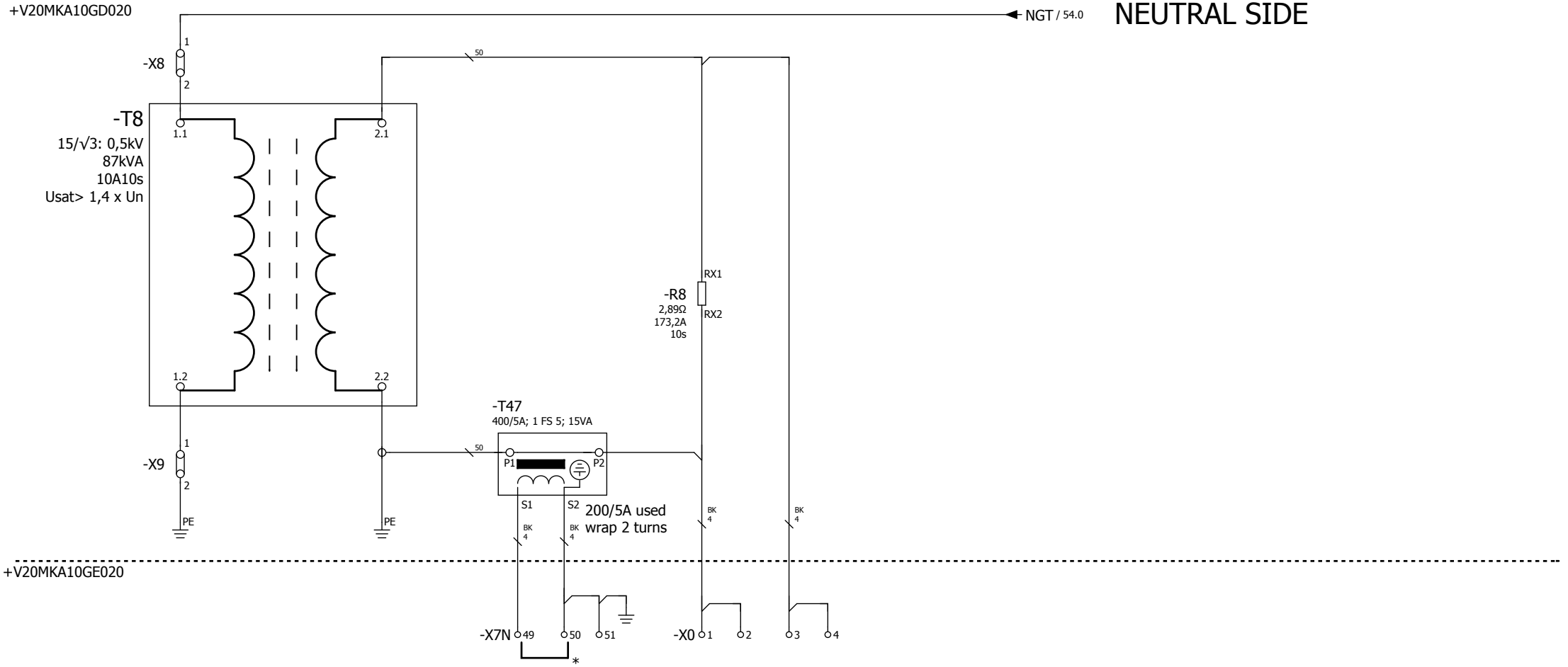
GENERATOR PROTECTION
AND SYNCHRONIZATION CUBICLE

GENERATOR PROTECTION
AND SYNCHRONIZATION CUBICLE

* REMOVE LINKS DURING ERECTION OR COMMISSIONING

b	16.04.2018	Rabe	Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	NEUTRAL SIDE CUBICLE CURRENT TRANSFORMER	= + V20MKA10GE020
			Drawn	Möbius				
			Appr.	Rabe			EG000367	DPPPG-70152441
REVISION	Date	Name	NORM		Replacement for	Replaced by		Page 54 / Pg. 79

MEDIUM VOLTAGE COMPARTMENT
NEUTRAL SIDE



PROTECTION

* REMOVE LINKS DURING ERECTION OR COMMISSIONING

b	16.04.2018	Rabe	Date	19.12.2017	VILNIUS Biomass	
			Drawn	Möbius		
			Appr.	Rabe		
REVISION	Date	Name	NORM		Replacement for	Replaced by

SIEMENS
ENERGY SECTOR

NEUTRAL SIDE CUBICLE
GROUNDING TRANSFORMER

= + V20MKA10GE020

EG000367 | DPPPG-70152441

Terminal diagram

item designation	Lev.	no. cable	type cable	destination A	terminal	link	terminal number	destination B	terminal	Lev.	no. cable	type cable	4 mm²	page / track
								Terminal strip =+V20MKA10GE020-X0						
							1	+V20MKA10GD020-R8	RX2				BK;BK	55;55 4;3
							2							
							3	+V20MKA10GD020-R8	RX1				BK	55 4
							4							

SEPARATION PLATE
SEPARATION WITH TS-K

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	Klemmenplan : =+V20MKA10GE020-X0	=
			Drawn	Möbius				+ V20MKA10GE020
			Appr.	Rabe			EG000367	DPPPG-70152441
REVISION	Date	Name	NORM		Replacement for	Replaced by		Page 56 / Pg. 79

Terminal diagram

Terminal strip
=+V20MKA10GE020-X7N

item designation	Lev.	no. cable	type cable	destination A	terminal	link	terminal number	destination B	terminal	Lev.	no. cable	type cable	4 mm²	page / track
							1	+V20MKA10GD020-T3L1	1S2				BK	53 1
							2	+V20MKA10GD020-T3L2	1S2				BK	53 2
							3	+V20MKA10GD020-T3L3	1S2				BK	53 2
							4	+V20MKA10GD020-T3L1	1S1				BK	53 1
							5	+V20MKA10GD020-T3L2	1S1				BK	53 1
							6	+V20MKA10GD020-T3L3	1S1				BK	53 2
							7	+V20MKA10GD020-T3L1	2S2				BK	53 3
							8	+V20MKA10GD020-T3L2	2S2				BK	53 4
							9	+V20MKA10GD020-T3L3	2S2				BK	53 4
							10	+V20MKA10GD020-T3L1	2S1				BK	53 3
							11	+V20MKA10GD020-T3L2	2S1				BK	53 3
							12	+V20MKA10GD020-T3L3	2S1				BK	53 4
							13	+V20MKA10GD020-T3L1	3S2				BK	53 5
							14	+V20MKA10GD020-T3L2	3S2				BK	53 6
							15	+V20MKA10GD020-T3L3	3S2				BK	53 6
							16	+V20MKA10GD020-T3L1	3S1				BK	53 5
							17	+V20MKA10GD020-T3L2	3S1				BK	53 5
							18	+V20MKA10GD020-T3L3	3S1				BK	53 6
							19	+V20MKA10GD020-T3L1	4S2				BK	53 7
							20	+V20MKA10GD020-T3L2	4S2				BK	53 8
							21	+V20MKA10GD020-T3L3	4S2				BK	53 8
							22	+V20MKA10GD020-T3L1	4S1				BK	53 7
							23	+V20MKA10GD020-T3L2	4S1				BK	53 8
							24	+V20MKA10GD020-T3L3	4S1				BK	53 8
							25	+V20MKA10GD020-T4L1	1S2				BK	54 1
							26	+V20MKA10GD020-T4L2	1S2				BK	54 2
							27	+V20MKA10GD020-T4L3	1S2				BK	54 2
							28	+V20MKA10GD020-T4L1	1S1				BK	54 1
							29	+V20MKA10GD020-T4L2	1S1				BK	54 1
							30	+V20MKA10GD020-T4L3	1S1				BK	54 2
							31	+V20MKA10GD020-T4L1	2S2				BK	54 3
							32	+V20MKA10GD020-T4L2	2S2				BK	54 4

SEPARATION PLATE
SEPARATION WITH TS-K

Terminal diagram

Terminal strip
=+V20MKA10GE020-X7N

item designation	Lev.	no. cable	type cable	destination A	terminal	link	terminal number	destination B	terminal	Lev.	no. cable	type cable	4 mm²	page / track
							33	+V20MKA10GD020-T4L3	2S2			BK		54 4
							34	+V20MKA10GD020-T4L1	2S1			BK		54 3
							35	+V20MKA10GD020-T4L2	2S1			BK		54 3
							36	+V20MKA10GD020-T4L3	2S1			BK		54 4
							37	+V20MKA10GD020-T4L1	3S2			BK		54 5
							38	+V20MKA10GD020-T4L2	3S2			BK		54 6
							39	+V20MKA10GD020-T4L3	3S2			BK		54 6
							40	+V20MKA10GD020-T4L1	3S1			BK		54 5
							41	+V20MKA10GD020-T4L2	3S1			BK		54 5
							42	+V20MKA10GD020-T4L3	3S1			BK		54 6
							43	+V20MKA10GD020-T4L1	4S2			BK		54 7
							44	+V20MKA10GD020-T4L2	4S2			BK		54 8
							45	+V20MKA10GD020-T4L3	4S2			BK		54 8
							46	+V20MKA10GD020-T4L1	4S1			BK		54 7
							47	+V20MKA10GD020-T4L2	4S1			BK		54 8
							48	+V20MKA10GD020-T4L3	4S1			BK		54 8
							49	+V20MKA10GD020-T47	S1			BK		55 3
							50	+V20MKA10GD020-T47	S2			BK		55 3
							51							55 3
							PE							53 3
							PE							53 5
							PE							53 7
							PE							53 9
							PE							54 3
							PE							54 5
							PE							54 7
							PE							54 9
							○							
							○							
							○							
							○							
							○							

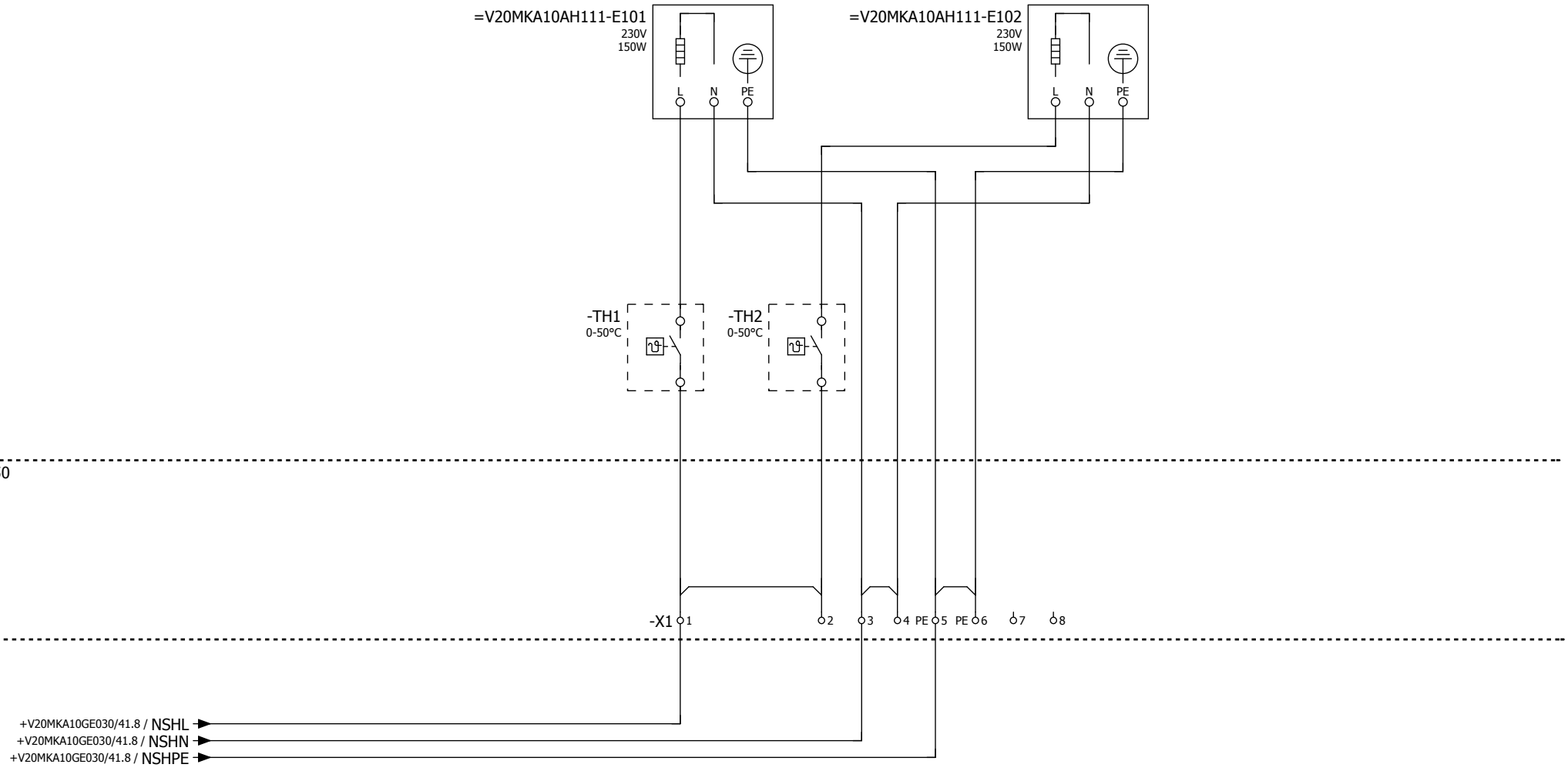
SEPARATION PLATE
SEPARATION WITH TS-K

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	Klemmenplan : =+V20MKA10GE020-X7N	= + V20MKA10GE020
			Drawn	Möbius				
			Appr.	Rabe				
REVISION	Date	Name	NORM		Replacement for	Replaced by	EG000367	DPPPG-70152441 Page 58 Pg. 79

+V20MKA10GD020

MEDIUM VOLTAGE COMPARTMENT
NEUTRAL SIDE

NEUTRAL SIDE CUBICLE HEATER



b	16.04.2018	Rabe	Date	19.12.2017	VILNIUS Biomass	
			Drawn	Möbius		
			Appr.	Rabe		
REVISION	Date	Name	NORM		Replacement for	Replaced by

SIEMENS
ENERGY SECTOR

NEUTRAL SIDE CUBICLE ANTICONDENSATION HEATER

=
+ V20MKA10GE050

EG000367 | DPPPG-70152441 | Page 59 | Pg. 79

Terminal diagram

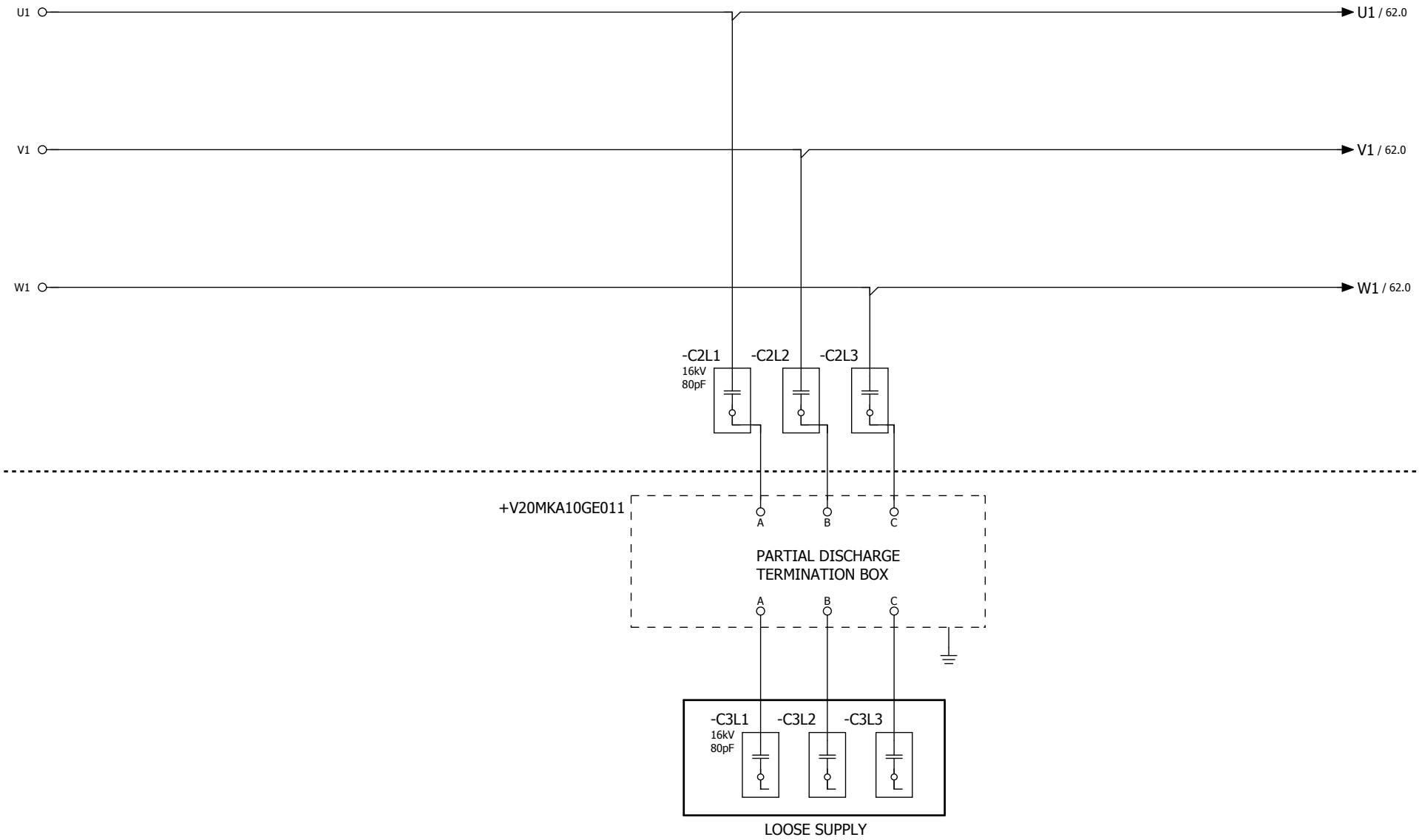
item designation	MEGAFLEX 500 type cable	MKA10AH004 no. cable	Lev.	Terminal strip =+V20MKA10GE050-X1 destination A	terminal	link	terminal number	destination B	terminal	Lev. type cable	no. cable	page / track
NEUTRAL SIDE CUBICLE HEATER		1		+V20MKA10GE030-X0	13		1	-TH1				59 4
=							2	-TH2				59 5
=		2		+V20MKA10GE030-X0	15		3	=V20MKA10AH111-E101	N			59 4
=							4	=V20MKA10AH111-E102	N			59 7
PE	GNYE			+V20MKA10GE030-X0	PE		5	=V20MKA10AH111-E101	PE			59 5
=							6	=V20MKA10AH111-E102	PE			59 7
NEUTRAL SIDE CUBICLE HEATER							7					
=							8					

SEPARATION PLATE
SEPARATION WITH TS-K

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	Klemmenplan : =+V20MKA10GE050-X1	=
			Drawn	Möbius				+ V20MKA10GE050
			Appr.	Rabe			EG000367	DPPPG-70152441
REVISION	Date	Name	NORM		Replacement for	Replaced by		Page 60 Pg. 79

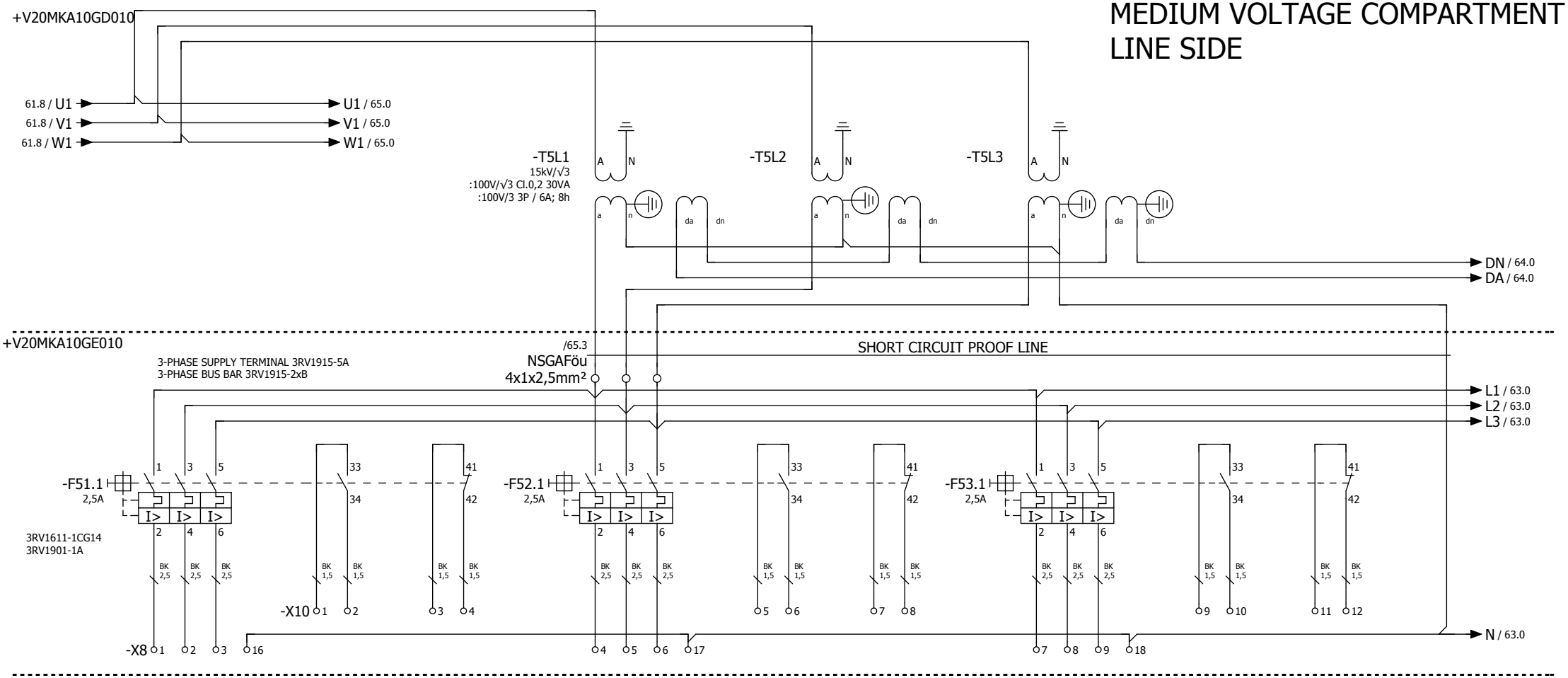
MEDIUM VOLTAGE COMPARTMENT
LINE SIDE CUBICLE

GENERATOR



b	16.04.2018	Rabe	Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	LINE SIDE CUBICLE PARTIAL DISCHARGE MEASUREMENT		=	
			Drawn	Möbius					+ V20MKA10GE010	
			Appr.	Rabe				EG000367	DPPPG-70152441	Page 61
REVISION	Date	Name	NORM		Replacement for	Replaced by				Pg. 79

MEDIUM VOLTAGE COMPARTMENT
LINE SIDE



PROTECTION

VOLTAGE REGULATION

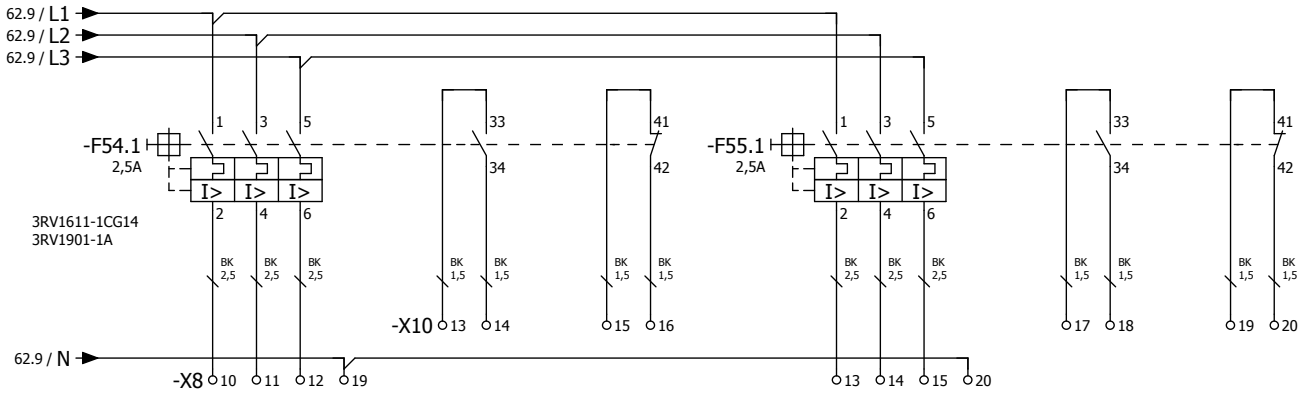
PROTECTION

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	LINE SIDE CUBICLE VOLTAGE TRANSFORMER	=	
			Drawn	Möbius				+ V20MKA10GE010	
			Appr.	Rabe				EG000367 DPPPG-70152441	Page 62
REVISION	Date	Name	NORM		Replacement for	Replaced by			Pg. 79

+V20MKA10GD010

MEDIUM VOLTAGE COMPARTMENT
LINE SIDE

+V20MKA10GE010



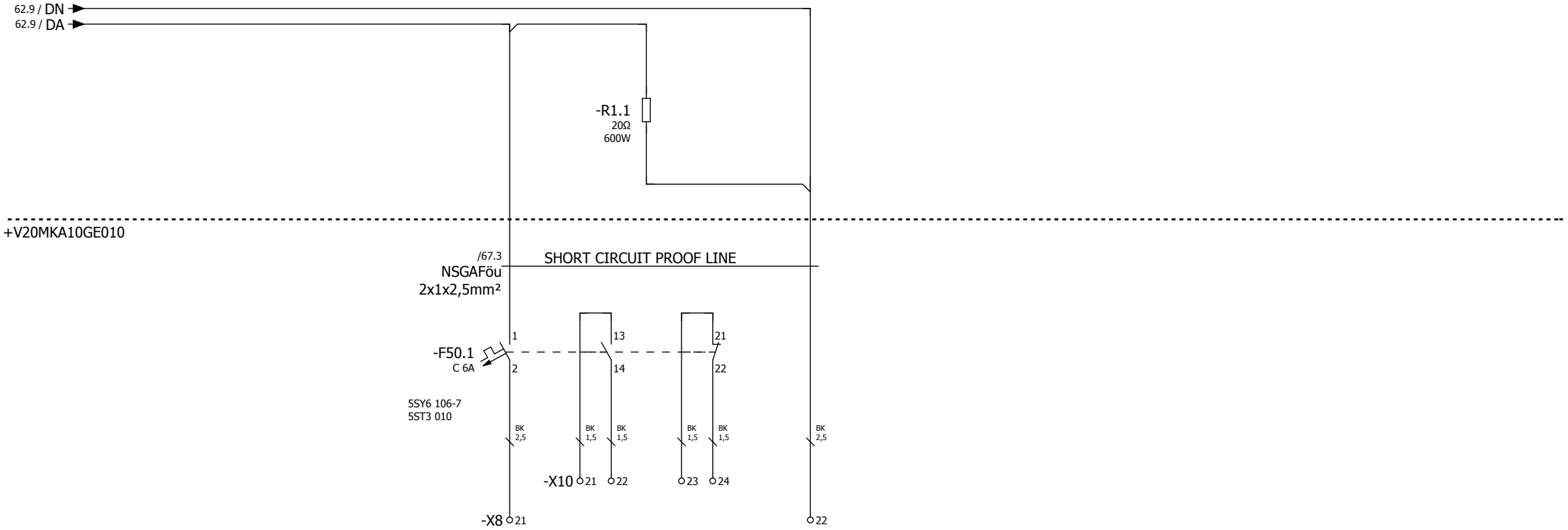
MEASUREMENT

SYNCHRONIZATION

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	LINE SIDE CUBICLE VOLTAGE TRANSFORMER	=	
			Drawn	Möbius				+ V20MKA10GE010	
			Appr.	Rabe				EG000367 DPPPG-70152441	Page 63
REVISION	Date	Name	NORM		Replacement for	Replaced by			Pg. 79

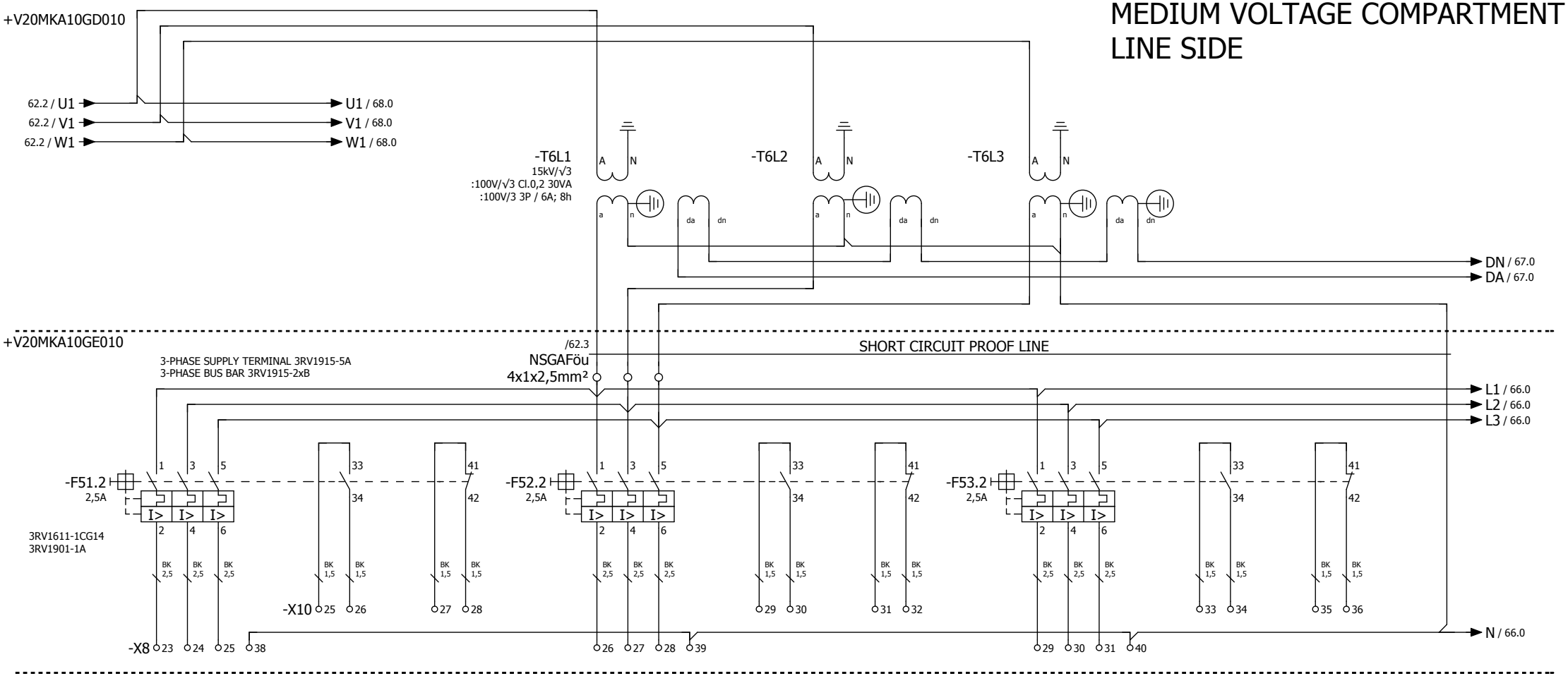
+V20MKA10GD010

MEDIUM VOLTAGE COMPARTMENT
LINE SIDE



			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	LINE SIDE CUBICLE VOLTAGE TRANSFORMER	=	
			Drawn	Möbius				+ V20MKA10GE010	
			Appr.	Rabe				EG000367 DPPPG-70152441	Page 64
REVISION	Date	Name	NORM		Replacement for	Replaced by			Pg. 79

MEDIUM VOLTAGE COMPARTMENT
LINE SIDE



PROTECTION

VOLTAGE REGULATION

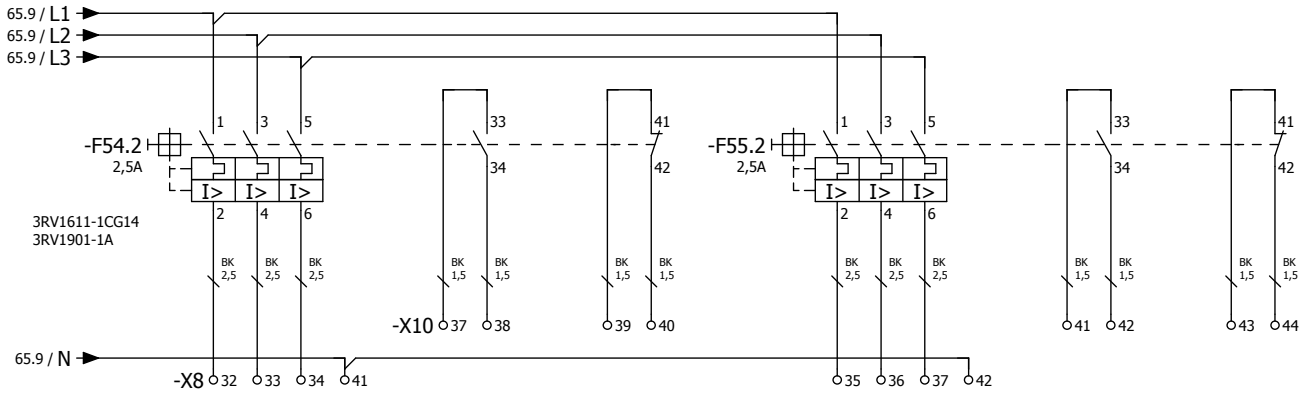
PROTECTION

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	LINE SIDE CUBICLE VOLTAGE TRANSFORMER	=	
			Drawn	Möbius				+ V20MKA10GE010	
			Appr.	Rabe				EG000367	DPPPG-70152441
REVISION	Date	Name	NORM		Replacement for	Replaced by		Page	65
								Pg.	79

+V20MKA10GD010

MEDIUM VOLTAGE COMPARTMENT
LINE SIDE

+V20MKA10GE010



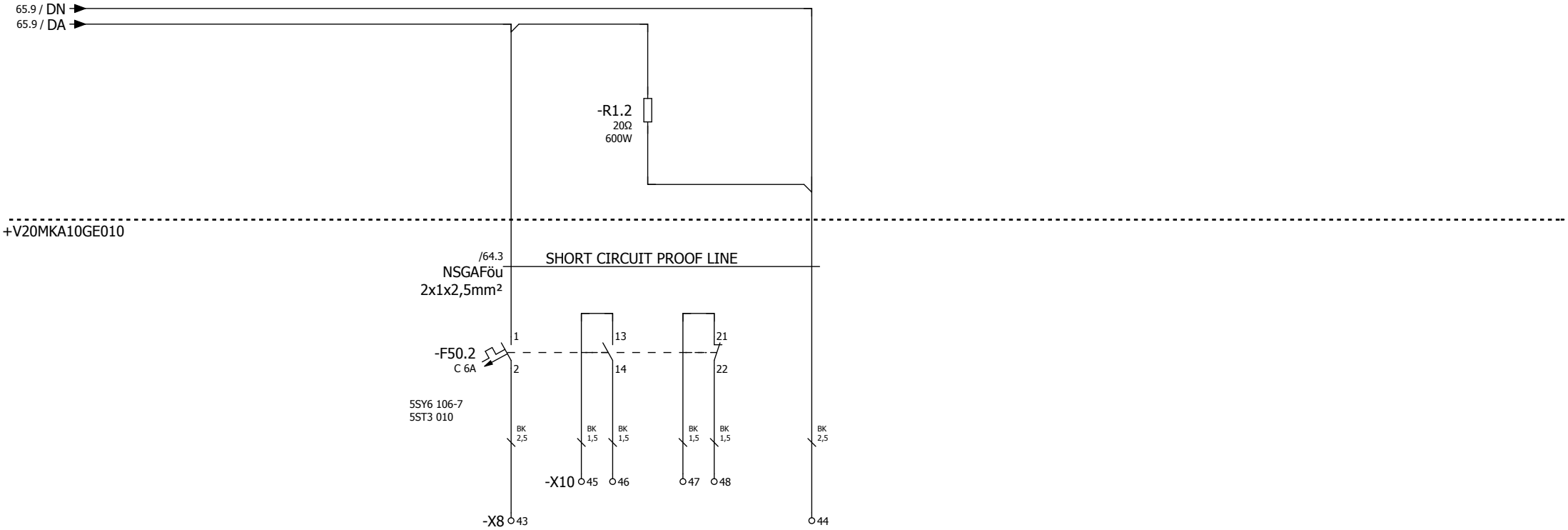
MEASUREMENT

SYNCHRONIZATION

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	LINE SIDE CUBICLE VOLTAGE TRANSFORMER	=	
			Drawn	Möbius				+ V20MKA10GE010	
			Appr.	Rabe				EG000367 DPPPG-70152441	Page 66
REVISION	Date	Name	NORM		Replacement for	Replaced by			Pg. 79

+V20MKA10GD010

MEDIUM VOLTAGE COMPARTMENT
LINE SIDE

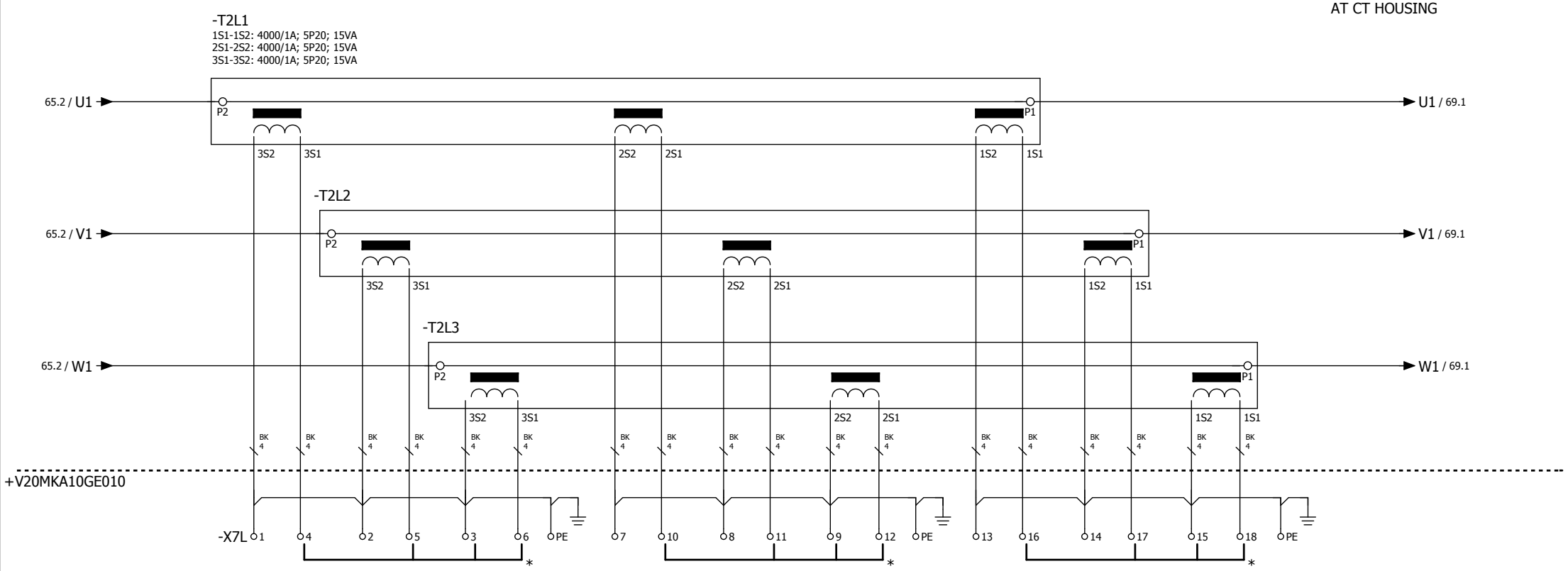


			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	LINE SIDE CUBICLE VOLTAGE TRANSFORMER	=	
			Drawn	Möbius				+ V20MKA10GE010	
			Appr.	Rabe				EG000367 DPPPG-70152441	Page 67
REVISION	Date	Name	NORM		Replacement for	Replaced by			Pg. 79

MEDIUM VOLTAGE COMPARTMENT
LINE SIDE

+V20MKA10GD010

CT CORES ARE EARTHED
ON SECONDARY SIDE
BY EARTHING SCREWS
AT CT HOUSING

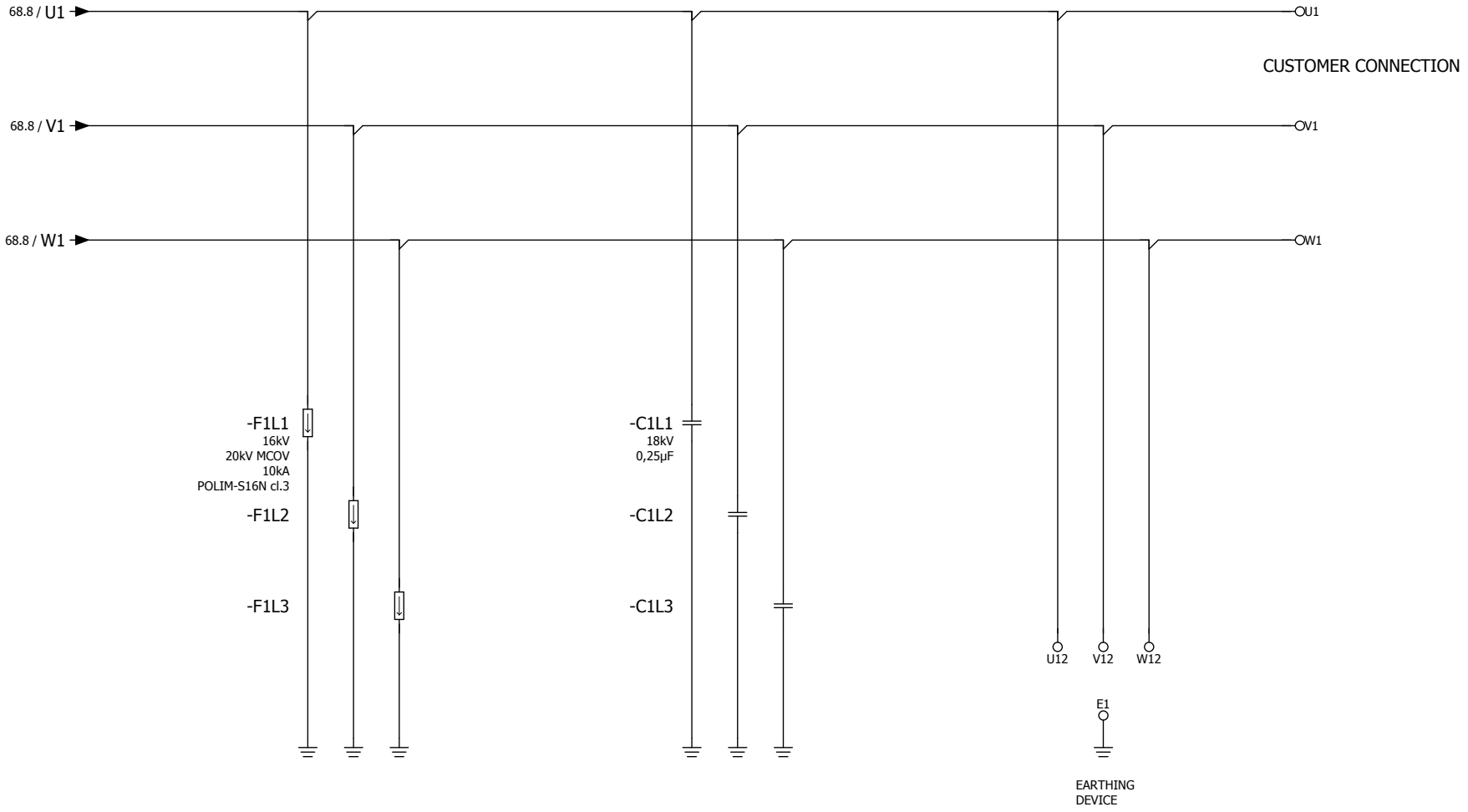


* REMOVE LINKS DURING ERECTION OR COMMISSIONING

b	16.04.2018	Rabe	Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	LINE SIDE CUBICLE CURRENT TRANSFORMER	=	
			Drawn	Möbius				+ V20MKA10GE010	
			Appr.	Rabe				EG000367	DPPPG-70152441
REVISION	Date	Name	NORM		Replacement for	Replaced by		Page	68
								Pg.	79

+V20MKA10GD010

MEDIUM VOLTAGE COMPARTMENT
LINE SIDE



b	16.04.2018	Rabe	Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	LINE SIDE CUBICLE SURGE ARRESTORS / CAPACITORS		=	
			Drawn	Möbius					+ V20MKA10GE010	
			Appr.	Rabe				EG000367	DPPPG-70152441	Page 69
REVISION	Date	Name	NORM		Replacement for	Replaced by				Pg. 79

Terminal diagram

item designation	Lev.	no. cable	type cable	destination A	terminal	link	terminal number	destination B	terminal	Lev.	no. cable	type cable	4 mm²	page / track
								Terminal strip =+V20MKA10GE010-X7L						
							1	+V20MKA10GD010-T2L1	3S2			BK		68 1
							2	+V20MKA10GD010-T2L2	3S2			BK		68 2
							3	+V20MKA10GD010-T2L3	3S2			BK		68 2
							4	+V20MKA10GD010-T2L1	3S1			BK		68 1
							5	+V20MKA10GD010-T2L2	3S1			BK		68 2
							6	+V20MKA10GD010-T2L3	3S1			BK		68 3
							7	+V20MKA10GD010-T2L1	2S2			BK		68 3
							8	+V20MKA10GD010-T2L2	2S2			BK		68 4
							9	+V20MKA10GD010-T2L3	2S2			BK		68 5
							10	+V20MKA10GD010-T2L1	2S1			BK		68 4
							11	+V20MKA10GD010-T2L2	2S1			BK		68 4
							12	+V20MKA10GD010-T2L3	2S1			BK		68 5
							13	+V20MKA10GD010-T2L1	1S2			BK		68 6
							14	+V20MKA10GD010-T2L2	1S2			BK		68 6
							15	+V20MKA10GD010-T2L3	1S2			BK		68 7
							16	+V20MKA10GD010-T2L1	1S1			BK		68 6
							17	+V20MKA10GD010-T2L2	1S1			BK		68 7
							18	+V20MKA10GD010-T2L3	1S1			BK		68 7
							PE							68 3
							PE							68 5
							PE							68 8

SEPARATION PLATE
SEPARATION WITH TS-K

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	Klemmenplan : =+V20MKA10GE010-X7L	=	
			Drawn	Möbius				+ V20MKA10GE010	
			Appr.	Rabe					
REVISION	Date	Name	NORM		Replacement for	Replaced by	EG000367	DPPPG-70152441	Page 70 / Pg. 79

Terminal diagram

item designation	Lev.	no. cable	type cable	destination A	terminal	link	terminal number	destination B	terminal	Lev.	no. cable	W21	W25	2,5 mm²	page / track
				Terminal strip =+V20MKA10GE010-X8											
PROTECTION							1	-F51.1	2					BK	62 1
=							2	-F51.1	4					BK	62 1
=							3	-F51.1	6					BK	62 1
VOLTAGE REGULATION							4	-F52.1	2					BK	62 3
=							5	-F52.1	4					BK	62 3
=							6	-F52.1	6					BK	62 3
PROTECTION							7	-F53.1	2					BK	62 6
=							8	-F53.1	4					BK	62 6
=							9	-F53.1	6					BK	62 6
MEASUREMENT							10	-F54.1	2					BK	63 1
=							11	-F54.1	4					BK	63 1
=							12	-F54.1	6					BK	63 1
SYNCHRONIZATION							13	-F55.1	2					BK	63 3
=							14	-F55.1	4					BK	63 3
=							15	-F55.1	6					BK	63 3
PROTECTION							16								
VOLTAGE REGULATION							17								
PROTECTION							18	+V20MKA10GD010-T5L3							62;62 6;5
MEASUREMENT							19								
SYNCHRONIZATION							20								
							21	-F50.1	2					BK	64 3
							22	+V20MKA10GD010-T5L3				BK;BK			62;64 7;4
PROTECTION							23	-F51.2	2					BK	65 1
=							24	-F51.2	4					BK	65 1
=							25	-F51.2	6					BK	65 1
VOLTAGE REGULATION							26	-F52.2	2					BK	65 3
=							27	-F52.2	4					BK	65 3
=							28	-F52.2	6					BK	65 3
PROTECTION							29	-F53.2	2					BK	65 6
=							30	-F53.2	4					BK	65 6
=							31	-F53.2	6					BK	65 6
MEASUREMENT							32	-F54.2	2					BK	66 1

SEPARATION PLATE
SEPARATION WITH TS-K

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	Klemmenplan : =+V20MKA10GE010-X8	=
			Drawn	Möbius				+ V20MKA10GE010
			Appr.	Rabe			EG000367	DPPPG-70152441
REVISION	Date	Name	NORM		Replacement for	Replaced by		Page 71 / Pg. 79

Terminal diagram

Terminal strip
=+V20MKA10GE010-X8

item designation	Lev. / no. cable / type cable	destination A	terminal	link	terminal number	destination B	terminal	Lev. / no. cable / type cable	W21 NSGAFöu	W25 NSGAFöu	2,5 mm²	page / track	
MEASUREMENT					33	-F54.2	4				BK	66	1
=					34	-F54.2	6				BK	66	1
SYNCHRONIZATION					35	-F55.2	2				BK	66	3
=					36	-F55.2	4				BK	66	3
=					37	-F55.2	6				BK	66	3
PROTECTION					38								
VOLTAGE REGULATION					39								
PROTECTION					40	+V20MKA10GD010-T6L3						65;65	6;5
MEASUREMENT					41								
SYNCHRONIZATION					42								
					43	-F50.2	2				BK	67	3
					44	+V20MKA10GD010-T6L3				BK;BK		65;67	7;4

SEPARATION PLATE
SEPARATION WITH TS-K

Terminal diagram

item designation	Lev.	no. cable	type cable	destination A	terminal	link	terminal number	destination B	terminal	Lev.	no. cable	type cable	1,5 mm²	page / track
				Terminal strip =+V20MKA10GE010-X10										
PROTECTION							1	-F51.1	33				BK	62 2
=							2	-F51.1	34				BK	62 2
=							3	-F51.1	41				BK	62 2
=							4	-F51.1	42				BK	62 2
VOLTAGE REGULATION							5	-F52.1	33				BK	62 5
=							6	-F52.1	34				BK	62 5
=							7	-F52.1	41				BK	62 5
=							8	-F52.1	42				BK	62 5
PROTECTION							9	-F53.1	33				BK	62 7
=							10	-F53.1	34				BK	62 7
=							11	-F53.1	41				BK	62 8
=							12	-F53.1	42				BK	62 8
MEASUREMENT							13	-F54.1	33				BK	63 2
=							14	-F54.1	34				BK	63 2
=							15	-F54.1	41				BK	63 2
=							16	-F54.1	42				BK	63 2
SYNCHRONIZATION							17	-F55.1	33				BK	63 5
=							18	-F55.1	34				BK	63 5
=							19	-F55.1	41				BK	63 5
=							20	-F55.1	42				BK	63 5
							21	-F50.1	13				BK	64 3
							22	-F50.1	14				BK	64 3
							23	-F50.1	21				BK	64 4
							24	-F50.1	22				BK	64 4
PROTECTION							25	-F51.2	33				BK	65 2
=							26	-F51.2	34				BK	65 2
=							27	-F51.2	41				BK	65 2
=							28	-F51.2	42				BK	65 2
VOLTAGE REGULATION							29	-F52.2	33				BK	65 5
=							30	-F52.2	34				BK	65 5
=							31	-F52.2	41				BK	65 5
=							32	-F52.2	42				BK	65 5

SEPARATION PLATE
SEPARATION WITH TS-K

Terminal diagram

item designation	Lev.	no. cable	type cable	destination A	terminal	link	terminal number	destination B	terminal	Lev.	no. cable	type cable	1,5 mm²	page / track
				Terminal strip =+V20MKA10GE010-X10										
PROTECTION							33	-F53.2	33				BK	65 7
=							34	-F53.2	34				BK	65 7
=							35	-F53.2	41				BK	65 8
=							36	-F53.2	42				BK	65 8
MEASUREMENT							37	-F54.2	33				BK	66 2
=							38	-F54.2	34				BK	66 2
=							39	-F54.2	41				BK	66 2
=							40	-F54.2	42				BK	66 2
SYNCHRONIZATION							41	-F55.2	33				BK	66 5
=							42	-F55.2	34				BK	66 5
=							43	-F55.2	41				BK	66 5
=							44	-F55.2	42				BK	66 5
							45	-F50.2	13				BK	67 3
							46	-F50.2	14				BK	67 3
							47	-F50.2	21				BK	67 4
							48	-F50.2	22				BK	67 4

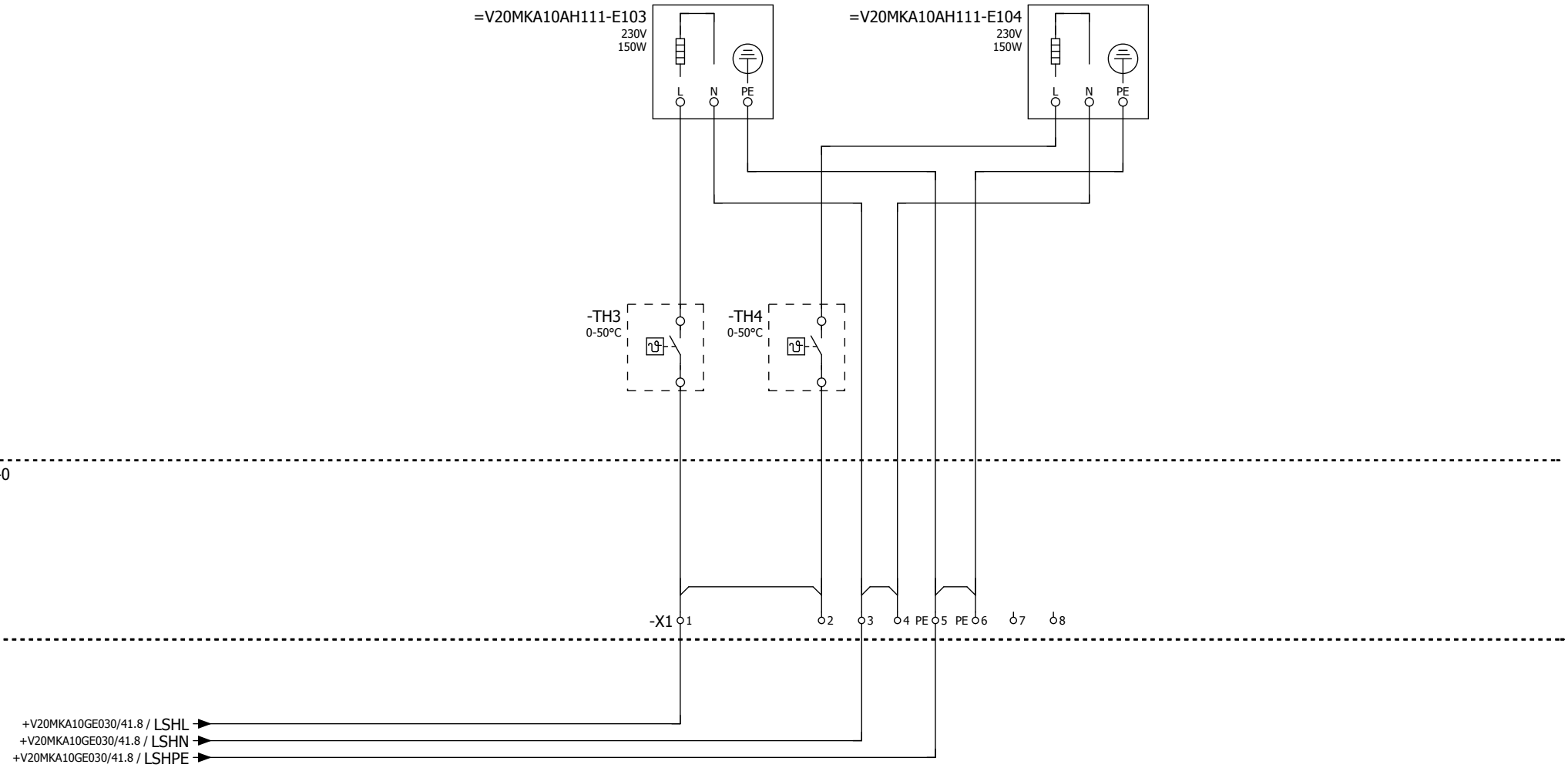
SEPARATION PLATE
SEPARATION WITH TS-K

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	Klemmenplan : =+V20MKA10GE010-X10	=
			Drawn	Möbius				+ V20MKA10GE010
			Appr.	Rabe			EG000367	DPPPG-70152441
REVISION	Date	Name	NORM		Replacement for	Replaced by		Page 74 / Pg. 79

+V20MKA10GD010

MEDIUM VOLTAGE COMPARTMENT
LINE SIDE

LINE SIDE CUBICLE HEATER



b	16.04.2018	Rabe	Date	19.12.2017	VILNIUS Biomass		SIEMENS ENERGY SECTOR	LINE SIDE CUBICLE ANTICONDENSATION HEATER	=	
			Drawn	Möbius					+ V20MKA10GE040	
			Appr.	Rabe					EG000367	DPPPG-70152441
REVISION	Date	Name	NORM		Replacement for	Replaced by			Page	75
									Pg.	79

Terminal diagram

item designation	MEGAFLEX 500 type cable	MKA10AH005 no. cable	Lev.	Terminal strip =+V20MKA10GE040-X1 destination A	terminal	link	terminal number	destination B	terminal	type cable	Lev.	page / track
LINE SIDE CUBICLE HEATER	1			+V20MKA10GE030-X0	14		1	-TH3				75 4
=							2	-TH4				75 5
=	2			+V20MKA10GE030-X0	16		3	=V20MKA10AH111-E103	N			75 4
=							4	=V20MKA10AH111-E104	N			75 7
PE	GNYE			+V20MKA10GE030-X0	PE		5	=V20MKA10AH111-E103	PE			75 5
=							6	=V20MKA10AH111-E104	PE			75 7
LINE SIDE CUBICLE HEATER							7					
=							8					

SEPARATION PLATE
SEPARATION WITH TS-K

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	Klemmenplan : =+V20MKA10GE040-X1	=
			Drawn	Möbius				+ V20MKA10GE040
			Appr.	Rabe			EG000367	DPPPG-70152441
REVISION	Date	Name	NORM		Replacement for	Replaced by		Page 76 / Pg. 79

MANUFACTURER HÄWA
STANDARD CASING K08-15/15
DEGREE OF PROTECTION IP66
TAPPED HOLES

MOUNTING RAIL TS 35 (EN60715)

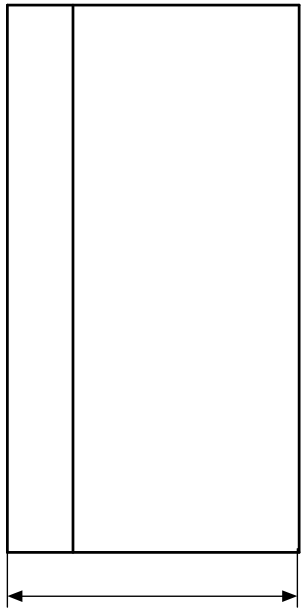
ALL DIMENSIONS IN MM

SCALE 1:2 (A3)

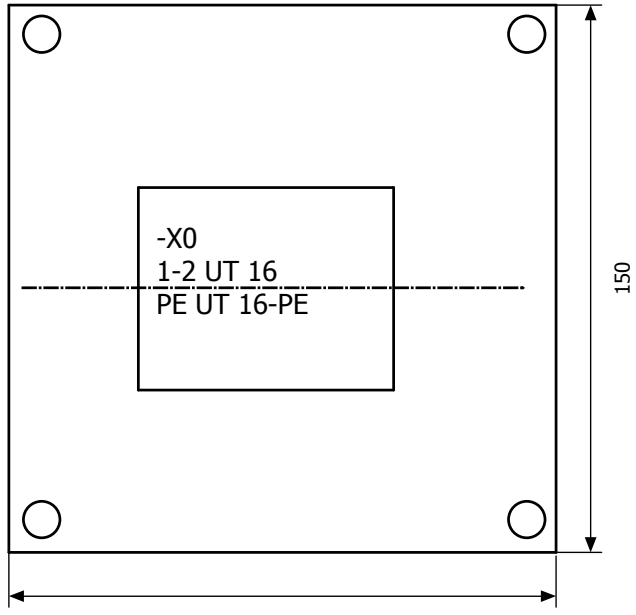
BOTTOM SIDE FOR CUSTOMER CONNECTION DRILLED AT SITE

COLOUR: RAL 7035

VIEW ON RIGHT HAND SIDE



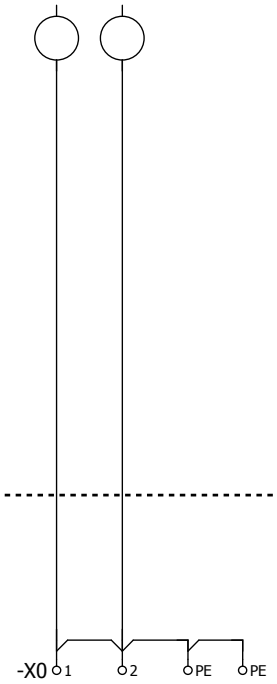
FRONT VIEW WITHOUT COVER



			Date	19.12.2017	VILNIUS Biomass		JUNCTION BOX ROTOR EARTHING MOUNTING PLATE	=	
			Drawn	Möbius				+ V20MKD10GA020	
			Appr.	Rabe				EG000367 DPPPG-70152441	Page 77
REVISION	Date	Name	NORM		Replacement for	Replaced by			Pg. 79

SIEMENS ENERGY SECTOR

ROTOR EARTHING BRUSHES
TE



+V20MKD10GA020

TE ... TURBINE END
EE ... EXCITER END

			Date	19.12.2017	VILNIUS Biomass	SIEMENS ENERGY SECTOR	JUNCTION BOX ROTOR EARTHING	=
			Drawn	Möbius				+ V20MKD10GA020
			Appr.	Rabe			EG000367	DPPPG-70152441 Page 78
REVISION	Date	Name	NORM		Replacement for	Replaced by		Pg. 79

Terminal diagram

Terminal strip
=+V20MKD10GA020-X0

item designation	destination A	terminal	link	terminal number	destination B	terminal	page / track
			●	1	-V1		78 2
			●	2	-V2		78 3
			●	PE			
			●	PE			

SEPARATION PLATE
SEPARATION WITH TS-K

List of Tools

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List of Tools - Recommendation

Pos	Quant.	Description	
01	1 Pc	Tool cabinet	19drawers
02	2 Pc	Lock fastening	BKS (GGXB 1)
		Drawer 1	
03	1 Pc	Table of contents	
04	1 Pc	Expendable material	Paket - A54J37G87
05	1 Pc	Saw	400
06	2 Pc	Crowbar	D=30*1250
07	1 Pc	Socket wrench box	Wafe10-32;1/2IN=27-Items
08	1 Pc	Socket wrench box	Wafe22-50;3/4IN=15-Items
09	1 Pc	Rigid steel rule	1000-00 70*40
010	1 Pc	Angled-nose self-gripping pipe wrench	2IN-560
011	1 Pc	Hammer	A5S-B
012	1 Pc	Angled-nose self-gripping pipe wrench	3IN-710
		Drawer 2	
013	1 Pc	Pocket slide caliper	BN300
014	1 Pc	Precision depth gauge with hook	C300
015	1 Pc	Precision Micrometer Gauge	0-25
016	1 Pc	Precision Micrometer Gauge	25-50
017	1 Pc	Inside Micrometer Gauge	I 30-40
018	1 Pc	Inside Micrometer Gauge	I 40-50
019	6 Pc	Dial indicator	10MM
020	3 Pc	Magnetic Stand	Dial indicators
021	3 Pc	Magnetic holder for Dial indicators	P 18
022	1 Pc	Feeler gauges-set	0,03-0,5*100*10=28 Bl.
023	1 Pc	Feeler gauges-set	0,05-1,5*600*10=18 Bl.
024	1 Pc	Feeler gauges-set	0,05-1,5*1000*10=18 Bl.
025	1 Pc	Flexible ruler	500MM
026	1 Pc	Tape measure	A-20
027	1 Pc	Gauging unit	Shaft position
028	1 Pc	Crankpin spirit levels	90
029	1 Pc	Frame spirit levels	B200
030	1 Pc	Spirit level; Wood	500
031	1 Pc	Hairline gauge	300
032	1 Pc	Circle cutter	D=0-400
033	1 Pc	Plumbline with reel	
034	2 Pc	Metal marker	5*180
035	2 Pc	Angle metal marker	6*160
036	1 Pc	Dividers	200MM
037	1 Pc	Inside calipers	200

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038	1 Pc	Outside calipers	200
039	1 Pc	Square with stop	B 150/100 II
040	1 Pc	Flat Square	A 200/130 II

Drawer 3

041	1 Pc	Flat file	A 150-2
042	1 Pc	Flat file	A 250-1
043	1 Pc	Flat file	A 250-3
044	1 Pc	Flat file	A 350-1
045	1 Pc	Flat file	A 350-3
046	1 Pc	Square file	D 150-2
047	1 Pc	Square file	D 250-1
048	1 Pc	Square file	D 250-3
049	1 Pc	Square file	D 350-1
050	1 Pc	Square file	D 350-3
051	1 Pc	Triangular file	C 200-1
052	1 Pc	Triangular file	C 200-3
053	1 Pc	Triangular file	C 300-1
054	1 Pc	Triangular file	C 300-3
055	1 Pc	Half-round file	E 200-1
056	1 Pc	Half-round file	E 200-3
057	1 Pc	Half-round file	E 300-1
058	1 Pc	Half-round file	E 300-3
059	1 Pc	Round file	F 150-2
060	1 Pc	Round file	F 200-1
061	1 Pc	Round file	F 200-3
062	1 Pc	Round file	F 300-1
063	1 Pc	Round file	F 300-3
064	1 Pc	Needle file set	160-2
065	10 Pc	File handle	80
066	15 Pc	File handle	120
067	15 Pc	File handle	140
068	1 Pc	Shaper tool file holder	
069	2 Pc	Shaper tool file	A 350-type:3
070	2 Pc	Shaper tool file	A 350-typ:1

Drawer 4

071	2 Pc	Center punch	5*120
072	4 Pc	Flat chisel	200
073	4 Pc	Cross cut chisel	200
074	1 Pc	Engineer`s hammer	2,0S
075	2 Pc	Engineer`s hammer	300S
076	1 Pc	Engineer`s hammer	500S
077	1 Pc	Engineer`s hammer	800S
078	2 Pc	Engineer`s hammer	1000S
079	1 Pc	Flat face rubber mallet	A 600S-90

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080	1 Pc	Wood hammer	A 50
081	1 Pc	Plastic hammer	60
082	1 Pc	Lead-hammer	3Kg
083	1 Pc	Cotter pin driver	C2
084	1 Pc	Cotter pin driver	C3
085	1 Pc	Cotter pin driver	C4
086	1 Pc	Cotter pin driver	C5
087	1 Pc	Cotter pin driver	C6
088	1 Pc	Cotter pin driver	C8
089	2 Pc	Drift punch	D10
090	1 Pc	Deburr seal strip metal	

Drawer 5

091	1 Pc	Twist scraper	
092	2 Pc	Carbide-tipped flat scraper	30*450
093	3 Pc	Tree-square curved scraper	16*200*310
094	4 Pc	Tree-square hollow scraper	C200G
095	5 Pc	Flat scraper	A250G
096	2 Pc	Portable saw for steel	A
097	1 Pc	Hand shears; straight	200
098	1 Pc	Hand shears; curved	L250
099	2 Pc	Paper scissors	210MM
0100	1 Pc	Flat nose pliers	A160
0101	1 Pc	Engineer`s pliers	200
0102	1 Pc	Round nose pliers	A160
0103	1 Pc	Carpenter`s pincers	200
0104	1 Pc	Adjustable plier	B240
0105	1 Pc	Snap ring pliers;extern	A19
0106	1 Pc	Snap ring pliers;intern	C19
0107	1 Pc	Diagonal cutting pliers	B160H

Drawer 6

0108	1 Pc	Screwdriver	A0,4*2,5
0109	1 Pc	Screwdriver	A0,6*3,5
0110	1 Pc	Screwdriver	A1*5,5
0111	1 Pc	Screwdriver	A1,2*6,5
0112	1 Pc	Screwdriver	A1,2*8
0113	1 Pc	Screwdriver	A1,6*10
0114	1 Pc	Screwdriver	A2*12
0115	1 Pc	Offset screwdriver (slotted)	A0,8*5,5
0116	1 Pc	Offset screwdriver (slotted)	A1,2*8*L2=20
0117	1 Pc	Offset screwdriver (slotted)	A1,6*10*L2=25
0118	1 Pc	Offset screwdriver (slotted)	A2,5*14
0119	1 Pc	Firmer chisel	B12GA
0120	1 Pc	Firmer chisel	B25/26GA
0121	2 Pc	Hand vise	0-35;130MM

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0122	1 Pc	Screw clamp	160;100
0123	1 Pc	Screw clamp	200
0124	4 Pc	Screw clamp	200
0125	2 Pc	Cable knife	

Drawer 7

0126	1 Pc	Bellows	
0127	1 Pc	Letter punch	Set:10MM
0128	1 Pc	Number punch	Set:10MM
0129	1 Pc	Nail extractor	D=17*500
0130	2 Pc	Chisel	1*11,5*132
0131	1 Pc	Shape	Swan.neck,S=0,8
0132	8 Pc	Installation wedges	30*40*150
0133	1 Pc	Hand-magnet	D=11*70*700;Flexible
0134	1 Pc	Hand-magnet	D=20*70*700;Flexible
0135	1 Pc	Hole punch	A5
0136	1 Pc	Hole punch	A10
0137	1 Pc	Hole punch	A12
0138	1 Pc	Hole punch	A16
0139	1 Pc	Hole punch	A20
0140	1 Pc	Hole punch	A24
0141	1 Pc	Hole punch	A28
0142	1 Pc	Hole punch	A32
0143	1 Pc	Hole punch	A40
0144	1 Pc	Oil can	300
0145	1 Pc	Hand compass saw for wood	B350

Drawer 8

0146	1 Pc	Hammer face ring wrench	36
0147	1 Pc	Hammer face ring wrench	41
0148	1 Pc	Hammer face ring wrench	46
0149	1 Pc	Hammer face ring wrench	50
0150	1 Pc	Hammer face ring wrench	55
0151	1 Pc	Hammer face ring wrench	60
0152	1 Pc	Hammer face ring wrench	65
0153	1 Pc	Hammer face ring wrench	70
0154	1 Pc	Hammer face ring wrench	75
0155	1 Pc	Hammer face ring wrench	80
0156	1 Pc	Hammer face ring wrench	85
0157	1 Pc	Hammer face ring wrench	90
0158	1 Pc	Hammer face ring wrench	95

Drawer 9

0159	2 Pc	CEE-Extension cable	220V-16A;10M
0160	2 Pc	CEE-Extension cable	24V-16A-2wire;10M

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0161	1 Pc	CEE-Extension cable	42V-16A-2wire;10M
0162	1 Pc	Multipel plug-ins with extension cable	220V-16A;10M.;CEE

Drawer 10

0163	1 Pc	Isolating transformer	220V/42V-16A-630VA
0164	1 Pc	Drill-machine	220V/740W;16MM
0165		Substitute:A54J21J63+A54J12E25	
0166	1 Pc	Hot air gun	600GRD
0167	2 Pc	Magnetic inspection lamp	24V-60W
0168	2 Pc	Isolating transformer	220V/24V-16A-100VA

Drawer 11

0169	1 Pc	Tubular socket wrench	A8*9
0170	1 Pc	Tubular socket wrench	A10*11
0171	1 Pc	Tubular socket wrench	A12*13
0172	1 Pc	Tubular socket wrench	A14*15
0173	1 Pc	Tubular socket wrench	A17*19
0174	1 Pc	Tubular socket wrench	A22*24
0175	1 Pc	Tubular socket wrench	A24*27
0176	1 Pc	Tubular socket wrench	A30*32
0177	1 Pc	Tubular socket wrench	A36*41
0178	1 Pc	Tubular socket wrench	A46*50
0179	1 Pc	First aid kit	

Drawer 12

0180	4 Pc	Twist drill	1
0181	4 Pc	Twist drill	1,5
0182	4 Pc	Twist drill	2
0183	4 Pc	Twist drill	2,5
0184	4 Pc	Twist drill	3
0185	4 Pc	Twist drill	3,3
0186	4 Pc	Twist drill	3,5
0187	4 Pc	Twist drill	4
0188	4 Pc	Twist drill	4,2
0189	4 Pc	Twist drill	4,5
0190	4 Pc	Twist drill	5
0191	4 Pc	Twist drill	5,5
0192	4 Pc	Twist drill	6
0193	4 Pc	Twist drill	6,5
0194	4 Pc	Twist drill	6,7
0195	4 Pc	Twist drill	7
0196	4 Pc	Twist drill	7,5
0197	4 Pc	Twist drill	8
0198	4 Pc	Twist drill	8,5
0199	4 Pc	Twist drill	9

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0200	4 Pc	Twist drill	10
0201	2 Pc	Twist drill	10,5
0202	2 Pc	Twist drill	11
0203	2 Pc	Twist drill	11,5
0204	2 Pc	Twist drill	12
0205	2 Pc	Twist drill	12,5
0206	2 Pc	Twist drill	13
0207	2 Pc	Twist drill	13,5
0208	1 Pc	Twist drill	14
0209	1 Pc	Twist drill	15
0210	1 Pc	Twist drill	16
0211	1 Pc	Twist drill	17
0212	1 Pc	Twist drill	18
0213	1 Pc	Twist drill	19
0214	1 Pc	Twist drill	20
0215	1 Pc	Twist drill	21
0216	1 Pc	Twist drill	22
0217	1 Pc	Twist drill	23
0218	1 Pc	Twist drill	24
0219	1 Pc	Twist drill	25
0220	1 Pc	Twist drill	26
0221	1 Pc	Twist drill	27
0222	1 Pc	Twist drill	28
0223	1 Pc	Twist drill	29
0224	1 Pc	Twist drill	30
0225	2 Pc	Taps drill	V-M4-6H
0226	2 Pc	Taps drill	M-M4-6H
0227	2 Pc	Taps drill	F-M4-6H
0228	2 Pc	Taps drill	V-M5-6H
0229	2 Pc	Taps drill	M-M5-6H
0230	2 Pc	Taps drill	F-M5-6H
0231	3 Pc	Taps drill	V-M6-6H
0232	3 Pc	Taps drill	M-M6-6H
0233	3 Pc	Taps drill	F-M6-6H
0234	3 Pc	Taps drill	V-M8-6H
0235	3 Pc	Taps drill	M-M8-6H
0236	3 Pc	Taps drill	F-M8-6H
0237	2 Pc	Taps drill	V-M10-6H
0238	2 Pc	Taps drill	M-M10-6H
0239	2 Pc	Taps drill	F-M10-6H
0240	2 Pc	Taps drill	V-M12-6H
0241	2 Pc	Taps drill	M-M12-6H
0242	2 Pc	Taps drill	F-M12-6H
0243	2 Pc	Taps drill	V-M16-6H
0244	2 Pc	Taps drill	M-M16-6H
0245	2 Pc	Taps drill	F-M16-6H
0246	2 Pc	Taps drill	V-M20-6H
0247	2 Pc	Taps drill	M-M20-6H

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0248	2 Pc	Taps drill	F-M20-6H
0249	1 Pc	Taps drill	V-M24-6H
0250	1 Pc	Taps drill	M-M24-6H
0251	1 Pc	Taps drill	F-M24-6H
0252	1 Pc	Taps drill	V-M27-6H
0253	1 Pc	Taps drill	M-M27-6H
0254	1 Pc	Taps drill	F-M27-6H
0255	1 Pc	Taps drill	V-M30-6H
0256	1 Pc	Taps drill	M-M30-6H
0257	1 Pc	Taps drill	F-M30-6H
0258	1 Pc	Taps drill	V-M33-6H
0259	1 Pc	Taps drill	M-M33-6H
0260	1 Pc	Taps drill	F-M33-6H
0261	1 Pc	Taps drill	V-M36-6H
0262	1 Pc	Taps drill	M-M36-6H
0263	1 Pc	Taps drill	F-M36-6H
0264	1 Pc	Taps drill	V-M39-6H
0265	1 Pc	Taps drill	M-M39-6H
0266	1 Pc	Taps drill	F-M39-6H
0267	1 Pc	Taps drill	V-M42-6H
0268	1 Pc	Taps drill	M-M42-6H
0269	1 Pc	Taps drill	F-M42-6H
0270	1 Pc	Taps drill	V-M48-6H
0271	1 Pc	Taps drill	M-M48-6H
0272	1 Pc	Taps drill	F-M48-6H
0273	1 Pc	Taps drill	V-M20*1,5
0274	1 Pc	Taps drill	F-M20*1,5
0275	1 Pc	Taps drill	V-M27*2-6H
0276	1 Pc	Taps drill	F-M27*2-6H
0277	1 Pc	Thread-cutting die	A-M4
0278	1 Pc	Thread-cutting die	A-M5
0279	1 Pc	Thread-cutting die	A-M6
0280	1 Pc	Thread-cutting die	A-M8
0281	1 Pc	Thread-cutting die	A-M10
0282	1 Pc	Thread-cutting die	A-M12
0283	1 Pc	Thread-cutting die	A-M16
0284	1 Pc	Thread-cutting die	A-M20
0285	1 Pc	Thread-cutting die	A-M20*1,5
0286	1 Pc	Thread-cutting die	A-M27*2
0287	1 Pc	Hexagon-Thread-cutting die	M24
0288	1 Pc	Hexagon-Thread-cutting die	M27
0289	1 Pc	Hexagon-Thread-cutting die	M30
0290	1 Pc	Hexagon-Thread-cutting die	M33
0291	1 Pc	Hexagon-Thread-cutting die	M36
0292	1 Pc	Hexagon-Thread-cutting die	M39
0293	1 Pc	Hexagon-Thread-cutting die	M42
0294	1 Pc	Hexagon-Thread-cutting die	M48
0295	1 Pc	Hexagon-Thread-cutting die	G1/2IN

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0296	1 Pc	Hexagon-Thread-cutting die	G3/4IN
0297	1 Pc	Hexagon-Thread-cutting die	M64*2
0298	1 Pc	Taps drill	F-M64*2-6H

Drawer 13

0299	1 Pc	Reducing sleeve	2*1
0300	1 Pc	Reducing sleeve	3*2
0301	1 Pc	Reducing sleeve	4*3
0302	1 Pc	Ejector drifts for morse taper	1
0303	1 Pc	Ejector drifts for morse taper	3
0304	2 Pc	Countersinks-90grad	C16,5
0305	1 Pc	Tab extension sockets	3,4
0306	1 Pc	Tab extension sockets	4,9*110
0307	1 Pc	Tab extension sockets	5,5
0308	1 Pc	Adjustable tap wrench	M1-10;2-6,3VKT;Size:1
0309	1 Pc	Adjustable tap wrench	M1-12;2,1-8VKT;Size:1,5
0310	1 Pc	Adjustable tap wrench	M5-20;4,9-12VKT;Size:3
0311	1 Pc	Adjustable tap wrench	M11-27;5,5-16VKT;Size:4
0312	1 Pc	Adjustable tap wrench	M25-52;16-32VKT;Size:7
0313	1 Pc	Boring jig for rupper o-ring	D=8MM
0314	1 Pc	Boring jig for rupper o-ring	D=10MM
0315	1 Pc	Die stocks	20*5GS
0316	1 Pc	Die stocks	20*7GS
0317	1 Pc	Die stocks	25*9GS
0318	1 Pc	Die stocks	30*11GS
0319	1 Pc	Die stocks	38*14
0320	1 Pc	Die stocks	45*18
0321	1 Pc	Die stocks	65*25

Drawer 14

0322	1 Pc	Taper shank reamer	A6
0323	1 Pc	Taper shank reamer	A8
0324	1 Pc	Taper shank reamer	A10
0325	1 Pc	Taper shank reamer	A12
0326	1 Pc	Taper shank reamer	A14
0327	1 Pc	Taper shank reamer	A16
0328	1 Pc	Taper shank reamer	A20
0329	1 Pc	Taper shank reamer	A25
0330	1 Pc	Taper shank reamer	A30
0331	1 Pc	Ratchet	3,5-11Sq;Sz:0
0332	1 Pc	Ratchet	5-14Sq;Sz:1
0333	1 Pc	Ratchet	10-17Sq;Sz:2
0334	1 Pc	Ratchet	14-22Sq;Sz:3
0335	1 Pc	Ratchet	18-30Sq;Sz:4
0336	1 Pc	Ratchet	25-46Sq;Sz:5
0337	1 Pc	Ratchet square insert	5,5Sq-Ratchet:Sz:0

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0338	1 Pc	Ratchet square insert	7Sq-Ratchet:Sz:0
0339	1 Pc	Ratchet square insert	8Sq-Ratchet:Sz:1
0340	1 Pc	Ratchet square insert	9Sq-Ratchet:Sz:1
0341	1 Pc	Ratchet square insert	11Sq-Ratchet:Sz:1
0342	1 Pc	Ratchet square insert	12Sq-Ratchet:Sz:1
0343	1 Pc	Ratchet square insert	14,5Sq-Ratchet:Sz:2
0344	1 Pc	Ratchet square insert	16Sq-Ratchet:Sz:2
0345	1 Pc	Ratchet square insert	18Sq-Ratchet:Sz:3
0346	1 Pc	Ratchet square insert	20Sq-Ratchet:Sz:4
0347	1 Pc	Ratchet square insert	22Sq-Ratchet:Sz:4
0348	1 Pc	Ratchet square insert	26Sq-Ratchet:Sz:4
0349	1 Pc	Ratchet square insert	29Sq-Ratchet:Sz:5
0350	1 Pc	Ratchet square insert	32Sq-Ratchet:Sz:5

Drawer 15

0351	2 Pc	Combination open-ended/box-end wrench	B9
0352	4 Pc	Combination open-ended/box-end wrench	B10
0353	2 Pc	Combination open-ended/box-end wrench	B11
0354	2 Pc	Combination open-ended/box-end wrench	B12
0355	4 Pc	Combination open-ended/box-end wrench	B13
0356	4 Pc	Combination open-ended/box-end wrench	B14
0357	2 Pc	Combination open-ended/box-end wrench	B16
0358	4 Pc	Combination open-ended/box-end wrench	B17
0359	2 Pc	Combination open-ended/box-end wrench	B18
0360	4 Pc	Combination open-ended/box-end wrench	B19
0361	2 Pc	Combination open-ended/box-end wrench	B21
0362	2 Pc	Combination open-ended/box-end wrench	B22
0363	2 Pc	Combination open-ended/box-end wrench	B23
0364	4 Pc	Combination open-ended/box-end wrench	B24
0365	2 Pc	Combination open-ended/box-end wrench	B26
0366	2 Pc	Combination open-ended/box-end wrench	B27
0367	4 Pc	Combination open-ended/box-end wrench	B30
0368	2 Pc	Combination open-ended/box-end wrench	B32
0369	2 Pc	Combination open-ended/box-end wrench	B34
0370	2 Pc	Combination open-ended/box-end wrench	B36
0371	1 Pc	Combination open-ended/box-end wrench	B41
0372	1 Pc	Combination open-ended/box-end wrench	B46
0373	1 Pc	Offset screw driver	2
0374	1 Pc	Offset screw driver	2,5
0375	1 Pc	Offset screw driver	3
0376	1 Pc	Offset screw driver	4
0377	1 Pc	Offset screw driver	5
0378	1 Pc	Offset screw driver	6
0379	1 Pc	Offset screw driver	7
0380	1 Pc	Offset screw driver	8
0381	1 Pc	Offset screw driver	9
0382	1 Pc	Offset screw driver	10

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0383	1 Pc	Offset screw driver	14
0384	1 Pc	Offset screw driver	17
0385	1 Pc	Offset screw driver	19
0386	1 Pc	Offset screw driver	22
0387	1 Pc	Offset screw driver	24
0388	1 Pc	Offset screw driver	27
0389	1 Pc	Offset screw driver	32

Drawer 16

0390	2 Pc	Load shackle	M10*50
0391	2 Pc	Load shackle	M12*55
0392	2 Pc	Load shackle	M16*65
0393	2 Pc	Load shackle	M20*70
0394	2 Pc	Load shackle	M24*80
0395	2 Pc	Load shackle	M30*110
0396	2 Pc	Pin shackle	C1
0397	2 Pc	Pin shackle	C6

Drawer 17

0398	4 Pc	Screw clamp support	40-50
0399	4 Pc	Lengthening for Levelling screw jacks	M12*60
0400	2 Pc	Screw clamp support	85-130
0401	4 Pc	Crowned tip for Levelling screw jacks	Peak
0402	2 Pc	Screw clamp support	140-215
0403	4 Pc	Crowned tip for Levelling screw jacks	Ball
0404	4 Pc	Crowned tip for Levelling screw jacks	Flat

Drawer 18

0405	1 Pc	Electric soldering iron	220V-300W
0406	1 Pc	Signal torque wrench	025-130NM-0/0IN
0407	1 Pc	Insert open-end wrench for Torque wrench	Wafe19
0408	1 Pc	Insert open-end wrench for Torque wrench	Wafe22
0409	1 Pc	Insert open-end wrench for Torque wrench	Wafe24
0410	2 Pc	Collecting belt	A
0411	1 Pc	Titeseal-hand pump	
0412	1 Pc	Collar screw wrench for water chamber	waf36

Drawer 19

0413	1 Pc	Angel-drill-machine; pneum.	Deprag-Dreb 50/MK4
0414	1 Pc	Impact screwdrivers	1-IN-Sq-Atlas-LMS64
0415	1 Pc	Impact drive sockets	32*25
0416	1 Pc	Impact drive sockets	36*25
0417	1 Pc	Impact drive sockets	41*25
0418	1 Pc	Impact drive sockets	46*25

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0419	1 Pc	Impact drive sockets	50*25
0420	1 Pc	Impact drive sockets	55*25
0421	1 Pc	Impact drive sockets	60*25
0422	1 Pc	Impact drive sockets	65*25
0423	1 Pc	Impact drive sockets/Allen Key	Wafe22-1IN;Sq
0424	1 Pc	Impact drive sockets/Allen Key	Wafe27-1IN;Sq
0425	1 Pc	Impact drive sockets/Allen Key	Wafe32-1IN;Sq
0426	1 Pc	Universal joint	1IN-Sq*150
0427	1 Pc	Extension for square socket	1IN-Sq*180
0428	1 Pc	Extension for square socket	1IN-Sq*335
0429	1 Pc	Impact screwdrivers	1/2IN-Sq;300MM
0430	1 Pc	Universal joint	1/2"Sq*75
0431	1 Pc	Extension for square socket	1/2IN-Sq*120
0432	1 Pc	Impact drive sockets	17*12,5
0433	1 Pc	Impact drive sockets	19*12,5
0434	1 Pc	Impact drive sockets	22*12,5
0435	1 Pc	Impact drive sockets	24*12,5
0436	1 Pc	Impact drive sockets	27*12,5
0437	1 Pc	Impact drive sockets	30*12,5
0438	1 Pc	Special stamping tool-screw punch	18,6
0439	1 Pc	Special stamping tool-screw punch	22
0440	1 Pc	Special stamping tool-screw punch	25
0441	1 Pc	Special stamping tool-screw punch	27
0442	1 Pc	Special stamping tool-screw punch	30
0443	1 Pc	Angel-grinder; pneum.	178MM-860U/MIN;2,2KW
0444	1 Pc	Air pressure hose	with oiler

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Generator Checklist

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SIEMENS

Siemens AG
Power and Gas Division
Large Gas Turbines, Generators
Generator Plant Erfurt

Issue: 11
Date: 2015-12-03

Generator Checklist (2-Pole Generator) for Readiness Reviews

This checklist shall be completed by the responsible representatives at site for each generator as the installation progresses

Note: This checklist is required for every site readiness review.
It is a standardized review checklist. Some of the collected issues may not apply to several projects and can be cancelled. If there are any corrections or adding's mail it to your Siemens contact person.

STEP	PROCEDURE	REFER TO DOCUMENT	CHECK IF STATUS OKAY	INITIAL/DATE CHECKED
1.	**Receipt of Generator Components and Generator**			
A.	Verify that the following components are stored in a clean and dry area:	*Gen. Outline Drawing* *Supplement Drawing*		
	1. Generator itself			
	2. Generator cover			
	3. Cooler cover and cooler elements			
	4. Oil Piping			
	5. Hydrostatic system and hoses			
	6. Anchoring and other loose shipped parts			
	7. Main lead bracket with current transformers, and voltage converters, neutral point connections and neutral grounding transformer			
	8. Neutral Point and Line Side Cubicle and there base frames			
	9. Generator rotor (if separate shipment).			
B.	All components of the generator, including the slip rings or the exciter, are a Visual inspection for damage and corrosion. Possible damage caused by rust, water intrusion, or wrong transport must be documented through photos of the affected components. After checking, all protective covers and fittings are refitted.			
	1. Check of the delivery status of the stator end windings, the stand plate package, its fastening and sealing, as well as the generator frame.			
	2. Check of the delivery status of the carbon brushes, holder and slip-rings.			

STEP	PROCEDURE	REFER TO DOCUMENT	CHECK IF STATUS OKAY	INITIAL/DATE CHECKED
	3. Check of the delivery status of the rotor externally as far as possible.			
	4. Verify that the covers over the oil supply and drain pipe flanges on each bearing pedestal completely seal the pipes to which they are attached. The covers should be sealed such that no dirt or debris can enter the pipe.			
	5. Before turning the rotor is to verify whether the packing in the bearing have been removed. Remove dirt and grease the bearings. After the inspection, close disassembled covers and open oil flanges.			
C.	Verify that there is a minimum insulation resistance of 1 mega ohm per 1 kV rated voltage (at 40 degrees C) on each **stator winding** phase when measured with a for example 1kV-5kV megger for 1 minute. Megger readings should be taken on a weekly basis. Record results on the protocol 4.7-2800-0001 /1 in the end of this checklist. The polarization index is not necessary because the Micalastic insulation is not sensitive to moisture.	*General Handling Guidelines* *4.7-1011-0004*		
D.	Verify that there is a minimum insulation resistance of 1 mega ohm (at 40 degrees C) on the **rotor windings** when measured with a 250-volt megger for 2 minutes. Megger readings should be taken on a weekly basis. Record results on the protocol 4.7-2800-0001 /2 in the end of this checklist.	*General Handling Guidelines* *4.7-1010-0006*		
E.	Verify that the minimum resistance from the rotor body/shaft to ground is ≥ 500 KΩ with a 100 - 250V megger.	*Generator Assembly Records*		
F.	Verify that the generator and exciter space heaters are energized. Refer to the Generator Outline Supplement for heater wiring and location of junction box.	*Generator Outline Drawing* *Wiring Diagram*		
G.	Verify the number and size of coupling bolts holes on the generator and turbine couplings.	*Generator Outline Drawing*		
H.	Ensure that yellow temporary shipping covers and shipping restraints have been removed. This includes the following; rotor shipping brace, stator shipping brace and transportation securing device. Refer to the Shipping Cover Assembly and the Field Final Assembly drawings for details.	*Gen. Outline Drawing* *Shipping Brace Spec. Design Drawing* *Shipping Gen.*		
	1. Rotor shipping precaution in the bearings (if rotor is mounted in the generator)			
	2. Internal stator shipping brace and bolting hardware.			
	3. Verify that returnable shipping components have been re-packaged for return to the Siemens Erfurt factory.			

STEP	PROCEDURE	REFER TO DOCUMENT	CHECK IF STATUS OKAY	INITIAL/DATE CHECKED
2.	**Receipt of Auxiliary Equipment**			
	Verify by visual inspection that the auxiliary equipment is complete, clean and undamaged.	*Shipping List*		
3.	**Generator Installation on Foundation and Alignment**			
3.1.	**Generator Foundation Verification**			
A.	Verify that the following generator foundation items meet the Siemens Generator Outline drawing requirements:	*Generator Outline Drawing* *Anchoring Drawing* *Manufacture Specifications for Anchoring*		
	1. Anchor bolt location for the generator and the acoustic outer enclosure.			
	2. Axial and transverse anchor embedment (if applicable).			
	3. Generator foundation size.			
	4. Cover foundation size.			
B.	Before setting generator on foundation insure that the bottom of generator and plates are clean, grease and burr free.			
C.	Check that the entire concrete between the generator base frame and cover foundation is properly sealed with a special. (if separate Cover anchor)			
3.2.	**After Generator Installation on Foundation**			
	Perform preliminary alignment of generator to the turbine and recording the results.			
3.3.	**Generator to Turbine Coupling Alignment**			
A.	Prior to mating the generator coupling to the turbine coupling verify that the minimum resistance from the rotor body/shaft to ground is ≥ 500 KΩ with a 100 - 250V megger.	*Generator Assembly Records*		
B.	Verify that at least 90% of the base frame is completely grouted with non shrinking grout, leveling screws are turned back and the found.-anchor bolts has been installed and torqued.	*Anchoring Drawing* *Manufacture Specifications for Anchoring*		
C.	Ensure that the coupling halves mating faces and bolt holes are clean and free of burrs and dents. Clean as necessary.			
D.	Verify the coupling alignment readings for parallelism and concentricity. Record the measurements.			
E.	Ensure that alignment requirements are observed and the offset and bending of rotor body are considered	*Outline Drawing Text*		
F.	Verify coupling bolts are properly torqued or tensioned per the coupling assembly drawing. Record the measurements of torque/tension.			

STEP	PROCEDURE	REFER TO DOCUMENT	CHECK IF STATUS OKAY	INITIAL/DATE CHECKED
4.	**Installation of Mechanical and Electrical Equipment**			
A.	Inspect the sealing from to the cooler cover to the generator cover. Inspect the bolting and sealing of the cooler elements.	*Cooler Drawing*		
B.	Inspect outer generator cover sealing to the generator base frame at all of the following locations below. All of the below should be verified via the halogen light test.	*Cover Drawings*		
	1. Between generator cover and base frame			
	2. Between generator cover and foundation.			
	3. Between generator cover and extra covers on Turbine End and Exciter End.			
	4. Between generator cover and wall panel (cool air / hot air) on generator base frame			
	5. Between generator cover and all shaft bushings on TE and EE.			
	6. Between generator cover and all pipe penetrations on TE and EE.			
	7. At all access panels and doors on generator cover and cooler cover.			
	8. Between generator cover and turbine enclosure.			
	9. Between generator cover and starting package.			
C.	Review all connection points for the cooler piping, liquid detector vent and drain, and cooler vents to ensure that they have been assembled correctly and that there are no obstructions in the lines.	*Cooler Drawing*		
D.	Inspect the top of the generator and cooler area for cleanliness.			
E.	Verify the cleanliness of the area inside the generator enclosure and cooler cover. The entire area should be swept and vacuumed.			
F.	Verify installation of the external generator junction boxes mounted on the generator base frame or generator enclosure.	*Generator Outline Drawing*		
G.	Verify installation of the intermediate shaft cover or coupling cover support.			
H.	Verify all air filters are installed and properly sealed to the support framework in all applicable locations.	*Generator Outline Drawing* *Cover Drawings* *Brush Gear Drawing*		
	1. Inlet filters on slip rings and silencers.			
	2. Make up duct filter on TEWAC cooler.			
I.	Verify that the main and neutral lead assemblies have been properly installed per drawing. Verify	*Assembly Instruction for Flex Link*		

STEP	PROCEDURE	REFER TO DOCUMENT	CHECK IF STATUS OKAY	INITIAL/DATE CHECKED
	that the contact check between the leads on the assembly and the leads extending from the generator has been performed. Make sure that all bolts have been properly lubricated and installed, all lock washers are locked and the flexible links are mounted stress-free.	*Installation* *Bushings Assembly*		
	1. All flexible connections stress free installed.			
	2. Main lead bolting lubricated and torqued.			
	3. Main lead assembly and contact check.			
	4. Neutral lead bolting lubricated and torqued.			
	5. Neutral lead assembly contact check.			
J.	Verify that the neutral grounding resistor and transformers have been properly connected. Verify that the contact check between the leads on the assembly and the leads extending from the generator has been performed. Make sure that all bolts have been properly lubricated and installed, all lock washers are locked and the flexible links are mounted stress-free.	*Cubicle Outline Drawing* *Single line diagram*		
	1. Verify that the resistance across the bank of resistors is 0.48 ohms.			
	2. Verify that the H1 side of the grounding transformer is connected to the neutral shorting bar on the neutral leads.			
	3. Verify that the H2 side of the grounding transformer is connected to ground.			
	4. Verify that the X1 side of the grounding transformer is connected to one end of the resistor bank.			
	5. Verify that the X4 side of the grounding transformer is connected to the opposite one end of the resistor bank from that of the lead that is connected to the X1 side of the grounding transformer.			
	6. Verify that the resistor bank is grounded.			
K.	Verify that all power consuming devices and measuring points are connected according to the connection diagram.			
L.	Verify that the slip rings assembly has taken place in accordance with the assembly drawing.	*Generator Outline Drawing*		
	1. Verify that the brush gear have been properly assembled and installed. The spring locking mechanism should fully engage insuring firm seating of the brush in the holder.			
	2. Verify that where the slip rings leads pass through the generator frame that they have been properly sealed.			

STEP	PROCEDURE	REFER TO DOCUMENT	CHECK IF STATUS OKAY	INITIAL/DATE CHECKED
M.	Verify that generator base frame and generator cover are grounded to the plant ground grid.	*Generator Outline Drawing* *Grounding Drawing*		
N.	Check the transmission ratio and polarity of electricity and power transformer (if provided) on the basis of the current run plans.	*Cubicle Outline Drawing* *Single line diagram*		
	1. Line Out Cubicle			
	2. Neutral Point Cubicle			
	3. Mai lead bracket with Cubicle			
O.	Verify wiring from the data acquisition system has been connected and labeled properly the main junction boxes of the generator. Continuity checks should be performed on all wiring. Refer to the Generator Outline drawing text.	*Generator Outline Drawing* *Outline Drawing Text* *Wiring Diagram*		
P.	Verify the correct arrangement of the rotor grounding brushes (earth brushes). Heed the direction of rotation.	*Rotor Grounding Brush Drawing*		
5.	**Installation of Auxiliary Equipment**			
5.1.	**Neutral Cubicle**			
	For each component carry out the operations as indicated in the relative instruction booklets.			
A.	Visually inspect the cubicle for damage.			
B.	Check the correct tightening of the nuts and bolts.			
C.	Check the correct connection of the medium and low voltage cables.			
D.	Check the correct tightening of the screws of the terminal boards.			
E.	Check the separation points of the contacts.			
F.	Check the mechanical operation of circuit breaker and the corresponding latches (as needed).			
G.	Insulation resistance test: Perform measuring by means of Megger, between phases and to earth on both main and auxiliary circuits to check the insulation resistance (Megger voltage: 2500 V for main circuits and 500 V for secondary circuits). The minimum values of resistance to earth may be a few tens of M Ohm for the main circuits and a few mega ohms for the secondary circuits.			
H.	Operation test: Perform tests on the secondary circuits to check the correct remote controlled working of the operating mechanism, indications, protection			

STEP	PROCEDURE	REFER TO DOCUMENT	CHECK IF STATUS OKAY	INITIAL/DATE CHECKED
	and of all other circuits connected to components outside the switchboard. Check the correct working of the heaters, if av.			
5.2.	**Lineside Cubicle**			
	For each component carry out the operations as indicated in the relative instruction booklets.			
A.	Visually inspect the cubicle for damage.			
B.	Check the correct tightening of the nuts and bolts.			
C.	Check the correct connection of the medium and low voltage cables.			
D.	Check the correct tightening of the screws of the terminal boards.			
E.	Check the separation points of the contacts.			
F.	Check the mechanical operation of circuit breaker and the corresponding latches (as needed).			
G.	Insulation resistance test: Perform measuring by means of Megger, between phases and to earth on both main and auxiliary circuits to check the insulation resistance (Megger voltage: 2500 V for main circuits and 500 V for secondary circuits). The minimum values of resistance to earth may be a few tens of M Ohm for the main circuits and a few mega Ohm for the secondary circuits.			
H.	Operation test: Perform tests on the secondary circuits to check the correct remote controlled working of the operating mechanism, indications, and protections and of all other circuits connected to components outside the switchboard. Check the correct working of the heaters, if av.			
5.3.	**Hydrostatic System**			
A.	Visually inspect all components for evidence of damage and corrosion.			
B.	Verify the motors were lubricated and checked.			
C.	Verify that the tank is cleaned.			
D.	Verify that the pipelines are cleaned and correctly fitted.			
E.	Verify that the pipelines and components are correctly connected in line with installation drawings or circuit diagram.			
F.	Verify that the motors and pumps are correctly assembled and aligned and the motors are correctly connected.			
G.	Verify that the skid is sufficiently fasted.			

STEP	PROCEDURE	REFER TO DOCUMENT	CHECK IF STATUS OKAY	INITIAL/DATE CHECKED
5.4.	**Air- or Water Cooler Unit (TEWAC)**	*Cooler Drawings*		
A.	Visually inspect all components for evidence of damage and corrosion.			
B.	Verify the completeness of the Cooler Unit			
	1. Cover and cooler sections			
	2. Cleaning Brush			
	3. Leakage Water Sensors			
	4. Sound insulation duly glued in.			
	5. Mounting hardware			
C.	Verify correct erection of cooler cover on the generator cover.			
	1. Sealing to the generator cover			
	2. Fixing the cooler cover with pulling anchors			
	3. Support to foundation			
D.	Verify that the water connections are checked. Water inlet flange and water outlet flange are not confused.			
E.	Cooler deaerated. Exhaust and drain valves closed.			
6.	**Completion of Mechanical and Electrical Testing**			
A.	Measure the insulation resistance of the bearing seat insulation with a 100 - 250V megger. The minimum resistance should be ≥ 500 KΩ.	*Generator Assembly Records*		
B.	Measure the resistance of the stator windings with a Kelvin Bridge, DLRO or suitable equipment that can measure to an accuracy of 10 micro ohms. Correct the resistance reading to 20 degrees using the following formula: $$R_s = R_t * \frac{(T_s + 234.5)}{(T_t + 234.5)}$$ Rs = Winding resistance, corrected to specified temperature, Ts Ts = Specified temperature, C (20 degrees C) Rt = Test value of winding resistance Tt = Temperature of winding when resistance was measured, C 234.5 = Characteristic constant for pure copper A variation of 1.5% is permitted between the measurements for any one phase and the average reading. Design resistance values at 20 degrees C borrow from the Shop Assembly Record.			

STEP	PROCEDURE	REFER TO DOCUMENT	CHECK IF STATUS OKAY	INITIAL/DATE CHECKED
C.	Measure the resistance of the rotor winding with a Kelvin Bridge, DLRO or suitable equipment that can measure to an accuracy of 10 micro ohms. The design resistances at 20 degrees C borrow from the Shop Assembly Record. Correct the resistance reading to 20 degrees C using the formula given above.			
D.	Verify that there is a minimum insulation resistance of 1 mega ohm per 1 kV rated voltage (at 40 degrees C) on each **stator winding** phase when measured with a for example 1kV-5kV megger for 1 minute. Megger readings should be taken on a weekly basis. Record results on the protocol 4.7-2800-0001 /1 in the end of this checklist.	*General Handling Guidelines* *4.7-1011-0004*		
E.	Verify that there is a minimum insulation resistance of 1 mega ohm (at 40 degrees C) on the **rotor windings** when measured with a 250-volt megger for 2 minutes. Megger readings should be taken on a weekly basis. Record results on the protocol 4.7-2800-0001 /2 in the end of this checklist.	*General Handling Guidelines* *4.7-1010-0006*		
F.	Verify after assembly and alignment all values according shop assembly records and fill out specified columns with the values at field assembly. **Please send back a copy of this checklist and completed Generator assembly records to the manufacturer Siemens Erfurt**	*Generator Assembly Records*		

Notes:

Notes:

Turbogeneratoren
Prüfprotokoll
Turbogenerators
Test Record

Generator Ständerwicklung
Isolationsmessung
Generator stator winding
Insulation resistance test

Kennwort: Code word:	**Auftr.-Nr.:** Order-No.:	**Prot.-Nr.:**4.7-2800-0001 Record-No.:	**Blatt-Nr.:** 1 Sheet-No.:
Material-Nr.: * Material-No.:	**Baugr.-Nr.:** * Group-No.:	**Id.-Nr.:** Id.-No.:	
Zeichn.-Nr.: * Drawing-No.:	**Index:** * Index:	**Position:** * Position:	**Typ:** SGen5/6-100A-2P Type:
Abteilung: Department:	**Prüfdatum:** Date of Insp.:	**Prüfer:** Inspector:	**Gegenzeichnung:** Countersignature:

Die Messspannung sollte zwischen 1000 V DC, und 5000 V DC liegen, keines Fall darüber.
The megger voltage should be not less than 1000 V DC, but may amount to up to 5000 V DC.

Hinweis: Nach erfolgter Messung muss die Wicklung entladen und geerdet werden.
Note: The winding must be discharged after the measurements have been completed.

Isolationswiderstandsmessung der Ständerwicklung / Insulation Resistance Measurement on Stator Winding

Nut Temperatur / Slot temperature _____ °C/F **Messspannung** / Applied Voltage _____ kV

Messzeit Testing Time	Gesamte Wicklung	Phase U	Phase V	Phase W	U - V	U - W	V - W
	Isolations-widerstand MΩ	Isolations-widerstand MΩ	Isolations-widerstand MΩ	Isolations-widerstand MΩ	Isolations-widerstand MΩ (60 sec)	Isolations-widerstand MΩ (60 sec)	Isolations-widerstand MΩ (60 sec)
30 sec.							
1 min							
10 min							
PI							

Messinstrument / Measuring Instrument

Messung der kompletten Wicklung (wenn Sternpunkt geschlossen)
Measurement of Total Winding (if neutral point connections are closed)

korrigiert auf 40 °C/104 F: $R_{1\ ,40}$ = MΩ
corrected to 40 °C/104 F: $R_{10,40}$ = MΩ

Messung Phase U
Measurement Phase U

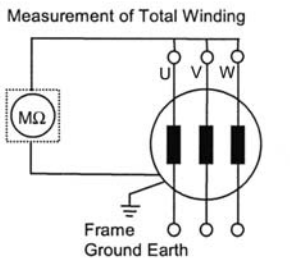
korrigiert auf 40 °C/104 F: $R_{1\ ,40}$ = MΩ
corrected to 40 °C/104 F: $R_{10,40}$ = MΩ

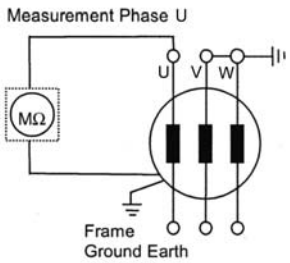
Messung Phase V
Measurement Phase V

korrigiert auf 40 °C/104 F: $R_{1\ ,40}$ = MΩ
corrected to 40 °C/104 F: $R_{10,40}$ = MΩ

Messung Phase W
Measurement Phase W

korrigiert auf 40 °C/104 F: $R_{1\ ,40}$ = MΩ
corrected to 40 °C/104 F: $R_{10,40}$ = MΩ





PI **korrigiert auf** / corrected to 40 °C: Phase U Phase V Phase W

Bemerkung
Comments:

Zeitpunkt des Tests
Time of Test:

Test durchgeführt von
Tested by:

Datum des Tests
Date of Test:

Geprüft von
Witnessed by:

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Turbogeneratoren Prüfprotokoll
Turbogenerators Test Record

Generator Läuferwicklung Isolationsmessung
Generator rotor winding Insulation resistance test

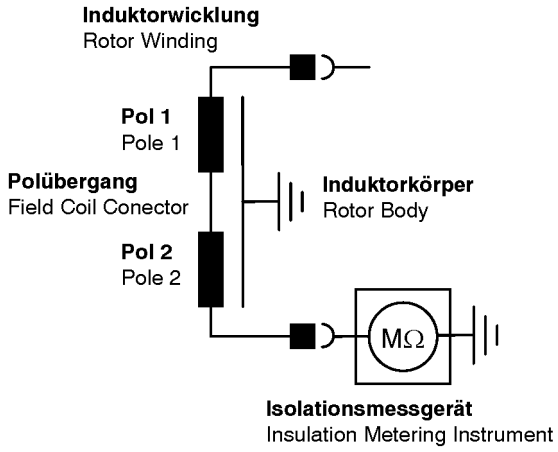
Kennwort: Code word:	**Auftr.-Nr.:** Order-No.:	**Prot.-Nr.:** 4.7-2800-0001 Record-No.:	**Blatt-Nr.:** 2 Sheet-No.:
Material-Nr.: * Material-No.:	**Baugr.-Nr.:** * Group-No.:	**Id.-Nr.:** Id.-No.:	
Zeichn.-Nr.: * Drawing-No.:	**Index:** * Index:	**Position:** * Position:	**Typ:** SGen5/6-100A-2P Type:
Abteilung: Department:	**Prüfdatum:** Date of Insp.:	**Prüfer:** Inspector:	**Gegenzeichnung:** Countersignature:

Die Isolation der Läuferwicklung wird über die Schleifringe der Welle mit 250V Gleichspannung gemessen.
The insulation resistance of the rotor winding is measured from the slip ring to the shaft preferably with 250 V DC.

Hinweis: Nach erfolgter Messung muss die Wicklung entladen und geerdet werden.
Note: The winding must be discharged after the measurements have been completed.

Isolationsmessung der Läuferwicklung
Insulation Resistance Measurement on Rotor Winding

Messaufbau
Measuring Setup



Läufer Temperatur
Rotor temperature _____ [°C/F]

Messspannung
Applied voltage _____ [V]

Messinstrument
Measuring instrument _____

Bemerkung
Comments:

Isolationswiderstand
Insulation resistance 2 min: _____ MΩ

korrigiert auf
corrected to 40 °C/104 F : _____ MΩ

Vor / nach jeder Messung sollten jegliche statischen Aufladungen der Wicklungen entladen werden.
Prior to / after each measurement any static charges should be removed by grounding the windings

Bemerkung
Comments:

Zeitpunkt des Tests
Time of Test:

Test durchgeführt von
Tested by:

Datum des Tests
Date of Test:

Geprüft von
Witnessed by:

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Drawings and Part Lists

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Turbogenerator Installation Manual

Drawing List

Generator Outline Drawing ..... DPPPG – 70149178 /001
Generator Outline Drawing ..... DPPPG – 70149178 /002
Generator Outline Drawing ..... DPPPG – 70149178 /003
Outline Drawing Text..... DPPPG – 70149179
Rotor Shaft Data for Calculation ..... DPPPG – 70149654
Axial and Radial Rotor Clearances..... DPPPG – 70166125
Generator Shop Final Assembly..... DPPPG – 70168603
Assembly Instruction for Flex Link Installation..... 1-2200 – 238955
Bushings Assembly..... 1-2570 – 451105
Bearing TE* / EE* – Tightening Torques ..... DPPPG – 00001060
Bearing TE*..... DPPPG – 70158485
Bearing EE*..... DPPPG – 70153217
Shaft Bushing Assembly ..... 2-4742 – 273961
Outer Air Seals..... DPPPG – 70024708
Air Baffle Ring ..... DPPPG – 70035099
Enclosure ..... DPPPG – 70156650 /001
Enclosure ..... DPPPG – 70156650 /002
Cooler Cover (General Drawing) ..... DPPPG – 70156503
Cooler Cover..... DPPPG – 70156504
Assembly Rotor Earth Brush..... DPPPG – 70167687
Anchoring ..... DPPPG – 70148624
Grounding Connections ..... DPPPG – 70067569
Rotor Shipping Precaution..... 3 – 279889

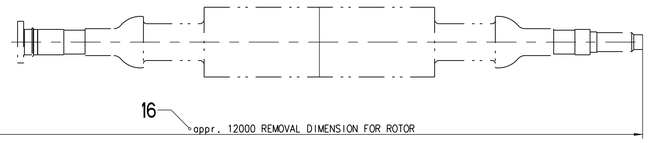
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TE* / EE* - (Turbine End / Exciter End)

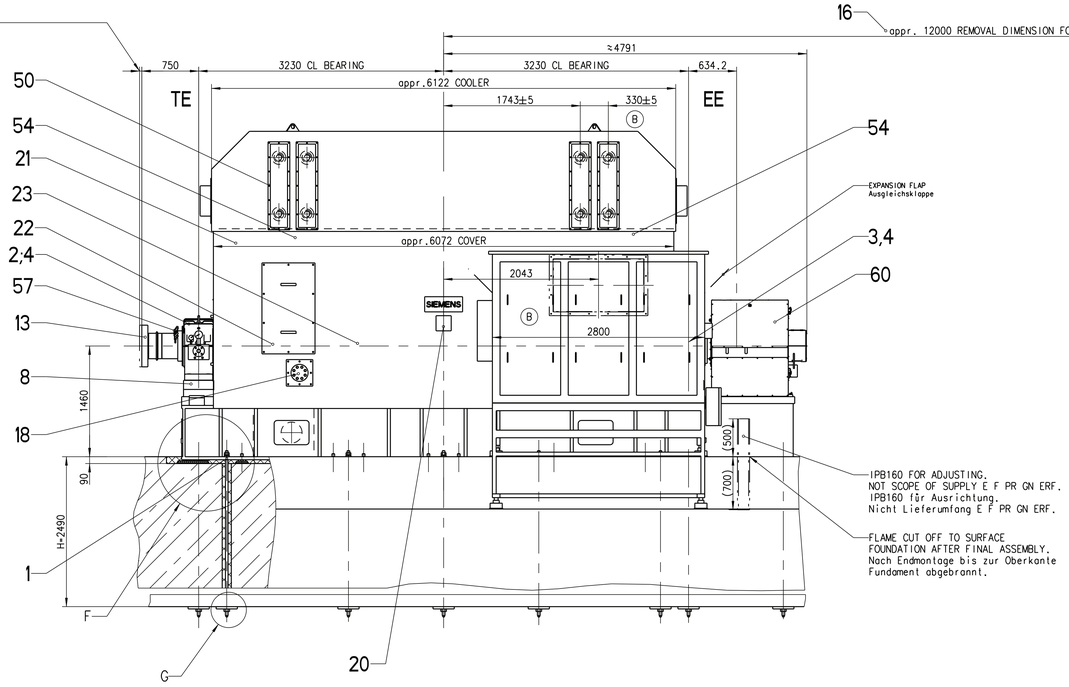
TO BALANCE THE HEAT-LENGHTENING OF THE TURBINES- AND GENERATORSHAFTS IN THE RATED OPERATING CONDITION, THE GENERATOR SHAFT IS PUT WITH THE INSTALLATION OUTSIDE THE MAGNETIC MIDDLE OF THE GENERATOR!

Zum Ausgleich der Wärmedehnung der Turbinen- und Generatorwelle im Nennlastbetrieb, wird die Generatorwelle bei der Generatormontage aus der magnetischen Mitte des Generators gestellt!

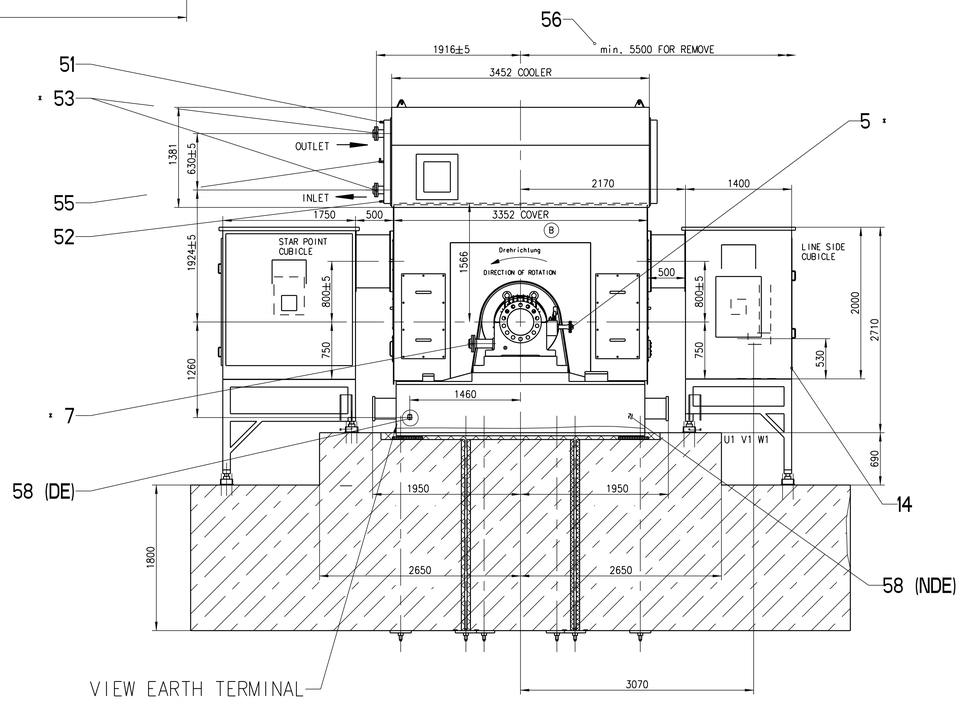
SEE DESIGN GROUP 0440!
SIEHE Baugruppe 0440!



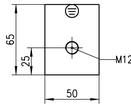
16 appr. 12000 REMOVAL DIMENSION FOR ROTOR

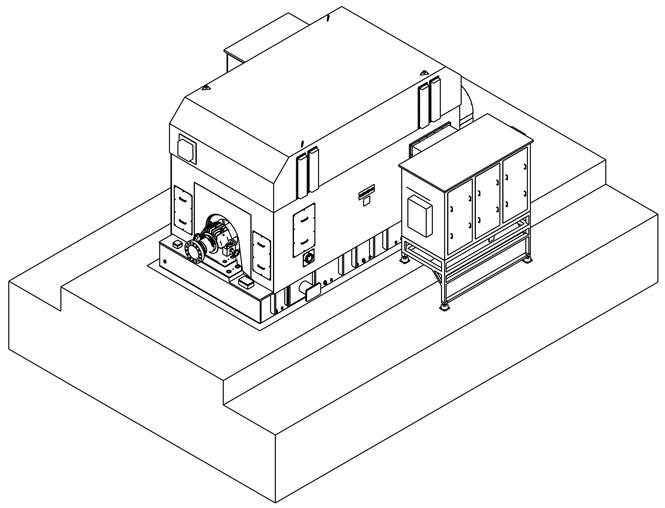


VIEW ONTO TE (B)
SICHT VON TS

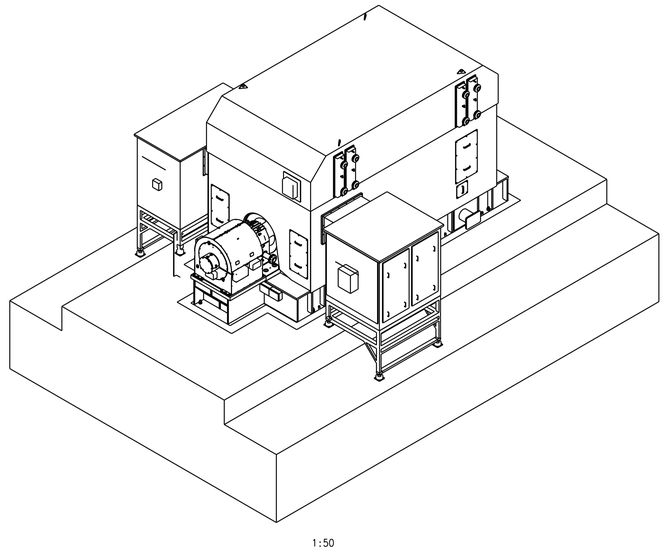


VIEW EARTH TERMINAL
Erdungsanschluss
1 FOR EACH SIDE (TE AND EE)
1 je Seite (TS und ES)





1:50



1:50

THE LINE TERMINALS ARE DESIGNATED U1,V1,W1
WITH THE CORRESPONDING NEUTRAL TERMINALS
DESIGNATED U2,V2,W2
THE VOLTAGE REACHES ITS POSITIVE MAXIMUM VALUE
IN THE ORDER U1,V1,W1

Die Ausleitungsschienen sind bezeichnet mit U1, V1, W1
die entsprechenden Sternpunktschienen mit U2, V2, W2
Die Spannung erreicht ihr positives Maximum
in der Reihenfolge U1, V1, W1

* - OIL AND WATER CONNECTION FLANGE
ASSEMBLY FREE OF FORCES AND MOMENTS!
* - Oel und Wasseranschluesse
kraefte- und momentenfrei anschlieszen!

NOTE FOR ITEMS SEE OUTLINE DRAWING TEXT
DRW-NO. DPPPG-70149179
Erlaeuterungen der Positionen siehe Maszbildtext
Zeichnungsnr. DPPPG-70149179

CODE WORD:	VILNIUS Biomass
ORDER NUMBER:	EG000367

US and EU Export Controls
Technology Classification:
ECCN: EAR99 AL: N US-Content: NO
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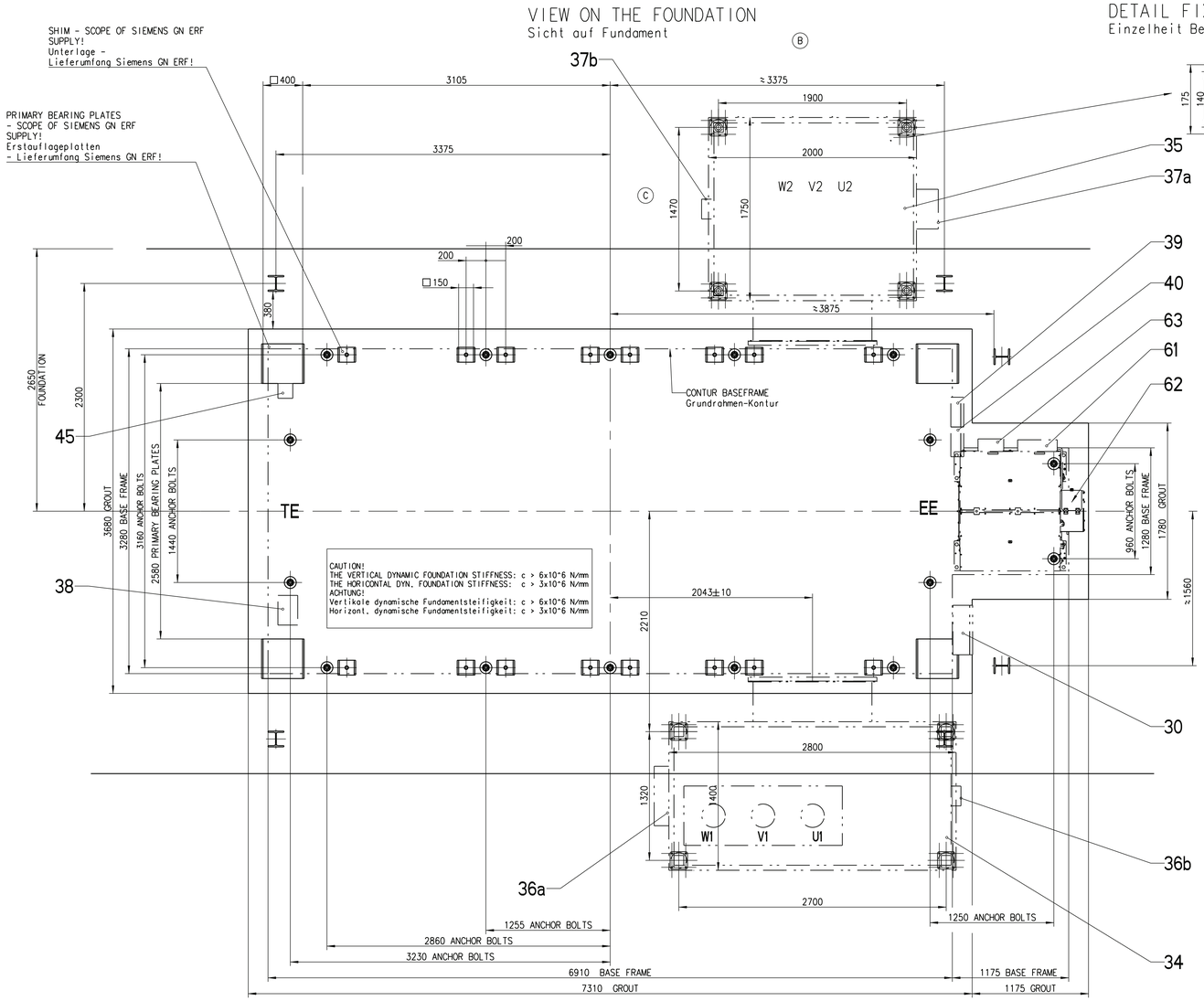
WEIGHT:	SCALE: 1:1	SPEC.:KUN351.00	
ORIGINATED:	2017-10-25 PARBS	TITLE: GENERATOR MASSBILD	
CHECKED:	2017-10-25 BAUER		
RELEASED:	2018-09-05 MUELLER	OUTLINE DRAWING	
CONFIDENTIAL COPYRIGHT (c) Siemens AG 2017 ALL RIGHTS RESERVED		LANG. - DRAWING NO. / VALUE: DPPPG-70149178	
		22-GNS0110T-70149178 SGEN5-100A-2P92-30	REV.: C SHEET: 1/3

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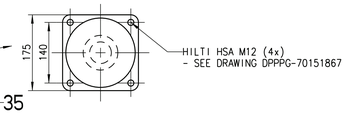
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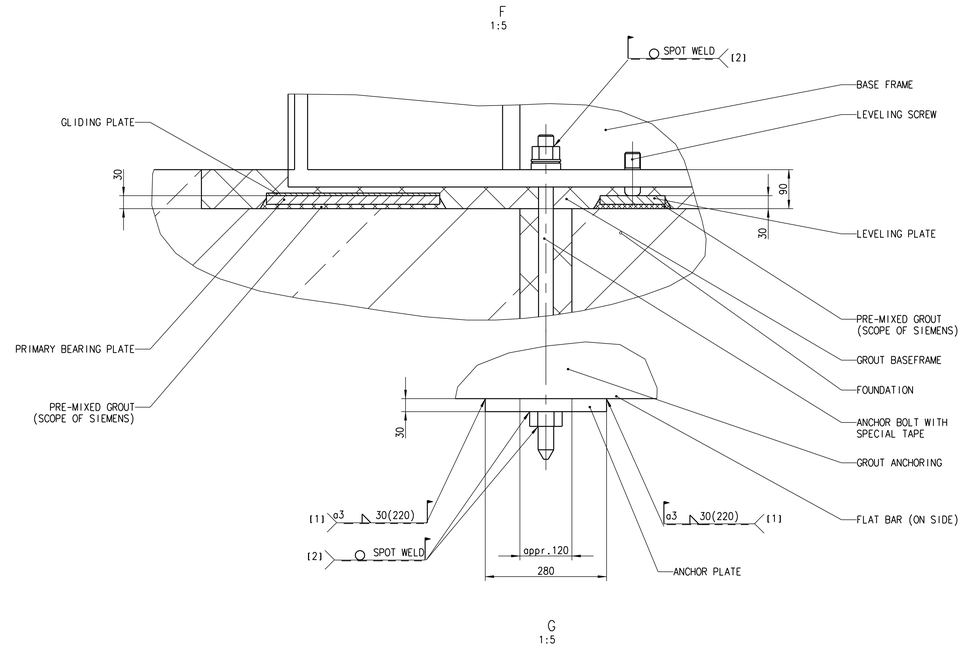
VIEW ON THE FOUNDATION
Sicht auf Fundament

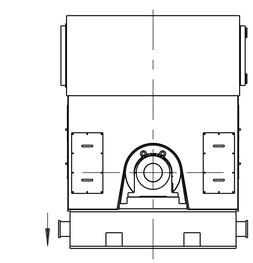


DETAIL FIXING CUBICLES
Einzelheit Befestigung Haubtklemmenkästen



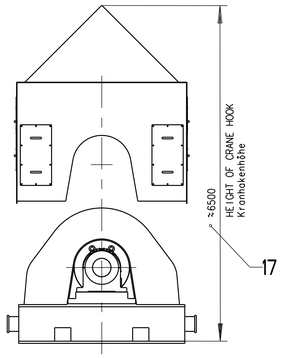
DETAIL ANCHORING
Detail Verankerung





Kurzschlusskraefte unter Berucksichtigung der Gewichte
SHORT CIRCUIT FORCES UNDER CONSIDERATION OF WEIGHTS

Fundamentlast = Generatorgewicht ± Kurzschlusskraft
FOUNDATION LOAD = GENERATOR WEIGHT ± SHORT CIRCUIT LOAD



NOTE FOR ITEMS SEE OUTLINE DRAWING TEXT
DRW-NO. DPPPG-70149179
Erlaeuterungen der Positionen siehe Maszbildtext
Zeichnungsnr. DPPPG-70149179

CODE WORD:	VILNIUS Biomass
ORDER NUMBER:	EG000367

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ORIGINATED:	2017-10-25 PARBS	TITLE: GENERATOR MASSBILD	
CHECKED:	2017-10-25 BAUER		
RELEASED:	2018-09-05 MUELLER	OUTLINE DRAWING	
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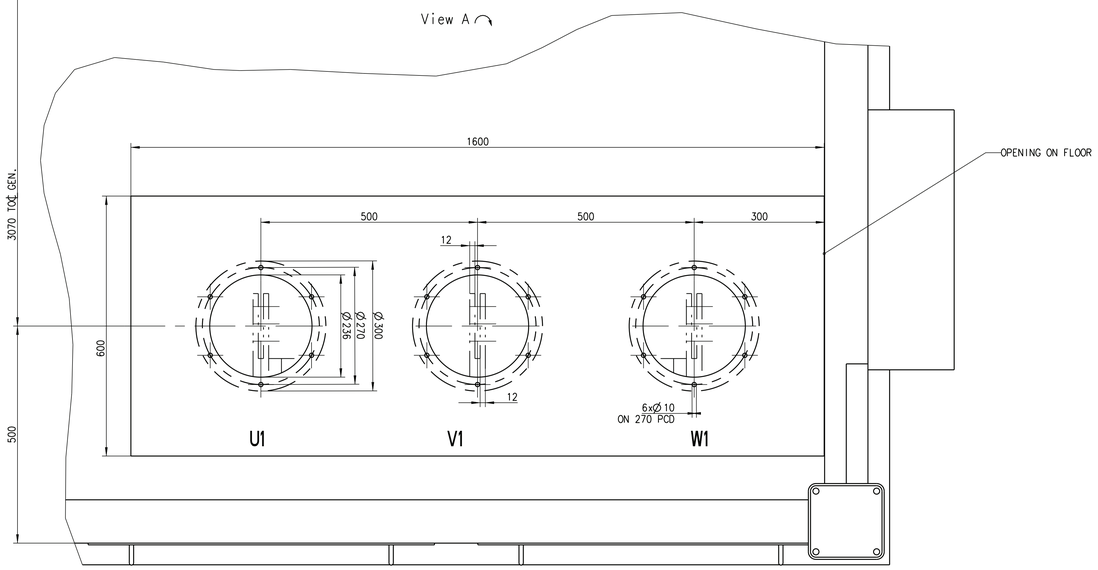
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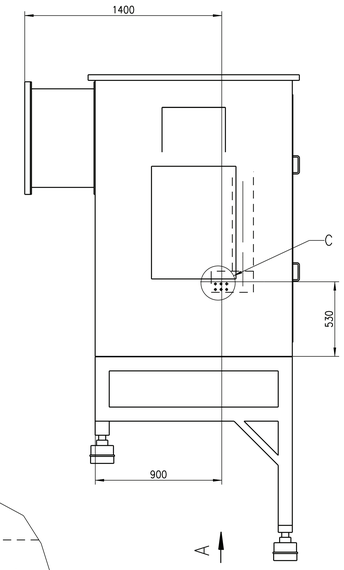
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VIEW ON THE CONNECTION BARS

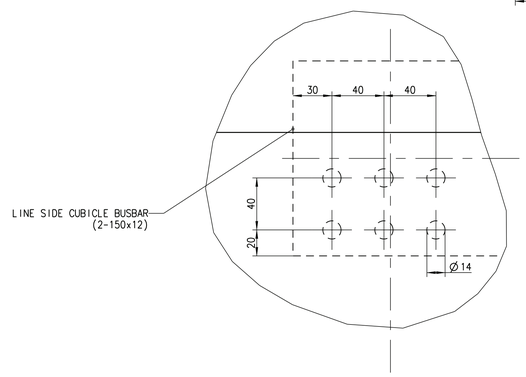
Sicht auf die Anschlussschienen
FOR MORE DETAILS SEE DRAWING DPPPG-70151868
für mehr Detail siehe Zeichnung DPPPG-70151868

(B) (C)



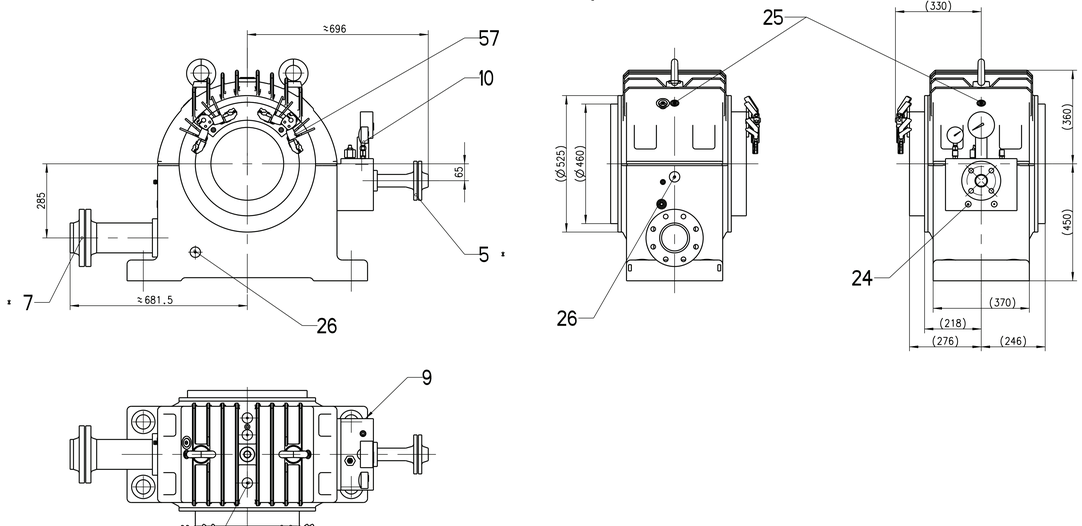


Detail C
3:5



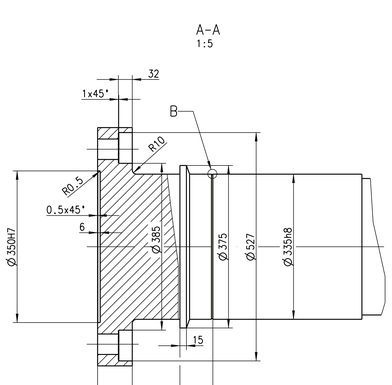
VIEW BEARING

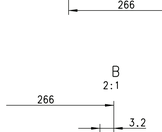
Ansicht Lager

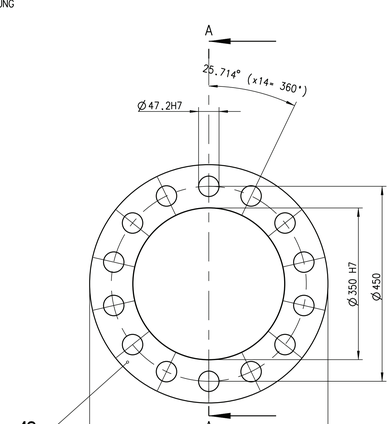


DETAIL COUPLING

EINZELHEIT KUPPLUNG







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Erlaeuterungen der Positionen siehe Maszbildtext
Zeichnungsnr. DPPPG-70149179

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CONFIDENTIAL	LANG. - DRAWING NO. / VALUE: DPPPG-70149178		
	22-GNS0110T-70149178 SGEN5-100A-2P92-30	REV.: C	SHEET: 3/3

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Maßbildtext *OUTLINE DRAWING TEXT*	**VILNIUS Biomass**
Zeichnungsnummer/*DRAWING NUMBER*: **DPPPG-70149179**	RK.-Nr./W.-NO.: **EG000367**

Index	Datum *Date*	bearbeitet *constr.*	geprüft *checked*	Änderungsbeschreibung *Description of Revision*
A	2018-01-09	Müller	Petzoldt	First issue
B	2018-02-14	Müller	Petzoldt	COOLER DATA
C	2018-09-05	Müller	Petzoldt	IT 53: COOLER FLANGE, WEIGHTS PRELIM. DELETED

Maßbild **DPPPG-70149878**
OUTLINE DRAWING

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SIEMENS	Form	Z.- Sys.	Zeichnungs-Nummer / DRAWING NUMBER	Index	Blatt / SHEET 1
	44	70	**DPPPG-70149879**	C	Von / OF 16

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MF

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Generator Typ: SGen5-100A-2P (TLRI 92/30)

Nenndaten	***RATINGS***			
Leistung S_N	*POWER*	93,176	MVA	
cos φ	*P.F.*	0,85		
Drehzahl	*SPEED*	3000	min^{-1}	
Drehrichtung, bei Sicht von Turbine auf Gen.	*DIRECTION OF ROTATION, VIEW FROM TURBINE TO GEN.*	gegen Uhrzeigersinn/ counter clockwise		
Spannung	*VOLTAGE*	15,0 +5/-5 %	KV	
Strom	*CURRENT*	3586	A	
Frequenz	*FREQUENCY*	50	Hz	
Thermische Zeitkonstante Ständer	*THERMAL TIME CONSTANT STATOR*	18,48	Min	
Thermische Zeitkonstante Läufer	*THERMAL TIME CONSTANT ROTOR*	7,54	Min	
Kapazität Ständerwicklung pro Phase gegen Erde	*CAPACITY STATOR WINDING AGAINST EARTH PER PHASE*	0,359	µF	
Kapazität Läuferwicklung gegen Erde	*CAPACITY ROTOR WINDING AGAINST EARTH*	0,231	µF	
Kühlluftmenge	*RATE OF COOLING AIR*	26	m^3/s	
Kühllufttemperatur	*COOLING AIR TEMPERATURE*	50	°C	
Abzuführende Verluste	*HEAT LOSS*	1051	kW	
Schalldruckpegel (ISO 3744)	*SOUND PRESSURE LEVEL (ISO 3744)*	90	dB(A)	
max. Umgebungstemperatur	*MAX. AMBIENT TEMPERATURE*	50	°C	
Bauform	***TYPE OF CONSTRUCTION***			
Bauform (DIN IEC 34 T.7)	*TYPE OF CONSTRUCTION*	IM 7215		
Schutzart (DIN IEC 34 T.5)	*DEGREE OF PROTECTION*	IP 54		
Kühlart (DIN IEC 34 T.6)	*METHODS OF COOLING*	IC 8 A 1 W 7		
Farbe	*COLOR*	RAL 7030 C3 high	EN ISO 12944	
Verladebedingung	***SHIPMENT INDICATION***			
Umgebungstemperatur	*AMBIENT TEMPERATURE*	not less than -20°C		

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Nenndaten	*RATINGS*	Wert *VALUE*	Einheiten *DIM.*	REV.

Gewicht	***WEIGHTS***			C
Induktor komplett	*ROTOR COMPLETE*	24800	kg	
Ständer-Aktivteil komplett	*STATOR ACTIV PART COMPLETE*	69000	kg	
Grundrahmen, Zubehör	*BASE FRAME, ACCESSORIES*	27000	kg	
RG-Stator / Bürstenapparat	*STATOR EXCITER / BRUSH ASSEMBLY*	1000	kg	
Lager; Zwischenrahmen	*BEARING/INTERMEDIATE FRAME*	2900	kg	
Abdeckhaube	*SHROUDING COVER*	7000	kg	
Kühler, Kühlerhaube	*COOLING ELEMENTS, COVER*	6000	kg	
Verankerung / Zubehör	*ANCHORING / ACCESSORIES*	4000	kg	
Gesamtgewicht	*TOTAL WEIGHT*	141700	kg	
Gewicht für Komplettversand	*WEIGHT DESPATCH COMPLETE*	131700	kg	
Min. Krantragfähigk. (Läufermont.)	*MIN. LOAD CAPACITY (ROTOR INSTALLATION)*	30000	kg	
Ausleitungs-, Sternpunktkasten - separat aufgestellt	*LINE SIDE-, NEUTRAL SIDE CUBICLE - BUILT SEPARATELY*	4000	kg	
Erregung	***EXCITATION***			
Erregermaschine	*EXCITER MACHINE*	ELR 62/19-30/8-2S		
Hilfserreger	*PMG*	ATE DC 190/90/6		
Mechanische Daten	***MECHANICAL DATA***			
Trägheitsmoment ($m*r^2$) (Läufer komplett)	*MOMENT OF INERTIA ($M*R^2$) (ROTOR COMPLETE)*	2375	kgm^2	
Losbrechmoment mit Druckölentlastung	*BREAK AWAY TORQUE WITH PRESSURE OIL*	ca.115	Nm	
Losbrechmoment ohne Druckölentlastung	*BREAK AWAY TORQUE WITHOUT PRESSURE OIL*	ca.9,6	kNm	
Lagerverluste je Lager	*BEARING LOSSES PER BEARING*	32	kW	
Zulässige Überdrehzahl im Störfall	*PERMISSIBLE OVERSPEED FOR FAULT CONDITIOM*	+21	%	

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POS.	Bezeichnung	*DESIGNATION*	Wert/ *VALUE*	Einheit/ *DIM.*	REV.
	Verankerung	***ANCHORING***			
1	Ankerbolzen mit Zubehör liefert Siemens GN ERF, ebenso die Montagevorschrift.	*ANCHOR BOLTS, ACCESSORIES AND ASSEMBLY PROCEDURE SUPPLIED BY SIEMENS GN ERF.*	16 x M36; DIN 797;		
	Lagerangaben	***BEARING DETAILS***			
2	TS Lager, Größe: (Auflagefläche); Umlaufschmierung.	*TE BEARING, SIZE: (BEARING AREA); CLOSED CIRCUIT LUBRICATION.*	∅ 315 * 218,5		
3	ES Lager, Größe: (Auflagefläche); Umlaufschmierung.	*EE BEARING, SIZE: (BEARING AREA); CLOSED CIRCUIT LUBRICATION.*	∅ 315 * 218,5		
4	Lagerisolierung TS und ES durch isolierte Lagerschalen. Die Isolierung des TS-Lagers ist überbrückt. Überbrückung liefert Siemens GN ERF. Die Isolation des ES-Lagers darf nicht überbrückt werden.	*BEARING INSULATION AT TE AND EE BY INSULATED SHELL. THE INSULATION OF THE TE BEARING IS BY-PASSED (SIEMENS GN ERF - SCOPE OF SUPPLY). INSULATION OF EE-BEARING SHOULD NOT BE LINKED.*			
5	Ölzufluß mit Flansch, Edelstahl	*OIL INLET WITH FLANGE, SS- STEEL*	DN40 DINEN 1092-1		
7	Ölabfluß mit Flansch, Edelstahl	*OIL OUTLET WITH FLANGE, SS- STEEL*	DN100 DINEN 1092-1		
8	Zwischenrahmen unter den Lagerböcken.	*INTERMEDIATE FRAME UNDER THE BEARINGS.*			
9	Anschluß für Druckölentlastung:	*OIL PRESSURE JACKING CONNECTION:*	G 1/2"		
	Anhebedruck:	*LIFTING PRESSURE:*	118*	barg	
	Haltedruck:	*HOLDING PRESSURE:*	77*	barg	
	Erforderliche Ölmenge je Lager (bei max. 49°C Öltemperatur).	*REQUIRED OIL VOLUME PER BEARING (49°C MAX. OIL TEMPERATURE).*	3	l/min *litres/min*	
	Min. zulässige Turndrehzahl:	*MINIMUM TURNING SPEED:*	<1 or >56	min^{-1} *R.P.M.*	
	Übergangsdrehzahl nach DIN31652-1	*TRANSITION SPEED ACC. TO* DIN31652-1	240	min^{-1} *R.P.M.*	

* Die angegebenen Drücke/Ölmengen sind Richtwerte und müssen ggf. bei der Inbetriebnahme korrigiert werden.

* THE STATED PESSURE/OIL VOLUME VALUES ARE CALCULATED VALUES AND MAY HAVE TO BE CORRECTED DURING INITIAL START-UP.

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POS.	Bezeichnung	*DESIGNATION*	Wert/ *VALUE*	Einheit/ *DIM.*	REV.
10	Je Lager sind eine Öldrossel und ein Manometer installiert (Siemens P25).	*ONE THROTTLE AND ONE MANOMETER ARE INSTALLED FOR EACH BEARING (SIEMENS P25- SCOPE OF SUPPLY).*	Ja / YES		
	Ölinhalt beider Lager insgesamt:	*TOTAL OIL VOLUME OF THE TWO BEARINGS:*	60	l *litres*	
	Erforderliche Ölmenge für beide Lager insgesamt mind.:	*REQUIRED OIL VOLUME FOR BOTH BEARINGS AT LEAST:*	120	l/min *litres/min*	
	(Lager werden ohne Ölfüllung geliefert).	*(THE BEARINGS ARE SUPPLIED WITHOUT OIL).*			
	Maximale Öleintrittstemperatur:	*MAXIMUM OIL INLET TEMPERATURE:*	49	°C	
	Minimaler Öldruck am Ölzulauf:	*MINIMUM OIL PRESSURE AT OIL INLET:*	1,3	bar	
	Maximaler Öldruck am Ölzulauf:	*MAXIMUM OIL PRESSURE AT OIL INLET:*	2,0	bar	
	Reinheitsklasse nach ISO 4406	*PURITY KLASS ACC. TO ISO 4406*	Kl. 18 / 16 / 13		
	<u>Empfohlene Öleigenschaften:</u> Nichtschäumendes Mineralöl: Flammpunkt:	*<u>RECOMMENDED PROPERTIES:</u>* *NON-FOAMING MINERAL OIL:* *FLASH POINT:*	 ISO VG46 185	 °C	
	Ölabflußrohre mit Gefälle verlegen von mindestens:	*OIL DRAIN PIPES INSTALLED WITH A SLOPE OF AT LEAST :*	5	°	
	Achtung! Innerhalb der Lagergehäuse entsteht durch die Rotation der Welle Ölnebel. Der Ölnebel ist durch geeignete Maßnahmen des Anlagenbetreibers aus dem Lagergehäuse abzusaugen. Der empfohlene Unterdruck im Lagergehäuse beträgt 100 Pa.	***ATTENTION !*** *WITHIN THE BEARING HOUSING OIL MIST RESULTS FROM THE ROTATION OF THE ROTOR. THE OIL MIST IS TO BE SUCKED OFF FROM THE BEARING HOUSING BY SUITABLE MEASURES OF THE PLANT OPERATOR. THE RECOMMENDED NEGATIVE PRESSURE IN THE BEARING HOUSING AMOUNTS TO 100 PA.*			
	Maximales axiales Lagerspiel:	*MAX. AXIAL BEARING CLEARANCE:*	± 30	mm	

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POS.	Bezeichnung	*DESIGNATION*	Wert/ *VALUE*	Einheit/ *DIM.*	REV.
	Allgemeine Daten	***GENERAL DATA***			
13	Generatorflansch	*GENERATOR FLANGE*			
14	Klemmenanschluß – Die Bezeichnung der Phasenklemmen erfolgt durch U1, V1, W1; die der entsprechenden Sternpunktklemmen durch U2, V2, W2. Die Klemmenspannung erreicht ihr positives Maximum in der Reihenfolge U1, V1, W1.	*TERMINAL CONNECTION – THE LINE TERMINALS ARE DESIGNATED U1, V1, W1; THE CORRESPONDING NEUTRAL TERMINALS DESIGNATED U2, V2, W2.* *THE VOLTAGE REACHES ITS POSITIVE MAXIMUM VALUE AT THE TERMINALS IN THE ORDER OF U1, V1, W1.*			
	Der Läufer ist zum Entkuppeln axial verschiebbar:	*FOR DE-COUPLING THE ROTOR CAN BE MOVED AXIALLY:*	20	mm	
16	Maß für das Ausfahren des Läufers. Ausbauvorr. (Rutschblech, Gleitbock, Gleitschuhe) liefert GNERF.	*DIMENSION FOR OBLIQUE REMOVAL OF THE ROTOR. ASSEMBLY DEVICE (SLIDING PLATE; SLIDING PEDESTAL; SLIDE SHOES) SUPPLIED BY GNERF.*			
17	Erforderliche Kranhakenhöhe zum Abheben der Haube.	*HEIGHT OF THE CRANE HOOK WHEN LIFTING THE COVER*			
18	Anschluss für Trockner	*CONNECTING FOR DRIER*		DN100	
20	Leistungsschild	*NAME PLATE*			
21	Abdeckhaube/ vor dem Abheben ist das Erdungskabel zu lösen.	*COVER/ BEFORE LIFTING THE COVER RELEASE THE GROUND CABLE.*			
22	Kaltluftthermometer	*COLD AIR THERMOMETER*	1 (TS / TE) 1 (ES / EE)	2*Pt100 2*Pt100	
23	Warmluftthermometer	*WARM AIR THERMOMETER*	1	2*Pt100	
24	Lagerthermometer	*BEARING THERMOMETER*	1 (TS / TE) 1 (ES / EE)	2*Pt100 2*Pt100	
25	Relative Schwingungsmessung (Welle) 2 Gewindebohrungen ¾“-14NPT um 90° versetzt im Lagerdeckel TS u. ES.	*RELATIVE SHAFT VIBRATION MEASUREMENT 2 BORES WITH SCREW ¾“-14NPT DISPLACED BY 90° ON THE BEARING COVER TE AND EE.*	*BENTLY NEVADA SERIES 3300 2 SENSORS PER BEARING*		
26	Absolute Schwingungsmessung (Lagerbock) 3 Gewindebohrungen M8x1 (X – Y – Z)	*ABSOLUTE VIBRATION MEASUREMENT (BEARING HOUSING) 3 BORES WITH SCREW M8X1* (X – Y – Z)	*BENTLY NEVADA SERIES 330400 3 SENSORS PER BEARING*		

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	Klemmenkästen	***TERMINAL BOXES***			
30	Klemmenkasten	*TERMINAL BOX*	**V20MKA10GA010**		
	Klemmenanschluß für Warmluftüberwachung	*TERMINAL STRIP CONNECTION FOR WARM AIR MONITORING*	1	2*Pt100	
	Klemmenanschluß für Warmluftüberwachung ERR	*TERMINAL STRIP CONNECTION FOR WARM AIR MONITORING EXCITER*	1	2*Pt100	
	Klemmenanschluß für Kaltluftüberwachung	*TERMINAL STRIP CONNECTION FOR COLD AIR MONITORING*	1 (TS / TE) 1 (ES / EE)	2*Pt100 2*Pt100	
	Klemmenanschluß für Widerstandsthermometer in der Ständerwicklung	*TERMINAL STRIP CONNECTION FOR RESISTANCE THERMOMETERS IN THE STATOR WINDING*	9 + 3 (SPARE)	1*Pt100	
	Klemmenanschluß für je ein Lagerthermometer	*TERMINAL STRIP CONNECTION FOR EACH ONE BEARING THERMOMETER*	1 (TS / TE) 1 (ES / EE)	2*Pt100 2*Pt100	
	Klemmenanschluß für Leckwassersensoren	*TERMINAL STRIP CONNECTION FOR LEAKAGE WATER SENSOR*	2 (TS / TE) 2 (ES / EE)	SIEMENS SITRANS	
34	Ausleitungskasten	*HIGH-VOLTAGE TERMINAL BOX*	**V20MKA10GD010**		
35	Sternpunktkasten	*NEUTRAL POINT TERMINAL BOX*	**V20MKA10GD020**		
36a	Hilfsklemmenkasten Ausleitungskasten	*AUXILIARY TERMINAL BOX HIGH-VOLTAGE TERMINAL BOX*	**V20MKA10GE010**		
36b	Ausleitungskasten Heizung	*HIGH-VOLTAGE CUBICLE JUNCTION BOX HEATER*	**V20MKA10GE011**		
	Anschluss für Heizung	CONNECTION FOR HEATER	230 50 2 x 150	V / AC Hz W	
37a	Hilfsklemmenkasten Sternpunktkasten	*AUXILIARY TERMINAL BOX NEUTRAL POINT TERMINAL BOX*	**V20MKA10GE020**		
37b	Sternpunktkasten Heizung	*NEUTRAL POINT CUBICLE JUNCTION BOX HEATER*	**V20MKA10GE021**		
	Anschluss für Heizung	*CONNECTION FOR HEATER*	230 50 2 x 150	V / AC Hz W	
38	Klemmenkasten (TS)	*TERMINAL BOX (TE)*	**V20MKD10GA010**		
	Relative Schwingungsmessung	*RELATIVE SHAFT VIBRATION MEASUREMENT*	*PER 2 SENSORS*	*BENTLY NEVADA*	
	Absolute Schwingungsmessung	*ABSOLUTE VIBRATION MEASUREMENT*	*PER 3 SENSORS*	*BENTLY NEVADA*	
	Keyphasor	*KEYPASOR*			
39	Klemmenkasten (ES)	*TERMINAL BOX (EE)*	**V20MKD20GA010**		
	Relative Schwingungsmessung	*RELATIVE SHAFT VIBRATION MEASUREMENT*	*PER 2 SENSORS*	*BENTLY NEVADA*	
	Absolute Schwingungsmessung	*ABSOLUTE VIBRATION MEASUREMENT*	*PER 3 SENSORS*	*BENTLY NEVADA*	

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POS.	Bezeichnung	*DESIGNATION*	Wert/ *VALUE*	Einheit/ *DIM.*	REV.
40	Klemmenkasten	*TERMINAL BOX*	**V20MKA10GE030**		
	Klemmenanschluß für Stillstandheizung:	*TERMINAL BOX FOR ANTICONDENSATION HEATING:*	400 / 3 50 2 * 1,6	V /PHASE Hz kW	
45	Klemmenkasten	*TERMINAL BOX*	**V20MKD10GA020**		
	Klemmenanschluß für Erdungsbürste	*TERMINAL BOX FOR GROUND BRUSH*			

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POS.	Bezeichnung	*DESIGNATION*	Wert/ *VALUE*	Einheit/ *DIM.*	REV.
	Kühler	***COOLER***	4 x 25 %		
50	Kühler Anzahl der Elemente:	*COOLER* *NUMBER OF ELEMENTS:*	4		
	Anzahl der Elemente in Betrieb	*NUMBER OF ELEMENTS IN WORKS*	4		
	zulässige Generatorleistung bei Ausfall eines Kühler-elementes (Klasse B):	ADMISS. GENERATOR OUTPUT BY FAILURE OF ONE COOLER ELEMENT (CLASS B)	67	**%**	
	Druckabfall wasserseitig:	*PRESSURE DROP WATER-SIDE*	< 1	bar	
	Minimal zulässige Wassereintrittstemperatur	*MIN. ALLOWABLE WATER INLET TEMPERATURE*	15	°C	
	Maximal zulässige Wassereintrittstemperatur	*MAXIMAL ALLOWABLE WATER INLET TEMPERATURE*	45		
	Wasseraustrittstemperatur:	*WATER OUTLET TEMPERATURE*	57.6		**B**
	Erforderliche Wassermenge:	*REQUIRED WATER FLOW*	73	m³/h	**B**
	Kühlwassergeschwindigkeit: (Flansche)	*WATER VELOCITY (FLANGES)*	1,9	m/s	**B**
	Auslegungsdruck:	*DESIGN PRESSURE*	25	barg	
	Prüfdruck:	*TESTING PRESSURE*	37,5	barg	
	Verschmutzungsfaktor	*FOULING FACTOR*	n.a.	m^2*K / W	
	Kühlwasser Frostschutz	*COOLING WATER ANTI-FREEZE*	-	%	
	Kühlerwerkstoffe:	*COOLER MATERIALS:*			
	Rohre:	*PIPES*	90/10 CuNi		**B**
	Rippen:	*FINS*	Al		**B**
	Rohrböden:	*TUBE PLATES*	C- Steel+ Epoxy		**B**
	Wasserkammern:	*WATERBOXES*	C- Steel+ Epoxy		**B**
	Wasseranalyse	*WATER ANALYSIS*	----		
51	Kühlerentlüftung	*COOLER VENTS*	(4xHahn+G1/2“) *(4xCock+G1/2“)*		
52	Kühlerentleerung	*COOLER DRAIN*	(4xHahn+G1/2“) *(4xCock+G1/2“)*		
53	Kühlwasseranschlußflansche (mit Gegenflansche)	*COOLING WATER CONNECTION FLANGES (WITH COUNTER FLANGES)*	DN 50 DIN EN 1092 PN 40	Carbon Steel	**B** **C**
54	Leckwassersensoren, je 4 auf TS und ES	*LEAKAGE WATER SENSORS, PER 4 ON TE AND EE*			
55	Sicherheitsventil	*SAFETY VALVE*	25	barg	
56	Maß für Kühlerausbau	*REMOVAL DIMENSION FOR COOLER*			

	Erdung	***GROUNDING***			
57	Erdungsbürste	*GROUND BRUSH*			
58	Erdungsklemmen	*EARTH TERMINALS*			

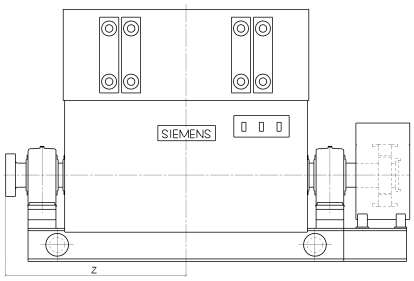
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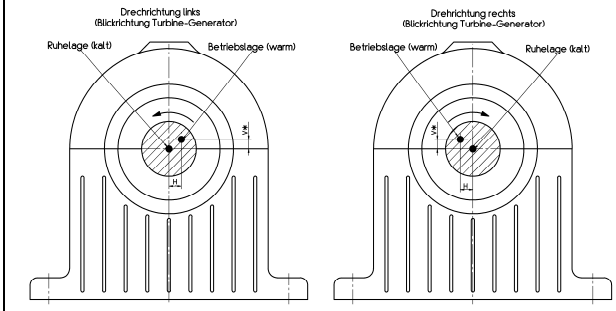
POS.	Bezeichnung	*DESIGNATION*	Wert/ *VALUE*	Einheit/ *DIM.*	REV.
	Erregereinrichtung	***EXCITATION EQUIPMENT***			
60	Haupterregermaschine (V20MKC10GE010)	*MAIN EXCITER*	ELR 62/19-30/8-2S		
	Hilfserregermaschine	*PMG*	ATE DC 190/90/6		
	Schutzart	*DEGREE OF PROTECTION*	IP 54		
	Werte	*VALUES*	Siehe Erreger- und Reglerangaben!/ See excitation data sheet!		
61	Klemmenkasten	*TERMINAL BOX*	**V20MKC10GE010**		
	PMG	*PMG*			
62	Klemmenkasten	*TERMINAL BOX*	**V20MKC10GA010**		
	Erdschlußmeßeinrichtung Meßbürsten permanent	*GROUND FAULT INDICATOR MEAS. BRUSHES PERMANENT*			
63	Klemmenkasten	*TERMINAL BOX*	**V20MKC10GE010**		
	Klemmenanschluß für Stillstandheizung:	*TERMINAL BOX FOR ANTICONDENSATION HEATING:*	200 1 50 2 x 100	V PH Hz W	**B**
	Anschlußklemmen Feldwicklung	*TERMINALS FOR THE FIELD WINDING*			

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Wellenverlagerung / *SHAFT DISPLACEMENT*

Drehrichtung: rechts (Sicht auf TS)
*DIRECTION OF ROTATION: C**CW** (VIEW ON TE)*





V* = Umgebungstemperatur: 20 / 50 °C - alle Werte theoretisch!

AMBIENT TEMPERATURE ***- ALL DATA ARE ONLY THEORETICAL!***

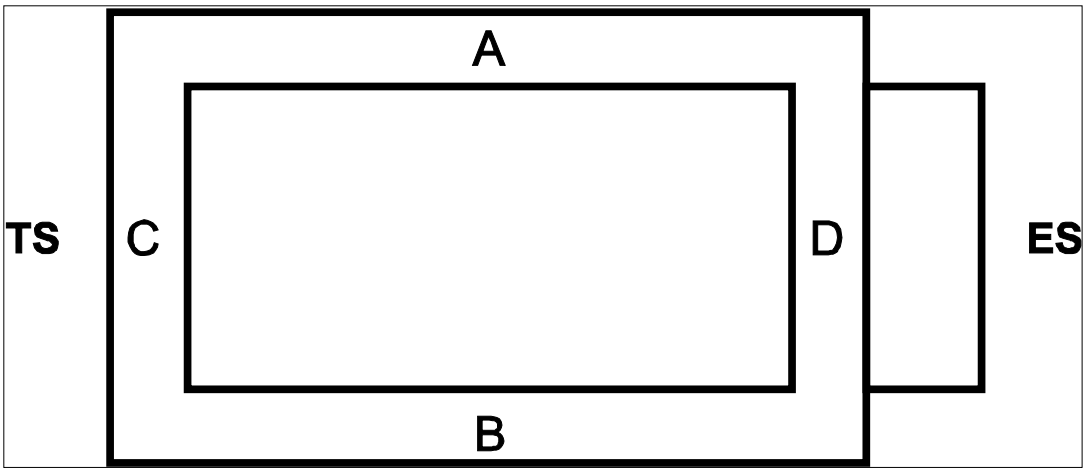
	ES		TS	
	H	V*	H	V*
Hydrodynamischer Betriebszustand *HYDRODYNAMIC OPERATION CONDITION*	0,187	0,083/0,083	0,187	0,083/0,083
Thermisches Wachsen Läufer *THERMAL EXPANSION ROTOR*		0,091/ 0,034		0,091/ 0,034
Thermisches Wachsen Lager *THERMAL EXPANSION BEARING*		0,164/ 0,062		0,164/ 0,062
Thermisches Wachsen Zwischenrahmen *THERMAL EXPANSION BAFFLE FRAME*		0,101/ 0,023		0,101/ 0,023
Gesamthöhenwachstum *TOTAL DISPLACEMENT*		0,439/ 0,202		0,439/ 0,202

Für die Berechnung der Wellenverlagerung wird davon ausgegangen, dass die Welle im kalten Zustand in der Unterseite der Lagerschale liegt.
FOR THE CALCULATION OF THE TOTAL SHAFT DISPLACMENT IT IS ASSUMED THAT IN THE COLD CONDITION THE SHAFTS LIE IN THE BOTTOM OF THE BEARINGS.

Axialdehnung Δ Z:	*AXIAL DISPLACEMENT Δ Z: (prelimin.)*	2,8	mm
Achtung! Maß ist ohne Getriebedehnung. Zum Ausgleich der Wärmedehnung der Getriebe- u. Generatorwellen im Nennlastbetrieb ist die Generatorwelle bei der Montage um diesen Betrag zuzüglich Getriebeschub außerhalb der magnetischen Mitte des Generators in Richtung Getriebe zu stellen.	***ATTENTION!*** *DIMENSION WITHOUT GEAR EXPANSION.* *TO THE OFFSET OF THE THERMAL EXPANSION OF THE GEAR- AND GENERATOR- SHAFTS IN THE RATED OPERATING CONDITION, THE GENERATOR SHAFT IS TO PUT WITH INSTALLATION ABOUT THIS AMOUNT ADDITIONAL GEAR SHAFT EXPANSION OUTSIDE THE MAGNETIC CENTRE INTO GEAR BOX DIRECTION.*		

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Fundamentbelastung / *FOUNDATION LOADING*



Durch das Gewicht ausgeübte Kräfte im Punkt:	*FORCE EXERTED BY THE WEIGHT IN POINTS:*	A: B: C: D: Summe:	**506,3** **506,3** **188,8** **188,8** **1390,2**	**kN** **kN** **kN** **kN** **kN**
Maximale Kraft errechnet aus dem maximalen Stoßmoment (2-poliger Klemmenkurzschluß)	*MAXIMUM FORCE CALCULATED FROM THE MAX. SUDDEN TORQUE (2 PHASE SHORT CIRCUIT)*	F_{dyn} =	**± 594,0**	**kN**
Die Kräfte treten unabhängig von der Drehrichtung wechselseitig auf (in A und B).	*THE FORCES OCCUR ALTERNATELY INDEPENDENT OF THE DIRECTION OF ROTATION (ON A & B).*			
Gesamt-Fundamentlast in A und B:	*TOTAL-FOUNDATION LOAD ON A AND B:*	**A/B:**	**506,3 ± 594,0**	**kN**
Berechnung und Ausführung des Fundamentes wird von der Bauabteilung ausgeführt.	*THE CALCULATION AND CONSTRUCTION OF THE FOUNDATION IS PROVIDED BY CIVIL ENGINEERING COMPANY.*			

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Betriebs- und Einstellwerte Generatorüberwachung /
OPERATING AND *SETTING VALUES – GENERATOR MONITORING*

Kriterium PARAMETER		Ausgangsleistung *POWER OUTPUT* / KKS *TAG NUMBER*	S_N=93,176 MVA Betrieb OPERATING >62,7	Betrieb OPERATING ≤62,7 *COOLER EMER-GENCY OPERA-TION* ****	Einstellwert *SETTING VALUE* Meldung ALARM HIGH >62,7	Meldung ALARM HIGH ≤62,7 *COOLER EMER-GENCY OPERA-TION* ****	Turbine Schutzausl TURBINE TRIP >62,7	Turbine Schutzausl TURBINE TRIP ≤62,7 *COOLER EMER-GENCY OPERA-TION* ****	Einheit UNIT
PHASE/SLOT	*U*	V20MKA10CT010	116	102	121		126		°C
	V	V20MKA10CT020							
Nuttemperatur	W	V20MKA10CT030							
Ständer	U	V20MKA10CT011							
STATOR SLOT	V	V20MKA10CT021							
TEMPERATURE	W	V20MKA10CT031							
Pt100	U	V20MKA10CT012							
	V	V20MKA10CT022							
	W	V20MKA10CT032							
Siemens SPARE	U	V20MKA10CT013							
Siemens SPARE	V	V20MKA10CT023							
Siemens SPARE	W	V20MKA10CT035							
Warmlufttemperatur WARM AIR TEMPER. Doppel – Pt100 DOUBLE – PT100		V20MKA10CT060	92	90					°C
Kaltlufttemperatur Doppel - Pt100	TS TE	V20MKA10CT050	50	60	55	65	60	70	°C
COLD AIR TEMPERATURE DOUBLE – PT100	ES EE	V20MKA10CT055							
Lagertemperatur	TS TE	V20MKD10CT010	92*		97*		102*		°C
BEARING TEMPERATURE	ES EE	V20MKD20CT010							
Leckwasserüber-wachung	TS	V20MKA10CL110			X				
	TE	V20MKA10CL111					X*****		
LEAKAGE WATER DETECTION	ES	V20MKA10CL120			X				
	EE	V20MKA10CL121					X*****		
Relative Wellen-schwingung **	TS	V20MKD10CY011	90		165		240		µm
	TE	V20MKD10CY012							
RELATIVE SHAFT VIBRATION **	ES	V20MKD20CY011							
	EE	V20MKD20CY012							
Absolute Lagerbock schwingung ***	TS	V20MKD10CY010	3,8		7,5		11,8		mm/s
	TE	V20MKD10CY020							
		V20MKD10CY030							
ABSOLUTE BEARING VBRATION ***	ES	V20MKD20CY010							
	EE	V20MKD20CY020							
		V20MKD20CY030							

SIEMENS	Form	Z.- Sys.	Zeichnungs-Nummer / DRAWING NUMBER	Index	Blatt SHEET 14
	44	70	**DPPPG-70149879**	C	Von OF 16

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MF

Spr. Kz.

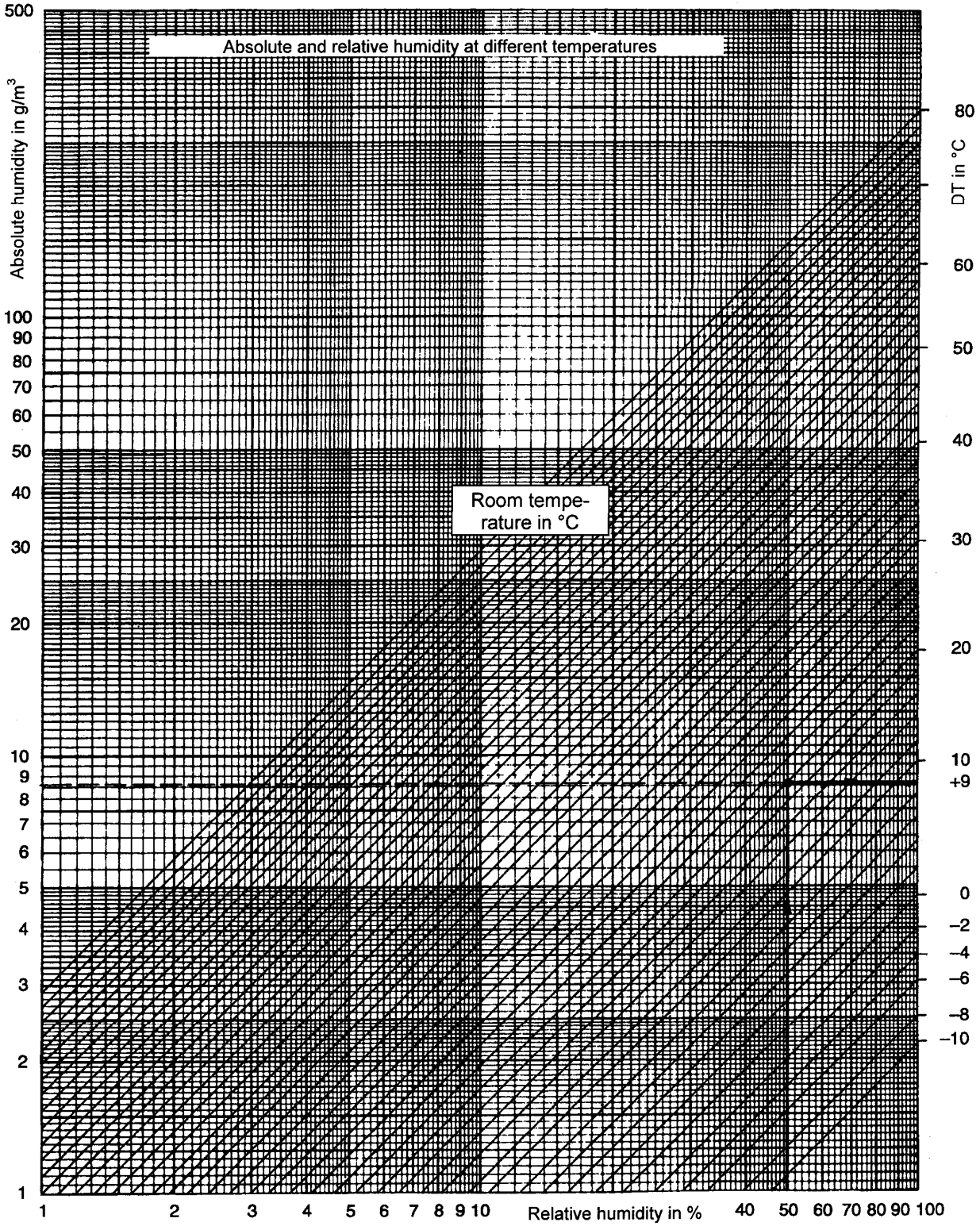
Die Betriebs- und Einstellwerte beziehen sich auf Maximalleistung des Generators bei entsprechender Kaltlufttemperatur.
THE OPERATING AND SETTING VALUES REFER TO MAXIMUM OUTPUT AT CORRESPONDING COOLING AIR TEMPERATURE.

* Die angegebenen Temperaturen sind Rechenwerte und werden nach der Inbetriebnahme korrigiert.
* *THE STATED TEMPERATURES ARE CALCULATED VALUES AND WILL BE CORRECTED AFTER INITIAL START-UP.*

** s_{p-p} nach ISO 7919-3 / ACCORDING TO ISO 7919–3
*** v_{eff} nach ISO 10816-3 / ACCORDING TO ISO 10816–3

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Bestimmung der Taupunkttemperatur / *Determination of Dewpoint Temperature*



Beispiel: Relative Luftfeuchte der Umgebungsluft = 50 % und Raumtemperatur = +20 °C ergeben eine Taupunkttemperatur (TP) = +9 °C. Dies entspricht einer absoluten Luftfeuchte von 8,6 g/m^3.

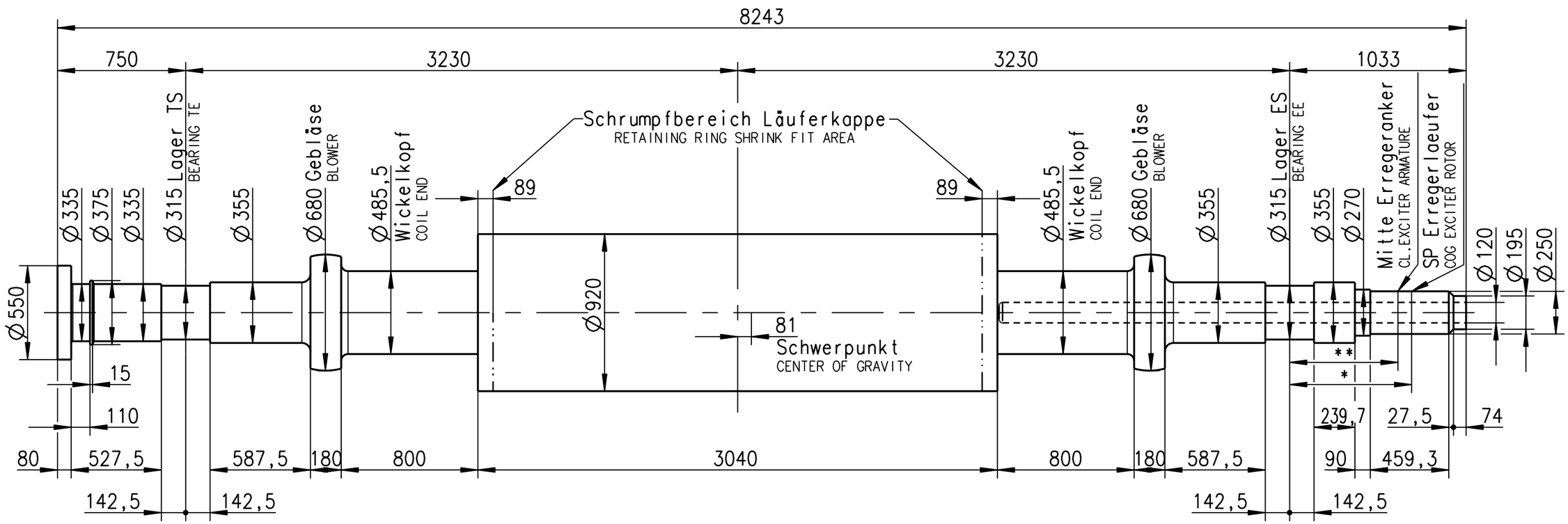
Example: Relative humidity of ambient air = 50 % and room temperature = +20 °C result in a dew-point temperature (DT) of +9°C, corresponding to an absolute humidity of 8,6 g/m^3.

SIEMENS	Form	Z.- Sys.	Zeichnungs-Nummer / DRAWING NUMBER	Index	Blatt / SHEET 16
	44	70	**DPPPG-70149879**	C	Von / OF 16

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Trägheitsmomente/MOMENTS OF INERTIA	$(m*r^2)$	$(G*D^2)$	Gew./WEIGHTS
Läufer kompl./ROTOR COMPL.	2374,9 kgm^2	93190 Nm^2	24786 kg
Erregerrotor/EXCITER ROTOR	31,4 kgm^2	1232 Nm^2	592 kg
ein Gebläse/ONE BLOWER	4,4 kgm^2	171 Nm^2	25 kg
Ballenbereich/BODY AREA	1611,5 kgm^2	63235 Nm^2	15309 kg
ein Wickelkopf/ONE COIL END	282,6 kgm^2	11091 Nm^2	1654 kg

(Wickelkopfbereich bestehend aus Kappe, Einsatzring, Kupfer und Isolierteilen
mit einer Länge von 609,6mm vom Ballen aus gerechnet ohne Welle)
(COIL END CONSISTS OF RETAINING RING, INSERT RING, COPPER AND INSULATION
WITH A LENGTH OF 609,6mm CALCULATED FROM BODY END WITHOUT SHAFT)

$M = 1697\ e^{-t/0,163s} \sin\omega t - 849\ e^{-t/0,162s} \sin 2\omega t + 327\ e^{-t/0,182s}$ [kNm]

M_{max} = 2432 kNm
M_N = 297 kNm
P_N = 79200 kW
S_N = 93176 kVA
cos f_N = 0,85
f = 50 Hz
n = 3000 min^{-1}
1. krit. Drehzahl/1ST CRIT. SPEED = 1233 U/min
2. krit. Drehzahl/2ND CRIT. SPEED = 3577 U/min
$I_{Ballen/BODY}$ = 2,56 * 10^{10} mm^4 (axiales Flächenträgheitsmoment des kompensierten Ballenbereiches
mit Wicklungsversteifung bei Nenndrehzahl)
(AXIAL POLAR MOMENT OF INERTIA OF COMPENSATED PLANE BODY AREA
WITH RESPECT TO WINDING REINFORCEMENT AT NOMINAL SPEED)

Material/ 26NiCrMoV14-5
MATERIAL:
0,2-Grenze/ 730...830 N/mm^2
YIELD STRENGTH:

* = 714,2mm
Massenschwerpunkt
Erregerlaeufer
CENTER OF GRAVITY
EXCITER ROTOR

** = 634,2mm
Mitte
Erregeranker
CENTER LINE OF
EXCITER ARMATURE

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EG000367	Vilnius Biomass

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Energy Sector

WEIGHT:	24786 KG	SCALE:	SPEC.:KUN351.00
ORIGINATED:	2017-12-14 SCHMIDT	TITLE:	WELLE ANGABEN F. BERECHNUNG
CHECKED:	2017-12-14 SIEGEL		
RELEASED:	2017-12-14 SCHMIDT		ROTOR SHAFT DATA FOR CALCULATION

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LANG. - DRAWING NO. / VALUE:
DPPPG-70149654
22-GNS1008-70149654
SGEN5-100A-2P92-30

REV.: A | SHEET: 1/1

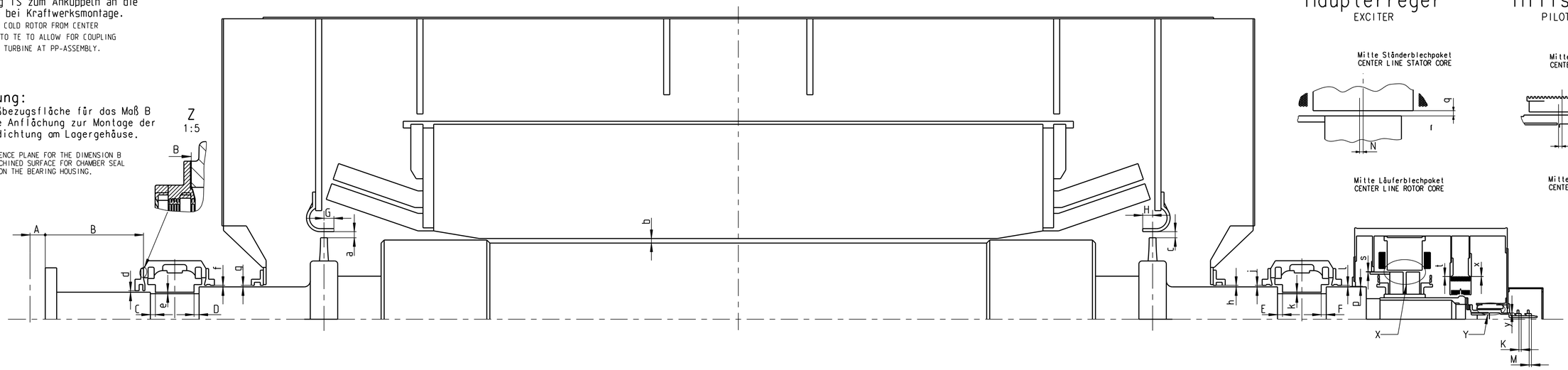
Pro/ENGINEER A3

DO NOT SCALE. WORK TO DIMENSIONS SHOWN

Verschiebung des kalten Läufers aus der Mittellage heraus in Richtung TS zum Ankuppeln an die Turbine bei Kraftwerksmontage.
OFFSET OF COLD ROTOR FROM CENTER POSITION TO TE TO ALLOW FOR COUPLING WITH THE TURBINE AT PP-ASSEMBLY.

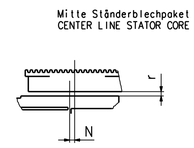
Achtung:
Die Maßbezugsfläche für das Maß B ist die Anflächung zur Montage der Kammerdichtung am Lagergehäuse.
NOTE:
THE REFERENCE PLANE FOR THE DIMENSION B IS THE MACHINED SURFACE FOR CHAMBER SEAL MOUNTING ON THE BEARING HOUSING.

Z
1:5



X
Haupterreger
EXCITER

Y
Hilfserreger
PILOT EXCITER

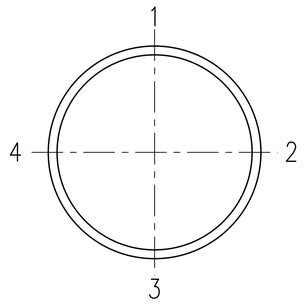


ACHTUNG!

Zunächst Mitte des Läufers zum Blechpaket ausrichten, dann Lagerbock und Konsole an Läufer ausrichten.
Luftführungsring nach Maß G und H einstellen.
Maß "A" dient zur Kompensation der Wärmedehnung des Läufers.
Der Axialschub der Turbine muss zusätzlich berücksichtigt werden, das heißt, Maß "A" muss um den Turbinenschub im stationären Zustand vergrößert werden.
Wenn Maß "B", gemessen von der Stirnseite der Kupplung eingestellt ist, steht Läufermitte auf Mitte Blechpaket.
Maß "B" bezogen auf kalten Zustand.
Die Wärmedehnung des Läufers wird berücksichtigt, indem der Abstand Kupplung - TS Lagerdichtfläche auf die Summe von "A" und "B" eingestellt wird.

NOTE!
FIRST ALIGN ELECTRICAL CENTER OF ROTOR TO STATOR CORE, THEN ADJUST BEARING PEDESTAL AND CONSOLE TO ROTOR.
ADJUST AIR BAFFLE RING TO DIMENSION G AND H.
DIM. "A" IS INTENDED FOR COMPENSATION OF THERMAL EXPANSION OF THE ROTOR.
THE AXIAL THRUST OF THE TURBINE HAS TO BE CONSIDERED ADDITIONALLY, THAT MEANS DIM. "A" HAS TO BE INCREASED BY THE STATIONARY TURBINE THRUST.
IF DIM. "B" AS MEASURED FROM THE FRONT SIDE OF COUPLING, ROTOR CENTRE LINE IS ON CORE CENTRE LINE.
DIM. "B" WITH RESPECT TO COLD CONDITION.
THE THERMAL EXPANSION OF THE ROTOR IS CONSIDERED IF THE DISTANCE FROM COUPLING TO SEALING AREA OF TE BEARING IS EQUAL TO THE SUM OF "A" AND "B".

Von TS gesehen
SEEN FROM TE



Axialspiele
AXIAL CLEARANCES

Maß DIM.	Sollmaß SPEC. DIM.	zul. Toleranz ALLOW. TOLERANCE +	−
A	2,9		
B	560		
C	35,0	1	1
D	35,0	1	1
E	35,0	1	1
F	35,0	1	1
G	65	5	5
H	65	5	5
K	25,5	1	1
M	25,5	1	1
N	2,8	1	1

Maß DIM.	Sollmaß SPEC. DIM.	zul. Toleranz ALLOW. TOLERANCE +	−
a	2,3	0,5	0,5
b	46	2,3	2,3
c	2,3	0,5	0,5
p	0,5	0,2	0,2
q	8	0,5	0,5
r	2,5	0,3	0,3
s	8	2	2
t	1	0,2	0,2
x	1	0,2	0,2
y	0,5	0,2	0,2

Maß DIM. \ Messpunkt MEAS. POINT	1 max.	1 min.	2 max.	2 min.	3 max.	3 min.	4 max.	4 min.
d	0,27	0,13	0,14	0,06	0,00	0,00	0,14	0,06
e	0,41	0,35	0,54	0,46	0,00	0,00	0,54	0,46
f	0,27	0,13	0,14	0,06	0,00	0,00	0,14	0,06
g	0,65	0,35	0,35	0,20	0,05	0,05	0,35	0,20
h	0,65	0,35	0,35	0,20	0,05	0,05	0,35	0,20
j	0,27	0,13	0,14	0,06	0,00	0,00	0,14	0,06
k	0,41	0,35	0,54	0,46	0,00	0,00	0,54	0,46
l	0,27	0,13	0,14	0,06	0,00	0,00	0,14	0,06

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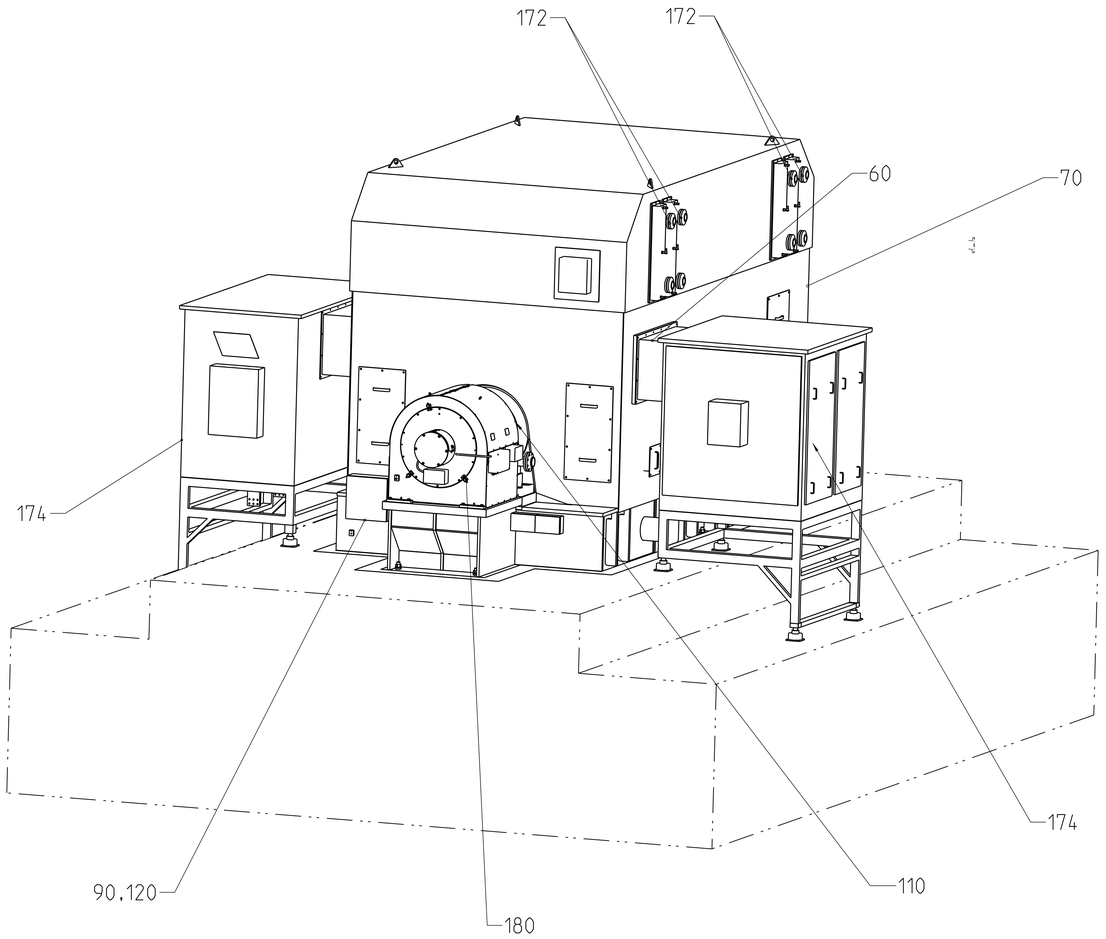
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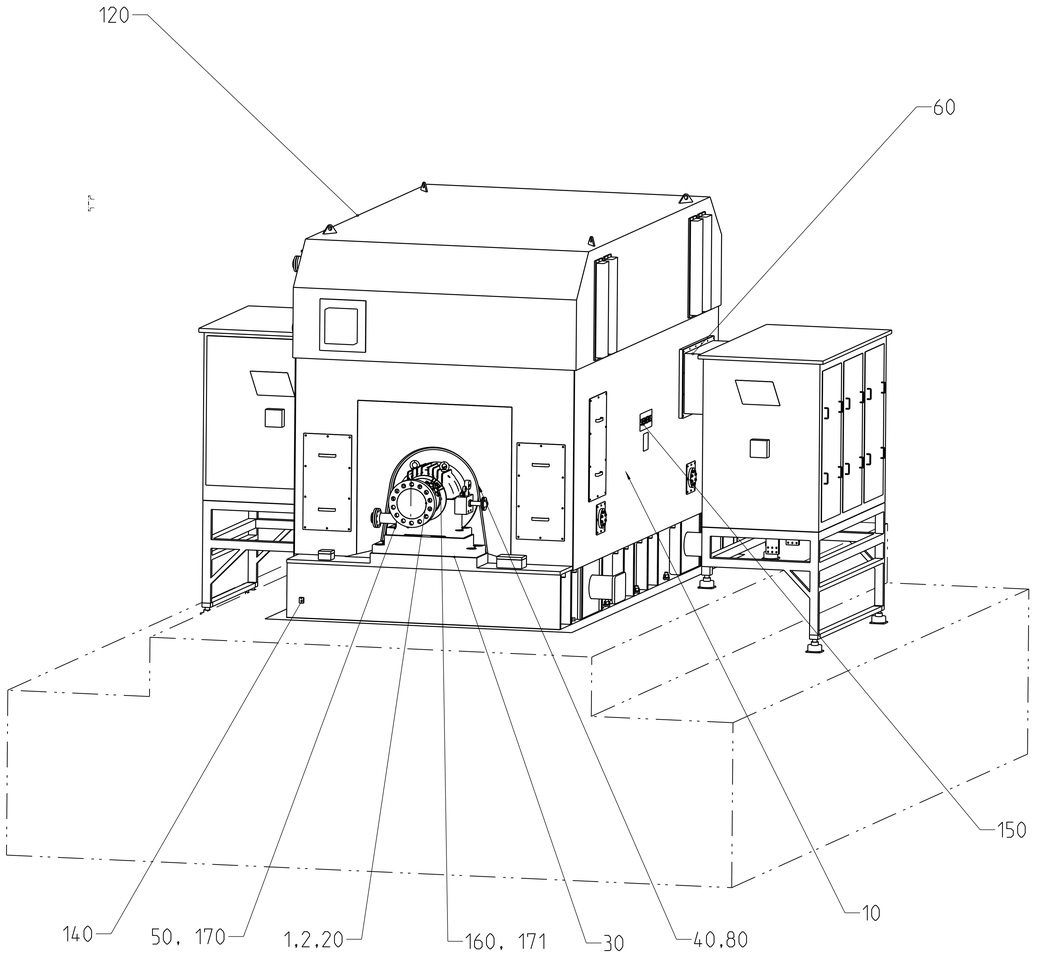
WEIGHT: / KG	SCALE:	SPEC.: KUN351.00	
ORIGINATED: 2018-07-24 HELBIG	TITLE: AXIALE U. RADIALE LAUFERSPIELE AXIAL AND RADIAL ROTOR CLEARANCES		
CHECKED: 2018-07-24 SIEGEL			
RELEASED: 2018-07-24 HELBIG			
CONFIDENTIAL COPYRIGHT (c) Siemens AG 2018 ALL RIGHTS RESERVED	LANG. - DRAWING NO. / VALUE: DPPPG-70166125 22-GNS0440T-70166125 SGEN5-100A-2P092-30	REV.: A	SHEET: 1/1

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Masze siehe Maszbild DPPPG-70149178
DIMENSIONS SEE DIMENSIONAL DRAWING DPPPG-70149178

CODE WORD:	VILNIUS Biomass
ORDER NUMBER:	EG000367

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WEIGHT:	SCALE: 1:1	SPEC.:KUN351.00	
ORIGINATED:	2018-08-27 MUELLER	TITLE:	WERKSMONTAGE
CHECKED:	2018-08-27 BAUER		
RELEASED:	2018-08-27 MUELLER		SHOP FINAL ASSEMBLY
CONFIDENTIAL		LANG. - DRAWING NO. / VALUE:	DPPPG-70168603
		22-GNS0110T-70168603	REV.: A SHEET: 1/1
		SGEN5-100A-2P92-30	

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MATERIAL: P0057422500 **REVISION:** A **EFFECTIVE:** 2018-08-27 **BAS.QTY:** 1.000 **REQ.QTY:** 1.000 **PLANT:** **APPL.:** ZEN1 **X-STATUS:** 40 **BASE UOM:** ST **ENG. UNIT:** MM
DESCRIPTION: SHOP FINAL ASSEMBLY **TITLE ID:** MKSFA0000-000 **PROJECT ID:** **ANCHOR ID:** **SERVICE CODE:**
DOCUMENT-STD/GRAPHIC: 22-SFA0000-70168603 **VARIANT:** **NET WEIGHT:** 140.400,000 KG **CAL. WEIGHT:** 0,000 KG **SER. REQ.:** X **SER. INH.:** X
B.TRACK:

DOCUMENT LINKS:

TYP	DOCUMENT ID	PAR	VER	ALTERNATIVE ID	ST	DESCRIPTION
DWG	DPPPG-70168603	000	A	22-SFA0000-70168603	RL	SFA0000 GENERATOR SHOP FINAL ASSEMBLY 2P

CLASSIFICATION:

Classification Data Exists

MATERIAL / ITEM / QUANTITY / REL.	RV / Level / REFERENCE POINT / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / SIZE/DIM 4	VAR / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE)	CAL. WEIGHT / RAW MATERIAL SPEC. / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE)	WU	SR	SI	BT	SC	X-STATUS / SURFACE TREAT.	BUOM / EUOM
P0057422900 0001 L X X X X 1.000 EA P0057422500	A 1 X 0.0 MKSFA7310-000	BALANCING INFORMATION MKSFA7310-000	22-SFA7310-70166898	5.380	KG						40	EA MM
		TYPE DWG	DOCUMENT ID DPPPG-70166898	PART 000	VR A	ALTERNATIVE ID 22-SFA7310-70166898	ST RL	DIR DESCRIPTION OVERSPEED RELEASE						
0002 D X 1.000 P0057422500	1 .0 MKGNS0440T-000	DWG	DPPPG-70166125	000	A	22-GNS0440T-70166125	RL	AXIAL & RADIAL ROTOR CLEARANCES						
P0057423000 0010 L X X X X 1.000 EA P0057422500	A 1 X 0.0 MKSTA0000-000	STATOR ASSEMBLY MKSTA0000-000	22-STA0000-70154619	91930.000	KG	X	X				40	EA MM
		DWG	DPPPG-70154619	000	A	22-STA0000-70154619	RL	STA0000 STATOR ASSEMBLY 2P						
P0057423100 0020 L X X X X 1.000 EA P0057422500	A 1 X 0.0 MKRTA0000-000	COMPLETE ROTOR MKRTA0000-000	22-RTA0000-70164915	24786.000	KG	X	X				40	EA MM
		DWG	DPPPG-70164915	000	A	22-RTA0000-70164915	RL	ROTOR COMPLETE						
P0002065500 0030 L X X X X 2.000 EA P0057422500	A 1 X 0.0 MKSFA6200-000	INTERMEDIATE FRAME MKSFA6200-000 BEARING TYPE	3-SFA6200-00000543 EN-GJL-300	520.000 LAGERTYP28	KG						40	EA MM
		DWG	DPPPG-00000543	000	B	3-SFA6200-00000543	RL	INTERMEDIATE FRAME SD						
		INTERNAL COMMENT: Internal comment Exists In Language E Internal comment Exists In Language D												
P0016124300 0040 L X X X X 2.000 EA P0057422500	B 1 X 0.0 MKSFA0400-000	BLOWER SHROUD MACHINING MKSFA0400-000 ITEM / VERSION	22-SFA0400-70035099	88.000 GEBLÄSEDURCHMESSER959	KG						40	EA MM
		DWG	DPPPG-70035099	000	B	22-SFA0400-70035099	RL	SFA0400 Luftfuehrungsring FZ						

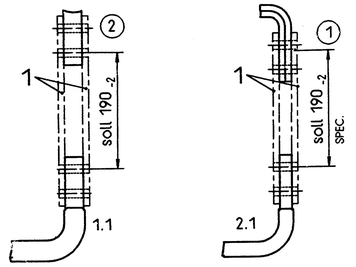
MATERIAL / ITEM / QUANTITY / REL.	RV / Level / UOM / REFERENCE POINT / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / SIZE/DIM 4 / DOCUMENT ID	PART	VR	ALTERNATIVE ID	VAR / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE) / ST	CAL. WEIGHT / RAW MATERIAL SPEC. / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE) / DIR DESCRIPTION	WU / SURFACE TREAT.
		INTERNAL COMMENT: Internal comment Exists In Language D Internal comment Exists In Language E							
P0057423200 0050 L X X X X 1.000	A / 1 X 0.0 EA / MKSFA5500-000 P0057422500	SLEEVE BEARING MKSFA5500-000 A=DIM1 B=DIM2 C=DIM3 ETC -	DPPPG-00001060 -				 WPXYQ28-315 -	1600.000 -	KG / 40 / EA / MM
		DWG	DPPPG-00001060	000	B		RL	BEARING COMPLETE SIZE 28	
		DWG	DPPPG-70153217	000	A	22-SFA5500-70153217	RL	SLEEVE BEARING EE	
		DWG	DPPPG-70158485	000	A	22-SFA5500-70158485	RL	SLEEVE BEARING TE	
P0060722500 0060 L X X X X X 1.000	A / 1 X 0.0 EA / MKSFA6500-000 P0057422500	BUSHING ASSEMBLY MKSFA6500-000	1-2570-451105				 	395.000 	KG / 40 / EA / MM
		DWG	1-2570-451105	000	A		RL	MONTAGE AUSLEITUNGEN	
P0059317400 0070 L X X X X 1.000	A / 1 X 0.0 EA / MKSFA5600-000 P0057422500	COVER MKSFA5600-000	22-SFA5600-70156650 				 	6581.000 	KG / 40 / EA / MM
		DWG	DPPPG-70156650	000	A	22-SFA5600-70156650	RL	SFA5600 ENCLOSURE 2P	
P0012417000 0080 L X X X X 1.000	A / 1 X 0.0 EA / MKSFA6600-000 P0057422500	SHAFT BUSHING ASSEMBLY MKSFA6600-000	2-4742-273961 				 	410.000 	KG / 40 / EA / MM
		DWG	2-4742-273961	000	A		RL	WELLENDURCHFUEHRG. MONT.	
P0057423300 0090 L X X X X 1.000	A / 1 X 0.0 EA / MKINS0000-000 P0057422500	INSTRUMENTATION+WIRING ASSEMBLY MKINS0000-000	22-SFA5400-70152441 				 0/ 	84.000 0	KG / 40 / EA / MM
		DWG	DPPPG-70152441	000	B	22-SFA5400-70152441	RL	SFA5400 AUXILIARY WIRING DOCUMENTS 2P	
PE427222 0110 L X X X X 1.000	A / 1 X 0.0 EA / MKSFA4400-000 P0057422500	SHAFT GUARD ASSEMBLY MKSFA4400-000	 				 	22.000 	KG / 40 / EA / MM
								NO DOCUMENT ASSIGNED	
P0057423400 0120 L X X X X 1.000	A / 1 X 0.0 EA / MKSFA6900-000 P0057422500	MEASURING NAME PLATE LIST MKSFA6900-000	- 				 	0.300 	KG / 40 / EA / MM
								NO DOCUMENT ASSIGNED	

MATERIAL / ITEM / QUANTITY / REL.	RV / Level / REFERENCE POINT / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / SIZE/DIM 4 / DOCUMENT ID	VAR / PART	CAL. WEIGHT / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE) / VR	WU / RAW MATERIAL SPEC. / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE) / ALTERNATIVE ID	SR / SI / BT / SC / X-STATUS / SURFACE TREAT. / ST / DIR DESCRIPTION	BUOM / EUOM
P0053048300 0140 L X X X X X X 1.000 EA P0057422500	A / 1 X 0.0 MKSFA7210-000	GROUNDING CONNECTIONS MKSFA7210-000 DWG	22-SFA7210-70067569 DPPPG-70067569	000	10.000 A	KG 22-SFA7210-70067569	40 RL	EA MM SFA7210 ERDUNGSANSCHLUESSE
P0057423500 0150 L X X X X X 1.000 EA P0057422500	A / 1 X 0.0 MKSFA5150-000	GENERATOR LABELS MKSFA5150-000 DWG DWG DWG	22-SFA5150-70124658 DPPPG-70033284 DPPPG-70116685 DPPPG-70124658	000 000 000	4.000 B B C	KG 22-70033284 22-70116685 22-SFA5150-70124658	40 RL RL RL	EA MM SFA5150 PLATES COOLER COVER SFA5150 PLATES EXCITER GENERATOR LABLES
P0037239800 0160 L X X X X X 1.000 EA P0057422500	A / 1 X 0.0 MKSFA5000-000	SHIPPING PRECAUTION MKSFA5000-000 DWG	3-279889 3-279889	000	5.000 -/ -	KG RL	40 SHIPPING PRECAUTION	EA MM
P0058659900 0170 L X X X X X X 1.000 EA P0057422500	A / 1 X 0.0 MKSFA4900-000	ROTOR ASSEMBLY MKSFA4900-000	O.Z.		240.000	KG	40 NO DOCUMENT ASSIGNED	EA MM
PE434335 0171 L X X X X X 1.000 EA P0057422500	D / 1 X 0.0 MKSFA4500-000	EARTH BRUSH MKSFA4500-000 DIAMETER DWG	22-SFA4500-70167687 DPPPG-70167687	000	6.000 D=335MM A	KG 22-70167687	40 RL	EA MM ASSEMBLY EARTH BRUSH
		INTERNAL COMMENT: Internal comment Exists In Language D Internal comment Exists In Language E						
0172 D X .0 1.000 MKSFA5701-000 P0057422500	1	DWG	DPPPG-70152426	000	A	22-SFA5701-70152426	RL	SFA5701 COOLING ELEMENTS 2P
P0057423600 0173 L X X X X X 1.000 EA P0057422500	A / 1 X 0.0 MKSFA5702-000	COOLER COVER MKSFA5702-000 DWG	22-SFA5702-70156503 DPPPG-70156503	000	7430.000 -/- A	KG 22-SFA5702-70156503	40 RL	EA MM SFA5702 COOLER COVER GENERAL DRAWING
P0058032000 0174 L X X X X X 1.000 EA P0057422500	B / 1 X 0.0 MKSFA6000-000	TERMINAL BOX ASSEMBLY MKSFA6000-000	0		4000.000 0/	KG	40	EA MM

MATERIAL	RV	Level	DESCRIPTION	DOCUMENT STD/GRAPHIC	VAR	CAL. WEIGHT	WU	SR	SI	BT	SC	X-STATUS	BUOM
ITEM T A P C W s U	S	I N M c REK	MATERIAL TITLE ID BASIC MATERIAL		TLV NO	RAW MATERIAL SPEC.						SURFACE TREAT.	EUOM
QUANTITY UOM	REFERENCE POINT		SIZE/DIM DESCRIPTION		SIZE/DIM 1 (STD. BOM NO./VAR)		SIZE/DIM 2 (SIZE/DIM STD. BOM)						
REL. BOM MM NO.			SIZE/DIM 3	SIZE/DIM 4	SIZE/DIM 5 (HEAD TYPE)		SIZE/DIM 6 (FITTING TYPE)						
			TYPE DOCUMENT ID	PART VR ALTERNATIVE ID	ST	DIR DESCRIPTION							
						NO DOCUMENT ASSIGNED							
			INTERNAL COMMENT: Internal comment Exists In Language D Internal comment Exists In Language E										
P0057425000	A	1	EXCITER MACHINE ASSEMBLY	26-EXC0001-70067255		2240.000	KG	X	X			40	EA
0180 L X X X X		X 0.0	MKEXC0001-000										MM
1.000	EA	MKEXC0001-000											
P0057422500													
			DWG DPPPG-70067255	000 A 26-EXC0001-70067255	RL	EXC0001 EXCITER MACHINE ASSEMBLY							

1.Schritt) Lochabstand (Radialversatz)

1st STEP) SPACING OF HOLES (RAD ALLY OFFSET)



Zum Erreichen von 190_{-2}, sind in (1) und (2) die Bohrungen evtl. zu vergrößern (max. ø18) alternativ Langloch

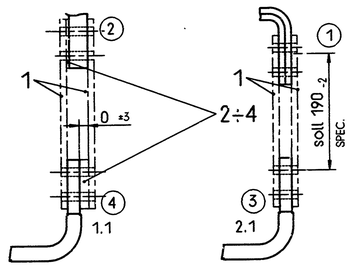
ENLARGE BORES IN (1) AND (2) TO GET 190_{-2} (MAX. ø18) ALTERNATIVELY ELONKATED HOLE

Dehnungsbandattrappe T.1 an Punkt 1.1 und 2.1 angeschraubt

BOLT TO ATTACH FLEX LINK MOCK-UP IT.1 AT POINTS 1.1 AND 2.1

2.Schritt) Axialversatz

2st STEP) AXIALLY OFFSET



Axialer Versatz durch Zwischenlegen von Kupferblechen T.2÷3 an (2) und (4) ausgeglichen (nur 1 Blech)

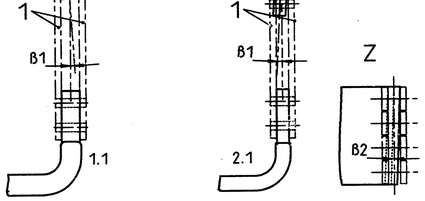
COMPENSATE AXIAL OFFSET BY POSITIONING SHIMS OF CU-PLATES AT 2 AND 4 (ONLY 1 PLATE)

Dehnungsbandattrappe T.1 an Punkt 1.1 und 2.1 angeschraubt

BOLT TO ATTACH FLEX LINK MOCK-UP IT.1 AT POINTS 1.1 AND 2.1

3.Schritt) Winkelversatz ß1 und ß2

3rd STEP) ANGLE OFFSET ß1 AND ß2



Bei Schiefwinkeligkeit von (2) bzw. (1) sind diese Teile soweit nachzubiegen, ggf. Langlöcher zu fertigen, bis Parallelität hergestellt ist; anschließend ist gemäß Punkt 2 vorzugehen.

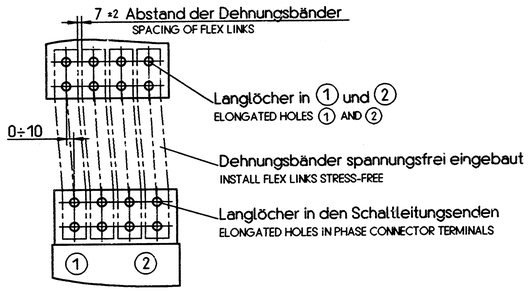
IN CASE OF OUT-OF-PLANE POSITION OF (2) OR (1), RE-BEND THESE PARTS, PRODUCE ELONGATED HOLES, IF REQUIRED TILL PARALLELISM IS ACHIEVED; PROCEED ACC. TO PARAGRAPH (2)

Dehnungsbandattrappe T.1 an Punkt 1.1 und 2.1 angeschraubt

BOLT TO ATTACH FLEX LINK MOCK-UP IT.1 AT POINTS 1.1 AND 2.1

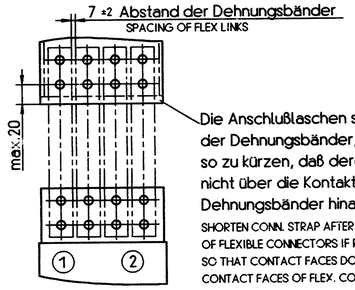
4.Schritt) Versatz in Umfangsrichtung

4th STEP) OFFSET IN CIRCUMFERENTIAL DIRECTION



5.Schritt) Kürzen der Anschlußlaschen

5th STEP)



Die Anschlußlaschen sind nach dem Anpassen der Dehnungsbänder, falls erforderlich so zu kürzen, daß deren Kontaktflächen nicht über die Kontaktflächen der Dehnungsbänder hinausragen.

SHORTEN CONN. STRAP AFTER ADAPTION OF FLEXIBLE CONNECTORS IF REQUIRED. SO THAT CONTACT FACES DO NOT PROTRUDE CONTACT FACES OF FLEX. CONNECTORS.

Stückliste BOM		
Pos. IT.	Benennung	TITEL
1	Dehnungsbandattrappe	FLEX LINK MOCK-UP
2	Ausgleichsstück	COMPENSATION PIECE
3	Ausgleichsstück	COMPENSATION PIECE
4	Ausgleichsstück	COMPENSATION PIECE
5	Dehnungsband	FLEX. LINK
6	Sicherungsblech	LOCK WASHER
7	Unterlegblech	BASE PLATE
8	Sechskantschraube	HEXAGON BOLT
9	Zwillingsmutter	TWIN NUT
10	Scheibe	WASHER
11	Spannscheibe	CONICAL SPRING WASHER
12	Unterlegblech	BASE PLATE
13	-	-
14	-	-
15	-	-

Achtung!

Vor Eintritt in den Generator ist sicherzustellen, daß seitens der Kraftwerksführung die netzseitigen Anschlüsse kurzgeschlossen und geerdet sind. Zum Bändertausch soll der Läufer still stehen. Falls der Bändertausch bei Turnbetrieb erfolgt, müssen die Schaltleitungsenden kurzgeschlossen und geerdet werden. Vor Beginn der Arbeiten ist der Wickelkopf grundsätzlich sauber abzudecken! Demontierbare Teile zur Nacharbeit ausbauen. Falls Nacharbeit an den Schaltleitungsenden erforderlich wird: mit Staubsauger kontinuierlich Feilspäne absaugen. Kontaktflächen vor der Endmontage metallisch blank gebürstet.

NOTE!

ALL EXTERNAL LEADS HAVE TO BE GROUNDED BY THE SITE MANAGEMENT, AND SHORTED BEFORE ENTERING THE GENERATOR. FOR FLEX LINK EXCHANGE THE ROTOR SHOULD BE AT STANDSTILL. IF EXCHANGE TAKES PLACE AT TURNING OPERATION, THE PHASE CONNECTOR ENDS SHOULD BE SHORTED AND GROUNDED. CAREFULLY COVER END WINDING BEFORE STARTING WORK. REMOVE DEMOUNTABLE PARTS FOR REMACHINING. IF REMACHINING AT PHASE CONNECTOR ENDS IS REQUIRED, CHIPS HAVE TO BE CONTINUOUSLY EXTRACTED BY YACUUM CLEANING. BRUSH CONTACT FACES METTALIC BARE BEFORE FINAL ASSEMBLY.

Randbedingung BOUNDARY CONDITIONS

1.) Bereits gebohrte S-Bänder nach Stückliste
1.) ALREADY DRILLED S-TAPES ACC. TO BOM

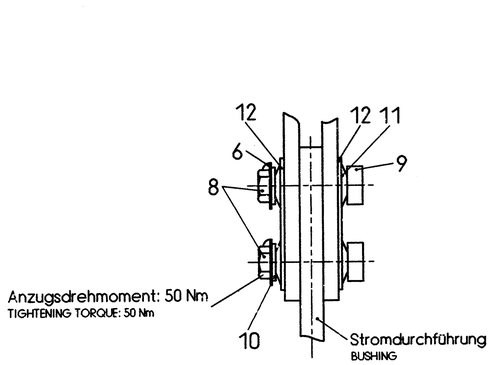
2.) Bereits gebohrte Stromverbindungslaschen (1) und (2) an den Durchführungen
2.) ALREADY DRILLED CURRENT CONN. LUGS (1) AND (2) AT BUSHINGS.

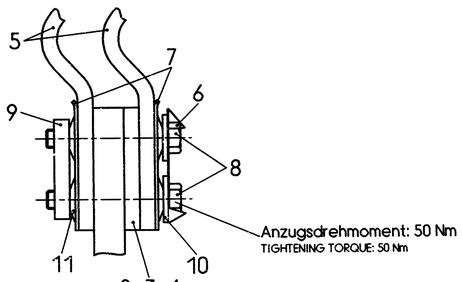
3.) Schablone in den Abmessungen eines starren Dehnungsbandes (nach Stückliste)
3.) TEMPLATE DIM.S OF A RIGID FLEX LINK (ACC. TO BOM)

4.) Keine Bandagen an den Dehnungbändern und keine Langlöcher
4.) NO BANDAGES AT FLEX LINKS AND NO ELONGATED HOLES

Anordnung der Spannscheiben (Schema)

ARRANGEMENT OF CONICAL SPRING WASHERS (DIAGRAM)





6.Schritt)

Dehnungsbandmontage entspr. Zeichnung der Baugr. 2575, einschließlich Spannscheiben nach DIN 6796
Schrauben und Unterlegbleche
Drehmoment = 50 Nm
Muttern und Schrauben trocken verschraubt
Achtung!
>12 h nach Erstmontage alle Schrauben mit Nenndrehmoment = 50 Nm nachgespannt.

6th STEP)

FLEX LINK INSTALLATION ACC. TO DWG OF DES. GR. 2575
INCL. CONICAL SPRING WASHERS ACC. TO DIN 6796
BOLTS AND BASE PLATES
TORQUE = 50 Nm
SCREW NUTS AND BOLTS DRY
NOTE!
RETIGHTEN ALL BOLTS WITH NOMINAL TORQUE = 50 Nm
>12h FOLLOWING INITIAL ASSEMBLY.

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WEITERGABE SOWIE VERVIELFÄLTIGUNG DIESER UNTERLAGE, VERWERTUNG UND MITTEILUNG IHRES INHALTS SIND OHNE SCHRIFTLICHE GENEHMIGUNG NICHT ZULÄSSIG. ZUWIDERHANDLUNGEN VERPFLICHTEN ZUM SCHADENERSATZ. ALLE RECHTE FÜR DEN FALL DER PATENTERTEILUNG ODER GEBRAUCHSMUSTER- ODER GESCHMACKSMUSTER-EINTRAGUNG VORBEHALTEN.

INDEX	DATUM DATE	NAME NAME	GEPRÜFT CHECKED	ÄENDERUNGSBESCHREIBUNG/DESCRIPTION OF CHANGE
ENTST. AUS/ORIG. OF				GRUND/REASON

	DATUM DATE	NAME NAME	MAßSTAB SCALE	SPECIFICATIONS KUN 351.00	UAS DOC. KEY
GEZEICH. DRAWN	29.04.98	Epp	BENENNUNG/TITLE		INHALTSKENNZEICHEN CODE
BEARB. COORD.	29.04.98	Epp	Montageanleitung für Dehnungsbandeinbau		
GEPRÜFT CHECKED	29.04.98	Mueller	ASSEMBLY INSTRUCTION FOR FLEX LINK INSTALLATION		
ABTLG. DEPT.			FORM.	Z-SY. SPRA.	ZEICHNUNGS-NUMMER/DRAWING NUMBER / KENNWERT/VALUE	INDEX
Siemens AG Energieerzeugung KWU			11		1-2200-238955	00
WMFTG2	WMFTG3				GES.GEW. TOTAL WT. IN KG	MF

1-2200-238955

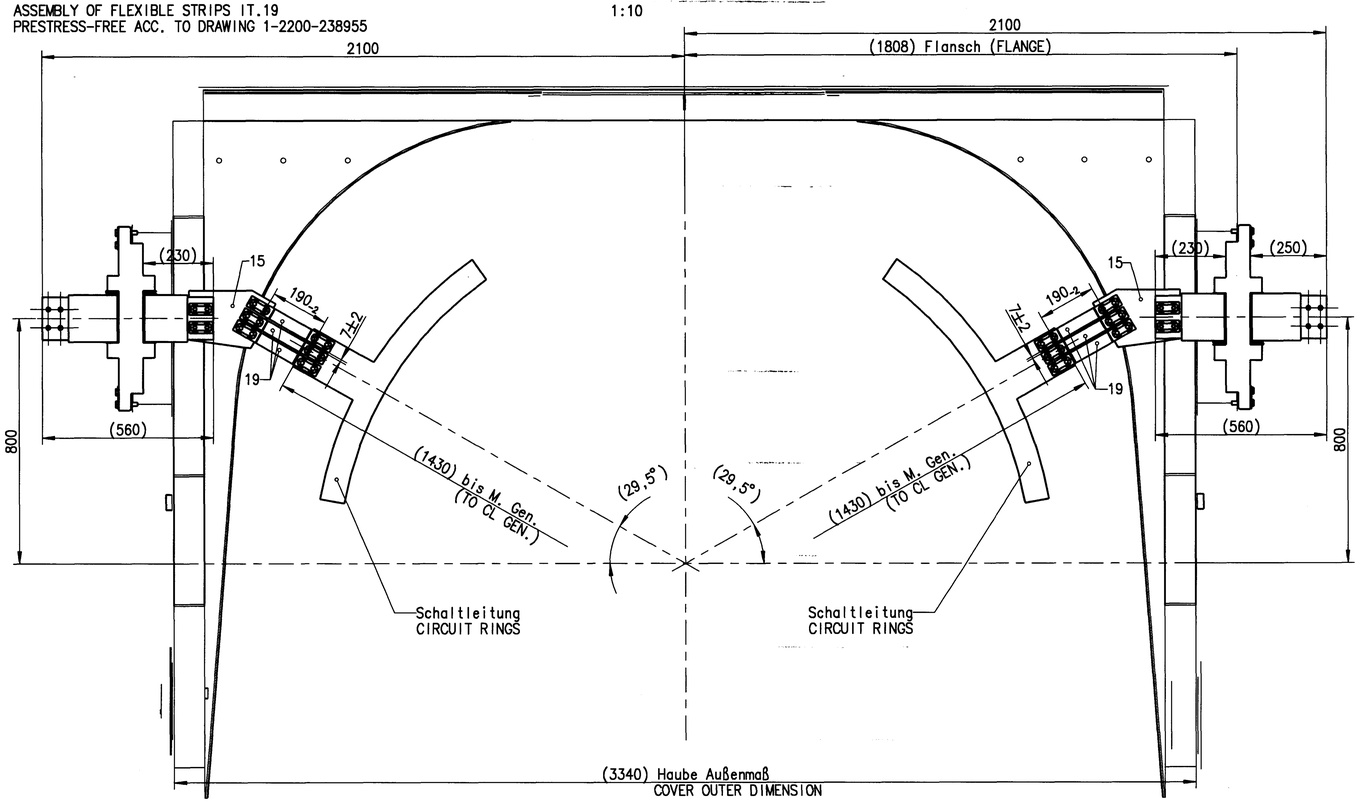
MAßE NICHT ABGREIFBAR/NOT TO SCALE

SIGRAPH DESIGN

Anbau der Dehnungsbänder T.19
vorspannungsfrei nach Z. 1-2200-238955

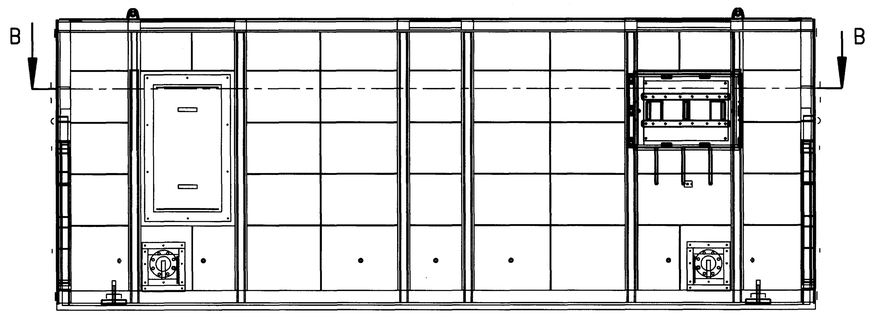
ASSEMBLY OF FLEXIBLE STRIPS IT.19
PRESTRESS-FREE ACC. TO DRAWING 1-2200-238955

Ansicht auf ES
VIEW ON EE
1:10



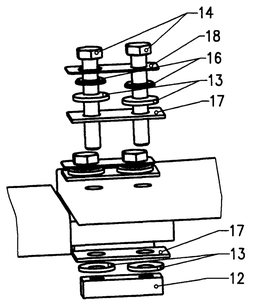
TS

ES

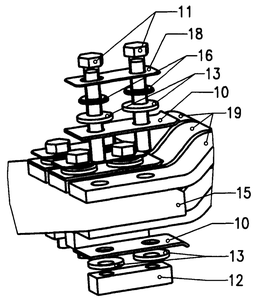


1:25

C
(explodiert/EXPLODED)



D
(explodiert/EXPLODED)



Bei Bedarf T.8/9 zwischen T.19 und T.15 bzw. Schaltleitung beigelegt.
T.11 und 14 auf der Baustelle mit T.18 gesichert.
IF NECESSARY, ATTACH IT.8/9 BETWEEN IT.19 AND 15 OR CIRCUIT RINGS.
IT.11 AND 14 LOCKED WITH IT.18 AT SITE.

Alle nicht verzinnten Kontaktflächen mit Schleifvlies behandelt und vor Versand Generator mit Kontaktfett Teil 21 eingerieben.

Blanke Leiter gegeneinander oder gegen Eisen:
Luftabstand min. 115 mm
Kriechstrecke min. 330 mm

Kennzeichnung nach KUN 107.01

Kriechstrecken und Luftabstände nach WFV 2.01

Anziehen der Schrauben M12 mit Spannscheiben an den Kontaktflächen: Drehmoment 50 Nm

Spannung: s. Rechnungsangaben
Prüfspannung: s. Rechnungsangaben
Hierzu gehört: WFV 2.01, WFV 1.4, FV 100054

ALL NON TINNED SURFACES ARE PROCESSED WITH GRINDING FLEECE AND GREASED WITH IT.21 BEFORE SHIPPING GENERATOR.

BETWEEN BLANK CONDUCTORS OR TO IRON:
AIR SPACE MIN. 115mm
CREEPAGE PATH MIN. 330mm

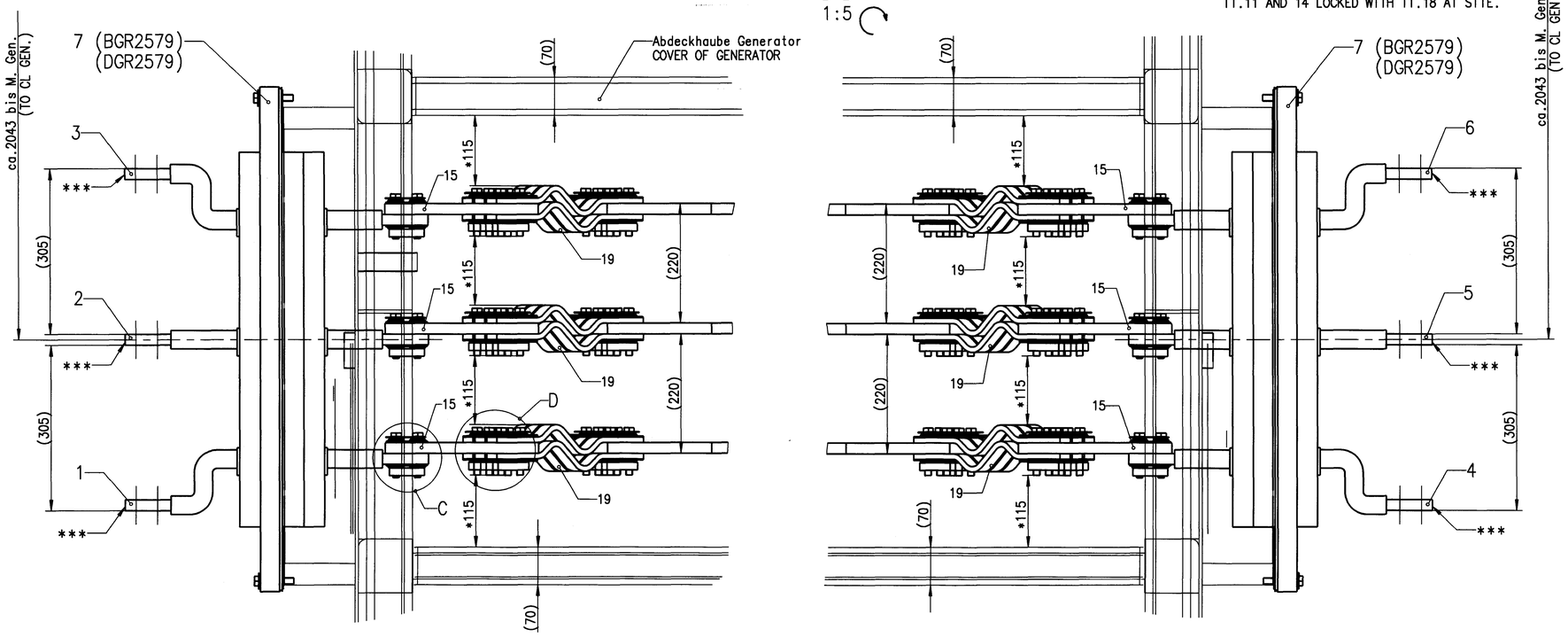
LABELING ACC. TO KUN 107.01

VOLTAGE SPACES AND CREEPAGE PATHES ACC. TO WFV 2.01

TORQUE SCREWS M12 WITH CLAMPING DISKS FOR CURRENT SURFACES: TIGHTENING TORQUE 50 Nm.

VOLTAGE: SEE CALCULATION DATA
TEST VOLTAGE: SEE CALCULATION DATA
FOR THIS: WFV 2.01, WFV 1.4, FV 100054

B-B
1:5



Kennzeichnung der Phasen (T.1-T.6) an den mit *** gekennzeichneten Stellen, entsprechend Stückliste mit 10mm perforierten Schlagzahlen.
LABEL PHASES (IT.1-IT.6) ON *** MARKED POSITIONS ACC. TO BOM WITH 10mm IMPACT NUMBERS.

REV.	DATE	CHANGE DESCRIPTION
A	2010-07-05	Erstausgabe / FIRST RELEASE

SIEMENS AG
POWER GENERATION

WEIGHT: KG	SCALE: 1:1	SPEC.: KUN351.00
DRAWN: 2010-07-05 SUPERKA	TITLE	
CHECKED: 2010-07-05 EPP	MONTAGE AUSLEITUNGEN	
RELEASED: 2010-07-05 SUPERKA	BUSHINGS ASSEMBLY	
CONFIDENTIAL (c) SIEMENS AG 2009 ALL RIGHTS RESERVED	DRAWING NUMBER /VALUE 1-2570-451105	REV. A / SHEET 1/1

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DO NOT SCALE. WORK TO DIMENSIONS SHOWN

MATERIAL: P0060722500 **REVISION:** A **EFFECTIVE:** 2018-06-04 **BAS.QTY:** 1.000 **REQ.QTY:** 1.000 **PLANT:** **APPL.:** ZEN1 **X-STATUS:** 40 **BASE UOM:** ST **ENG. UNIT:** MM
DESCRIPTION: BUSHING ASSEMBLY **TITLE ID:** MKSFA6500-000 **PROJECT ID:** **ANCHOR ID:** **SERVICE CODE:**
DOCUMENT-STD/GRAPHIC: 1-2570-451105 **VARIANT:** **NET WEIGHT:** 395,000 KG **CAL. WEIGHT:** 0,000 KG **SER. REQ.:** **SER. INH.:**
B.TRACK:

DOCUMENT LINKS:

TYP	DOCUMENT ID	PAR	VER	ALTERNATIVE ID	ST	DESCRIPTION
DWG	1-2570-451105	000	A		RL	MONTAGE AUSLEITUNGEN

CLASSIFICATION:

Classification Data Exists

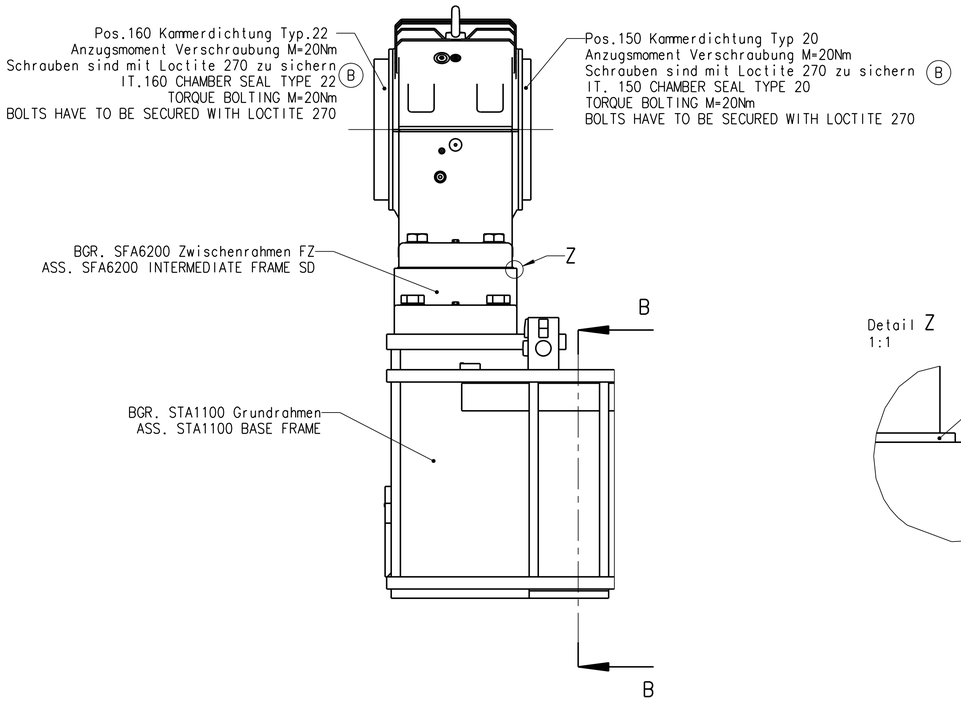
MATERIAL / ITEM / T / A / P / C / W / s / U / QUANTITY / UOM / REL. / BOM MM NO.	RV / Level / S / I / N / M / c / REK / REFERENCE POINT	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE / DOCUMENT ID	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / SIZE/DIM 4 / PART / VR / ALTERNATIVE ID	VAR / CAL. WEIGHT / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE) / ST	WU / SR / SI / BT / SC / X-STATUS / RAW MATERIAL SPEC. / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE) / BUOM / SURFACE TREAT. / EUOM	DIR DESCRIPTION
0001 T X 0.0 1.000 P0060722500	1	ITEM TEXT : Anschluss1/CONNECTION1; Phase U1				NO DOCUMENT ASSIGNED
0002 T X .0 1.000 P0060722500	1	ITEM TEXT : Anschluss2/CONNECTION2; Phase V1				NO DOCUMENT ASSIGNED
0003 T X .0 1.000 P0060722500	1	ITEM TEXT : Anschluss3/CONNECTION3; Phase W1				NO DOCUMENT ASSIGNED
0004 T X .0 1.000 P0060722500	1	ITEM TEXT : Anschluss4/CONNECTION4; Phase U2				NO DOCUMENT ASSIGNED
0005 T X .0 1.000 P0060722500	1	ITEM TEXT : Anschluss5/CONNECTION5; Phase V2				NO DOCUMENT ASSIGNED
0006 T X .0 1.000 P0060722500	1	ITEM TEXT : Anschluss6/CONNECTION6; Phase W2				NO DOCUMENT ASSIGNED
PE460364 0007 L X X X X X X 0.0 1.000 EA P0060722500	A / 1 MKSFA6400-000	BUSHINGS COMPLETE, BLANK MKSFA6400-000		256.000 KG WFV 1.4	40 EA MM	NO DOCUMENT ASSIGNED

MATERIAL / ITEM / QUANTITY / REL.	RV / Level / REFERENCE POINT / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / SIZE/DIM 4 / DOCUMENT ID	PART	VR	ALTERNATIVE ID	VAR / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE) / ST	CAL. WEIGHT / RAW MATERIAL / SIZE/DIM 6 (FITTING TYPE) / DIR DESCRIPTION	WU / SPEC.	SR	SI	BT	SC / SURFACE TREAT.	X-STATUS / SIZE/DIM 2 (SIZE/DIM STD. BOM)	BUOM / EUOM
PE257108 0008 L X X X X X 0.0 6.000 EA P0060722500	1	SHEET ZZ00047971-000 SE-CUF25 THICKNESS / WIDTH / LENGTH 140	4-257108					0.500 DIN 46433 5	KG 80					40	EA MM
		DWG 4-257108	000	A			RL	SHEET							
		INTERNAL COMMENT: Internal comment Exists In Language D Internal comment Exists In Language E													
PE224602 0009 L X X X X X 0.0 6.000 EA P0060722500	1	SHEET ZZ00047971-000 SE-CUF25 THICKNESS / WIDTH / LENGTH 140	4-224602					1.000 DIN 46433 10	KG 80					40	EA MM
		DWG 4-224602	000	A			RL	SHEET							
		INTERNAL COMMENT: Internal comment Exists In Language D Internal comment Exists In Language E													
PE437960 0010 L X X X X X 0.0 72.000 EA P0060722500	1	SPACER PLATE X5CRNI18-10	EMT164-225					0.050 DIN 59382	KG				Z	40	EA MM
		DWG A0100A9322	000	C	EMT164-225		RL	SPACER PLATE							
		INTERNAL COMMENT: Internal comment Exists In Language D Internal comment Exists In Language E													
PE109739 0011 L X X X X X 0.0 72.000 EA P0060722500	1	HEXAGON CAP SCREW M12*90 A2-70 ZZ10002283-000 A2-70 THREAD/LENGTH						0.090 ISO 4017 M12	KG 90					40	EA MM
								NO DOCUMENT ASSIGNED							
PE113235 0012 L X X X X X 0.0 48.000 EA P0060722500	1	TWIN NUT ZZ00101575-000 X5CRNI18-10 SIZE/DIMENSION (FROM LEGACY SYSTEM)	4-113235					0.115 4-113235 M12/65*25*10	KG				X	40	EA MM
		DWG 4-113235	000	B			RL	Zwillingsmutter							
		INTERNAL COMMENT: Internal comment Exists In Language D Internal comment Exists In Language E													
PE104491 0013 L X X X X X 0.0 192.000 EA P0060722500	1	CLAMPING DISC 12 ZZ00060150-000 FST SIZE/DIMENSION (FROM LEGACY SYSTEM)						0.012 DIN 6796 12	KG				Z A2B	40	EA MM
								NO DOCUMENT ASSIGNED							

MATERIAL / ITEM / QUANTITY / REL.	T	A	P	C	W	s	U	RV / S	Level / I	N	M	c	REK / UOM / REFERENCE POINT / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE / DOCUMENT ID	BASIC MATERIAL / SIZE/DIM 4 / PART	VR	ALTERNATIVE ID	DOCUMENT STD/GRAPHIC / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE) / ST	VAR	CAL. WEIGHT / RAW MATERIAL / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE) / DIR DESCRIPTION	WU / SPEC.	SR	SI	BT	SC	X-STATUS / SURFACE TREAT.	BUOM / EUOM
PE112407									1					HEXAGON SCREW						0.080	KG					40	EA
0014	L		X	X	X	X							X 0.0	ZZ10002283-000	A2-70					ISO 4017							MM
24.000							EA							THREAD/LENGTH					M12			70					
			P0060722500																	NO DOCUMENT ASSIGNED								
PE451106									1					CONNECTION PIECE	4-451106					9.000	KG					40	EA
0015	L		X	X	X	X							X 0.0	ZZ00002807-000	CU-PHC-R240					DIN EN 13599							MM
6.000							EA							SIZE/DIMENSION (FROM LEGACY SYSTEM)					T=20								
			P0060722500											DWG	4-451106	000	A			RL	NIPPLE SOCKET FITTING							
														INTERNAL COMMENT: Internal comment Exists In Language D														
PE117584									1					WASHER A12						0.006	KG					40	EA
0016	L		X	X	X	X							X 0.0	ZZ10002092-000	A2-70					ISO 7090							MM
96.000							EA							SIZE/DIMENSION (FROM LEGACY SYSTEM)					A12								
			P0060722500																	NO DOCUMENT ASSIGNED								
PE440817									1					SHEET	4-238946					0.060	KG					40	EA
0017	L		X	X	X	X							X 0.0		X5CRNI18-10					DIN 59382							MM
24.000							EA							SIZE/DIMENSION (FROM LEGACY SYSTEM)					76*38*2,5								
			P0060722500											DWG	4-238946	000	C			RL	SHEET							
														INTERNAL COMMENT: Internal comment Exists In Language D Internal comment Exists In Language E														
PE231451									1					LOCK WASHER	KUN607.06					0.014	KG				X	40	EA
0018	L		X	X	X	X							X 0.0	ZZ00059324-000	X5CRNI18-10					EN10259							MM
48.000							EA							THREAD / DISTANCE BETWEEN HOLE CENTERS					12			40					
			P0060722500											STD	D-IST-00030238	DE	E	KUN 607.06		RL	LOCK WASHERS; FOR 2 BOLTS							
														INTERNAL COMMENT: Internal comment Exists In Language D														
PE276377								A	1					FLEXIBLE CONNECTORS OD						41.400	KG					40	EA
0019	L	X	X	X	X	X							X 0.0	MKSFA6510-000													MM
1.000							EA	MKSFA6510-000																			
			P0060722500																	NO DOCUMENT ASSIGNED								
PE105707									1					GREASE						1.000	KG			X	D	40	KG
0021	L												X 0.0		KONTAKTFETT_LIQUI-MOLY_330_					DIN 51825							MM
0.500							KG							ADDITIONAL MATERIAL DESCRIPTION					GEBINDE:1KG								
			P0060722500																									

MATERIAL / ITEM / QUANTITY / REL.	RV / Level / T / A / P / C / W / s / U / S / I / N / M / c / REK / UOM / REFERENCE POINT / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / DOCUMENT ID	PART	VR	ALTERNATIVE ID	VAR / TLV NO / SIZE/DIM 4 / ST	CAL. WEIGHT / RAW MATERIAL / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE) / DIR DESCRIPTION	WU / SPEC. / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE)	SR	SI	BT	SC / SURFACE TREAT.	X-STATUS	BUOM / EUOM
		SPE	DPQD-00007581	000	A	PE105707 KONTAKTFETT LIQUI-MOL	RL								
		SPE	DPQD-00009138	000	A	SDB PE105707 KONTAKTFETT LIQUI	RL								
		SPE	DPQD-00009139	000	A	BA PE105707 KONTAKTFETT LIQUI-	RL								
	BASIC DATA TEXT: Purchase from Liqui-moly or equivalent. The below Product details are below are from basic material KONTAKTFETT_LIQUI-MOLY_330: Colour: Yellow brown Base: Synthetic oil NLGI class: 1 DIN 51818 density at +20° degrees Celsius: 1.0 g/cm3 Tumbling resistance to 60.000 double piston strokes : : max. + 30 1/10 mm DIN ISO 2136 Flow pressure at - 35° degrees Celsius: 450 hPa DIN 51805 Temperature field of application: - 40° degrees Celsius to+150° degrees Celsius specific electrical resistance: 3.5*10^8 Ohm*cm														
	INTERNAL COMMENT: Internal comment Exists In Language E														
PE238955 0022 L X X 0.0 1.000 EA P0060722500	1	Assembly Instruction	1-2200-238955					0.000	KG				40	EA MM	
		DWG	1-2200-238955	000	-		RL	MONTAGEANLEITUNG FUER DEHNUNGSBANDEINBAU							

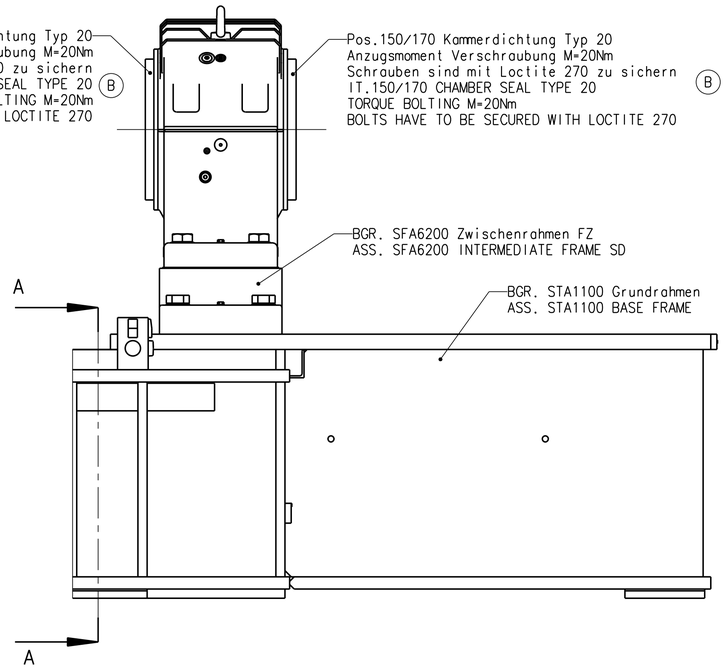
TS
TE



Detail Z
1:1

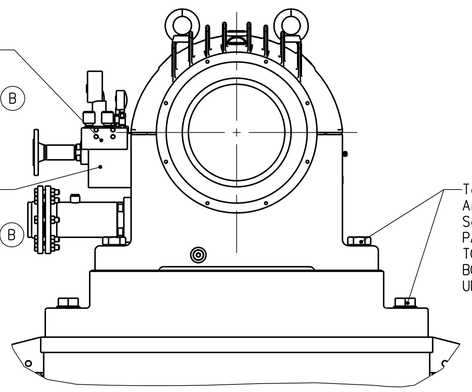
Platten sind Bestandteil der BGR. SFA5560
Lagerzubehoerteile zum Ausrichten der Lagerhoehe
auf TS und ES verwenden
PLATES ARE PART OF ASS. SFA5560
BEARING ACCESSORY USED FOR
ADJUSTMENT OF THE HIGH OF THE BEARING
ON TE AND EE

ES
EE

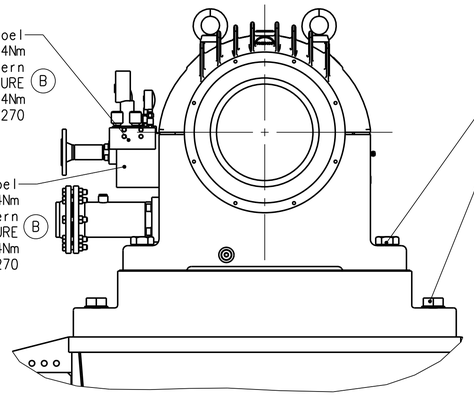


Schnitt A-A
SECTION A-A
1:10

Schnitt B-B
SECTION B-B
1:10



Teile sind in BGR. SFA5560 Lagerzubehoerteile enthalten
Anzugsmoment Verschraubung M=3003Nm
Schrauben sind mit Molykote bis unter den Kopf einzuschmieren
PARTS CONSISTS TO ASS. 5560 BEARING ACCESSORY
TORQUE BOLTING M=3003Nm
BOLTS HAVE TO BE LUBRICATED WITH MOLYKOTE
UNTIL THE SCREW HEAD



Teile sind in BGR. SFA5560 Lagerzubehoerteile enthalten
Anzugsmoment Verschraubung M=3003Nm
Schrauben sind mit Molykote bis unter dem Kopf einzuschmieren
PARTS CONSISTS TO ASS. 5560 BEARING ACCESSORY
TORQUE BOLTING M=3003Nm
BOLTS HAVE TO BE LUBRICATED WITH MOLYKOTE
UNTIL THE SCREW HEAD

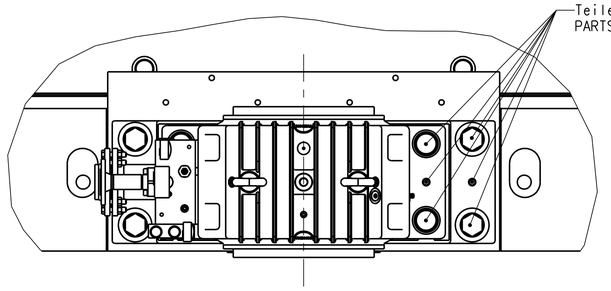
Pos.170 nur bei abweichenden Dichtungsdurchmesser TS und ES vorhanden
IT.170 ONLY IF SEAL DIAMETER TE AND EE DIFFERENT

POS.100 nur bei Bedarf vorhanden Siehe dazu BGR. SFA0000
IT.100 ONLY IF REQUIERED SEE ALSO ASS. SFA0000

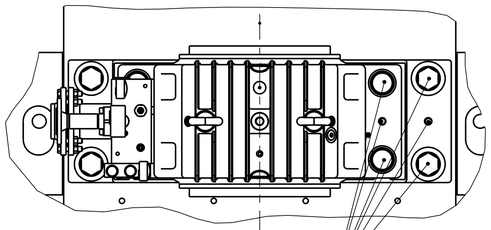
Anzugsmoment fuer Verschraubung der Lagerschalen betraegt
M=170Nm fuer µ=0,1 leicht geoelt
TORQUE BOLTING OF BEARING SHELLS
M=170Nm FOR µ=0,1 LIGHT LUBRICATED

Anzugsmoment fuer die Lagerdeckelgehaeusehaelften
M=1150Nm fuer µ=0,1 leicht geoelt
TORQUE BOLTING OF BEARING HOUSING
M=1150Nm FOR µ=0,1 LIGHT LUBRICATED

Montageseite Pos.90 BGR SFA5520 und Seite der Oelauslassflansche
kann variieren und muss aus BGR. SFA0000 entnommen werden
MOUNTING SIDE IT.90 ASS. SFA5520 AND SIDE OF THE OIL
OUTLET FLANGE IS VARIABLE AND THE RIGHT VERSION IS
SHOWN IN ASS. SFA0000 SHOP FINAL ASS.



Teile sind in BGR. SFA5560 Lagerzubehoerteile enthalten
PARTS CONSISTS TO ASS. SFA5560 BEARING ACCESSORY



Teile sind in BGR. SFA5560 Lagerzubehoerteile enthalten
PARTS CONSISTS TO ASS. SFA5560 BEARING ACCESSORY

REV.	DATE	CHANGE DESCRIPTION
B	2012-01-23	USING OF LOCTITE 270 ADDED
A		FIRST RELEASE / Erstausgabe

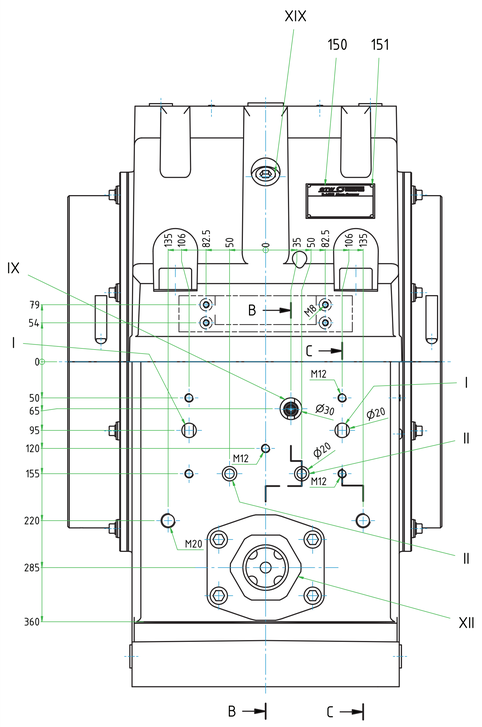
Siemens AG
Energy Sector

WEIGHT:	SCALE: 1:10	SPEC.: KUN351.00
DRAWN: 2012-01-04 LANGE	TITLE: STEH-/SATTELLAGER LAGERGROESZE 28	
CHECKED: 2012-01-04 SIEBENHAAR		
RELEASED: 2012-01-04 LANGE	SLEEVE BEARING BEARING SIZE 28	
CONFIDENTIAL (c) Siemens AG 2012 ALL RIGHTS RESERVED	DRAWING NUMBER /VALUE DPPPG-00001060	
	1-SFA5500-00001060	REV. B / SHEET 1/1

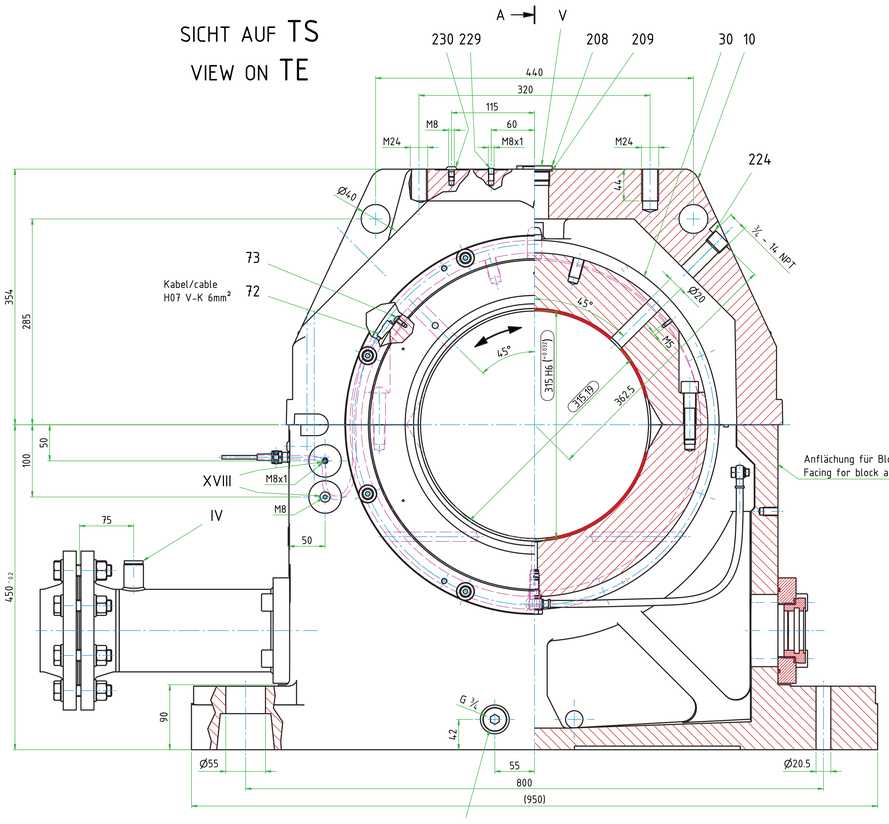
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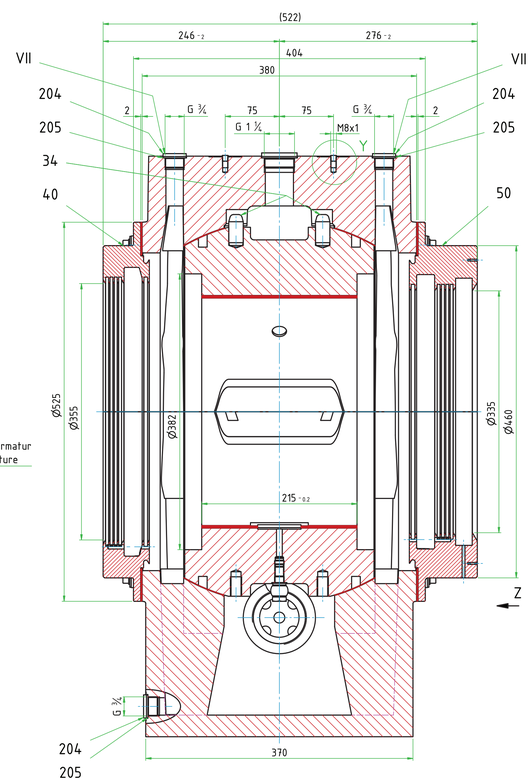
SICHT AUF TS
VIEW ON TE



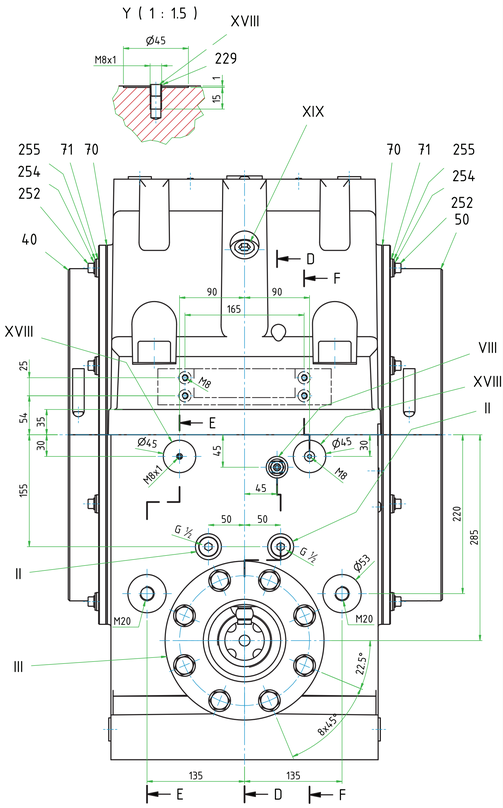
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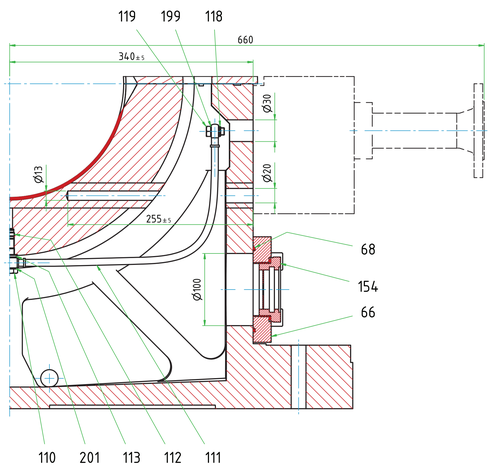
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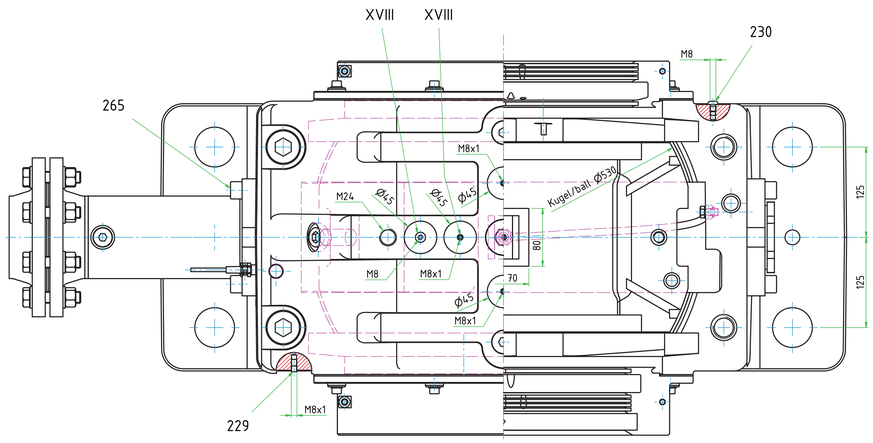


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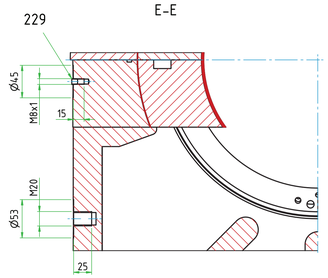


B–B

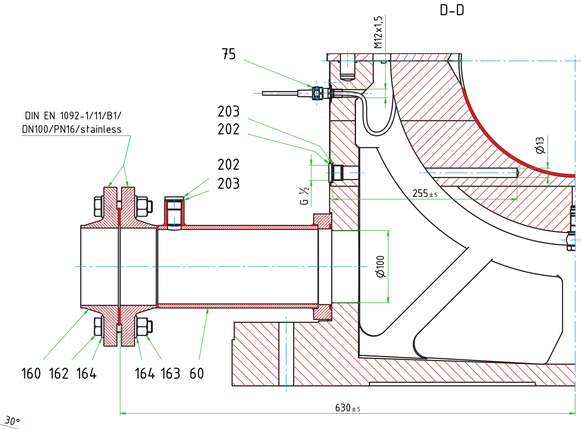




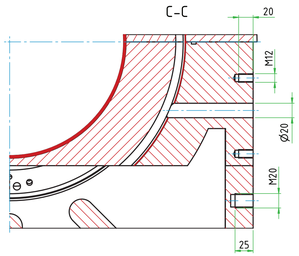
E–E

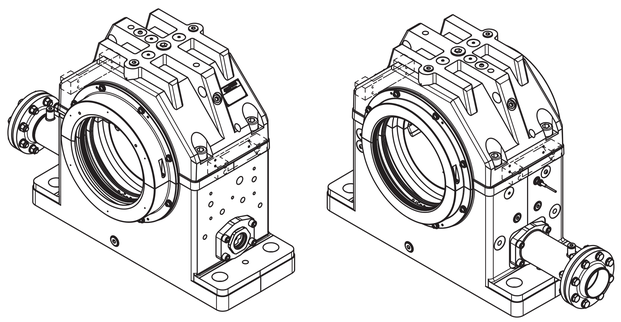


D–D

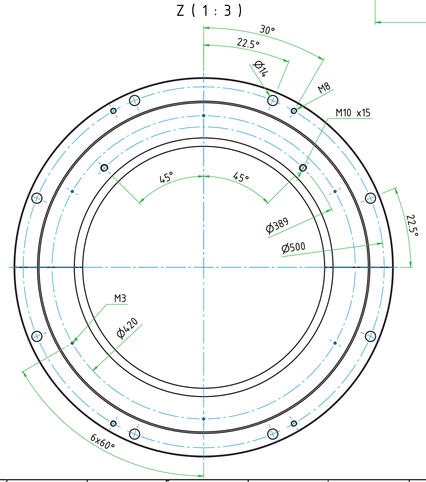


C–C

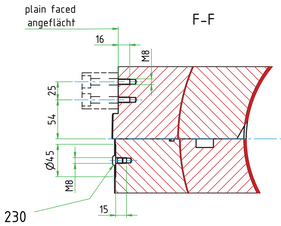




Z (1 : 3)



F–F



I	Ölzulauf bei Ölumlaufanlage radial	Circulation oil inlet radial
II	Temperaturmessung Lagerschale radial	Bearing metal temperature measurement radial
III	Ölablauf bei Ölumlaufanlage	Circulation pump oil outlet
IV	Anschluss für Ölsumpfthermometer	Connection for oil sump temperature measurement
V	Überprüfung Ölförderung des Schmierrings	Inspection of oil ring lubrication performance
VI	Ölablass	Oil drain
VII	Öleinfüllung bzw. Be- und Entlüftungsfilter	Oil filling or aeration filter
VIII	Erdungskabeldurchführung	Earthing cable lead - through
IX	Anschluss für Hydrostatik	Connection for hydrostatics
XII	Ölstandsanzeige	Oil level indicator
XVIII	Anschluss für Schwingungsmessung (Gehäuse)	Connection for vibration sensor (housing)
XIX	Anschluss für Schwingungsmessung (Welle)	Connection for vibration sensor (shaft)

Siemens AG
Energy Sector

Zeichnungs-Nr. / DRAWING NUMBER:
Auftrags-Nr. / ORDER NUMBER:
DPPPG - 7015 8485

INDEX: A
ISO 128

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GENERAL TOLERANCES
DIN ISO 2768 - mH

A0

SCALE: 1 : 100
WEIGHT: 761,7 kg

TITLE
Gleitlager WPXYQ 28-315 TS
Slide bearing WPXYQ 28-335 TE
Assembly Siemens Erfurt - Hy+EK insulated

	DATE	NAME
Drawn BY	20.04.2018	SAN
CHECKED BY	23.04.2018	CBE

GTW Gleitlagertechnik Weißacher GmbH

DRAWING NUMBER: 452031
REVISION: 00
1 OF 2 SHEETS

INDEX | DESCRIPTION OF CHANGE | DATE | NAME | ORIGIN | STATUS: Freigegeben

POS	QTY	BENENNUNG	DESCRIPTION	DWG NO	REV	DIMENSIONS	MATERIAL	MASS
265	8	Zylinderschraube	Socket screw	DIN EN ISO 4762	00	M16x45	8.8 zinced	0,1 kg
255	16	Unterlegscheibe	Washer	DIN 9021	00	8,4	100 HV zinced	0 kg
254	16	Unterlegscheibe	Washer	DIN 125	00	A 8,4	140 HV zinced	0 kg
252	16	Zylinderschraube	Socket screw	DIN EN ISO 4762	00	M8x30	8.8 zinced	0 kg
230	4	Rundkopfschraube	Fillister Socked Head Screw	ISO 7380	00	M8x10	10.9 zinced	0 kg
229	6	Verschlußschraube	Plug	DIN 906	00	M8x1	St zinced	0 kg
224	2	Verschlußstopfen	Plug	ANSI B1.20	00	3/4" NPT	St zinced	0,1 kg
209	1	Dichtring	Gasket	DIN 7603	00	A42x49x2	Cu	0 kg
208	1	Verschlußschraube	Plug	DIN 908	00	G1¼A	St zinced	0,2 kg
205	4	Dichtring	Gasket	DIN 7603	00	A27x32x2	Cu	0 kg
204	4	Verschlußschraube	Plug	DIN 908	00	G¾A	St zinced	0,1 kg
203	3	Dichtring	Gasket	DIN 7603	00	A21x26x1,5	Cu	0 kg
202	3	Verschlußschraube	Plug	DIN 908	00	G½A	St zinced	0 kg
201	1	Dichtring	Gasket	DIN 7603	00	A14x18x1,5	Cu	0 kg
199	1	Dichtring	Gasket	DIN 7603	00	A10x13x1	Cu	0 kg
164	16	Unterlegscheibe	Washer	DIN 125	00	A 17	A2-70	0 kg
163	8	Sechskantmutter	Hexagon nut	DIN EN ISO 4032	00	M16	A2-70	0 kg
162	8	Sechskantschraube	Hexagon head screw	DIN EN 24017	00	M16x70	A2-70	0,1 kg
161	1	Flachdichtung PN16	Gasket	DIN 2690	00	DN100	KLINGERsil C-4400	0 kg
160	1	Vorschweißflansch	Welding neck flange	DIN EN 1092-1	00	11/B1/DN100x3,6/PN16	1.4404/1.4571	4,6 kg
159	1	Curil T- Dichtmasse	Sealing compound	000131	00	Tube 75ml		0 kg
154	1	Ölstandsauge	Oil level gauge	000213	00	G 2 1/2	CuZn40Pb2	0,7 kg
151	4	Kerbnagel	Grooved drive stud	DIN EN ISO 8746	00	2,5x8 - A	1.4404	0 kg
150	1	Typenschild GTW	Name plate	000540	00	95x67x0,5	1.4404	0 kg
119	1	Hohlschraube	Banjo bolt	001763	00	DIN 7643-3 / M10x1	St zinced	0 kg
118	1	Dichtkantenring	Edge sealing ring	001770	00	DKAZ M10	St zinced	0 kg
113	1	Dichtkantenring	Edge sealing ring	000221	00	DKAZ ¼	St zinced	0 kg
112	1	Rückschlagventil RC1	Non-return valve	000026	00	G 1/4	St	0 kg
111	1	Hydraulikschlauch	Hydraulic hose	R7 DN6	00	450mm	Polyflex	0,1 kg
110	1	Hohlschraube	Banjo bolt	000281	00	DIN 7643	St zinced	0 kg
75	1	Kabelverschraubung	Cable connection	001314	00	M12x1.5	Brass nickel plated	0 kg
73	1	Rundkopfschraube	Fillister Socked Head Screw	ISO 7380	00	M5x10	10.9 zinced	0 kg
72	1	Erdungskabel	Erthing Cable	000146	00	2 m		0 kg
71	16	Isolierhülse M8	Insulating bush	300192	00		Grivory GV4H	0 kg
70	2	Isolierscheibe, geteilt	Insulating disc	300193	02	ø525xø434x2	novapress 850	0,2 kg
68	2	O-Ring	O-ring	DIN 3771	00	110,72x3,53	NBR 90	0 kg
66	1	HAVIT SAE-Flansch AFC 4"	HAVIT SAE-Flange AFC 4"	303495	00		S235	3 kg
60	1	Ölablaufrohr DN100	Oil outlet pipe	303915	03	EN 1092-1/11/DN100/PN16	1.4404	10,1 kg
50.1	2	Zylinderschraube	Socket screw	DIN EN ISO 4762	00	M8x40	8.8 zinced	0 kg
50	1	Kammerdichtung W28-335 S	Rigid seal	302979	06		G-AlZn10Si8Mg	17,5 kg
40.1	2	Zylinderschraube	Socket screw	DIN EN ISO 4762	00	M8x40	8.8 zinced	0 kg
40	1	Kammerdichtung W28-355	Rigid seal	300292	07	(IP44)	G-AlZn10Si8Mg	10,2 kg
34	2	Zylinderstift	Pin	300231	00	ø20m6x45	PA66-GF30	0 kg
30.3	2	Zylinderschraube	Socket screw	DIN EN ISO 4762	00	M16x65	8.8	0,1 kg
30.2	2	Zylinderstift	Pin	DIN EN ISO 8733	00	ø16m6x40	St	0,1 kg
30	1	Lagerschale W-YQ 28-315	Bearing shell	303914	03		C10/C15 / GTW 89	206,6 kg
10.3	4	Zylinderschraube	Socket screw	DIN EN ISO 4762	00	M30x150	8.8 zinced	1,1 kg
10.2	2	Zylinderstift	Pin	DIN EN ISO 8733	00	ø20m6x50	St	0,1 kg
10.1	1	Isolierung	Insulation		00		Halar® ECTFE	0,2 kg
10	1	Lagergehäuse WP 28 isoliert	Pedestal housing	306196	00		EN-GJL-300	504,3 kg

Siemens AG
Energy Sector

Zeichnungs-Nr. / DRAWING NUMBER:
Auftrags-Nr. / ORDER NUMBER:
DPPPG - 7015 8485

INDEX: A

ISO 128

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GENERAL TOLERANCES
DIN ISO 2768 - mH

A2

SCALE: 1 : 100

WEIGHT: 761,7 kg

TITLE:
Gleitlager WPXYQ 28-315 TS
Slide bearing WPXYQ 28-335 TE
Assembly Siemens Erfurt - Hy+EK insulated

	DATE	NAME
DRAWN BY:	20.04.2018	SAN
CHECKED BY:	23.04.2018	CBE

INDEX	DESCRIPTION OF CHANGE	DATE	NAME

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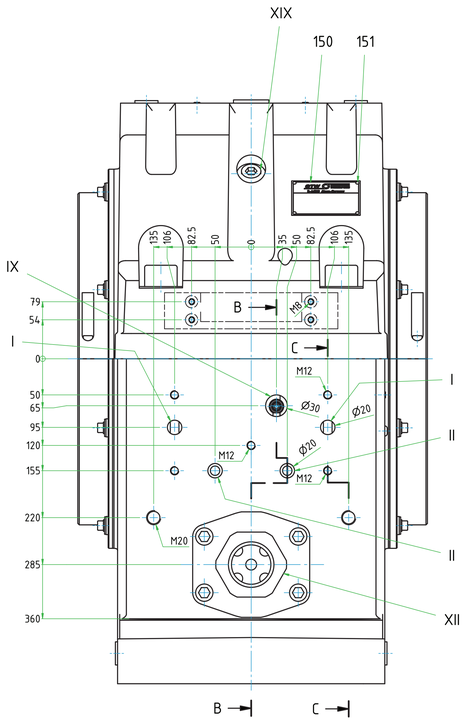
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REVISION: 00

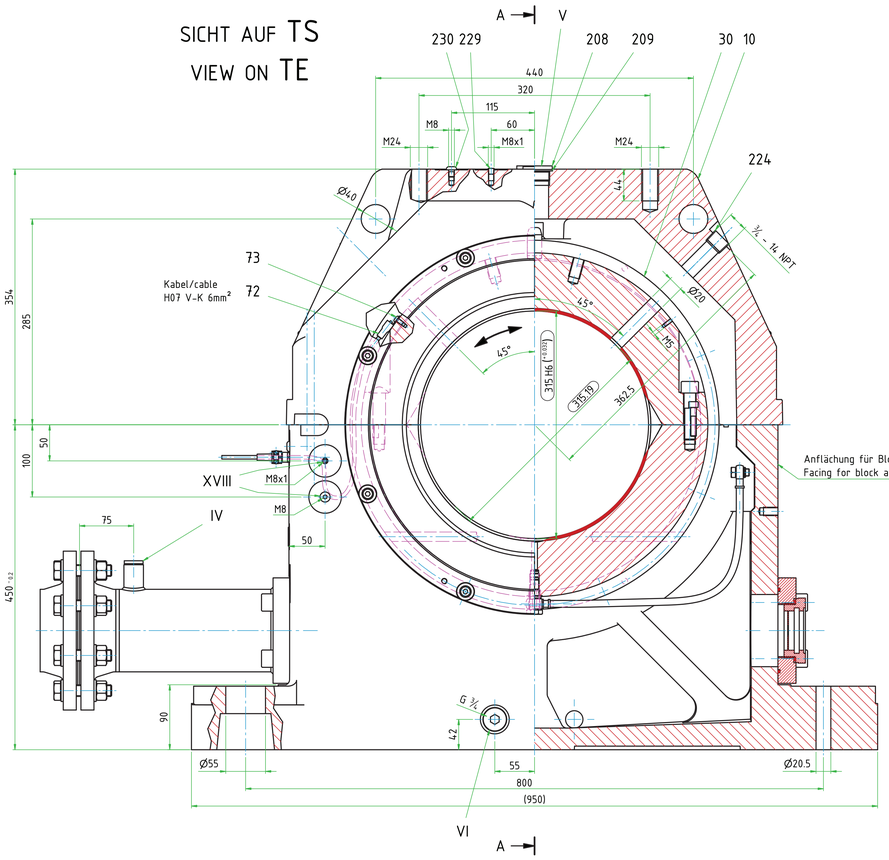
2 OF 2 SHEETS

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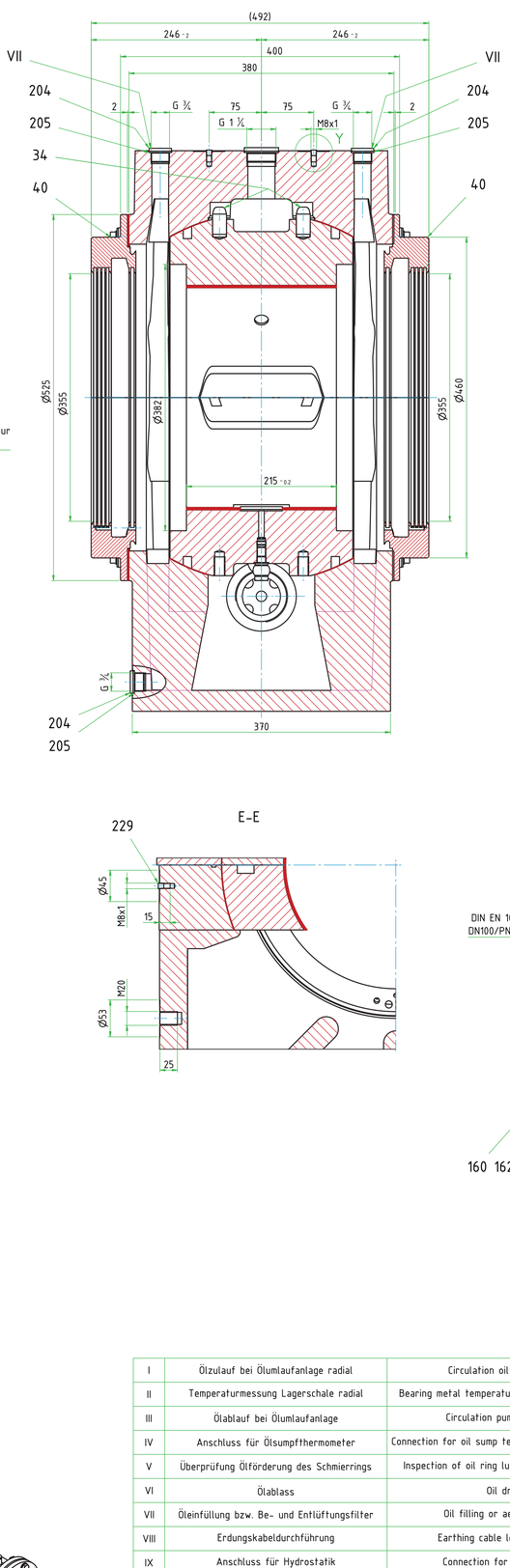
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VIEW ON TE



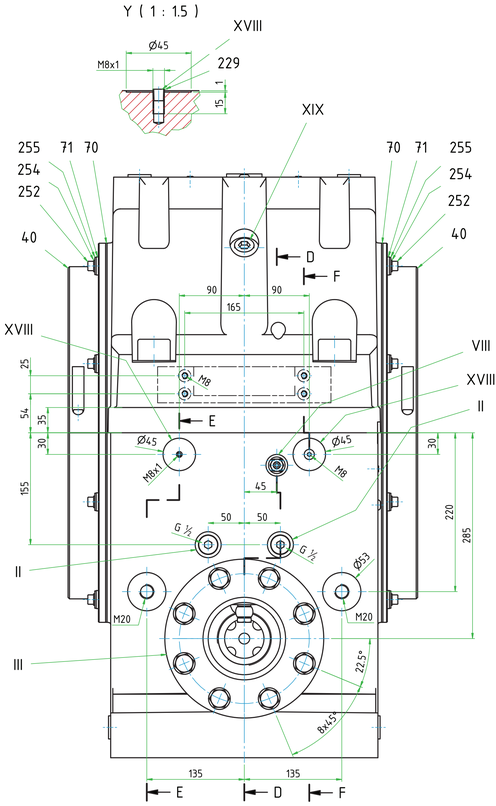
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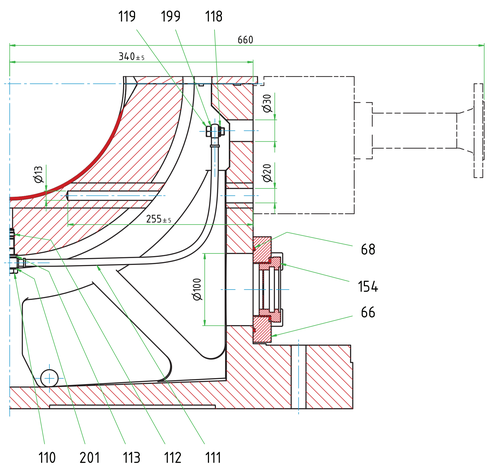
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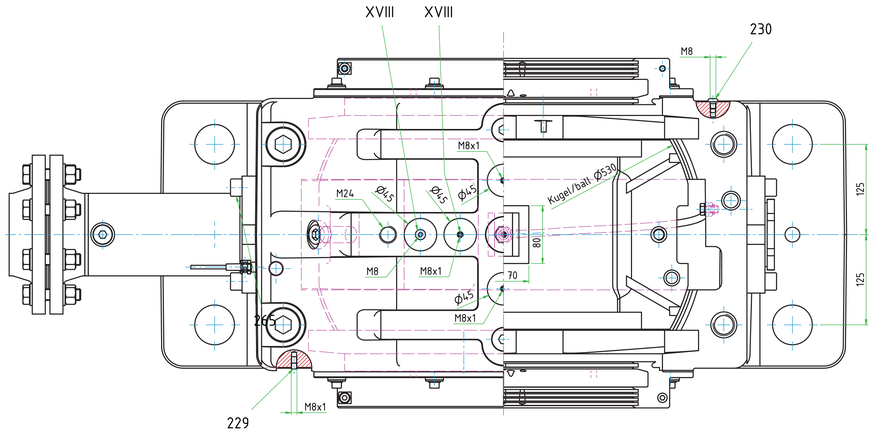


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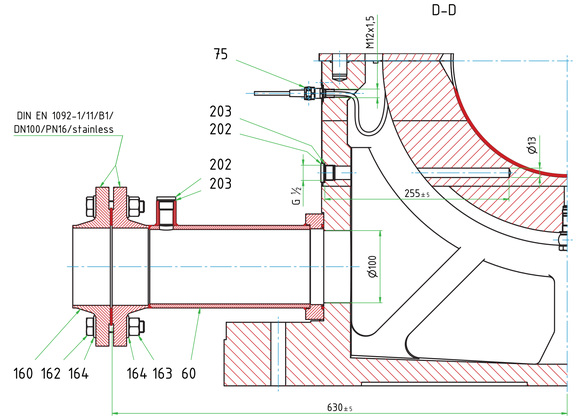
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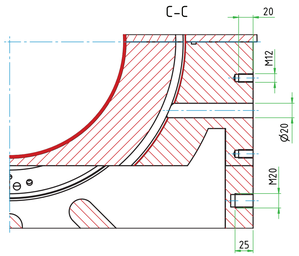


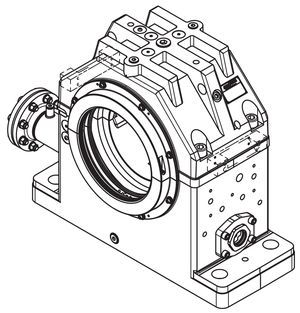
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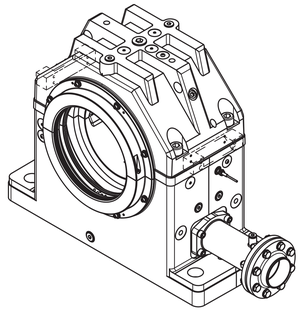
D–D



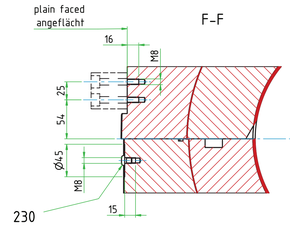
C–C







F–F



I	Ölzulauf bei Ölumlaufanlage radial	Circulation oil inlet radial
II	Temperaturmessung Lagerschale radial	Bearing metal temperature measurement radial
III	Ölablauf bei Ölumlaufanlage	Circulation pump oil outlet
IV	Anschluss für Ölsumpfthermometer	Connection for oil sump temperature measurement
V	Überprüfung Ölförderung des Schmierrings	Inspection of oil ring lubrication performance
VI	Ölablass	Oil drain
VII	Öleinfüllung bzw. Be- und Entlüftungsfilter	Oil filling or aeration filter
VIII	Erdungskabeldurchführung	Earthing cable lead - through
IX	Anschluss für Hydrostatik	Connection for hydrostatics
XII	Ölstandsanzeige	Oil level indicator
XVIII	Anschluss für Schwingungsmessung (Gehäuse)	Connection for vibration sensor (housing)
XIX	Anschluss für Schwingungsmessung (Welle)	Connection for vibration sensor (shaft)

Siemens AG
Energy Sector

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GENERAL TOLERANCES DIN ISO 2768 - mH

A0

SCALE: 1 : 3
WEIGHT: 754.3 kg

	DATE	NAME
Drawn BY	12.01.2018	SMü
CHECKED BY	12.01.2018	GZO

TITLE:
Gleitlager WPXYQ 28-315 ES
Slide bearing WPXYQ 28-315 EE
Assembly Siemens Erfurt - Hy+EK insulated

GTW Gleitlagertechnik Weißwasser GmbH

DRAWING NUMBER: 452004
REVISION: 00
1 OF 2 SHEETS

INDEX	DESCRIPTION OF CHANGE	DATE	NAME	ORIGIN:

STATUS: Freigegeben

POS	QTY	BENENNUNG	DESCRIPTION	DWG NO	REV	DIMENSIONS	MATERIAL	MASS
265	8	Zylinderschraube	Socket screw	DIN EN ISO 4762	00	M16x45	8.8 zinced	0,1 kg
255	16	Unterlegscheibe	Washer	DIN 9021	00	8,4	100 HV zinced	0 kg
254	16	Unterlegscheibe	Washer	DIN 125	00	A 8,4	140 HV zinced	0 kg
252	16	Zylinderschraube	Socket screw	DIN EN ISO 4762	00	M8x30	8.8 zinced	0 kg
230	4	Rundkopfschraube	Fillister Socked Head Screw	ISO 7380	00	M8x10	10.9 zinced	0 kg
229	6	Verschlußschraube	Plug	DIN 906	00	M8x1	St zinced	0 kg
224	2	Verschlußstopfen	Plug	ANSI B1.20	00	3/4" NPT	St zinced	0,1 kg
209	1	Dichtring	Gasket	DIN 7603	00	A42x49x2	Cu	0 kg
208	1	Verschlußschraube	Plug	DIN 908	00	G1¼A	St zinced	0,2 kg
205	4	Dichtring	Gasket	DIN 7603	00	A27x32x2	Cu	0 kg
204	4	Verschlußschraube	Plug	DIN 908	00	G¾A	St zinced	0,1 kg
203	3	Dichtring	Gasket	DIN 7603	00	A21x26x1,5	Cu	0 kg
202	3	Verschlußschraube	Plug	DIN 908	00	G½A	St zinced	0 kg
201	1	Dichtring	Gasket	DIN 7603	00	A14x18x1,5	Cu	0 kg
199	1	Dichtring	Gasket	DIN 7603	00	A10x13x1	Cu	0 kg
164	16	Unterlegscheibe	Washer	DIN 125	00	A 17	A2-70	0 kg
163	8	Sechskantmutter	Hexagon nut	DIN EN ISO 4032	00	M16	A2-70	0 kg
162	8	Sechskantschraube	Hexagon head screw	DIN EN 24017		M16x70	A2-70	0,1 kg
161	1	Flachdichtung PN16	Gasket	DIN 2690	00	DN100	KLINGERsil C-4400	0 kg
160	1	Vorschweißflansch	Welding neck flange	DIN EN 1092-1	00	11/B1/DN100x3,6/PN16	1.4404/1.4571	4,6 kg
159	1	Curil T- Dichtmasse	Sealing compound	000131	00	Tube 75ml		0 kg
154	1	Ölstandsauge	Oil level gauge	000213	00	G 2 1/2	CuZn40Pb2	0,7 kg
151	4	Kerbnagel	Grooved drive stud	DIN EN ISO 8746	00	2,5x8 - A	1.4404	0 kg
150	1	Typenschild GTW	Name plate	000540	00	95x67x0,5	1.4404	0 kg
119	1	Hohlschraube	Banjo bolt	001763	00	DIN 7643-3 / M10x1	St zinced	0 kg
118	1	Dichtkantenring	Edge sealing ring	001770	00	DKAZ M10	St zinced	0 kg
113	1	Dichtkantenring	Edge sealing ring	000221	00	DKAZ ¼	St zinced	0 kg
112	1	Rückschlagventil RC1	Non-return valve	000026	00	G 1/4	St	0 kg
111	1	Hydraulikschlauch	Hydraulic hose	R7 DN6	00	450mm	Polyflex	0,1 kg
110	1	Hohlschraube	Banjo bolt	000281	00	DIN 7643	St zinced	0 kg
75	1	Kabelverschraubung	Cable connection	001314	00	M12x1.5	Brass nickel plated	0 kg
73	1	Rundkopfschraube	Fillister Socked Head Screw	ISO 7380	00	M5x10	10.9 zinced	0 kg
72	1	Erdungskabel	Erthing Cable	000146	00	2 m		0 kg
71	16	Isolierhülse M8	Insulating bush	300192	00		Grivory GV4H	0 kg
70	2	Isolierscheibe, geteilt	Insulating disc	300193	02	ø525xø434x2	novapress 850	0,2 kg
68	2	O-Ring	O-ring	DIN 3771	00	110,72x3,53	NBR 90	0 kg
66	1	HAVIT SAE-Flansch AFC 4"	HAVIT SAE-Flange AFC 4"	303495	00		S235	3 kg
60	1	Ölablaufrohr DN100	Oil outlet pipe	303915	03	EN 1092-1/11/DN100/PN16	1.4404	10,1 kg
40.1	2	Zylinderschraube	Socket screw	DIN EN ISO 4762	00	M8x40	8.8 zinced	0 kg
40	2	Kammerdichtung W28-355	Rigid seal	300292	07	(IP44)	G-AlZn10Si8Mg	10,2 kg
34	2	Zylinderstift	Pin	300231	00	ø20m6x45	PA66-GF30	0 kg
30.3	2	Zylinderschraube	Socket screw	DIN EN ISO 4762	00	M16x65	8.8	0,1 kg
30.2	2	Zylinderstift	Pin	DIN EN ISO 8733	00	ø16m6x40	St	0,1 kg
30	1	Lagerschale W-YQ 28-315	Bearing shell	303914	03		C10/C15 / GTW 89	206,6 kg
10.3	4	Zylinderschraube	Socket screw	DIN EN ISO 4762	00	M30x150	8.8 zinced	1,1 kg
10.2	2	Zylinderstift	Pin	DIN EN ISO 8733	00	ø20m6x50	St	0,1 kg
10.1	1	Isolierung	Insulation		00		Halar® ECTFE	0,2 kg
10	1	Lagergehäuse WP 28 isoliert	Pedestal housing	306196	00		EN-GJL-300	504,3 kg

Siemens AG
Energy Sector

Zeichnungs-Nr. / DRAWING NUMBER:
Auftrags-Nr. / ORDER NUMBER:
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INDEX A

ISO 128

ECCN: EAR99 | AL: N | ECL: N | U.S.-Content: N

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GENERAL TOLERANCES
DIN ISO 2768 - mH

A2

SCALE: 1 : 3

WEIGHT: 754,3 kg

TITLE:
Gleitlager WPXYQ 28-315 ES
Slide bearing WPXYQ 28-315 EE

Assembly Siemens Erfurt - Hy+EK insulated

	DATE	NAME
DRAWN BY:	12.01.2018	SWi
CHECKED BY:	12.01.2018	GZO

GTW Gleitlagertechnik Weißbacher GmbH

DRAWING NUMBER: 452004

REVISION 00

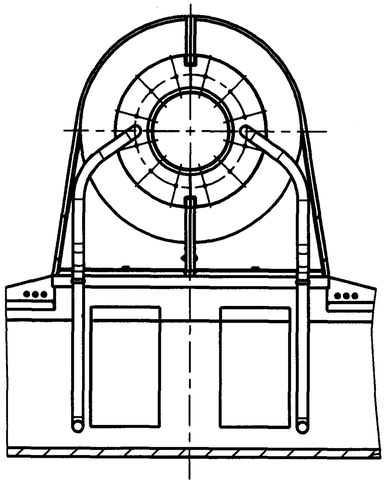
2 OF 2 SHEETS

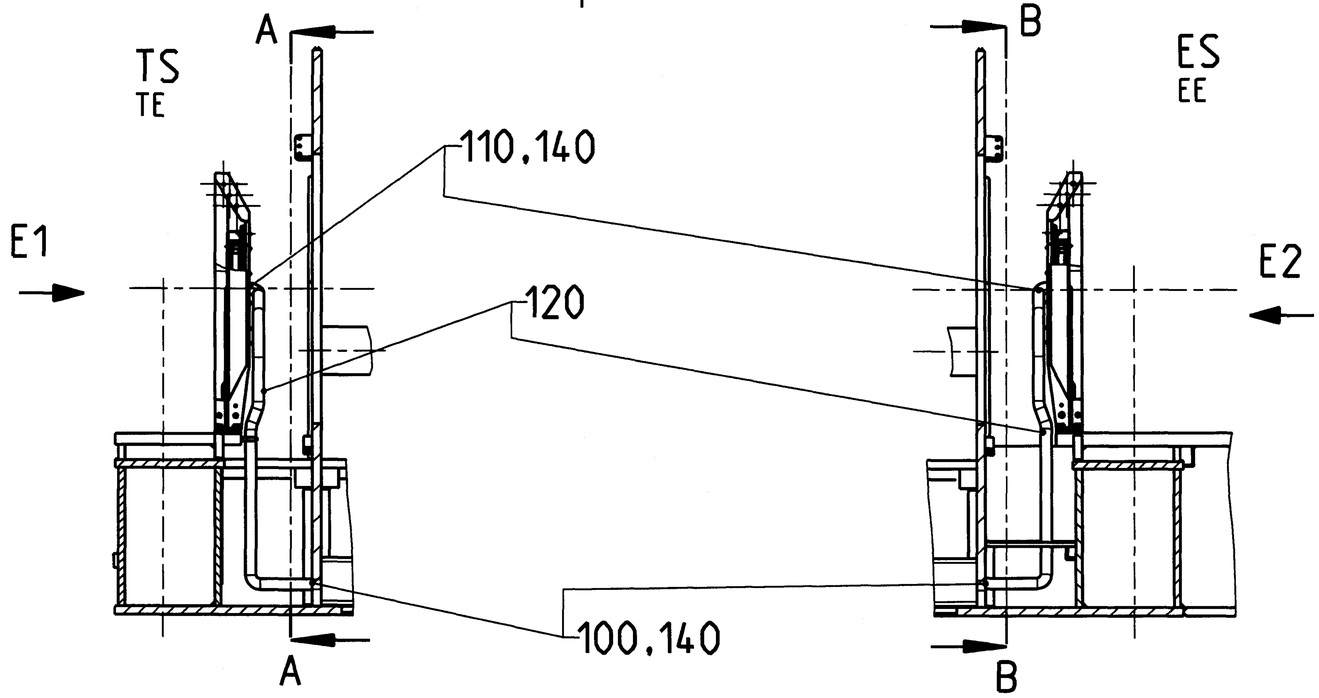
INDEX | DESCRIPTION OF CHANGE | DATE | NAME

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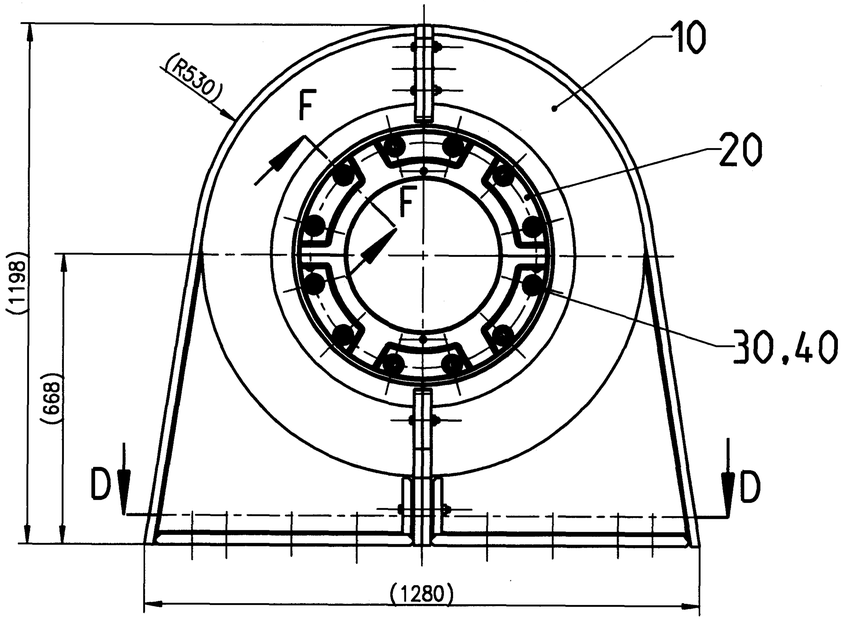
STATUS: Freigegeben

A-A (A-D5)
B-B (A-D8)

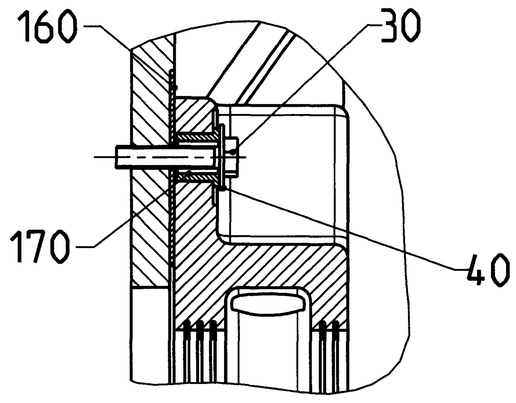




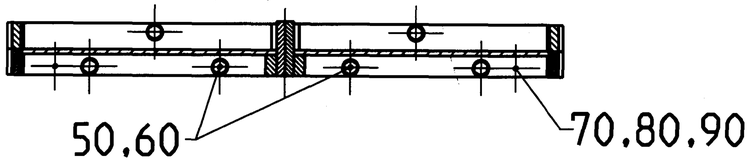
E1 1:10 (B4)
E2 1:10 (B10)



F-F
1:2 (E3)



D-D
(F2-5)



5 Schraubverbindungen gesichert mit T.130
SCREW-CONNECTIONS LOCKED WITH ITEM 130

4 Vor Montage der Wellendurchfuehrung auf dem Grundrahmen - T.110 einsetzen
BEFORE ASSEMBLY SHAFT BUSHING ON BASE FRAME FIT ITEM 110

2 Einstellung der Spaltmasze am Kammring erfolgt entspechend Angaben aus Baugruppe 0440 "Axiale und radiale Laeuferspiele".
ADJUSTMENT OF LABYRINTH RING AIR GAB IN ACCORDANCE WITH ASSEMBLY 0440 "AXIAL AND RADIAL ROTOR CLEARENCES"

1 Montage und Aufbau der Wellendurchfuehrung auf TS und ES identisch. Kammring auf TS und ES isoliert montiert.
ASSEMBLY AND COMPONENTS OF SHAFT BUSHING IDENTICAL ON TE AND EE LABYRINTH RING ASSEMBLED ON TE AND EE INSULATED

(...) Konstruktionsmasze
(...) DESIGN DIM.

REV.	DATE	CHANGE DESCRIPTION
A	2010-09-16	Pos. 150 entfernt / DELETED ITEM 150

Siemens AG
Energy Sector

WEIGHT: 410 KG	SCALE: 1:20	SPEC.: KUN351.00
DRAWN: 2004-04-02 MARTINI	TITLE	
CHECKED: 2004-04-19 PARBS	WELLENDURCHFUEHRUNG MONTAGE	
RELEASED: 2004-04-19 MARTINI	SHAFT BUSHING ASSEMBLY	
(c) Siemens AG 2010 ALL RIGHTS RESERVED	DRAWING NUMBER /VALUE 2-4742-273961	REV. A / SHEET 1/1

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DO NOT SCALE. WORK TO DIMENSIONS SHOWN

MATERIAL: P0012417000 **REVISION:** A **EFFECTIVE:** 2013-02-26 **BAS.QTY:** 1.000 **REQ.QTY:** 1.000 **PLANT:** **APPL.:** ZEN1 **X-STATUS:** 40 **BASE UOM:** ST **ENG. UNIT:** MM
DESCRIPTION: SHAFT BUSHING ASSEMBLY **TITLE ID:** MKSFA6600-000 **PROJECT ID:** **ANCHOR ID:** **SERVICE CODE:**
DOCUMENT-STD/GRAPHIC: 2-4742-273961 **VARIANT:** **NET WEIGHT:** 410,000 KG **CAL. WEIGHT:** 0,000 KG **SER. REQ.:** **SER. INH.:**
B.TRACK:

DOCUMENT LINKS:

TYP	DOCUMENT ID	PAR	VER	ALTERNATIVE ID	ST	DESCRIPTION
DWG	2-4742-273961	000	A		RL	WELLENDURCHFUEHRG. MONT.

CLASSIFICATION:

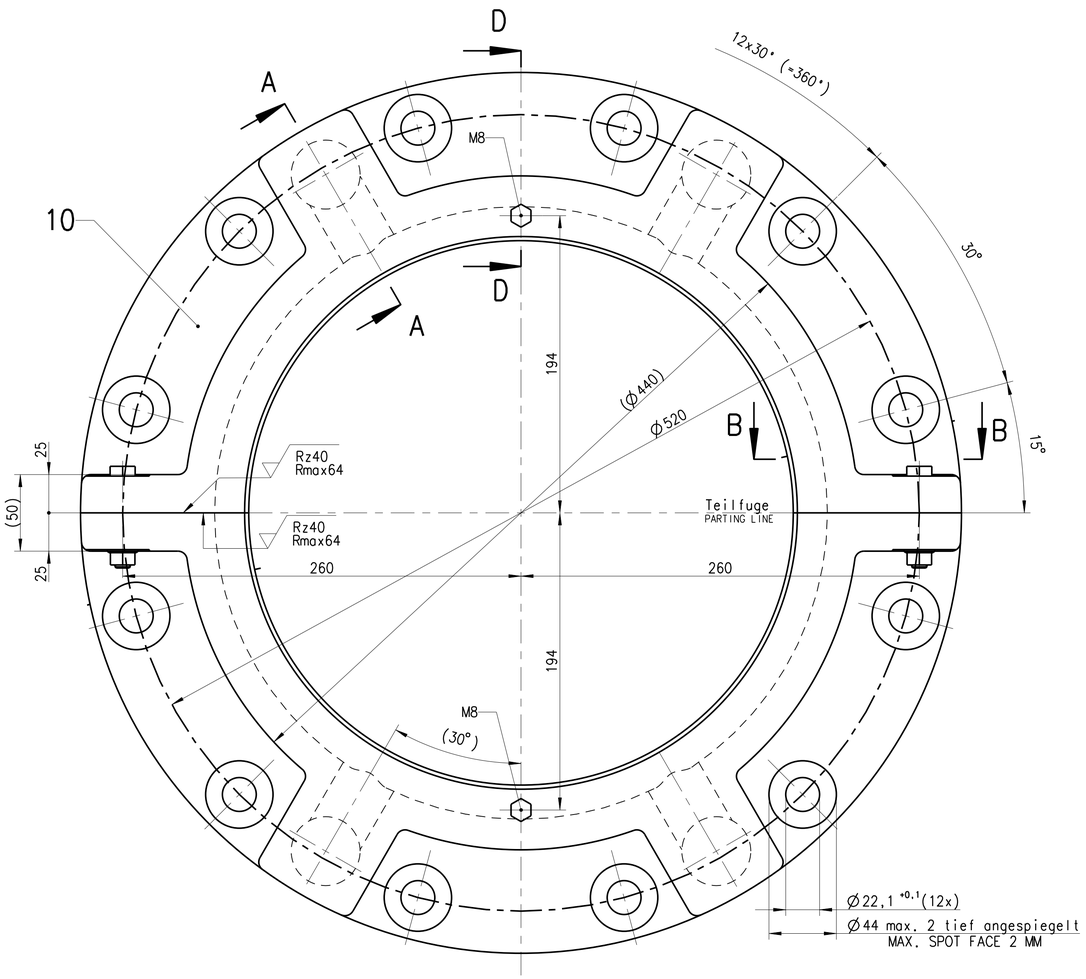
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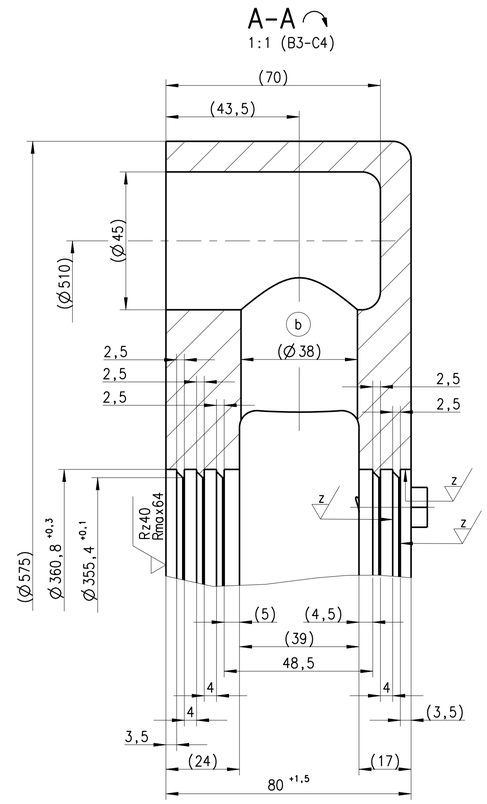
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PE274000 0010 L X X X X X 0 0 2.000	A / 1 EA / MKSFA6700-000 P0012417000	shaft bushing s. d. MKSFA6700-000 DWG / 1-4741-274000	1-4741-274000 000 / B	175.000 RL / WELLENDURCHFUEHRG. FZ	KG 40 MM		EA
		INTERNAL COMMENT: Internal comment Exists In Language E Internal comment Exists In Language D					
P0012416100 0020 L X X X X X 0 0 2.000	C / 1 EA / MKSFA0300-000 P0012417000	OUTER AIR SEAL ASSEMBLY MKSFA0300-000 TYPE DWG / DPPPG-70024708	1-SFA0300-70024708 (WELLEØ355) 000 / B / 1-SFA0300-70024708	16.400 RL / SFA0300 OUTER AIR SEAL ASSEMBLY 2P	KG 40 MM		EA
		INTERNAL COMMENT: Internal comment Exists In Language D Internal comment Exists In Language E					
PE104428 0030 L X X X X 0 0 24.000	1 EA P0012417000	HEXAGON CAP SCREW / M10*50K ZZ10002283-000 THREAD/LENGTH	8.8 M10	0.036 ISO 4017 50 NO DOCUMENT ASSIGNED	KG 40 A2B MM		EA
PE116636 0040 L X X X X 0 0 24.000	1 EA P0012417000	WASHER ZZ10002092-000 SIZE/DIMENSION (FROM LEGACY SYSTEM)	ST 10	0.020 ISO 7093-1 NO DOCUMENT ASSIGNED	KG X 40 A2B MM		EA
PE110043 0050 L X X X X 0 0 12.000	1 EA P0012417000	HEXAGON HEAD SCREW ZZ00057849-000 THREAD/LENGTH	ISO4014 8.8 M20	0.217 70 NO DOCUMENT ASSIGNED	KG 83 ZN5//CN//T0 MM		EA
		INTERNAL COMMENT:					

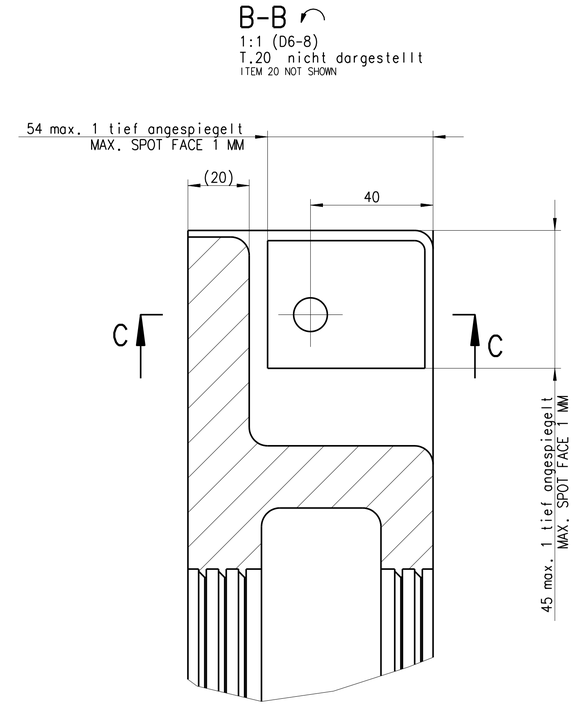
MATERIAL / ITEM / QUANTITY / REL.	RV / Level / T / A / P / C / W / s / U / S / I / N / M / c / REK / UOM / REFERENCE POINT / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE / DOCUMENT ID	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / SIZE/DIM 4 / PART / VR / ALTERNATIVE ID	VAR / CAL. WEIGHT / TLV NO / RAW MATERIAL / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE) / ST / DIR DESCRIPTION	WU / SR / SI / BT / SC / X-STATUS / SPEC. / SURFACE TREAT. / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE)	BUOM / EUOM
		Internal comment Exists In Language D Internal comment Exists In Language E				
		ALTERNATE/SUPERCEDURE DATA : Alternate/Supercedure Data Exists				
PE104477 0060 L X X X X 12.000 EA P0012417000	1 X 0.0	WASHER ZZ10002092-000 ST SIZE/DIMENSION (FROM LEGACY SYSTEM)		0.015 ISO 7090 20 NO DOCUMENT ASSIGNED	KG X 40 A2B	EA MM
PE103191 0070 L X X X X 4.000 EA P0012417000	1 X 0.0	TAPER PIN ZZ10000962-000 ST DIAMETER / LENGTH (HEIGHT)	ISO8737 10	0.060 80 NO DOCUMENT ASSIGNED	KG X 40 A2B	EA MM
		INTERNAL COMMENT: Internal comment Exists In Language D				
PE105142 0080 L X X X X 4.000 EA P0012417000	1 X 0.0	HEXAGON NUT / M10 ZZ00057841-000 8 THREAD	M10	0.012 ISO 4032 NO DOCUMENT ASSIGNED	KG 40 A2B	EA MM
		INTERNAL COMMENT: Internal comment Exists In Language D				
PE106488 0090 L X X X X 4.000 EA P0012417000	1 X 0.0	WASHER / 10,5 ST-A3C ZZ10002092-000 SIZE/DIMENSION (FROM LEGACY SYSTEM)	10	0.003 ISO 7090 NO DOCUMENT ASSIGNED	KG X 40	EA MM
PE111407 0100 L X X X X 4.000 EA P0012417000	1 X 0.0	HOSE FITTING, STRAIGHT SIZE/DIMENSION (FROM LEGACY SYSTEM)	NW40,M45*2,GERADESELBSTDICH	0.150 ARTKL.-NR 24200660 NO DOCUMENT ASSIGNED	KG F 40	EA MM
		BASIC DATA TEXT: nach Angebot von "Hyma" Erfurt Tel.EF/77826-0; Fax EF/7782633				
PE111408 0110 L X X X X 4.000 EA P0012417000	1 X 0.0	ELBOW SIZE/DIMENSION (FROM LEGACY SYSTEM)	NW40,M45*2,90°M.KONTERM.	0.200 ARTKL.-NR 24200661 NO DOCUMENT ASSIGNED	KG F 40	EA MM

MATERIAL / ITEM / QUANTITY / REL.	RV / Level / UOM / REFERENCE POINT / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE / DOCUMENT ID	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / SIZE/DIM 4 / PART / VR / ALTERNATIVE ID	VAR / CAL. WEIGHT / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE) / ST / DIR DESCRIPTION	WU / SR / SI / BT / SC / X-STATUS / RAW MATERIAL SPEC. / SURFACE TREAT. / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE)	BUOM / EUOM
		BASIC DATA TEXT: nach Angebot von "Hyma" Erfurt Tel.EF/77826-0; Fax EF/7782633				
PE114611 0120 R X X X X 2.500 M P0012417000	1 X 0.0	AIR SEAL HOSE ZZ00101442-000 PVC ISOLIERT SIZE/DIMENSION (FROM LEGACY SYSTEM)		2.000 ARTKL.-NR 25600001 40MMDURCHMESSER NO DOCUMENT ASSIGNED	KG F 40 MM	M MM
NO.OF PCS:4	SIZE 1:2500.000 UOM:MM	SIZE 2:0.000 UOM:MM	SIZE 3:0.000 UOM:MM			
		CLASSIFICATION: Classification Data Exists				
		ITEM TEXT : Länge bei Montage anpassen				
PE104420 0130 L X X X X 2.000 EA P0012417000	1 X 0.0	ADHESIVE ZZ00030663-000 LOCTITE_270 ADDITIONAL MATERIAL DESCRIPTION SPE DPQD-00007564 000 A	PE104420 KLEBER LOCTITE 270	0.082 50GFL. RL	KG X E 40	EA MM
		INTERNAL COMMENT: Internal comment Exists In Language D				
PE111406 0140 L X X X X 8.000 EA P0012417000	1 X 0.0	HOSE CLAMP ZZ00055700-000 SIZE/DIMENSION (FROM LEGACY SYSTEM)		0.100 ARTKL.-NR 24100292 ND50,VERSTÄRKTEAUSFÜHRUNG NO DOCUMENT ASSIGNED	KG F 40 MM	EA MM
		BASIC DATA TEXT: nach Angebot von "Hyma" Erfurt Tel.EF/77826-0; Fax EF/7782633				
PE451269 0160 L X X X X 2.000 EA P0012417000	1 X 0.0	INSULATING RING ZZ00029459-000 EPGC203 SIZE/DIMENSION (FROM LEGACY SYSTEM) DWG 4-230219 000 A	4-230219 RL INSULATING RING	0.540 KUN 562.01 DA=595,DI=420,2DICK	KG 40	EA MM
PE120057 0170 L X X X X 24.000 EA P0012417000	1 X 0.0	insolating bushing PA6.6 SIZE/DIMENSION (FROM LEGACY SYSTEM)		0.030 BESTELL.NR.:5061.00 NO DOCUMENT ASSIGNED	KG X 40	EA MM

MATERIAL	RV	Level	DESCRIPTION	DOCUMENT STD/GRAPHIC	VAR	CAL. WEIGHT	WU	SR	SI	BT	SC	X-STATUS	BUOM
ITEM T A P C W s U	S	I N M c REK	MATERIAL TITLE ID	BASIC MATERIAL	TLV NO	RAW MATERIAL SPEC.					SURFACE TREAT.	EUOM	
QUANTITY	UOM	REFERENCE POINT	SIZE/DIM DESCRIPTION		SIZE/DIM 1 (STD. BOM NO./VAR)		SIZE/DIM 2 (SIZE/DIM STD. BOM)						
REL.	BOM MM NO.		SIZE/DIM 3	SIZE/DIM 4	SIZE/DIM 5 (HEAD TYPE)		SIZE/DIM 6 (FITTING TYPE)						
			TYPE	DOCUMENT ID	PART	VR	ALTERNATIVE ID	ST	DIR DESCRIPTION				
			INTERNAL COMMENT: Internal comment Exists In Language D										







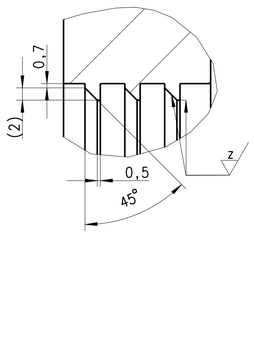
[1] T.40 und T.50 gesichert mit T.60
ITEM 40 AND ITEM 50 LOCKED WITH ITEM 60

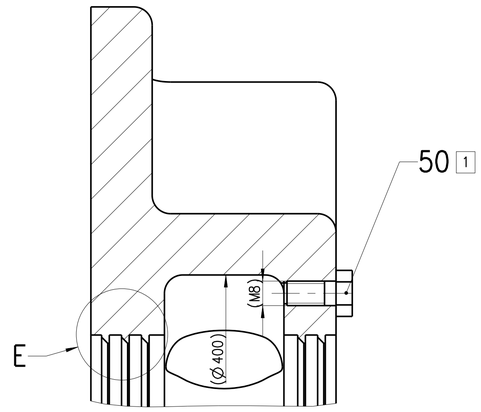
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(...) DESIGN DIM.

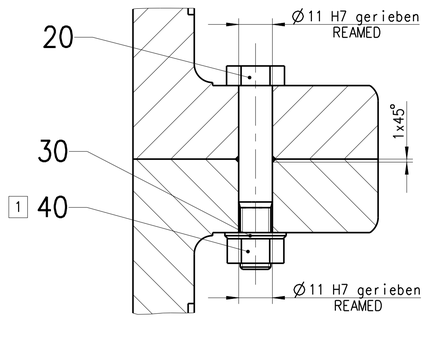
z = Rz100 Rmax160

alle Bohrungen= Rz250
ALL BORED HOLES=

(Rz100 Rmax160 Rz40 Rmax64 Rz250)







ECCN: EAR99	AL: N	ECL: N	U.S.-CONTENT: N
B	2015-03-25	siehe CIDD-Dok / SEE CIDD-DOC	
A		Erstausgabe / FIRST ISSUE	
REV.	DATE	CHANGE DESCRIPTION	

Siemens AG
Energy Sector

WEIGHT: 16,4 KG	SCALE: 1:2	SPEC.: KUN351.00
DRAWN: 2013-02-16 APEL	TITLE	
CHECKED: 2013-02-16 PRADEL	KAMMRING FZ WELLE Ø 355	
RELEASED: 2013-02-16 APEL	OUTER AIR SEAL ASSEMBLY ROTOR Ø 355	
CONFIDENTIAL (c) Siemens AG 2013 ALL RIGHTS RESERVED	DRAWING NUMBER /VALUE DPPPG-70024708 1-SFA0300-70024708	REV. B SHEET 1/1

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MATERIAL: P0012416100 **REVISION:** C **EFFECTIVE:** 2013-07-30 **BAS.QTY:** 1.000 **REQ.QTY:** 1.000 **PLANT:** **APPL.:** ZEN1 **X-STATUS:** 40 **BASE UOM:** ST **ENG. UNIT:** MM
DESCRIPTION: OUTER AIR SEAL ASSEMBLY **TITLE ID:** MKSFA0300-000 **PROJECT ID:** **ANCHOR ID:** **SERVICE CODE:**
DOCUMENT-STD/GRAPHIC: 1-SFA0300-70024708 **VARIANT:** **NET WEIGHT:** 16,400 KG **CAL. WEIGHT:** 0,000 KG **SER. REQ.:** **SER. INH.:**
B.TRACK: **SIZE/DIM. DESC.:** TYPE **SIZE/DIM 1:** (WELLEØ355)
SIZE/DIM 2:

DOCUMENT LINKS:

TYP	DOCUMENT ID	PAR	VER	ALTERNATIVE ID	ST	DESCRIPTION
DWG	DPPPG-70024708	000	B	1-SFA0300-70024708	RL	SFA0300 OUTER AIR SEAL ASSEMBLY 2P

INTERNAL COMMENT:
Internal comment Exists In Language D
Internal comment Exists In Language E

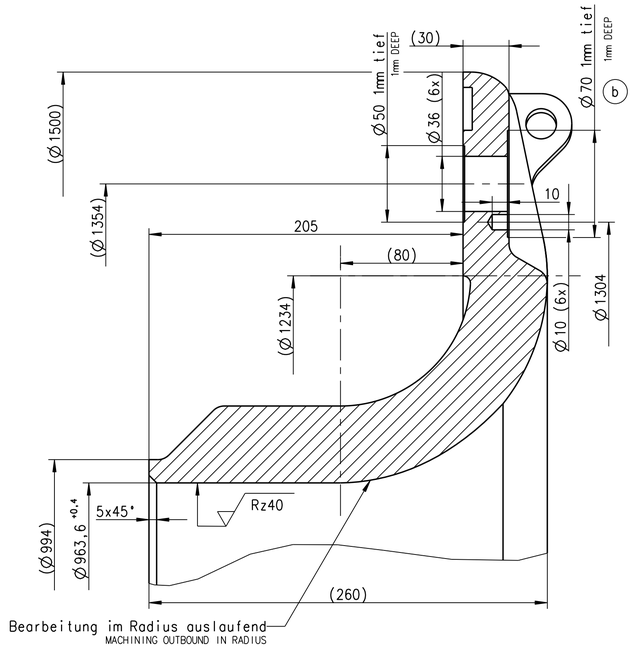
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P0012416500 0010 L X X X 1.000 EA P0012416100	A 1	OUTER AIR SEAL MKSFA0310-000 ENAC-ALSI10MG(A) TYPE D355,4(WELLED355E8) DWG DPPPG-70024709 000 B 2-SFA0310-70024709 RL SFA0310 OUTER AIR SEAL 2P		20.000 40	KG MM							EA
		INTERNAL COMMENT: Internal comment Exists In Language E Internal comment Exists In Language D										
P0017645200 0020 L X X X 2.000 EA P0012416100	1	FITTING BOLT ZZ10001592-000 8.8 THREAD / PITCH / LENGTH M10 1,5 NO DOCUMENT ASSIGNED		0.070 DIN 609 60 40	KG MM							EA
PE106488 0030 L X X X 2.000 EA P0012416100	1	WASHER / 10,5 ST-A3C ZZ10002092-000 SIZE/DIMENSION (FROM LEGACY SYSTEM) 10 NO DOCUMENT ASSIGNED		0.003 ISO 7090 40	KG MM				X			EA
PE105142 0040 L X X X 2.000 EA P0012416100	1	HEXAGON NUT / M10 ZZ00057841-000 8 THREAD M10 NO DOCUMENT ASSIGNED		0.012 ISO 4032 40	KG MM					A2B		EA
		INTERNAL COMMENT: Internal comment Exists In Language D										
PE106425 0050 L X X X 2.000 EA P0012416100	1	HEXAGON SCREW ZZ10002283-000 8.8 THREAD/LENGTH M8 NO DOCUMENT ASSIGNED	ISO4017	0.011 16 40	KG MM					A2B		EA

MATERIAL	RV	Level	DESCRIPTION	DOCUMENT STD/GRAPHIC	VAR	CAL. WEIGHT	WU	SR	SI	BT	SC	X-STATUS	BUOM
ITEM T A P C W s U	S I N M c REK		MATERIAL TITLE ID	BASIC MATERIAL	TLV NO	RAW MATERIAL SPEC.						SURFACE TREAT.	EUOM
QUANTITY	UOM	REFERENCE POINT	SIZE/DIM DESCRIPTION		SIZE/DIM 1 (STD. BOM NO./VAR)		SIZE/DIM 2 (SIZE/DIM STD. BOM)						
REL.	BOM MM NO.		SIZE/DIM 3	SIZE/DIM 4	SIZE/DIM 5 (HEAD TYPE)		SIZE/DIM 6 (FITTING TYPE)						
			TYPE	DOCUMENT ID	PART	VR	ALTERNATIVE ID	ST	DIR DESCRIPTION				
PE104420		1	ADHESIVE				0.082	KG			X	E	40	EA
0060 L	X X X	X 0.0	ZZ00030663-000	LOCTITE_270										MM
1.000	EA		ADDITIONAL MATERIAL DESCRIPTION		50GFL.									
P0012416100			SPE	DPQD-00007564	000	A	PE104420 KLEBER LOCTITE 270	RL						
			INTERNAL COMMENT: Internal comment Exists In Language D											

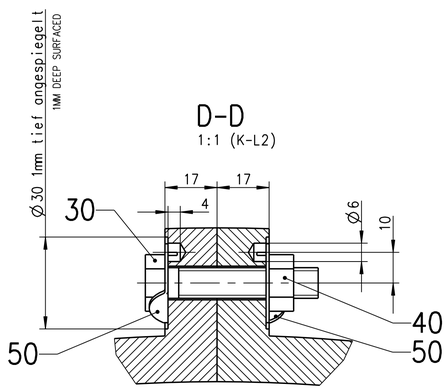
(...) Konstruktionsmaße
(...) CONSTRUCTION DIMENSIONS

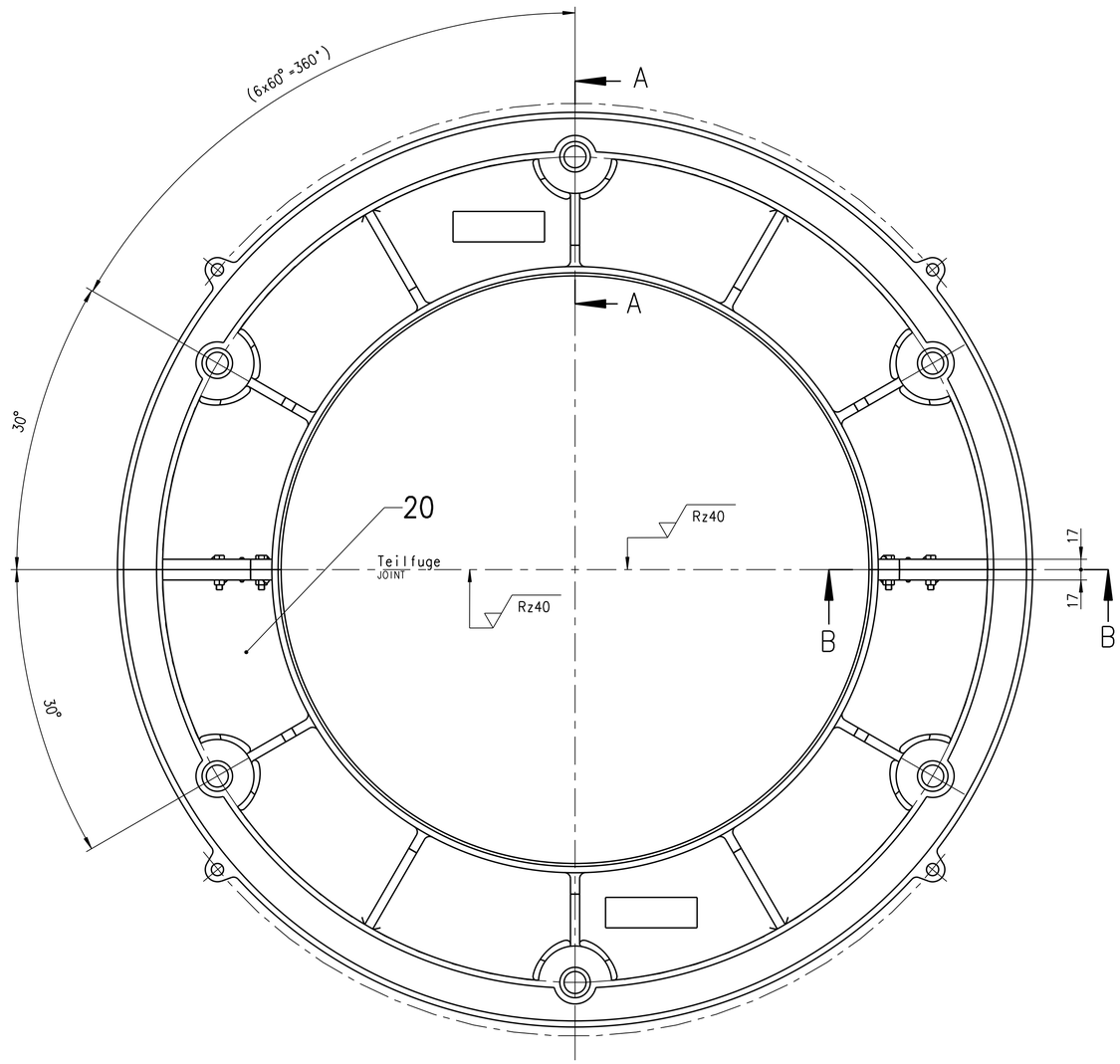
(Rz40 Bohrungen BORE HOLES Rz250)

A-A
1:2 (B-C13)

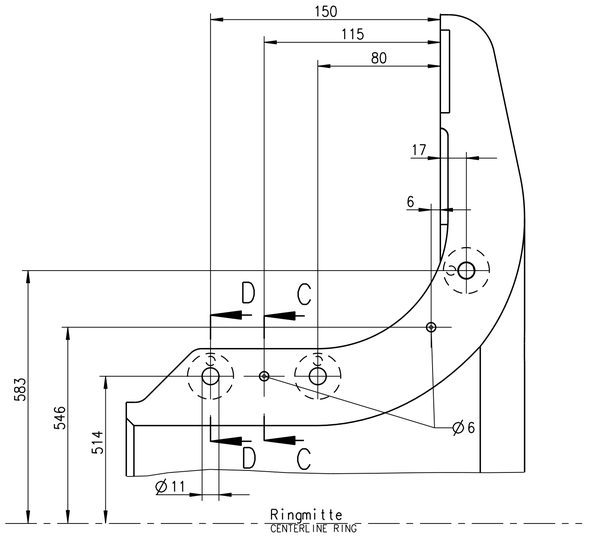


D-D
1:1 (K-L2)

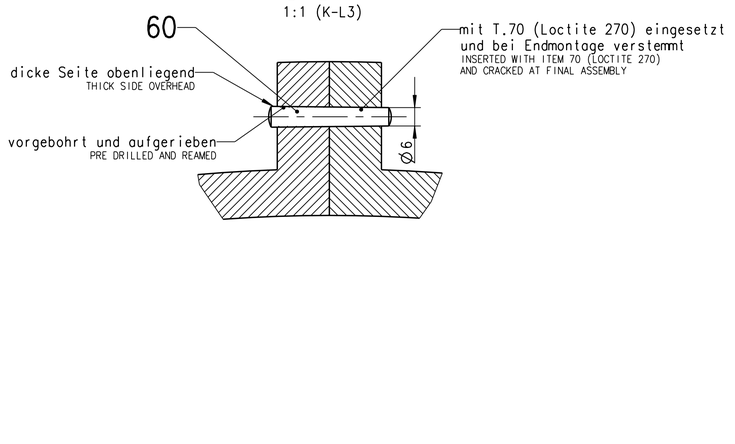




B-B
1:2 F14-16)
Ansicht auf Teilfuge
VIEW ON JOINT



C-C
1:1 (K-L3)



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REVISION: SEE SEPARATE CID DOCUMENT

Siemens AG

WEIGHT: 88 KG	SCALE: 1:5	SPEC.:KUN351.00	DCC:
ORIGINATED: 2013-06-28 APEL	TITLE: LUFTFUEHRUNGSRING FZ GEBLAESEDURCHMESSER 959		
CHECKED: 2013-06-28 PRADEL	AIR BAFFLE RING SD		
RELEASED: 2013-06-28 APEL	LANG. - DRAWING NO. / VALUE: DPPPG-70035099		
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Pro/ENGINEER A1

DO NOT SCALE, WORK TO DIMENSIONS SHOWN

MATERIAL: P0016124300 **REVISION:** B **EFFECTIVE:** 2016-06-27 **BAS.QTY:** 1.000 **REQ.QTY:** 1.000 **PLANT:** **APPL.:** ZEN1 **X-STATUS:** 40 **BASE UOM:** ST **ENG. UNIT:** MM
DESCRIPTION: BLOWER SHROUD MACHINING **TITLE ID:** MKSFA0400-000 **PROJECT ID:** **ANCHOR ID:** **SERVICE CODE:**
DOCUMENT-STD/GRAPHIC: 22-SFA0400-70035099 **VARIANT:** **NET WEIGHT:** 88,000 KG **CAL. WEIGHT:** 0,000 KG **SER. REQ.:** **SER. INH.:**
B.TRACK: **SIZE/DIM. DESC.:** ITEM / VERSION **SIZE/DIM 1:** GEBLÄSEDURCHMESSER959
SIZE/DIM 2:

DOCUMENT LINKS:

TYP	DOCUMENT ID	PAR	VER	ALTERNATIVE ID	ST	DESCRIPTION
DWG	DPPPG-70035099	000	B	22-SFA0400-70035099	RL	SFA0400 Luftfuehrungsring FZ

INTERNAL COMMENT:
Internal comment Exists In Language D
Internal comment Exists In Language E

MATERIAL / ITEM / QUANTITY / REL.	RV / S / UOM	Level / I / REFERENCE POINT	BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION	DOCUMENT STD/GRAPHIC / BASIC MATERIAL	VAR / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR)	CAL. WEIGHT / RAW MATERIAL SPEC. / SIZE/DIM 2 (SIZE/DIM STD. BOM)	WU	SR	SI	BT	SC / SURFACE TREAT.	X-STATUS / SIZE/DIM 6 (FITTING TYPE)	BUOM / EUOM
0010 T X		1	0.0	ITEM TEXT : Luftführungsring zweiteilig, Ober- und Unterteil bestellt mit BGR Luftführungsring BZ TWO-PIECE RING, UPPER- AND LOWER PART ORDERED AT ASSEMBLY AIR BAFFLE RING CD			NO DOCUMENT ASSIGNED							
1.000			P0016124300											
P0016123100 0020 L X X X X 1.000 EA P0016124300	B	1	X 0.0	AIR BAFFLE RING ZZ00037602-000 ENAC-ALSI10MG(A) ITEM / VERSION	22-SFA0410-70035098	984301 GEBLÄSEØ959	102.000	KG				40	EA MM	

SIZE/DIM 3 TYPE	SIZE/DIM 4 DOCUMENT ID	PART	VR	SIZE/DIM 5 (HEAD TYPE) ALTERNATIVE ID	ST	SIZE/DIM 6 (FITTING TYPE) DIR DESCRIPTION
DWG	DPPPG-70035098	000	B	22-SFA0410-70035098	RL	SFA0410 Luftfuehrungsring BZ
DWG	DPPPG-70035099	000	B	22-SFA0400-70035099	RL	SFA0400 Luftfuehrungsring FZ
SPE	TLV984301	DE	B	TLV 9843 01	RL	EN AC-Al Si10Mg(a);(G-ALSI10MG); Annular

INTERNAL COMMENT:
Internal comment Exists In Language D
Internal comment Exists In Language E

Schweißzangaben / welding summary

Stahlsorte / base metal	: S235JR
Zusatzwerkstoff / filler metal	: G4Si1 (G18 8 Mn)
Schweißverfahren / welding process	: MAG (MIG)
Schweißnahtgroesse / welding thickness	: t≥3, a10, a12, t1, t , V
Prueflumfang nach / test scope according to	: PV00026.0-00000
Bewertungsgruppe / classification group	: DINENISO 5817 - C (B)
Pruefstufe / test class	: S (1)

Oberflaeche ohne anhaftende Schweisspritzer
surface without adherent weld splatter

Haube im Innenbereich frei von Schweisszspritzern und Strahlgut
NO WELD SPLATTERS AND BLASTING MEDIUM INSIDE THE COVER

zulaessige Welligkeit der Auszenbleche: 5mm/m^2
ALLOWED SORFACE RIPPLE: 5MM/M^2

auszenliegende Schweisznaehte einebnen
FLAT WELDINGS AT THE OUTSIDE

Farbgebung siehe BGR. SFA5100
FOR COLOR LOOK ASSEMBLY SFA5100

Nichtdurchgeschweiszte Naehte mit Pos.800 abdichten
SEAL INTERRUPTED WELDS WITH IT.800

Bei Rechteck- bzw. Quadratprofilen sind HY-Naehte in der Staerke der Wanddicke des Profils auszufuehren.
HY-WELDS FOR RECTANGULAR TUBES MUST HAVE THE THICKNESS OF THE PROFILE WALL THICKNESS

Schallschutz (Pos.05) ist in den Seitenwaenden, den Stirnwaenden (Pos.30) und deren Deckeln vorzusehen.
SOUND INSULATION (IT.05) MUST BE INSERT IN THE SIDE WALLS AND FRONT WALLS (IT.30) AS WELL WHOSE COVER

1. Gewinde ggf. nach Komponente abgebohrt
THREAD CAN BE TAPPING ACC. TO COMPONENT
Anzugsmoment nach VDI 2230 - siehe Tabelle:
SCREW ACC TO. VDI 2230 - ON SEE TABLE

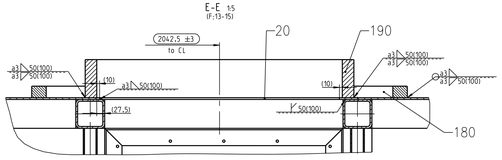
Groesze SIZE	Anzugsmoment TORQUE	Werkstoff MATERIAL
M6	20Nm	8.8

2. Bohrung Ø30 in Endmontage nach Kueherhaube abgebohrt
HOLE Ø30 DRILLED IN FINAL ASSEMBLY ACCORDING TO COOLER COVER

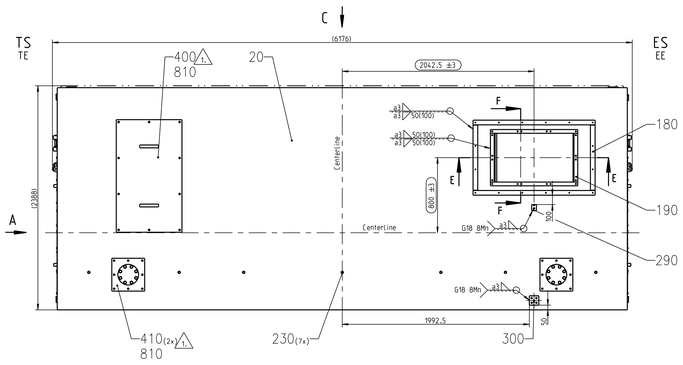
3. Erdungsklemmen auf der gegenueberliegenden Stirnwand analog anbringen.
INSTALL GROUNDING TERMINALS ANALOGOUSLY ON THE OPPOSITE FRONT WALL.

4. Pos.80 (Sylomer L) buendig an der Innenseite der Seitenwaende anbringen.
IT.80 (SYLOMER L) FLUSH WITH THE INSIDE OF THE SIDE WALLS.

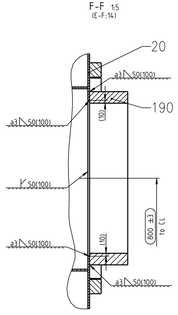
E-E 1:5
(F;13-15)



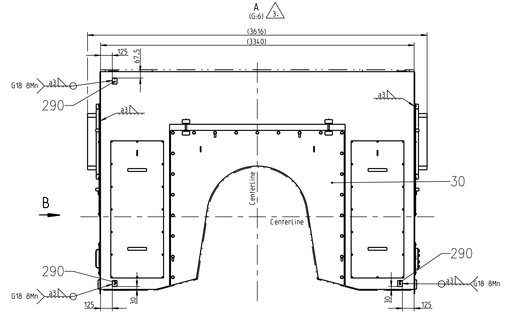
C



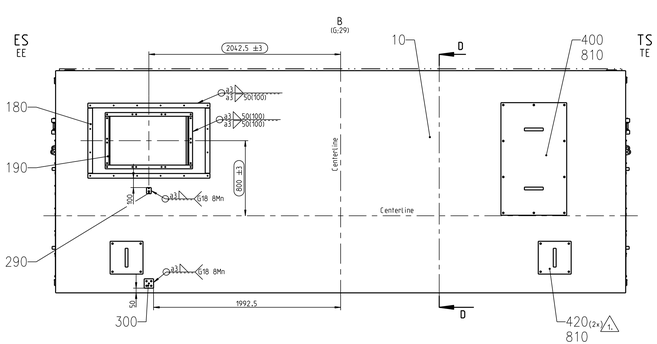
F-F 1:5
(E-F;14)



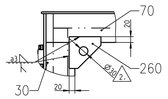
A
(G;6)



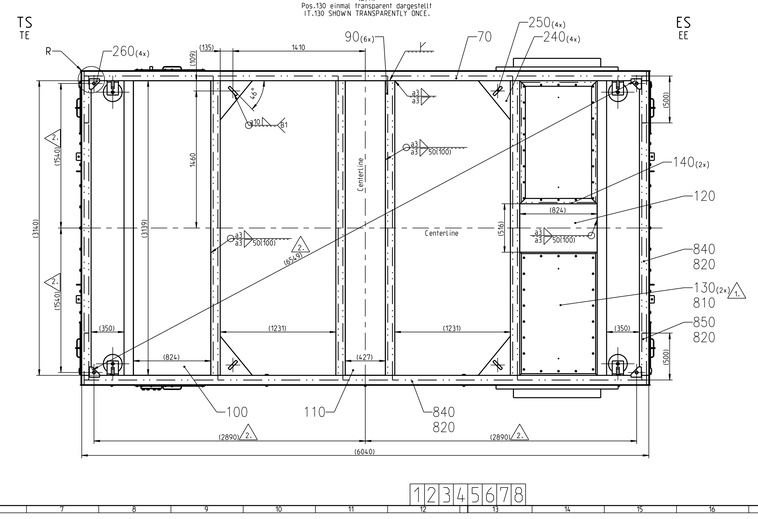
B
(G;29)



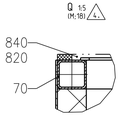
R 1:5
(K;7)



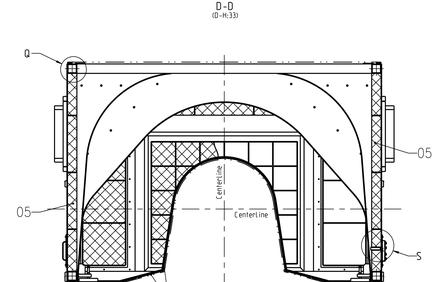
C
(D;11)
Pos.130 einmal transparent dargestellt
IT.130 SHOWN TRANSPARENTLY ONCE.



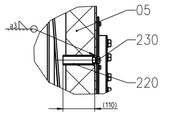
Q 1:5
(M;18)



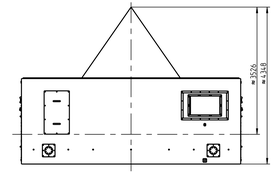
D-D
(D-H;33)

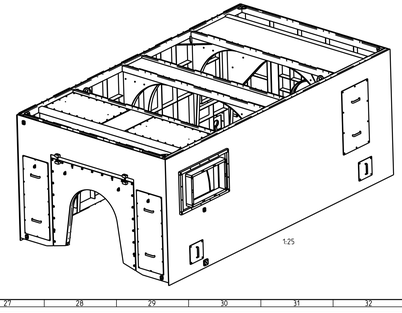


S 1:5
(P;23)



CRANE HOOK HEIGHT
(1;40)





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Siemens AG

WEIGHT:	6581 KG	SCALE: 1:15	SPEC.:KUN3ST.00
ORIGINATED:	2018-03-01 REISSIG	TITLE:	ABDECKHAUBE
CHECKED:	2018-03-07 GOETZ		
RELEASED:	2018-03-08 REISSIG	ENCLOSURE	
		LANG. - DRAWING NO. / VALUE:	DPPPG-70156650
		22-SFA5600-70156650	REV.: A SHEET: 1/2

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Pro/ENGINEER

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DO NOT SCALE, WORK TO DIMENSIONS SHOWN

Schweißangaben / welding summary

Stahlsorte / base metal	: S235JR
Zusatzwerkstoff / filler metal	: G4Si1 (G18 8 Mn)
Schweißverfahren / welding process	: MAG (M1G)
Schweißnahtgröesse / welding thickness	: ta3, a10, a12, t1, t , V
Pruefumfang nach / test scope according to	: PV0026,0-00000
Bewertungsgruppe / classification group	: DIN(EN)ISO 5817 - C (B)
Pruefstufe / test class	: 5 (1)

Oberflaeche ohne anhaftende Schweisspritzer
surface without adherent weld spatter

Haube im Innenbereich frei von Schweisspritzern und Strahlgut
NO WELD SPLATTERS AND BLASTING MEDIUM INSIDE THE COVER

zulaessige Welligkeit der Auszenbleche: 5mm/m^2
ALLOWED SORFACE RIPPLE: 5MM/M^2

auszenliegende Schweisznaehte einebnen
FLAT WELDINGS AT THE OUTSIDE

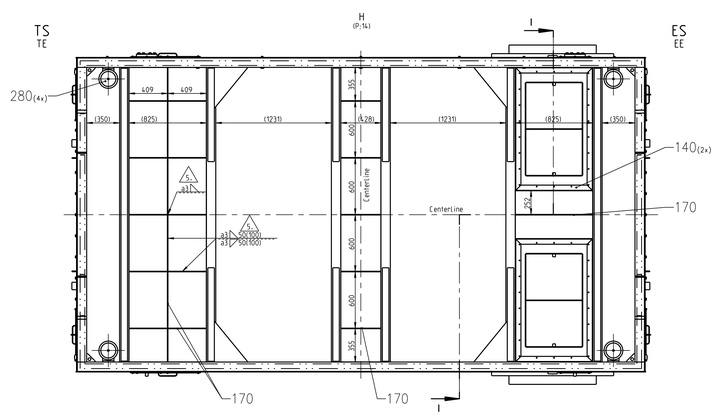
Farbgebung siehe BGR. SFA5100
FOR COLOR LOOK ASSEMBLY SFA5100

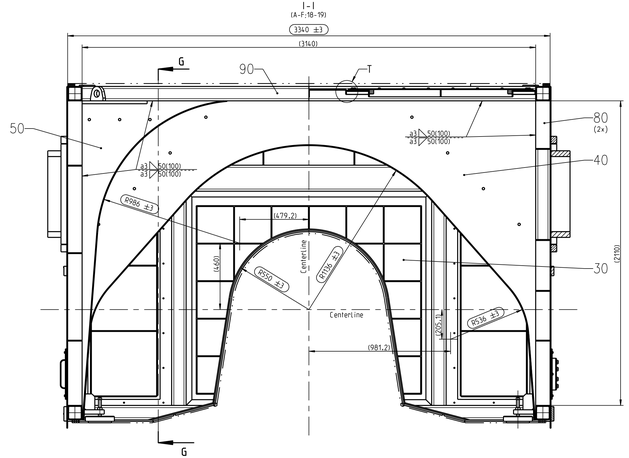
Nichtdurchgeschweiszte Naehte mit Pos.800 abdichten
SEAL INTERRUPTED WELDS WITH IT.800

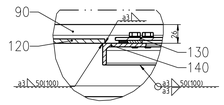
Bei Rechteck- bzw. Quadratprofilen sind HY-Naehte in der Staerke der Wanddicke des Profils auszufuehren.
HY-WELDS FOR RECTANGULAR TUBES MUST HAVE THE THICKNESS OF THE PROFILE WALL THICKNESS

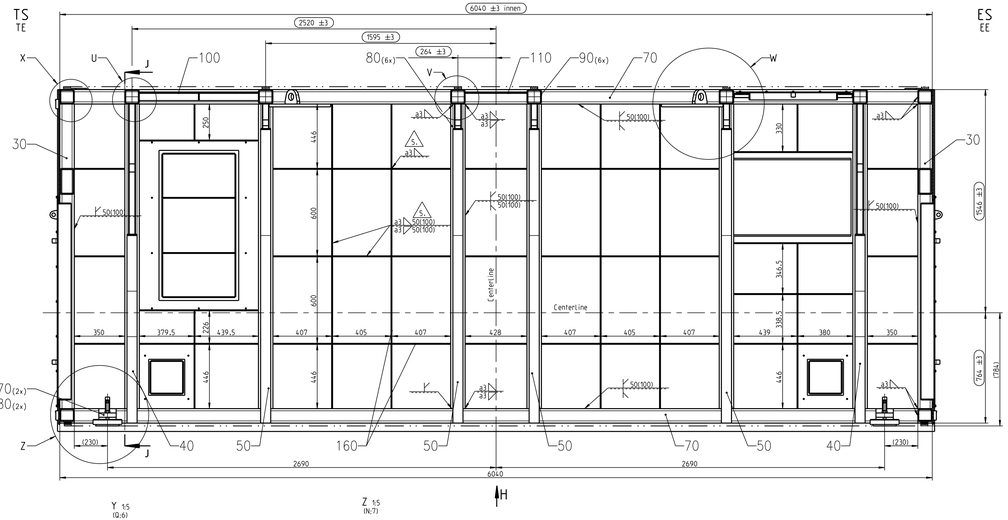
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SOUND INSULATION (IT.05) MUST BE INSERT IN THE SIDE WALLS AND FRONT WALLS (IT.30) AS WELL WHOSE COVER

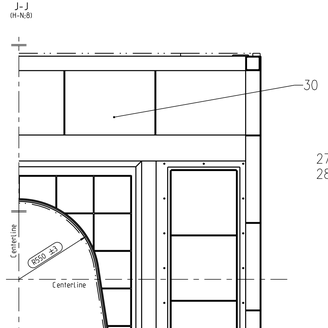
⚠5 gilt fuer alle Rippen
VALID TO ALL RIBS

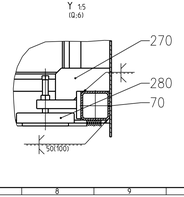


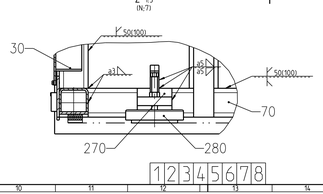


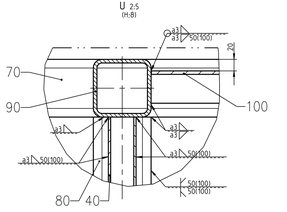


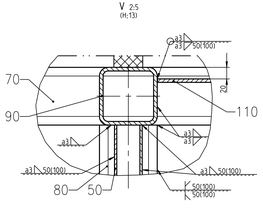


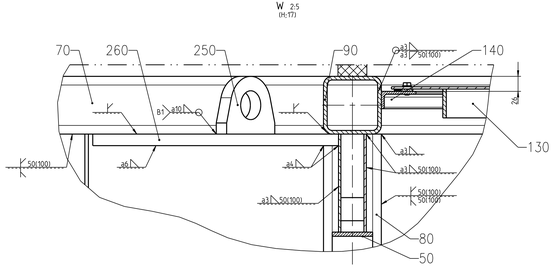


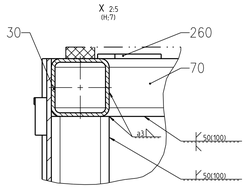


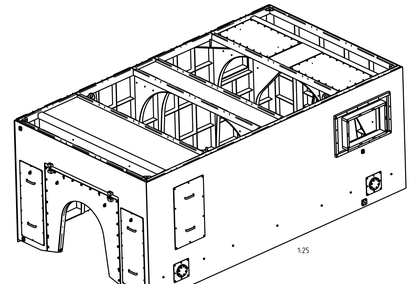












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Siemens AG

WEIGHT:	6581 KG	SCALE: 1:15	SPEC:,KUN351.00
ORIGINATED:	2018-03-01 REISSIG	TITLE:	ABDECKHAUBE
CHECKED:	2018-03-07 GOETZ		ENCLOSURE
RELEASED:	2018-03-08 REISSIG		

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LANG. - DRAWING NO. / VALUE:
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22-SFA5600-70156650

REV.: A | SHEET: 2/2

Pro/ENGINEER

DO NOT SCALE, WORK TO DIMENSIONS SHOWN

MATERIAL: P0059317600 **REVISION:** A **EFFECTIVE:** 2018-03-07 **BAS.QTY:** 1.000 **REQ.QTY:** 1.000 **PLANT:** **APPL.:** ZEN1 **X-STATUS:** 40 **BASE UOM:** ST **ENG. UNIT:** MM
DESCRIPTION: ENCLOSURE, WELDING ASSEMBLY **TITLE ID:** ZZ00100039-000 **PROJECT ID:** **ANCHOR ID:** **SERVICE CODE:**
DOCUMENT-STD/GRAPHIC: 22-SFA5600-70156650 **VARIANT:** **NET WEIGHT:** 6.581,000 KG **CAL. WEIGHT:** 0,000 KG **SER. REQ.:** **SER. INH.:**
B.TRACK:

DOCUMENT LINKS:

TYP	DOCUMENT ID	PAR	VER	ALTERNATIVE ID	ST	DESCRIPTION
DWG	DPPPG-70156650	000	A	22-SFA5600-70156650	RL	SFA5600 ENCLOSURE 2P

INTERNAL COMMENT:
Internal comment Exists In Language D

MATERIAL / ITEM / QUANTITY / REL. / BOM MM NO.	RV / Level / UOM / REFERENCE POINT	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE / DOCUMENT ID	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / SIZE/DIM 4 / PART / VR / ALTERNATIVE ID	VAR / TLV NO / SIZE/DIM 5 (HEAD TYPE) / ST / DIR DESCRIPTION	CAL. WEIGHT / RAW MATERIAL SPEC. / SIZE/DIM 1 (STD. BOM NO./VAR)	WU / SURFACE TREAT. / SIZE/DIM 2 (SIZE/DIM STD. BOM)	SR	SI	BT	SC	X-STATUS / SIZE/DIM 6 (FITTING TYPE)	BUOM / EUOM
P0037233200 0005 L X X X X X 0.0 1.000 EA P0059317600	A 1	NOISE PROTECTION LINING ZZ00054454-000 DWG 2-4759-222513 000 F	2-4759-222513 RL SCHALLAUSKLEIDUNG	398.000 KG 40								EA MM
		INTERNAL COMMENT: Internal comment Exists In Language D Internal comment Exists In Language E										
P0059321800 0010 L X X X X 0.0 1.000 EA P0059317600	 1	SIDE WALL ZZ00058433-000 S235JR DWG DPPPG-70156651 000 A	22-70156651 22-70156651 RL SFA5600 SP SIDE WALL 2P	623.000 KG DIN EN 10029 40								EA MM
P0059321900 0020 L X X X X 0.0 1.000 EA P0059317600	 1	SIDE WALL ZZ00058433-000 S235JR DWG DPPPG-70156652 000 A	22-70156652 22-70156652 RL SFA5600 SP SIDE WALL 2P	623.000 KG DIN EN 10029 40								EA MM
P0036677500 0030 L X X X X X 0.0 2.000 EA P0059317600	B 1	FRONT WALL COMPLETE ZZ10005123-000 DWG 1-281292 000 A	1-281292 RL STIRNWAND KPL.	820.000 KG 40								EA MM
		INTERNAL COMMENT: Internal comment Exists In Language D Internal comment Exists In Language E										
PE437191 0040 L X X X X X 0.0 2.000 EA P0059317600	A 1	SEAL WALL ZZ00012878-000 DWG 2-437191 000 A	2-437191 RL SEALING WALL	199.000 KG 40								EA MM

MATERIAL / ITEM / QUANTITY / REL.	RV / Level / UOM / REFERENCE POINT / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE / DOCUMENT ID	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / SIZE/DIM 4 / PART / VR / ALTERNATIVE ID	VAR / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE) / ST / DIR DESCRIPTION	CAL. WEIGHT / RAW MATERIAL SPEC. / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE)	WU / SR / SI / BT / SC / X-STATUS / BUOM / EUOM
PE437193 0050 L X X X X X 0.0 8.000 EA P0059317600	A / 1	SEAL WALL SEGMENT DWG 3-437193 000 A	3-437193 RL DICHTWANDSEGMENT	39.000	KG 40 EA MM
PE119908 0070 R X X X X 0.0 111.956 KG P0059317600	1	HOLLOW PROFILE ZZ10000753-000 S235JR BREADTH / HEIGHT / WALLTHICKNESS 6,3	100 100 NO DOCUMENT ASSIGNED	1.000 EN 10210-2	KG 40 KG MM
NO.OF PCS:4	SIZE 1:6040.000 UOM:MM	SIZE 2:100.000 UOM:MM	SIZE 3:6.300 UOM:MM		
	CLASSIFICATION: Classification Data Exists				
PE119908 0080 R X X X X 0.0 39.110 KG P0059317600	1	HOLLOW PROFILE ZZ10000753-000 S235JR BREADTH / HEIGHT / WALLTHICKNESS 6,3	100 100 NO DOCUMENT ASSIGNED	1.000 EN 10210-2	KG 40 KG MM
NO.OF PCS:12	SIZE 1:2110.000 UOM:MM	SIZE 2:100.000 UOM:MM	SIZE 3:6.300 UOM:MM		
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PE119908 0090 R X X X X 0.0 58.202 KG P0059317600	1	HOLLOW PROFILE ZZ10000753-000 S235JR BREADTH / HEIGHT / WALLTHICKNESS 6,3	100 100 NO DOCUMENT ASSIGNED	1.000 EN 10210-2	KG 40 KG MM
NO.OF PCS:6	SIZE 1:3140.000 UOM:MM	SIZE 2:100.000 UOM:MM	SIZE 3:6.300 UOM:MM		
	CLASSIFICATION: Classification Data Exists				
PE104318 0100 R X X X X 0.0 121.826 KG P0059317600	1	PLATE S235JRG2 SIZE/DIMENSION (FROM LEGACY SYSTEM)	6*2000*4000 NO DOCUMENT ASSIGNED	1.000 EN 10029	KG 40 KG MM
NO.OF PCS:1	SIZE 1:3139.000 UOM:MM	SIZE 2:824.000 UOM:MM	SIZE 3:6.000 UOM:MM		
	CLASSIFICATION: Classification Data Exists				

MATERIAL / ITEM / QUANTITY / REL.	RV / Level / T / A / P / C / W / s / U / S / I / N / M / c / REK / UOM / REFERENCE POINT / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE / DOCUMENT ID	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / SIZE/DIM 4 / PART / VR / ALTERNATIVE ID	VAR / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE) / ST / DIR DESCRIPTION	CAL. WEIGHT / RAW MATERIAL / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE)	WU / SR / SI / BT / SC / X-STATUS / SURFACE TREAT.	BUOM / EUOM
PE104318 0110 R X X X X 63.131 KG P0059317600	1	PLATE S235JRG2 SIZE/DIMENSION (FROM LEGACY SYSTEM)		6*2000*4000 NO DOCUMENT ASSIGNED	1.000 EN 10029	KG MM	KG MM
NO.OF PCS:1	SIZE 1:3139.000 UOM:MM		SIZE 2:427.000 UOM:MM		SIZE 3:6.000 UOM:MM		
	CLASSIFICATION: Classification Data Exists						
PE104318 0120 R X X X X 20.026 KG P0059317600	1	PLATE S235JRG2 SIZE/DIMENSION (FROM LEGACY SYSTEM)		6*2000*4000 NO DOCUMENT ASSIGNED	1.000 EN 10029	KG MM	KG MM
NO.OF PCS:1	SIZE 1:516.000 UOM:MM		SIZE 2:824.000 UOM:MM		SIZE 3:6.000 UOM:MM		
	CLASSIFICATION: Classification Data Exists						
PE431486 0130 L X X X X 2.000 EA P0059317600	B 1	COVER ZZ00011872-000 DWG 3-431486 000 A	3-431486	RL COVER	44.000	KG MM	EA MM
	INTERNAL COMMENT: Internal comment Exists In Language D Internal comment Exists In Language E						
P0058086100 0140 L X X X X 2.000 EA P0059317600	A 1	FRAME ZZ10001778-000 DWG DPPPG-70152464 000 A	22-70152464 22-70152464	RL SFA5600 COVER FRAME 2P	13.800	KG MM	EA MM
PE110251 0160 R X X X X 248.688 KG P0059317600	1	FLAT ZZ00019313-000 S235JRG2 SIZE/DIMENSION (FROM LEGACY SYSTEM)		100*6 NO DOCUMENT ASSIGNED	1.000 DIN 1017	KG MM	KG MM
NO.OF PCS:1	SIZE 1:52800.000 UOM:MM		SIZE 2:100.000 UOM:MM		SIZE 3:6.000 UOM:MM		
	CLASSIFICATION: Classification Data Exists						
	ITEM TEXT : nach Bedarf zuschneiden						

MATERIAL / ITEM / QUANTITY / REL.	RV / Level / S I N M c REK / UOM / REFERENCE POINT / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / SIZE/DIM 4 / DOCUMENT ID	PART	VR	ALTERNATIVE ID	VAR / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE) / ST	CAL. WEIGHT / RAW MATERIAL SPEC. / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE) / DIR DESCRIPTION	WU / SR / SI / BT / SC / X-STATUS / SURFACE TREAT.	BUOM / EUOM
		CUT TO LENGTH AS REQUIERED							
PE110252 0170 R X X X X 24.021 KG P0059317600	1 X 0.0	FLAT ZZ00019313-000 SIZE/DIMENSION (FROM LEGACY SYSTEM)	S235JRG2				50*6	1.000 DIN 1017 NO DOCUMENT ASSIGNED	KG 40 MM	KG
NO.OF PCS:1	SIZE 1:10200.000 UOM:MM	SIZE 2:50.000 UOM:MM	SIZE 3:6.000 UOM:MM							
		CLASSIFICATION: Classification Data Exists								
		ITEM TEXT : nach Bedarf zuschneiden CUT TO LENGTH AS REQUIERED								
PE457773 0180 L X X X X 2.000 EA P0059317600	A 1 X 0.0	WELDING FLANGE ZZ00002878-000 DWG	2-457773 2-457773	000	B		RL	62.500 DIN 1017 ANSCHWEISSFLANSCH	KG 40 EA MM	
		INTERNAL COMMENT: Internal comment Exists In Language E Internal comment Exists In Language D								
P0058086200 0190 L X X X X 2.000 EA P0059317600	A 1 X 0.0	WELDING FLANGE ZZ00002878-000 DWG	22-70152462 DPPPG-70152462	000	A	22-70152462	RL	120.000 DIN 1017 SFA5600 SP FRONT WALL PLATE 2P	KG 40 EA MM	
PE112954 0220 R X X X X 0.322 KG P0059317600	1 X 0.0	PIPE ZZ10001937-000 SIZE/DIMENSION (FROM LEGACY SYSTEM)	ST35.8-I				33,7*4	0.300 DIN EN 10220 NO DOCUMENT ASSIGNED	KG 40 MM	KG
NO.OF PCS:7	SIZE 1:110.000 UOM:MM	SIZE 2:33.700 UOM:MM	SIZE 3:4.000 UOM:MM							
		CLASSIFICATION: Classification Data Exists								
0230 T X .0 7.000 P0059317600	1	ITEM TEXT : PE117358 Blindverschluß-NE-Ms M20x1,5 Anbringung bei Endmontage Siemens MOUNTING AT FINAL ASSEMBLY AT SIEMENS						NO DOCUMENT ASSIGNED		

MATERIAL / ITEM / QUANTITY / REL.	RV / Level / UOM / REFERENCE POINT / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE / DOCUMENT ID	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / SIZE/DIM 4 / PART / VR / ALTERNATIVE ID	VAR / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE) / ST / DIR DESCRIPTION	CAL. WEIGHT / RAW MATERIAL / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE)	WU / SPEC.	SR	SI	BT	SC / SURFACE TREAT.	X-STATUS	BUOM / EUOM
P0036635500 0240 L X X X X 4.000 EA P0059317600	1 X 0.0	JUNCTION PLATE ZZ10000998-000 DWG	22-70098543 S235JR DPPPG-70098543 / 000 / A / 22-70098543	RL	19.000 DIN EN 10025 SFA5600 SHEET METAL	KG				40		EA MM
PE260781 0250 L X X X X 4.000 EA P0059317600	1 X 0.0	LUG ZZ10001548-000 SIZE/DIMENSION (FROM LEGACY SYSTEM)	S235JRG2 A50 NO DOCUMENT ASSIGNED		1.600 SN 66101	KG				40		EA MM
P0049723500 0260 L X X X X 4.000 EA P0059317600	1 X 0.0	JUNCTION PLATE ZZ10000998-000 DWG	22-70128996 S235JR DPPPG-70128996 / 000 / A / 22-70128996	RL	0.560 DIN EN 10025 SFA5600 GUSSET PLATE	KG				40		EA MM
PE436251 0270 L X X X X X 4.000 EA P0059317600	A 1 X 0.0	CONSOLE ZZ00031588-000 DWG	3-436251 3-436251 / 000 / D	RL	9.200 SUPPORT	KG				40		EA MM
		INTERNAL COMMENT: Internal comment Exists In Language D Internal comment Exists In Language E										
PE128742 0280 L X X X X 4.000 EA P0059317600	1 X 0.0	machine mounting pad TYPE / DIAMETER RPT	DPPIC-2013-0000002 / 000 / A / 22-2013-0000002 INT.VERMERK Ø208	RL	0.500	KG				Z 40		EA MM
		RECOMMENDED SUPPLIER NAME: GMT-GUMMI-METALL-TECHNIK GMBH **RECOMMENDED SUPPLIER PART ID NO.:** 110006										
		INTERNAL COMMENT: Internal comment Exists In Language D										
PE117820 0290 L X X X X 8.000 EA P0059317600	1 X 0.0	GROUND TERMINAL, TOTAL X6CRNITI18-10 DWG	4-117820 4-117820 / 000 / B	RL	0.500 ERDUNGSKLEMME, KPL.	KG				40		EA MM
		INTERNAL COMMENT: Internal comment Exists In Language E Internal comment Exists In Language D										

MATERIAL / ITEM / QUANTITY / REL.	RV / Level / REFERENCE POINT / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / SIZE/DIM 4 / DOCUMENT ID	PART	VR	ALTERNATIVE ID	VAR / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE) / ST	CAL. WEIGHT / RAW MATERIAL / DIR DESCRIPTION	WU / SPEC. / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE)	SR	SI	BT	SC / SURFACE TREAT.	X-STATUS	BUOM / EUOM
P0018847000 0300 L X X 2.000 EA P0059317600	1 X 0.0	GROUNDING BLOCK ZZ00100384-000 DWG	22-70047309 X6CRNITI18-10 DPPPG-70047309	000	A	22-70047309	RL	0.500 SFA5600 SP GROUND TERMINAL 2P	KG				40	EA MM
P0008103200 0400 L X X X 2.000 EA P0059317600	C 1 X 0.0	COVER ZZ00011872-000 DWG	3-278824 3-278824	000	B		RL	65.000 COVER	KG				40	EA MM
		INTERNAL COMMENT: Internal comment Exists In Language E Internal comment Exists In Language D												
PE296806 0410 L X X X 2.000 EA P0059317600	B 1 X 0.0	cap with connection for dryer DWG	3-296806 3-296806	000	A		RL	15.000 COVER	KG				40	EA MM
		INTERNAL COMMENT: Internal comment Exists In Language D Internal comment Exists In Language E												
P0008100000 0420 L X X X 2.000 EA P0059317600	C 1 X 0.0	COVER ZZ00011872-000 DWG	3-278825 3-278825	000	C		RL	12.000 COVER	KG			Z	40	EA MM
		INTERNAL COMMENT: Internal comment Exists In Language E Internal comment Exists In Language D												
PE120384 0800 L X X X 15.000 EA P0059317600	1 X 0.0	SEALING COMPOUND ZZ00100938-000 ADDITIONAL MATERIAL DESCRIPTION SPE SPE	- TEROSON_MS935_290ML DPQD-00007286 DPQD-00007728	000 000	A A	PE120384 DICHTMASSE TEROSTAT-M PE120384 TEROSTAT - MS 935 WEI	RL RL	0.400	KG			X X	40	EA MM
		INTERNAL COMMENT: Internal comment Exists In Language D												
		ITEM TEXT : Zum Abdichten abgesetzter Schweisznaehte im Inneren. FOR SEALING INTERRUPTED WELDS INSIDE. Verwendung nach Bedarf												

MATERIAL / ITEM / QUANTITY / REL.	RV / Level / S / I / N / M / c / REK / UOM / REFERENCE POINT / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE / DOCUMENT ID	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / SIZE/DIM 4 / PART / VR / ALTERNATIVE ID	VAR / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE) / ST	CAL. WEIGHT / RAW MATERIAL / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE) / DIR DESCRIPTION	WU / SR / SI / BT / SC / X-STATUS / BUOM / SPEC. / SURFACE TREAT. / EUOM
		USE IF NECESSARY				
0810 T X . 0 1.000 P0059317600	1	ITEM TEXT : PE106528 LOCTITE_243 Verwendung nach Bedarf USE IF NECESSARY			NO DOCUMENT ASSIGNED	
0820 T X . 0 1.000 P0059317600	1	ITEM TEXT : PE104421 PATTEX-PX Verwendung nach Bedarf USE IF NECESSARY			NO DOCUMENT ASSIGNED	
0830 T X . 0 8.000 P0059317600	1	ITEM TEXT : PE120385 Gummi-Sylomer G25/50 breit Anbringung bei Endmontage Siemens MOUNTING AT FINAL ASSEMBLY BY SIEMENS			NO DOCUMENT ASSIGNED	
0840 T X . 0 44.000 P0059317600	1	ITEM TEXT : PE117583 Gummi-Sylomer L25/50 Anbringung bei Endmontage Siemens MOUNTING AT FINAL ASSEMBLY BY SIEMENS			NO DOCUMENT ASSIGNED	
0850 T X . 0 2.000 P0059317600	1	ITEM TEXT : PE115598 Gummi Profil 50*20 CR 65 SHORE ,selbstkl<(>&<)> Anbringung bei Endmontage Siemens MOUNTING AT FINAL ASSEMBLY BY SIEMENS			NO DOCUMENT ASSIGNED	

MATERIAL: P0059317400 **REVISION:** A **EFFECTIVE:** 2018-03-07 **BAS.QTY:** 1.000 **REQ.QTY:** 1.000 **PLANT:** **APPL.:** ZEN1 **X-STATUS:** 40 **BASE UOM:** ST **ENG. UNIT:** MM
DESCRIPTION: COVER **TITLE ID:** MKSFA5600-000 **PROJECT ID:** **ANCHOR ID:** **SERVICE CODE:**
DOCUMENT-STD/GRAPHIC: 22-SFA5600-70156650 **VARIANT:** **NET WEIGHT:** 6.581,000 KG **CAL. WEIGHT:** 0,000 KG **SER. REQ.:** **SER. INH.:**
B.TRACK:

DOCUMENT LINKS:

TYP	DOCUMENT ID	PAR	VER	ALTERNATIVE ID	ST	DESCRIPTION
DWG	DPPPG-70156650	000	A	22-SFA5600-70156650	RL	SFA5600 ENCLOSURE 2P

CLASSIFICATION:

Classification Data Exists

MATERIAL / ITEM / QUANTITY / REL.	RV / Level / TASPCWSUSINMc / REK / UOM / REFERENCE POINT / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE / DOCUMENT ID	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / SIZE/DIM 4 / PART / VR / ALTERNATIVE ID	VAR / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE) / ST / DIR DESCRIPTION	CAL. WEIGHT / RAW MATERIAL SPEC. / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE)	WU / SR / SI / BT / SC / X-STATUS / BUOM / SURFACE TREAT. / EUOM
P0059317600 0010 L X X X X X 0.0 1.000 EA P0059317400	A / 1	ENCLOSURE, WELDING ASSEMBLY ZZ00100039-000 DWG DPPPG-70156650 000 A 22-SFA5600-70156650 RL SFA5600 ENCLOSURE 2P	22-SFA5600-70156650	6581.000	KG 40 EA MM	
		INTERNAL COMMENT: Internal comment Exists In Language D				
PE121847 0020 L X X X X 0.0 22.000 M P0059317400	1	Rubber profile 20 x 20 self-adhesive & ZELLKAUTSCHUK / EPDM SIZE/DIMENSION (FROM LEGACY SYSTEM)	20*20 NO DOCUMENT ASSIGNED	0.300	KG X 40 M MM	
		ITEM TEXT : Verwendet in den Pos.30 der Abdeckhaube. USED IN IT.30 OF THE ENCLOSURE.				
P00495116 0030 L X X X X 0.0 40.000 M P0059317400	1	GASKET ZZ02016973-000 CR 30 NEOPRENE WIDTH / THICKNESS EINSEITIG_SELBSTKLEBEND	ZELLKAUTSCHUK 8 12 NO DOCUMENT ASSIGNED	0.032	KG 40 M MM	
		RECOMMENDED SUPPLIER NAME: C+L INDUSTRIETECHNIK GMBH				
		INTERNAL COMMENT: Internal comment Exists In Language D				
		ITEM TEXT : Verwendet als Dichtung in allen Deckeln der Abdeckhaube. USED AS SEAL IN ALL COVER OF THE ENCLOSURE.				

MATERIAL / ITEM / QUANTITY / REL.	RV / Level / S / I / N / M / c / REK / UOM / REFERENCE POINT / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE / DOCUMENT ID	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / SIZE/DIM 4 / PART / VR / ALTERNATIVE ID	VAR / CAL. WEIGHT / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE) / ST / DIR DESCRIPTION	WU / SR / SI / BT / SC / X-STATUS / RAW MATERIAL SPEC. / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE)	BUOM / EUOM
PE117358 0230 L X X X X 0.0 7.000 EA P0059317400	1	BLIND COVER ZZ00101078-000 MESSING VERNICKELT SIZE/DIMENSION (FROM LEGACY SYSTEM)	0.050 EN 50 262 M20X1,5MITO-RING NO DOCUMENT ASSIGNED	KG 40	EA MM
		INTERNAL COMMENT: Internal comment Exists In Language D			
		ITEM TEXT : Verwendet als Pos.230 der Abdeckhaube USED AS IT.230 OF THE ENCLOSURE			
PE106528 0810 L X X X X X 0.0 1.000 EA P0059317400	1	ADHESIVE ZZ00030663-000 LOCTITE_243 ADDITIONAL MATERIAL DESCRIPTION SPE DPQD-00007327 000 A PE106528 KLEBER LOCTITE 243 SPE DPQD-00007583 000 A PE106528 LOCTITE 243	0.050 50GFL. RL RL	KG X E 40	EA MM
		INTERNAL COMMENT: Internal comment Exists In Language D			
		ITEM TEXT : Verwendung nach Bedarf USE IF NECESSARY			
PE104421 0820 L X X X X 0.0 1.000 EA P0059317400	1	ADHESIVE ZZ00030663-000 PATTEX-PX ADDITIONAL MATERIAL DESCRIPTION SPE DPQD-00007322 000 A PE104421 KLEBER PATTEX-PX SPE DPQD-00008591 000 A PE104421 PATTEX KRAFTKLEBER CL	0.650 650G-DOSE RL RL	KG X E 40	EA MM
		INTERNAL COMMENT: Internal comment Exists In Language D			
		ITEM TEXT : Verwendung nach Bedarf USE IF NECESSARY			
PE120385 0830 L X X X X 0.0 8.000 M P0059317400	1	GASKET SIZE/DIMENSION (FROM LEGACY SYSTEM)	0.318 DICKE:25;BREITE:50(GELB) NO DOCUMENT ASSIGNED	KG X 40	M MM
		ITEM TEXT : Verwendet als Pos.830 der Abdeckhaube USED AS IT.830 OF THE ENCLOSURE			

MATERIAL / ITEM / QUANTITY / REL.	T	A	P	C	W	s	U	RV / S	Level / I	N	M	c	REK / UOM / REFERENCE POINT / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE	BASIC MATERIAL / DOCUMENT ID	DOCUMENT STD/GRAPHIC / SIZE/DIM 4 / PART	VR	ALTERNATIVE ID	VAR / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE) / ST	CAL. WEIGHT / RAW MATERIAL / DIR DESCRIPTION	WU	SR	SI	BT	SC	X-STATUS / SURFACE TREAT.	BUOM / EUOM / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE)
PE117583									1					GASKET							0.500	KG					X	40	M
0840	L		X	X	X								X 0.0															MM
44.000								M						SIZE/DIMENSION (FROM LEGACY SYSTEM)						DICKE:25;BREITE:50(GRÜN)								
			P0059317400																	NO DOCUMENT ASSIGNED								
														ITEM TEXT : Verwendet als Pos.840 der Abdeckhaube USED AS IT.840 OF THE ENCLOSURE															
PE115598									1					RUBBER PROFILE 50x20, self- adhesive &							0.300	KG						40	M
0850	L		X	X	X								X 0.0		CR (65 SHORE)													MM
2.000								M						SIZE/DIMENSION (FROM LEGACY SYSTEM)						50*20,SELBSTKLEBEND								
			P0059317400																	NO DOCUMENT ASSIGNED								
														ITEM TEXT : Verwendet als Pos.850 der Abdeckhaube USED AS IT.850 OF THE ENCLOSURE															

GEWICHTSTABELLE TABLE OF WEIGHTS	
KUEHLERHAUBE COOLER COVER	5730 kg
KUEHLERHAUBE MIT KUEHLERN COOLER COVER WITH COOLING ELEMENTS	7430 kg
KUEHLERHAUBE MIT GEFUELLTEN KUEHLERN COOLER COVER WITH FULL COOLING ELEMENTS	7618 kg

AUFTRAG ORDER	BEZEICHNUNG PROJECT NAME
EG000367	VILNIUS BIOMASS

1. WASSER AUSTRITT
VORSCHWEISSZFLANSCH MIT GEGENFLANSCH EN1092,12 DN50 PN40
WATER OUTLET
WELDING NECK FLANGE WITH COUNTERFLANGE EN1092,12 DN50 PN40
HUBBED SLIP ON

2. WASSER EINTRITT
VORSCHWEISSZFLANSCH MIT GEGENFLANSCH EN1092,12 DN50 PN40
WATER INLET
WELDING NEC KFLANGE AND COUNTERFLANGE EN1092,12 DN50 PN40
HUBBED SLIP ON

3. ENTLUEFTUNG
MUFFENKUGELHAHN 1/2" BSP
VENT
BALL VALVE 1/2" BSP

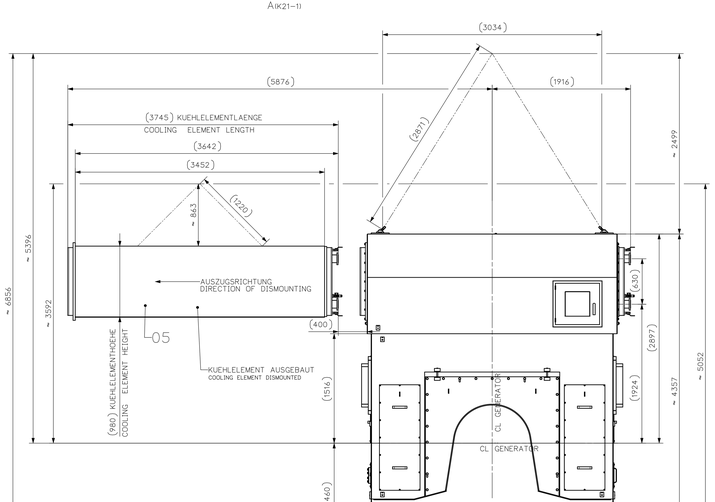
4. ENTLEERUNG
MUFFENKUGELHAHN 1/2" BSP
DRAIN
BALL VALVE 1/2" BSP

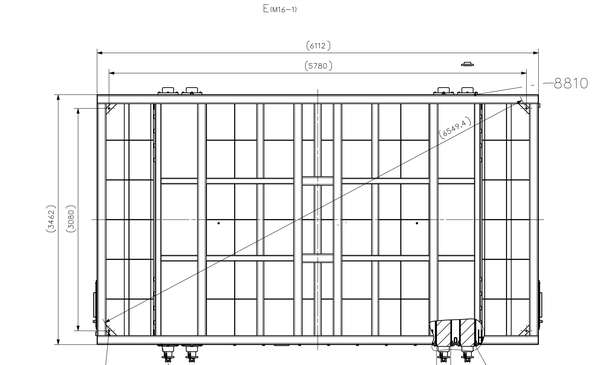
5. SICHERHEITSVENTIL 1/2" BSP
OEFFNUNGSDRUCK 25 BAR
PRESSURE RELIEF VALVE 1/2" BSP
SET PRESSURE 25 BAR

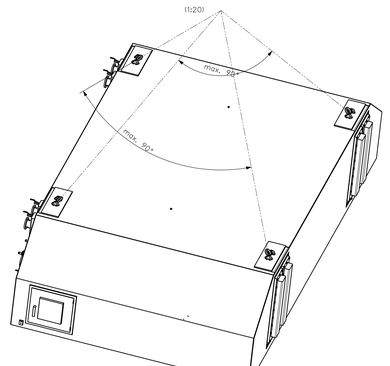
ANZUGSMOMENT POS. 8020: 87 Nm
BOLTING TORQUE IT. 8020: 87 Nm

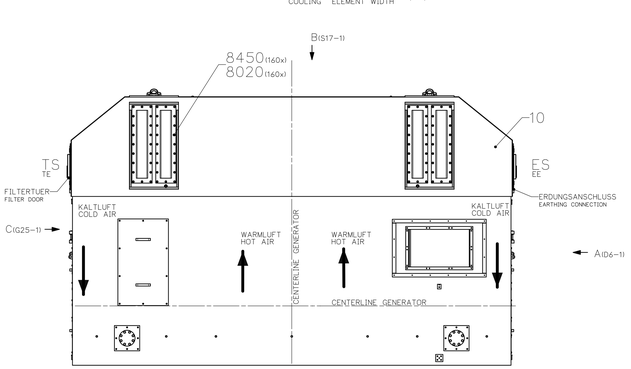
6. Nach Montage Leckwassersensoren nicht genutzte Stopfen mittels Loctite (Pos. 8630) sichern (Anzugsmoment: 30 Nm)
AFTER INSTALLATION LEAKAGE (IT.8630) WATER SENSORS SECURE UNSUED PLUGS WITH LOCTITE (TIGHTENING TORQUE: 30 Nm)

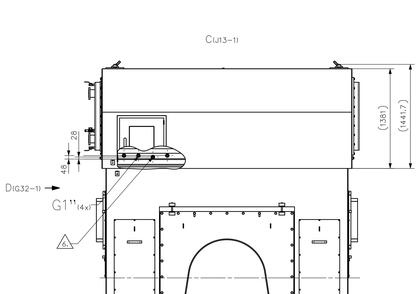
ACHTUNG! LUFTRICHTUNG AN KUEHLELEMENTEN BEACHTEN!
CAUTION! PAY ATTENTION TO AIR DIRECTION OF THE COOLING ELEMENTS

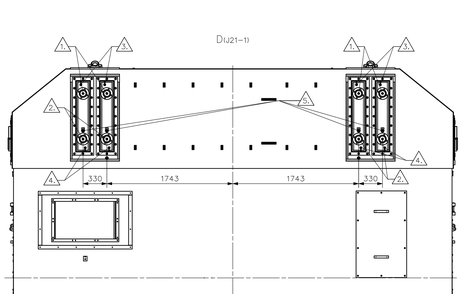


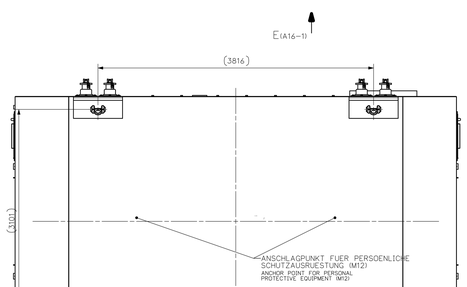












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US AND EU EXPORT CONTROLS
TECHNOLOGY CLASSIFICATION
ECCN: EAR99
AL: N
US-CONTENT: NO

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Siemens AG

WEIGHT: SEE TAB	SCALE: 1:20	SPEC.: KUN351.00	
ORIGINATED:	2018-01-17 Behnke	TITLE:	SFA5702 COOLER COVER
CHECKED:	2018-01-17 GOETZ		GENERAL DRAWING
RELEASED:	2018-01-17 Behnke		Kuehlerhaube Uebersichtszeichnung
CONFIDENTIAL		LANG. - DRAWING NO. / VALUE:	DPPPC-70156503
COPYRIGHT (C) Siemens AG 2018 ALL RIGHTS RESERVED			22-SFA5702-70156503
		REV.: A	SHEET: 1/1
			1:5A

MATERIAL: P0057423600 **REVISION:** A **EFFECTIVE:** 2018-04-17 **BAS.QTY:** 1.000 **REQ.QTY:** 1.000 **PLANT:** **APPL.:** ZEN1 **X-STATUS:** 40 **BASE UOM:** ST **ENG. UNIT:** MM
DESCRIPTION: COOLER COVER **TITLE ID:** MKSFA5702-000 **PROJECT ID:** **ANCHOR ID:** **SERVICE CODE:**
DOCUMENT-STD/GRAPHIC: 22-SFA5702-70156503 **VARIANT:** **NET WEIGHT:** 7.430,000 KG **CAL. WEIGHT:** 0,000 KG **SER. REQ.:** **SER. INH.:**
B.TRACK:
STD. BOM NO./VARIANT: -/- **SIZE/DIM STD. BOM:** **FITTING TYPE:**

DOCUMENT LINKS:

TYP	DOCUMENT ID	PAR	VER	ALTERNATIVE ID	ST	DESCRIPTION
DWG	DPPPG-70156503	000	A	22-SFA5702-70156503	RL	SFA5702 COOLER COVER GENERAL DRAWING

CLASSIFICATION:

Classification Data Exists

MATERIAL / ITEM / QUANTITY / REL.	RV / Level / UOM / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / SIZE/DIM 4	VAR / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE)	CAL. WEIGHT / RAW MATERIAL / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE)	WU / SPEC.	SR	SI	BT	SC / SURFACE TREAT.	X-STATUS	BUOM / EUOM
P0057424600 0005 L X X X 1.000 EA P0057423600	A 1 X 0.0 MKSFA5711-000	AIR COOLER MKSFA5711-000 LENGTH/WIDTH/HEIGHT/WEIGHT 300	22-SFA5711-70152425 3733 445	2240.000 TLV13-044 1277	KG					40	EA MM	
		DWG DPPPG-70152425	000 A 22-SFA5711-70152425	RL	SFA5711 COOLING ELEMENTS OD 2P							
		SPE TLV13-044	000 C	RL	Cooling elements							
		SPE TLV14-905	000 E	RL	General requirements of the customer doc							
		RECOMMENDED SUPPLIER NAME: STERLING TECHNOLOGY LTD. **RECOMMENDED SUPPLIER PART ID NO.:** 18571 OEM QUOTE REV 0 11_01_18 **SUPPLIER GRAPHIC REQUIRED:** X										
P0059471100 0010 L X X X X 1.000 EA P0057423600	A 1 X 0.0	COOLER COVER ZZ00032127-000	22-70156504	5730.000	KG					40	EA MM	
		DWG DPPPG-70156504	000 A 22-70156504	RL	SFA5702 COOLER COVER 2P							
		INTERNAL COMMENT: Internal comment Exists In Language D										
1130 T X .0 1.000 P0057423600	1	ITEM TEXT : Dichtrahmen Pos.1130 aus Stahlbau Pos.10 Sealingframe IT.1130 from IT.10		NO DOCUMENT ASSIGNED								
PE114800 8020 L X X X 160.000 EA P0057423600	1 X 0.0	HEXAGON CAP SCREW ZZ10002283-000 THREAD/LENGTH	A2-70 M12	0.080 ISO 4017 60	KG					40	EA MM	
		NO DOCUMENT ASSIGNED										
P0053037700 8450 L X X X 160.000 EA P0057423600	1 X 0.0	LOCKING WASHERS ZZ00055086-000 TYPE	EDELSTAHL NL12SPSS-NORD-LOCK	0.008	KG					40	EA MM	
		NO DOCUMENT ASSIGNED										
		RECOMMENDED SUPPLIER NAME: NORD-LOCK INC										

MATERIAL / ITEM / QUANTITY / REL.	RV / Level / T / A / P / C / W / s / U / S / I / N / M / c / REK / UOM / REFERENCE POINT / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / SIZE/DIM 4 / DOCUMENT ID	PART	VR	ALTERNATIVE ID	VAR / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE) / ST	CAL. WEIGHT / RAW MATERIAL / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE) / DIR DESCRIPTION	WU / SPEC.	SR	SI	BT	SC	X-STATUS / SURFACE TREAT.	BUOM / EUOM
PE106528 8630 L X X X 1.000 EA P0057423600	1 X 0.0	ADHESIVE ZZ00030663-000 LOCTITE_243 ADDITIONAL MATERIAL DESCRIPTION SPE DPQD-00007327 000 A PE106528 KLEBER LOCTITE 243 RL SPE DPQD-00007583 000 A PE106528 LOCTITE 243 RL						0.050 50GFL.	KG			X	E	40	EA MM
		INTERNAL COMMENT: Internal comment Exists In Language D													
PE130240 8800 L X X X 10.000 M P0057423600	1 X 0.0	cord-gasket ZZ10003879-000 EPDM (ÄTHYLEN-PROPYLEN-TERPOLYMERE) SIZE/DIMENSION (FROM LEGACY SYSTEM) NO DOCUMENT ASSIGNED	SIEHEINT.VERMERK					0.000 15MMDURCHMESSER;SHORE-A:CA.	KG					40	M MM
		INTERNAL COMMENT: Internal comment Exists In Language D													
P00522420 8810 L X X X 10.000 M P0057423600	1 X 0.0	GASKET ZZ02016973-000 CR 30 NEOPRENE WIDTH / THICKNESS EINSEITIG_SELBSTKLEBEND NO DOCUMENT ASSIGNED	ZELLKAUTSCHUK					0.016 4 12	KG					40	M MM
		RECOMMENDED SUPPLIER NAME: C+L INDUSTRIETECHNIK GMBH													
		INTERNAL COMMENT: Internal comment Exists In Language D													

SCHWEISSANGABEN/WELDING PROCEDURE INFORMATION

WERKSTOFF	/ BASE MATERIAL	:	S235JR (X6CrNiTi18-10)
ZUSATZWERKSTOFF	/ FILLER MATERIAL	:	G4Si1; (G18 8Mn)
SCHWEISZVERFAHREN	/ WELDING PROCESS	:	MAG
SCHWEISZNAHTGROESSE	/ WELDING THICKNESS	:	▷ a2;a3;a4;a5;a6;a8;∨;∨;∨ ;
PRUEFUMFANG nach	/ TEST SCOPE ACCORDING TO	:	PV00260-00000
BEWERTUNGSGRUPPE	/ CLASSIFICATION GROUP	:	DINENISO 5817 – C
PRUEFSTUFE	/ TEST CLASS	:	S

OBERFLAECHE OHNE ANHAFTENDE SCHWEISZSPRITZER
SURFACE WITHOUT ADHERENT WELD SPLATTER

FREI VON SCHWEISSSPRITZERN UND STRAHLGUT!
NO WELD SPLATTERS AND BLASTING MEDIUM

ZULAESSIGE WELLIGKEIT DER AUSSENBLECHE: SMM/M²!
ALLOWED SURFACE RIPPLE: SMM/M²

AUSSENLIEGENDE SCHWEISSNAEHTE EINEBNEN!
FLAT WELDINGS AT THE OUTSIDE!

UNTERBROCHENE NAEHTE MIT POS. 8610 ABDICHTEN
SEAL INTERRUPTED WELDS WITH IT. 8610

HAUBE IM INNENBEREICH FREI VON SCHWEISZSPRITZERN UND STRAHLGUT!
NO WELD SPLATTERS AND BLASTING MEDIUM INSIDE THE COVER!

FARBGEBUNG SIEHE BGR; SFA5100
FOR COLOR LOOK ASSEMBLY SFA5100

1 GILT FUER ALLE RIPPEN
VALID FOR ALL RIBS

2 IN DIESEM BEREICH UNTER DEN ANHAENGEOESEN ALLE SCHWEISZVERBINDUNG ZWISCHEN BELCHEN UND PROFILEN NICHT UNTERBROCHEN AUSGEFUEHREN
AT THE AREA BELOW LIFTING EYEBOLTS ALL WELDINGS BETWEEN SHEET METALS AND PROFILES EXECUTED NOT INTERRUPTEDLY

3 VORWAERMTEMPERATUR BEACHTEN!
SIEHE SCHWEISZANWEISUNG
OBSERVE PREHEAT TEMPERATURE!
SEE WELDING INSTRUCTION

DPSTP-70000115

4 VORWAERMTEMPERATUR BEACHTEN (MIN. 120°C)!
OBSERVE PREHEAT TEMPERATURE (MIN. 120°C)!

5 POS. 1010 WERKSTOFF: S235JR+Z15
IT. 1010 MATERIAL: S235JR+Z15

6 POS. 1130 VOLLSTAENDIGE ANSCHRAUBBARKEIT MIT POS. 2010 FLANSCHPLATTE AUS BGR. KEUHLERADAPTER PRUEFEN UND LOOSE BEILEGEN
CHECK FULL DRILLING PATTERN IT. 1130 WITH IT. 2010 FLANGE PLATE FROM ASSY. COOLER ADAPTER AND SHIP LOOSE

7 POS. 8900 NACH DEM FINALEN VERSCHWEISZEN VON POS. 1020 UND 1030 ANSCHWEISZEN
WELD IT. 8900 AFTER THE FINAL WELDING OF IT. 1020 AND 1030

NACH SCHWEISZEN GEWINDE PRUEFEN UND GGF. NACHARBEITEN
CHECK THREAD AFTER WELDING AND IF NECESSARY REWORK

8 GILT FUER ALLE POS. 8710 UND 8740
VALID FOR ALL IT. 8710 AND 8740

9 GILT FUER ALLE 4 ECKEN
VALID FOR ALL 4 EDGES

10 UEBER DIE GESAMTE LAENGE ALLER KUEHLELEMENTAUSSCHNITTE ALLE 250mm MESSEN
MEASUERE EVERY COOLING ELEMENT CUTOUT EVERY 250 mm OVER THE HOLE LENGTH

11 GILT FUER ALLE POS. 1040 MIT POS. 1020
VALID FOR ALL IT. 1040 WITH IT. 1020

12 GILT FUER ALLE POS. 1040 MIT POS. 1070
VALID FOR ALL IT. 1040 WITH IT. 1070

ZZ(1:5;D21-1)

ZX(1:5;D20-1)

ZY(1:5;G21-1)

ZU(1:10;A21-1)

ZT(1:2;J20-1)

G(P18-1)

ZU(A33-1)

A–A(K14-1)

N○180°(J18-1)

M–M(D21-1)

DARSTELLUNG OHNE AUSZENBLECHE
VIEW WITHOUT OUTSIDE SHEET METALS

H(H20-1)

ZV○90°(I1;2;S17-1)

AD(I9-1)

NI(B26-1)

F(P17-1)

ZT(A30-1)

H(H5-1)

F–F○90°(H19-1)

G(B18-1)

SICHT AUF TS
VIEW ON TE
L○90°(L14-1)

SICHT AUF ES
VIEW ON EE
K○–90°(L21-1)

ZV(K12-1)

NUR POS. 1020 UND 1030 GEZEIGT
ONLY IT. 1020 AND 1030 SHOWN

US AND EU EXPORT CONTROLS
TECHNOLOGY CLASSIFICATION
ECCN: EAR99
AL: N
US-CONTENT: NO

THIS DOCUMENT IS SUBJECT TO NATIONAL EXPORT CONTROL REGULATIONS. IF US-CONTENT IS MARKED "YES", THEN US REEXPORT REGULATIONS APPLY. DIVERSION CONTRARY TO THOSE REGULATIONS IS PROHIBITED. IN CASE OF DOUBT EXPORT COMPLIANCE DEPARTMENT MUST BE CONTACTED.

Siemens AG

WEIGHT: 5965	KG	SCALE: 1:20	SPEC.: KUN351.00
ORIGINATED:	2018-01-17 Behnke	TITLE:	KUEHLERHAUBE
CHECKED:	2018-01-17 GOETZ		
RELEASED:	2018-01-17 Behnke		SFA5702 COOLER COVER 2P

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LANG. – DRAWING NO. / VALUE:
DPPPC-70156504
22-70156504

REV.: A | SHEET: 1/1

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MATERIAL: P0059471100 **REVISION:** A **EFFECTIVE:** 2018-04-17 **BAS.QTY:** 1.000 **REQ.QTY:** 1.000 **PLANT:** **APPL.:** ZEN1 **X-STATUS:** 40 **BASE UOM:** ST **ENG. UNIT:** MM
DESCRIPTION: COOLER COVER **TITLE ID:** ZZ00032127-000 **PROJECT ID:** **ANCHOR ID:** **SERVICE CODE:**
DOCUMENT-STD/GRAPHIC: 22-70156504 **VARIANT:** **NET WEIGHT:** 5.730,000 KG **CAL. WEIGHT:** 0,000 KG **SER. REQ.:** **SER. INH.:**
B.TRACK:

DOCUMENT LINKS:

TYP	DOCUMENT ID	PAR	VER	ALTERNATIVE ID	ST	DESCRIPTION
DWG	DPPPG-70156504	000	A	22-70156504	RL	SFA5702 COOLER COVER 2P

INTERNAL COMMENT:
Internal comment Exists In Language D

MATERIAL / ITEM / T / A / P / C / W / s / U / S / I / N / M / c / REK / QUANTITY / UOM / REFERENCE POINT / REL. / BOM MM NO.	RV / Level	DESCRIPTION / MATERIAL TITLE ID / BASIC MATERIAL / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE / DOCUMENT ID / SIZE/DIM 4 / PART / VR / ALTERNATIVE ID	DOCUMENT STD/GRAPHIC	VAR / TLV NO	CAL. WEIGHT / RAW MATERIAL SPEC. / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE) / ST / DIR DESCRIPTION	WU / SURFACE TREAT. / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE)	SR	SI	BT	SC	X-STATUS	BUOM / EUOM
P0059471000 1005 L X X X X X 0.0 1.000 EA P0059471100	A 1	NOISE PROTECTION LINING ZZ00054454-000	2-4759-222513		410.000 NO DOCUMENT ASSIGNED	KG 40						EA MM
P00528233 1010 R X X X X 0.0 26.690 KG P0059471100	 1	PLATE ZZ00047971-000 S235JR+Z15 THICKNESS / WIDTH / LENGTH 8000			1.000 EN 10029 20 4000 NO DOCUMENT ASSIGNED	KG 40						KG MM
NO.OF PCS:4	SIZE 1:680.000 UOM:MM		SIZE 2:250.000 UOM:MM		SIZE 3:20.000 UOM:MM							
	CLASSIFICATION: Classification Data Exists											
P0059469400 1020 L X X X X X 0.0 2.000 EA P0059471100	A 1	SIDE WALL ZZ00058433-000 DWG DPPPG-70156511 000 A	22-70156511		667.800 22-70156511 RL SFA5702 SP SIDE WALL	KG 40						EA MM
P0059470300 1030 L X X X X X 0.0 2.000 EA P0059471100	A 1	COOLER ADAPTER ZZ02004250-000 S235JR DWG DPPPG-70156505 000 A	22-70156505		843.600 22-70156505 RL SFA5702 COOLER ADAPTER	KG 40						EA MM
P00496117 1040 R X X X X 0.0 71.000 KG P0059471100	 1	HOLLOW PROFILE, SQUARE ZZ10000753-000 S235JR BREADTH / HEIGHT / WALLTHICKNESS 8			27.500 EN 10210-2 100 100 NO DOCUMENT ASSIGNED	KG 40						KG MM
NO.OF PCS:3	SIZE 1:3252.000 UOM:MM		SIZE 2:100.000 UOM:MM		SIZE 3:8.000 UOM:MM							
	CLASSIFICATION: Classification Data Exists											

MATERIAL / ITEM / QUANTITY / REL.	RV / Level / S I N M c REK / UOM / REFERENCE POINT / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE / DOCUMENT ID	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / SIZE/DIM 4 / PART / VR / ALTERNATIVE ID	VAR / CAL. WEIGHT / TLV NO / RAW MATERIAL / SIZE/DIM 5 (HEAD TYPE) / ST / DIR DESCRIPTION	WU / SR / SI / BT / SC / X-STATUS / SPEC. / SURFACE TREAT. / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE)	BUOM / EUOM
P00187809 1050 R X X X X 70.000 KG P0059471100	1 X 0.0	HOLLOW PROFILE ZZ10000754-000 S235JR BREADTH / HEIGHT / WALLTHICKNESS 8		1.000 EN 10210-2 120 NO DOCUMENT ASSIGNED	KG 80	40 MM	KG
NO.OF PCS:6	SIZE 1:3212.000 UOM:MM		SIZE 2:120.000 UOM:MM		SIZE 3:8.000 UOM:MM	
		CLASSIFICATION: Classification Data Exists				
P00561058 1060 R X X X X 5.700 KG P0059471100	1 X 0.0	HOLLOW PROFILE, SQUARE ZZ10000753-000 S235JR BREADTH / HEIGHT / WALLTHICKNESS 5		1.000 EN 10210-2 80 NO DOCUMENT ASSIGNED	KG 80	40 MM	KG
NO.OF PCS:4	SIZE 1:503.500 UOM:MM		SIZE 2:80.000 UOM:MM		SIZE 3:5.000 UOM:MM	
		CLASSIFICATION: Classification Data Exists				
P0059470800 A 1070 L X X X X 1.000 EA P0059471100	1 X 0.0	ROOF SHEETING ZZ10004926-000 S235JR DWG DPPPG-70156515	22-70156515 000 A 22-70156515	594.400 RL SFA5702 ROOF PLATE	KG	40 MM	EA
P0059470700 1080 L X X X X 1.000 EA P0059471100	1 X 0.0	FRONT WALL PLATE ZZ10004913-000 S235JR DWG DPPPG-70156516	22-70156516 000 A 22-70156516	221.900 RL SFA5702 FRONT PLATE EE	KG	40 MM	EA
P0059470600 1090 L X X X X 1.000 EA P0059471100	1 X 0.0	FRONT WALL PLATE ZZ10004913-000 S235JR DWG DPPPG-70156517	22-70156517 000 A 22-70156517	221.900 RL SFA5702 FRONT PLATE TE	KG	40 MM	EA
P0054157500 1100 L X X X X 4.000 EA P0059471100	1 X 0.0	GUIDE BOLT ZZ10000412-000 S235JR DWG DPPPG-70139919	22-70139919 000 A 22-70139919	0.200 RL GUIDE PIN	KG	40 MM	EA
P00187809 1110 R X X X X 9.300 KG P0059471100	1 X 0.0	HOLLOW PROFILE ZZ10000754-000 S235JR BREADTH / HEIGHT / WALLTHICKNESS 8		1.000 EN 10210-2 120	KG 80	40 MM	KG

MATERIAL / ITEM / QUANTITY / REL.	RV / Level / UOM / REFERENCE POINT / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE / DOCUMENT ID	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / SIZE/DIM 4 / PART / VR / ALTERNATIVE ID	VAR / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE) / ST / DIR DESCRIPTION	CAL. WEIGHT / RAW MATERIAL / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE)	WU / SPEC.	SR	SI	BT	SC / SURFACE TREAT.	X-STATUS	BUOM / EUOM
				NO DOCUMENT ASSIGNED								
NO.OF PCS:2	SIZE 1:428.000 UOM:MM		SIZE 2:120.000 UOM:MM		SIZE 3:8.000 UOM:MM							
		CLASSIFICATION: Classification Data Exists										
P00561058 1120 R X X X X 36.200 KG P0059471100	1 X 0.0	HOLLOW PROFILE, SQUARE ZZ10000753-000 S235JR BREADTH / HEIGHT / WALLTHICKNESS 5		80 NO DOCUMENT ASSIGNED	1.000 EN 10210-2 80	KG				40		KG MM
NO.OF PCS:2	SIZE 1:3212.000 UOM:MM		SIZE 2:80.000 UOM:MM		SIZE 3:5.000 UOM:MM							
		CLASSIFICATION: Classification Data Exists										
P0059470500 1130 L X X X X 4.000 EA P0059471100	1 X 0.0	DICHTRAHMEN ZZ00100309-000 S235 DWG DPPPG-70156519	22-70156519 000 A 22-70156519	RL SFA5702 SEALING FRAME	12.600	KG				40		EA MM
P00561058 1140 R X X X X 14.260 KG P0059471100	1 X 0.0	HOLLOW PROFILE, SQUARE ZZ10000753-000 S235JR BREADTH / HEIGHT / WALLTHICKNESS 5		80 NO DOCUMENT ASSIGNED	1.000 EN 10210-2 80	KG				40		KG MM
NO.OF PCS:4	SIZE 1:1211.000 UOM:MM		SIZE 2:80.000 UOM:MM		SIZE 3:5.000 UOM:MM							
		CLASSIFICATION: Classification Data Exists										
P00496117 1150 R X X X X 25.000 KG P0059471100	1 X 0.0	HOLLOW PROFILE, SQUARE ZZ10000753-000 S235JR BREADTH / HEIGHT / WALLTHICKNESS 8		100 NO DOCUMENT ASSIGNED	27.500 EN 10210-2 100	KG				40		KG MM
NO.OF PCS:2	SIZE 1:1146.000 UOM:MM		SIZE 2:100.000 UOM:MM		SIZE 3:8.000 UOM:MM							
		CLASSIFICATION: Classification Data Exists										
PE129443 1160 R X X X X 198.213 KG P0059471100	1 X 0.0	FLAT ZZ00019313-000 S235JRG2 SIZE/DIMENSION (FROM LEGACY SYSTEM)		100*5 NO DOCUMENT ASSIGNED	1.000 DIN 1017	KG				40		KG MM

MATERIAL	RV	Level	DESCRIPTION	DOCUMENT STD/GRAPHIC	VAR	CAL. WEIGHT	WU	SR	SI	BT	SC	X-STATUS	BUOM
ITEM T A P C W s U	S	I N M c REK	MATERIAL TITLE ID	BASIC MATERIAL	TLV NO	RAW MATERIAL SPEC.						SURFACE TREAT.	EUOM
QUANTITY	UOM	REFERENCE POINT	SIZE/DIM DESCRIPTION		SIZE/DIM 1 (STD. BOM NO./VAR)		SIZE/DIM 2 (SIZE/DIM STD. BOM)						
REL.	BOM MM NO.		SIZE/DIM 3	SIZE/DIM 4	SIZE/DIM 5 (HEAD TYPE)		SIZE/DIM 6 (FITTING TYPE)						
			TYPE	DOCUMENT ID	PART	VR	ALTERNATIVE ID	ST	DIR DESCRIPTION				

NO.OF PCS:1	SIZE 1:50500.000 UOM:MM	SIZE 2:100.000 UOM:MM	SIZE 3:5.000 UOM:MM

	CLASSIFICATION: Classification Data Exists
P0059470400 1 1170 L X X X X 0.0 4.000 EA P0059471100	FLAT 22-70156518 1.100 KG 40 EA ZZ00019313-000 S235JR MM DWG DPPPG-70156518 000 A 22-70156518 RL SFA5702 FLAT
P0013951700 A 1 1180 L X X X X X 0.0 1.000 EA P0059471100	DOOR 20.000 KG 40 EA ZZ10003002-000 MM TYPE WSS07.630.0055.010R NO DOCUMENT ASSIGNED
	RECOMMENDED SUPPLIER NAME: HORCH STAHLBAU **RECOMMENDED SUPPLIER PART ID NO.:** 912621 **REQUIRED MANUF.PART ID NUMBER:** ZEICHNUNGSNUMMER: 102599-A
	INTERNAL COMMENT: Internal comment Exists In Language E Internal comment Exists In Language D
P0016354900 A 1 1190 L X X X X X 0.0 1.000 EA P0059471100	DOOR 20.000 KG 40 EA ZZ10003002-000 MM TYPE WSS07.631.0055.010L NO DOCUMENT ASSIGNED
	RECOMMENDED SUPPLIER NAME: HORCH STAHLBAU **RECOMMENDED SUPPLIER PART ID NO.:** 912621 **REQUIRED MANUF.PART ID NUMBER:** ZEICHNUNGSNUMMER: 102599-A
	INTERNAL COMMENT: Internal comment Exists In Language E Internal comment Exists In Language D
P0053958200 1 8530 L X X X X 0.0 4.000 EA P0059471100	LIFTING EYE O.Z. 3.000 KG 40 EA ZZ10001899-000 MM TYPE / NOMINAL SIZE RINGBOCK VRBS-10T SPE DPSTP-70000115 000 A RL RING TRESTLE WELDABLE VRBS STD D-IST-00030525 DE N KUN 693.20 RL Load attachment rigging - Load ring and
	RECOMMENDED SUPPLIER NAME: TUL Tec Gesellschaft fuer **RECOMMENDED SUPPLIER PART ID NO.:** RINGBOCK SCHWEIßB.VRBS-10T **REQUIRED PART MANUFACTURER:** RUD ART:NR:7992490

MATERIAL / ITEM / QUANTITY / REL.	RV / Level / REFERENCE POINT / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE / DOCUMENT ID	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / SIZE/DIM 4 / PART / VR / ALTERNATIVE ID	VAR / CAL. WEIGHT / TLV NO / RAW MATERIAL / SIZE/DIM 5 (HEAD TYPE) / ST / DIR DESCRIPTION	WU / SR / SI / BT / SC / X-STATUS / SPEC. / SURFACE TREAT. / SIZE/DIM 6 (FITTING TYPE)	BUOM / EUOM / SIZE/DIM 2 (SIZE/DIM STD. BOM)
PE120384 8610 L X X X X 0.0 10.000 EA P0059471100	1	SEALING COMPOUND ZZ00100938-000 ADDITIONAL MATERIAL DESCRIPTION SPE DPQD-00007286 000 A SPE DPQD-00007728 000 A	- TEROSON_MS935_290ML PE120384 DICHTMASSE TEROSTAT-M RL PE120384 TEROSTAT - MS 935 WEI RL	0.400 	KG X X 	EA MM
		INTERNAL COMMENT: Internal comment Exists In Language D				
PE117820 8700 L X X X X 0.0 2.000 EA P0059471100	1	GROUND TERMINAL, TOTAL X6CRNITI18-10 DWG 4-117820 000 B	4-117820 RL ERDUNGSKLEMME, KPL.	0.500 	KG 	EA MM
		INTERNAL COMMENT: Internal comment Exists In Language E Internal comment Exists In Language D				
P0020242800 8710 L X X X X 0.0 2.000 EA P0059471100	1	SUPPORT BAR ZZ10002929-000 HEIGHT / LENGTH NO DOCUMENT ASSIGNED	- 14 	0.200 200 	KG 	EA MM
		RECOMMENDED SUPPLIER NAME: STAUFF **RECOMMENDED SUPPLIER CAT.DESC:** TRAGSCHIENE 2 TS 14-1W3				
P0020773900 8740 L X X X X 0.0 14.000 EA P0059471100	1	SUPPORT BAR ZZ10002929-000 HEIGHT / LENGTH NO DOCUMENT ASSIGNED	- 14 	0.050 80 	KG 	EA MM
		RECOMMENDED SUPPLIER NAME: STAUFF **RECOMMENDED SUPPLIER CAT.DESC:** TRAGSCHIENE 2 TS 14-1W3				
PE275605 8900 L X X X X 0.0 4.000 EA P0059471100	1	weld socket drain S235JRG2 DWG 4-275605 000 -	4-275605 RL ANSCHWEISSSTUTZEN ABLAUF	0.150 	KG 	EA MM
		INTERNAL COMMENT: Internal comment Exists In Language D				
PE275622 8910 L X X X X 0.0 4.000 EA P0059471100	1	LOCKING SCREW ZZ00070967-000 C35E THREAD NO DOCUMENT ASSIGNED	 M20*1,5 	0.120 DIN 910 	KG 	EA MM

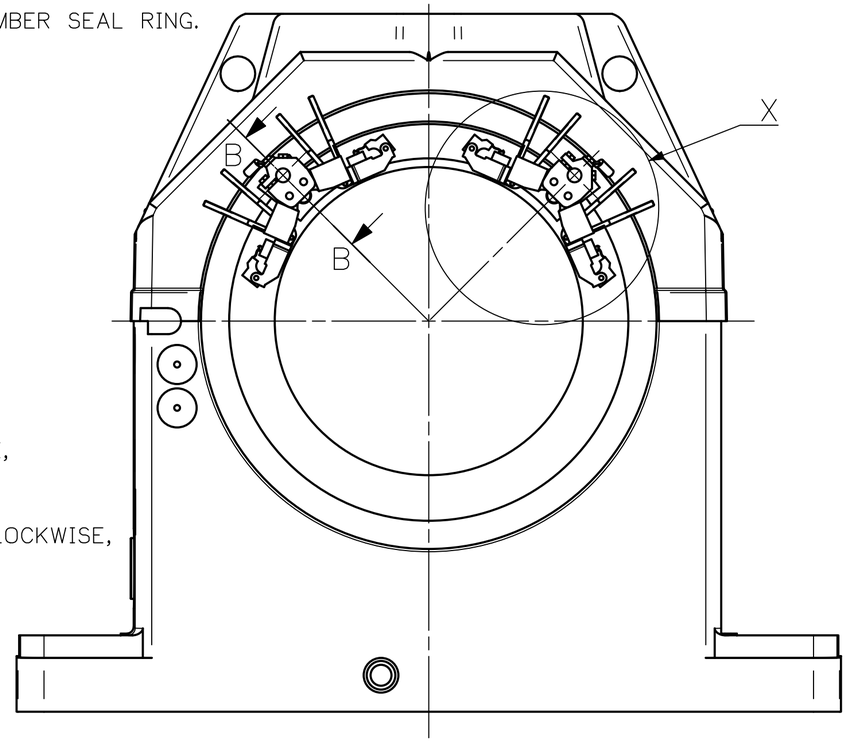
MATERIAL	RV	Level	DESCRIPTION	DOCUMENT STD/GRAPHIC	VAR	CAL. WEIGHT	WU	SR	SI	BT	SC	X-STATUS	BUOM
ITEM T A P C W s U	S	I N M c REK	MATERIAL TITLE ID	BASIC MATERIAL	TLV NO	RAW MATERIAL SPEC.					SURFACE TREAT.	EUOM	
QUANTITY	UOM	REFERENCE POINT	SIZE/DIM DESCRIPTION		SIZE/DIM 1 (STD. BOM NO./VAR)		SIZE/DIM 2 (SIZE/DIM STD. BOM)						
REL.	BOM MM NO.		SIZE/DIM 3	SIZE/DIM 4	SIZE/DIM 5 (HEAD TYPE)		SIZE/DIM 6 (FITTING TYPE)						
			TYPE	DOCUMENT ID	PART	VR	ALTERNATIVE ID	ST	DIR DESCRIPTION				
			INTERNAL COMMENT: Internal comment Exists In Language D										

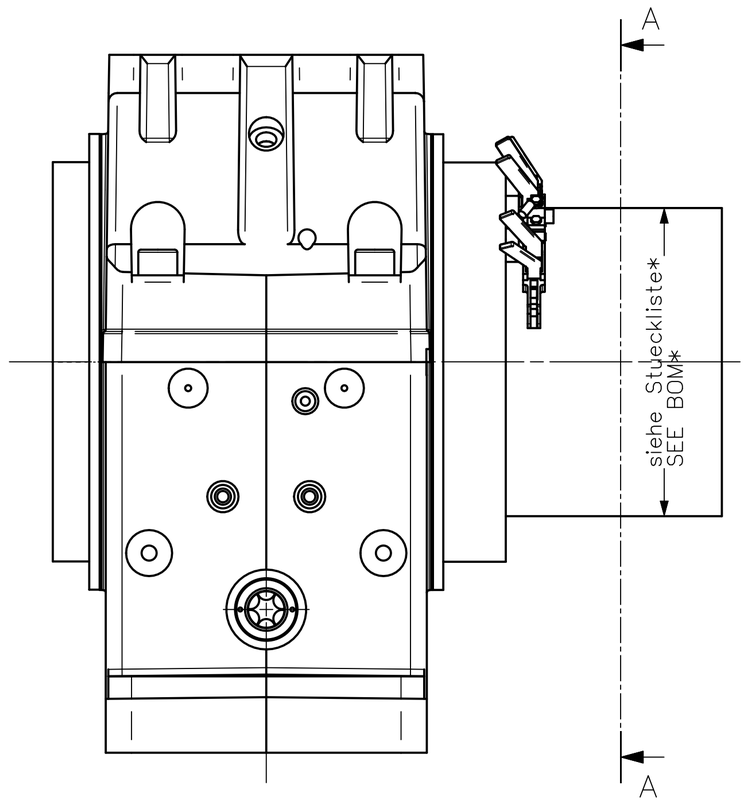
1. Nach Schaltplan:
ACCORDING TO WIRING DIAGRAM:
Verlegung erfolgt zum Klemmenkasten.
Wenn Klemmenkasten nicht vorhanden, zum Kammerdichtring.
INSTALLATION TO THE JUNCTION BOX.
IF JUNCTION BOX NOT AVAILABLE, TO THE CHAMBER SEAL RING.

2. Mit Loctite 243 sichern
SECURE WITH LOCTITE 243

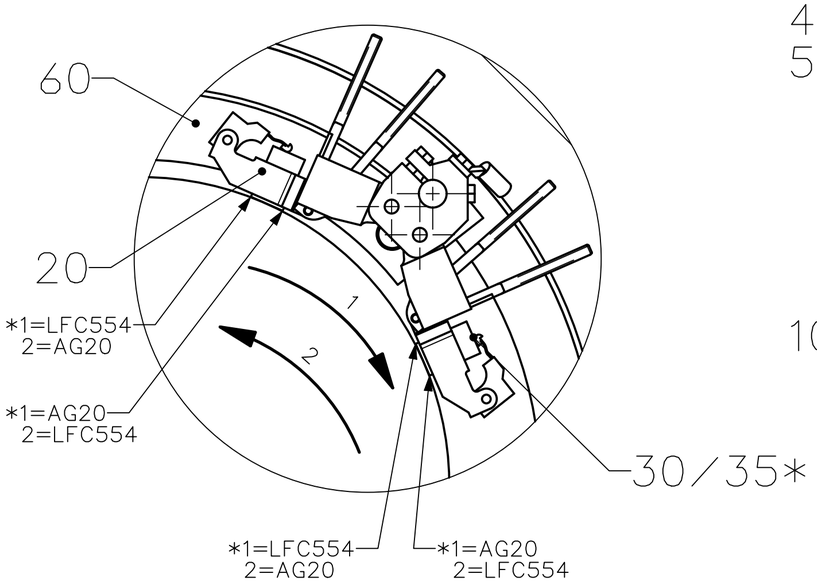
* Reihenfolge der Werkstoffe (POS.30/35)
entsprechend der Drehrichtung, beim Einbau
der Kontaktbuersten beachten
SEQUENCE OF MATERIALS (ITEM30/35)
AT THE INSTALLATION OF THE BRUSHES
ACCORDING TO THE DIRECTION OF ROTATION
1= Drehrichtung Generator im Uhrzeigersinn,
Sicht auf TS
DIRECTION OF ROTATION OF GENERATOR CLOCKWISE,
VIEW ON TE
2= Drehrichtung Generator gegen Uhrzeigersinn,
Sicht auf TS
DIRECTION OF ROTATION OF GENERATOR COUNTERCLOCKWISE,
VIEW ON TE

A–A

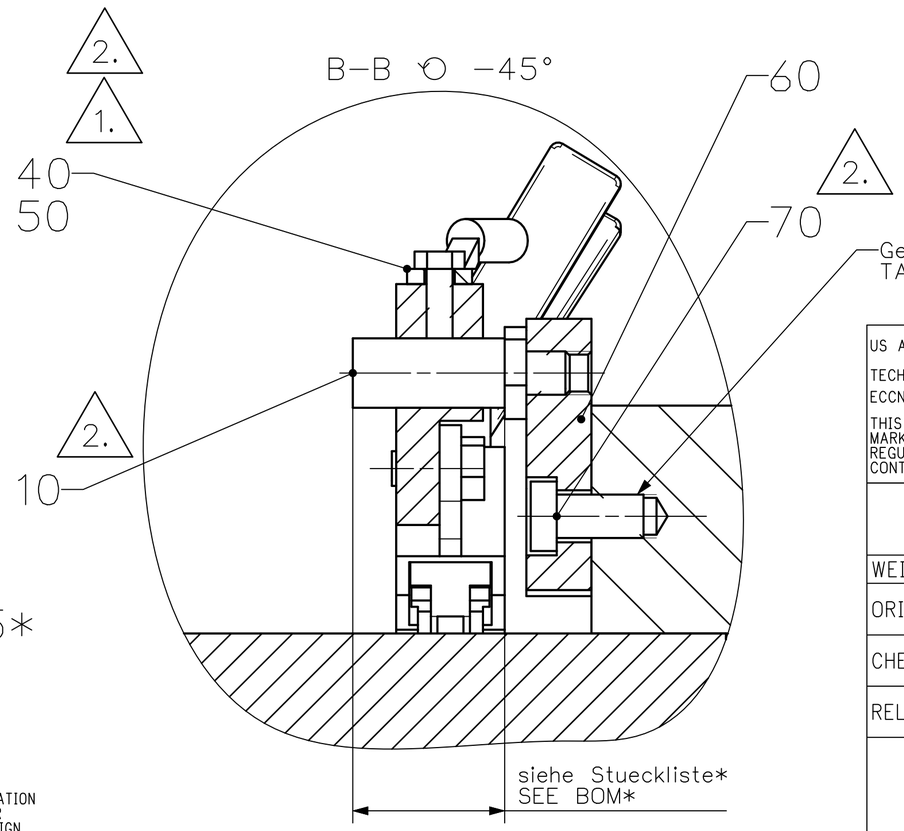




X (2:5)



B–B ↺ −45°



US AND EU EXPORT CONTROLS

TECHNOLOGY CLASSIFICATION
ECCN: EAR99 AL: N US-CONTENT: NO

THIS DOCUMENT IS SUBJECT TO NATIONAL EXPORT CONTROL REGULATIONS. IF US-CONTENT IS MARKED "YES", THEN US REEXPORT REGULATIONS APPLY. DIVERSION CONTRARY TO THOSE REGULATIONS IS PROHIBITED. IN CASE OF DOUBT EXPORT COMPLIANCE DEPARTMENT MUST BE CONTACTED.

Siemens

WEIGHT: 6 KG	SCALE: 1:5	SPEC.: KUN351.00	
ORIGINATED: 2018-08-09 DRAGON	TITLE: ASSEMBLY EARTH BRUSH		
CHECKED: 2018-08-09 GOETZ			
RELEASED: 2018-08-09 DRAGON	MONTAGE ERDUNGSBUERSTE		
CONFIDENTIAL	LANG. – DRAWING NO. / VALUE: DPPPG-70167687		
	22-SFA4500-70167687	REV.: A	SHEET: 1/1

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MATERIAL: PE434335 **REVISION:** D **EFFECTIVE:** 2018-08-15 **BAS.QTY:** 1.000 **REQ.QTY:** 1.000 **PLANT:** **APPL.:** ZEN1 **X-STATUS:** 40 **BASE UOM:** ST **ENG. UNIT:** MM
DESCRIPTION: EARTH BRUSH **TITLE ID:** MKSFA4500-000 **PROJECT ID:** **ANCHOR ID:** **SERVICE CODE:**
DOCUMENT-STD/GRAPHIC: 22-SFA4500-70167687 **VARIANT:** **NET WEIGHT:** 6,000 KG **CAL. WEIGHT:** 0,000 KG **SER. REQ.:** **SER. INH.:**
B.TRACK: **SIZE/DIM. DESC.:** DIAMETER **SIZE/DIM 1:** D=335MM
SIZE/DIM 2:

DOCUMENT LINKS:

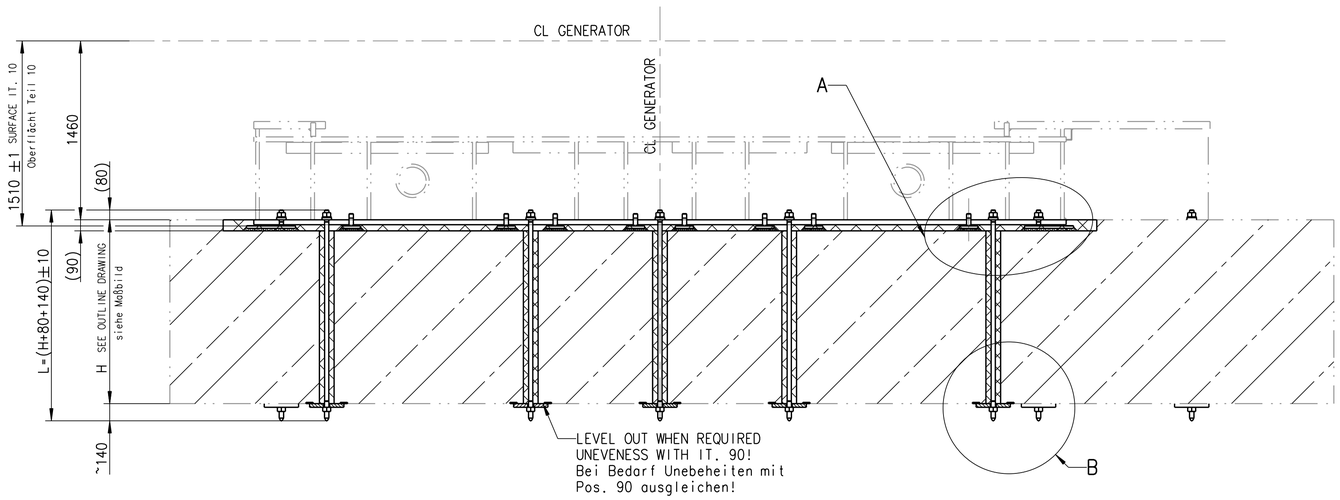
TYP	DOCUMENT ID	PAR	VER	ALTERNATIVE ID	ST	DESCRIPTION
DWG	DPPPG-70167687	000	A	22-70167687	RL	ASSEMBLY EARTH BRUSH

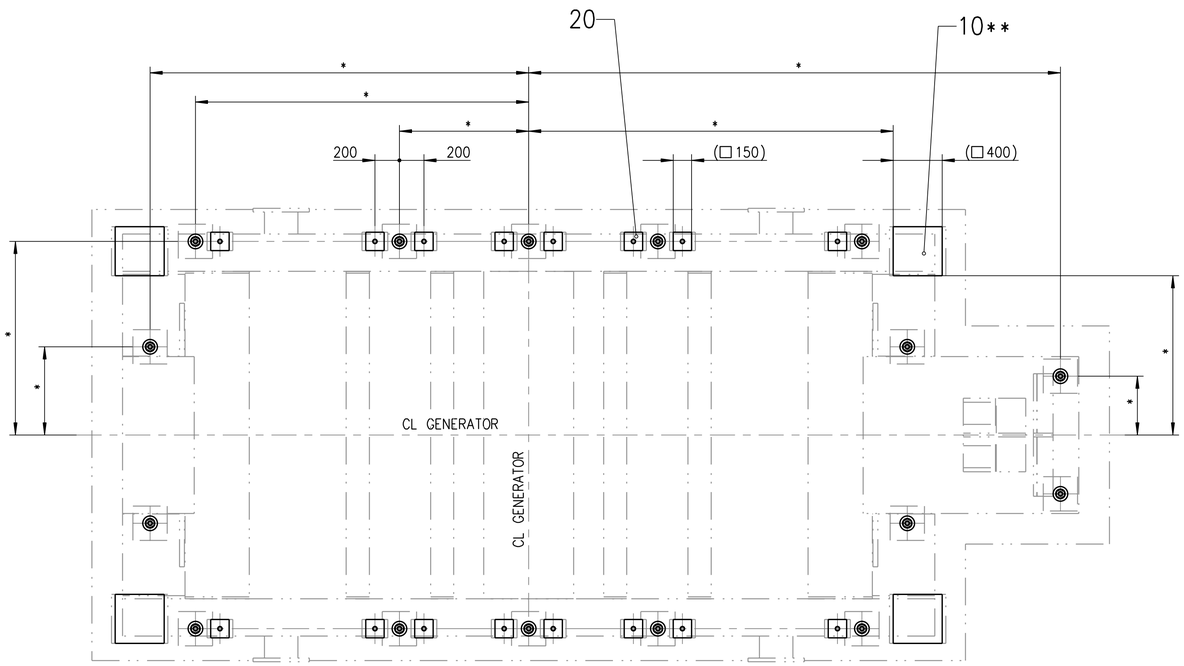
INTERNAL COMMENT:
Internal comment Exists In Language D
Internal comment Exists In Language E

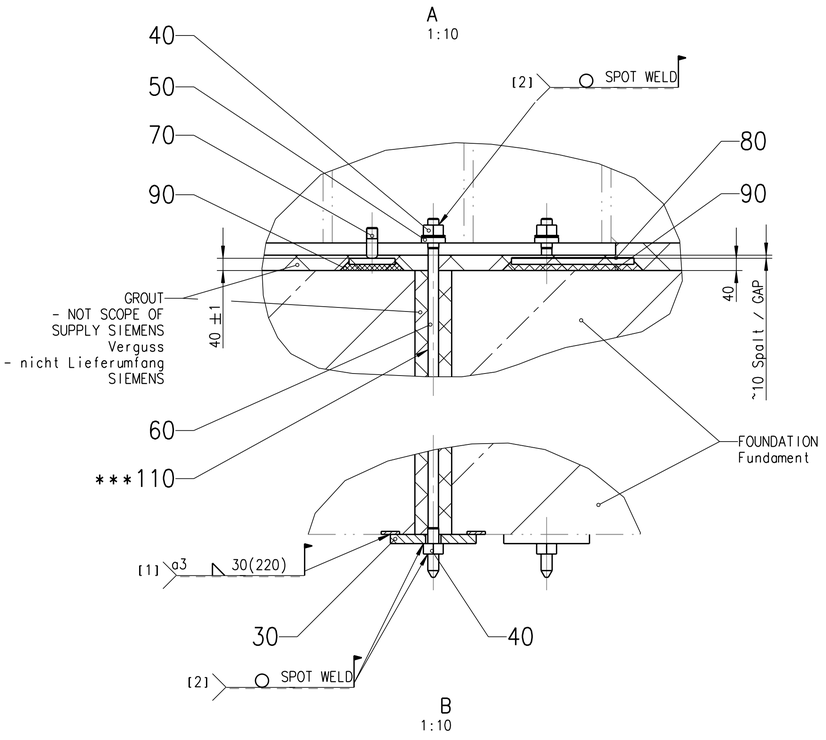
MATERIAL / ITEM / QUANTITY / REL. / BOM MM NO.	RV / S / UOM / REFERENCE POINT	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE / DOCUMENT ID	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / SIZE/DIM 4 / PART / VR / ALTERNATIVE ID	VAR / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE) / ST / DIR DESCRIPTION	CAL. WEIGHT / RAW MATERIAL SPEC. / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE)	WU / SURFACE TREAT.	SR	SI	BT	SC	X-STATUS	BUOM / EUOM
0001 / T / 1.000 / PE434335	1	ITEM TEXT : Index D: Stückliste nach neuer Zeichnung angepasst Sechskantschraube + Scheibe entfernt BOM adapted to new drawing Hexagon screw + washer removed		NO DOCUMENT ASSIGNED								
PE130001 0010 / L / X X X / 2.000 / EA / PE434335	1 X 0.0	BRUSH HOLDER BOLT A=DIM1/ B=DIM2/ C=DIM3/ ETC LÄNGE_KUNSTSTOFF/LENGHT:30MM DWG 4-502289	0.050 GEWINDE/THREAD:M10 BEZEICHNUNG:BK_16/35 000 -	KG DURCHMESSER/DIAMETER:16MM RL BUERSTENHALTER BOLZEN	Z	40						EA MM
PE113413 0020 / L / X X X / 2.000 / EA / PE434335	1 X 0.0	Brush holder MESSING/BRASS DWG DPPPG-70040343	06.00.0468.00 000 A 22-SFA4500-70040343	0.950 RL SFA4500 GROUNDING BRUSH HOLDER 2P	KG	F	40					EA MM
		INTERNAL COMMENT: Internal comment Exists In Language D										
P0002946000 0030 / L / X X X / 2.000 / EA / PE434335	1 X 0.0	2-LAYER CONTACT BRUSH ZZ00076310-000 A=DIM1 / B=DIM2 / C=DIM3 LFC554/AG20 DWG DPPPG-70006808	DPPPG-70006808 20*8*32 000 A 4-SFA4500-70006808	0.020 AUSFÜHRUNG_B/VARIATION_B RL SP SFA4500 GROUNDING BRUSH 2P	KG	F	40					EA MM
		RECOMMENDED SUPPLIER NAME: MERSEN **RECOMMENDED SUPPLIER PART ID NO.:** 1027296 **RECOMMENDED SUPPLIER CAT.DESC:** KOHLEBUERSTE **REQUIRED MANUF.PART ID NUMBER:** EMT 513-005										
		INTERNAL COMMENT: Internal comment Exists In Language D Internal comment Exists In Language E										

MATERIAL / ITEM / QUANTITY / REL.	RV / Level / UOM / REFERENCE POINT / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / SIZE/DIM 4 / DOCUMENT ID	PART	VR	ALTERNATIVE ID	VAR / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE) / ST	CAL. WEIGHT / RAW MATERIAL / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE) / DIR DESCRIPTION	WU	SR	SI	BT	SC	X-STATUS / SURFACE TREAT.	BUOM / EUOM
		ALTERNATE/SUPERCEDURE DATA : Alternate/Supercedure Data Exists													
P0002947100 0035 L X X X X 2.000 EA PE434335	1 X 0.0	2-LAYER CONTACT BRUSH ZZ00076310-000 A=DIM1 / B=DIM2 / C=DIM3 LFC554/AG20 DWG	DPPPG-70006810 20*8*32 DPPPG-70006810	000	A	PAGEFORMAT-SFA4500-DIRNRLAST8	 RL	0.020 AUSFÜHRUNG_A/VARIATION_A SP SFA4500 GROUNDING BRUSH 2P	KG				F	40	EA MM
		RECOMMENDED SUPPLIER NAME: MERSEN **RECOMMENDED SUPPLIER PART ID NO.:** 1027297 **RECOMMENDED SUPPLIER CAT.DESC:** KOHLEBUERSTE **REQUIRED MANUF.PART ID NUMBER:** EMT 513-005													
		INTERNAL COMMENT: Internal comment Exists In Language D Internal comment Exists In Language E													
		ALTERNATE/SUPERCEDURE DATA : Alternate/Supercedure Data Exists													
PE118914 0040 L X X X X 2.000 EA PE434335	1 X 0.0	CABLE TERMINAL LUG ZZ00100911-000 SIZE/DIMENSION (FROM LEGACY SYSTEM)	 CU-ETP 6-2,5 NO DOCUMENT ASSIGNED				 	0.010 DIN 46237	KG				SE	40	EA MM
PE112789 0050 L X X X X 20.000 DM PE434335	1 X 0.0	FLEXIBLE STRANDED WIRE CU-ETP SIZE/DIMENSION (FROM LEGACY SYSTEM)	 4,0MM2 NO DOCUMENT ASSIGNED				 	0.040 	KG				F	40	DM MM
		INTERNAL COMMENT: Internal comment Exists In Language D													
PE434328 0060 L X X X X 1.000 EA PE434335	1 X 0.0	SHEET ZZ10003427-000 SIZE/DIMENSION (FROM LEGACY SYSTEM) DWG	3-434328 S235JRG2 400*150*15FÜRD=335 3-434328	000	B		 RL	2.500 DIN 1543 PLATE	KG					40	EA MM
		INTERNAL COMMENT: Internal comment Exists In Language D Internal comment Exists In Language E													
PE112665 0070 L X X X X 2.000 EA PE434335	1 X 0.0	SOCKET HEAD SCREW ZZ00075858-000 THREAD/LENGTH	 8.8 M10 NO DOCUMENT ASSIGNED				 	0.030 DIN 7984 20	KG					40	EA MM

MATERIAL								RV	Level	DESCRIPTION		DOCUMENT STD/GRAPHIC		VAR	CAL. WEIGHT	WU	SR	SI	BT	SC	X-STATUS	BUOM
ITEM	T	A	P	C	W	s	U	S	I	N	M	c	REK	MATERIAL TITLE ID	BASIC MATERIAL				TLV NO	RAW MATERIAL SPEC.		SURFACE TREAT.	EUOM
QUANTITY							UOM	REFERENCE POINT		SIZE/DIM DESCRIPTION					SIZE/DIM 1 (STD. BOM NO./VAR)		SIZE/DIM 2 (SIZE/DIM STD. BOM)					
REL.	BOM MM NO.									SIZE/DIM 3		SIZE/DIM 4			SIZE/DIM 5 (HEAD TYPE)		SIZE/DIM 6 (FITTING TYPE)					
										TYPE	DOCUMENT ID	PART	VR	ALTERNATIVE ID		ST	DIR DESCRIPTION					







* - SEE DIMENSIONAL DRAWING
- siehe Massbild

** - FINISHED AREAS AT THE TOP!
- bearbeitete Flächen oben!

*** - ANCHOR BOLTS WRAPPED ACCORDING MANUFACTURING SPECIFICATION!
- Ankerschrauben umwickelt nach Arbeitsanweisung!

Vorschriften im Montagehandbuch beachten!
OBSERVE INSTRUCTIONS IN THE INSTALLATION MANUAL!

CAUTION: THE NUMBER AND DISTRIBUTION OF THE ANCHOR PARTS CAN CHANGE DEPENDING ON MACHINE TYPE! SEE THE DIMENSIONAL DRAWING!
Achtung: Die Anzahl und Verteilung der Verankerungsteile kann sich je nach Maschinentyp ändern! Siehe Massbild!

Schweiszangaben / welding summary

Stahlsorte / base metal	:	S235JR, C35E, St
Zusatzwerkstoff / filler metal	:	E 42 2 B...(1), E 18 8 Mn R...(2)
Schweiszverfahren / welding process	:	E
Schweisznahtgroesze / welding thickness	:	a3
Pruefumfang nach / test scope according to	:	PV0026.0-00000
Bewertungsgruppe / classification group	:	DINENISO 5817 - C
Pruefstufe / test class	:	5

Oberflaeche ohne anhaftende Schweiszspritzer
surface wilhout odherent weld splatter

US and EU Export Controls
Technology Classification:
ECCN: EAR99 AL: N US-Content: NO

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Siemens AG

WEIGHT:	SEE BOM	SCALE: ---	SPEC.:KUN351.00
ORIGINATED:	2017-10-16 PARBS	TITLE:	VERANKERUNG
CHECKED:	2017-10-16 GOETZ		ANCHORING
RELEASED:	2017-10-16 PARBS		
CONFIDENTIAL COPYRIGHT (c) Siemens AG 2017 ALL RIGHTS RESERVED		LANG. - DRAWING NO. / VALUE: DPPPG-70148624 22-SFA4600-70148624 SGEN5/6 -100A-2P092	REV.: A SHEET: 1/1

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DO NOT SCALE, WORK TO DIMENSIONS SHOWN

Pro/ENGINEER A1

MATERIAL: P0056912300 **REVISION:** A **EFFECTIVE:** 2017-10-24 **BAS.QTY:** 1.000 **REQ.QTY:** 1.000 **PLANT:** **APPL.:** ZEN1 **X-STATUS:** 40 **BASE UOM:** ST **ENG. UNIT:** MM
DESCRIPTION: ANCHORING **TITLE ID:** MKSFA4600-000 **PROJECT ID:** **ANCHOR ID:** **SERVICE CODE:**
DOCUMENT-STD/GRAPHIC: 22-SFA4600-70148624 **VARIANT:** **NET WEIGHT:** 520,000 KG **CAL. WEIGHT:** 0,000 KG **SER. REQ.:** **SER. INH.:**
B.TRACK:

DOCUMENT LINKS:

TYP	DOCUMENT ID	PAR	VER	ALTERNATIVE ID	ST	DESCRIPTION
DWG	DPPPG-70148624	000	A	22-SFA4600-70148624	RL	SFA4600 ANCHORING 2P/ TLRI92/ Tisch

CLASSIFICATION:

Classification Data Exists

MATERIAL / ITEM / T / A / P / C / W / s / U / RV / S / I / N / M / c / REK / QUANTITY / UOM / REFERENCE POINT / REL. / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / BASIC MATERIAL / SIZE/DIM DESCRIPTION / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 3 / SIZE/DIM 4 / SIZE/DIM 5 (HEAD TYPE) / SIZE/DIM 6 (FITTING TYPE) / TYPE / DOCUMENT ID / PART / VR / ALTERNATIVE ID / ST / DIR DESCRIPTION	DOCUMENT STD/GRAPHIC / TLV NO / RAW MATERIAL SPEC.	VAR	CAL. WEIGHT	WU	SR	SI	BT	SC	X-STATUS / SURFACE TREAT.	BUOM / EUOM
PE234137 0010 L X X X X X 0.0 4.000 EA P0056912300	PRIMARY BEARING PLATE S235JRG2 SIZE/DIMENSION (FROM LEGACY SYSTEM) DWG 4-234137 000 - INTERNAL COMMENT: Internal comment Exists In Language D	4-234137 EN 10029 400*400*20 RL ERSTAUFLAGEPLATTE	1	24.000	KG					40	EA MM
PE212322 0020 L X X X X X 0.0 16.000 EA P0056912300	LEVELING PLATE S235JRG2 SIZE/DIMENSION (FROM LEGACY SYSTEM) NO DOCUMENT ASSIGNED INTERNAL COMMENT: Internal comment Exists In Language D	EN10029 150*150*20	1	3.500	KG					40	EA MM
PE230605 0030 L X X X X X 0.0 14.000 EA P0056912300	ANCHOR PLATE ZZ00001861-000 S235JRG2 SIZE/DIMENSION (FROM LEGACY SYSTEM) DWG 4-230605 000 - INTERNAL COMMENT: Internal comment Exists In Language D	4-230605 DIN 1543 30*280*280;D=38 RL SHEET	1	18.000	KG					40	EA MM
PE101068 0040 L X X X X X 0.0 28.000 EA P0056912300	HEXAGON NUT ZZ00057841-000 8 THREAD NO DOCUMENT ASSIGNED INTERNAL COMMENT: Internal comment Exists In Language D	ISO4032 M36	1	0.393	KG				A2B	40	EA MM

MATERIAL / ITEM / QUANTITY / REL.	T	A	P	C	W	s	U	RV / S	Level / I	N	M	c	REK / UOM / REFERENCE POINT / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE	BASIC MATERIAL / DOCUMENT ID	SIZE/DIM 4 / PART	VR	DOCUMENT STD/GRAPHIC / ALTERNATIVE ID	VAR / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE) / ST	CAL. WEIGHT / RAW MATERIAL / DIR DESCRIPTION	WU / SPEC.	SR	SI	BT	SC / SURFACE TREAT.	X-STATUS / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE)	BUOM / EUOM
PE420300								A	1					spherical washer C37 / conical seat D42						0.400	KG					40	EA
0050	L	X	X	X	X								X 0.0	ZZ10001056-000	galv. verzinkt					DIN 6319							MM
14.000	EA																										
P0056912300																				NO DOCUMENT ASSIGNED							
P0031614700									1					ANCHOR SCREW						22.000	KG					40	EA
0060	L		X	X									X 0.0	ZZ10000384-000	C35E					DIN 797							MM
14.000	EA													OUTER THREAD DIAMETER / LENGTH / INNER THREAD DIAMETER		M36				2710							
P0056912300														M8													
																				NO DOCUMENT ASSIGNED							
														INTERNAL COMMENT:													
														Internal comment Exists In Language D													
PE111023									1					LEVELING SCREW / M36*1,5-100						0.750	KG					40	EA
0070	L		X	X	X	X							X 0.0	ZZ00023655-000	ST					ISO 4026					A2B		MM
16.000	EA													SIZE/DIMENSION (FROM LEGACY SYSTEM)		M36*1,5-100											
P0056912300																				NO DOCUMENT ASSIGNED							
P0020656200									1					SHEET						0.500	KG					40	EA
0080	L		X	X	X	X							X 0.0	ZZ10001687-000	PTFE												MM
4.000	EA													LENGTH/THICKNESS/WIDTH		400				400							
P0056912300														6													
																				NO DOCUMENT ASSIGNED							
PE110549									1					underfill mortar Pagel V14/10						25.000	KG			X		40	EA
0090	L		X	X	X	X							X 0.0	ZZ00101612-000	V14/10_PAGEL-UNTERSTOPFMOERTEL												MM
2.000	EA																										
P0056912300														SPE	DPQD-00007414	000	A	PE110549 UNTERSTOPFMÖRTEL PAGE	RL							
														SPE	DPQD-00007549	000	A	PE110549 UNTERSTOPFMÖRTEL	RL							
														SPE	DPQD-00008124	000	A	PE110549 UNTERSTOPF-MÖRTEL	RL							
														INTERNAL COMMENT:													
														Internal comment Exists In Language D													
PE104417									1					sealing strip						1.000	KG			X		40	EA
0110	L		X	X	X	X							X 0.0	ZZ00100313-000													MM
32.000	EA													SIZE/DIMENSION (FROM LEGACY SYSTEM)		100-BREITE;1ROLLE=10M											
P0056912300																				NO DOCUMENT ASSIGNED							
														INTERNAL COMMENT:													
														Internal comment Exists In Language D													
PE105889									1					HEXAGON HEAD SCREW				ISO4017		0.018	KG					83	EA
0120	L		X	X	X	X							X 0.0	ZZ00057849-000	8.8										A2B		MM
12.000	EA													THREAD/LENGTH		M8				50							
P0056912300																											

MATERIAL	RV	Level	DESCRIPTION	DOCUMENT STD/GRAPHIC	VAR	CAL. WEIGHT	WU	SR	SI	BT	SC	X-STATUS	BUOM
ITEM T A P C W s U	S I N M c REK		MATERIAL TITLE ID BASIC MATERIAL		TLV NO	RAW MATERIAL SPEC.						SURFACE TREAT.	EUOM
QUANTITY	UOM	REFERENCE POINT	SIZE/DIM DESCRIPTION		SIZE/DIM 1 (STD. BOM NO./VAR)		SIZE/DIM 2 (SIZE/DIM STD. BOM)						
REL.	BOM MM NO.		SIZE/DIM 3	SIZE/DIM 4	SIZE/DIM 5 (HEAD TYPE)		SIZE/DIM 6 (FITTING TYPE)						
			TYPE DOCUMENT ID	PART VR ALTERNATIVE ID	ST	DIR DESCRIPTION							
						NO DOCUMENT ASSIGNED							

INTERNAL COMMENT:
Internal comment Exists In Language D
Internal comment Exists In Language E

ITEM TEXT :
- zum Ausrichten der Pos. 10; nach Aushärtung der Mörtels, vor Aufsetzen des Generators sind die Schrauben zu entfernen!
- to organizing the pos. 10; after set that of concrete, before touchdowns of the generator, the screws are to be removed!

ALTERNATE/SUPERCEDURE DATA :
Alternate/Supercedure Data Exists

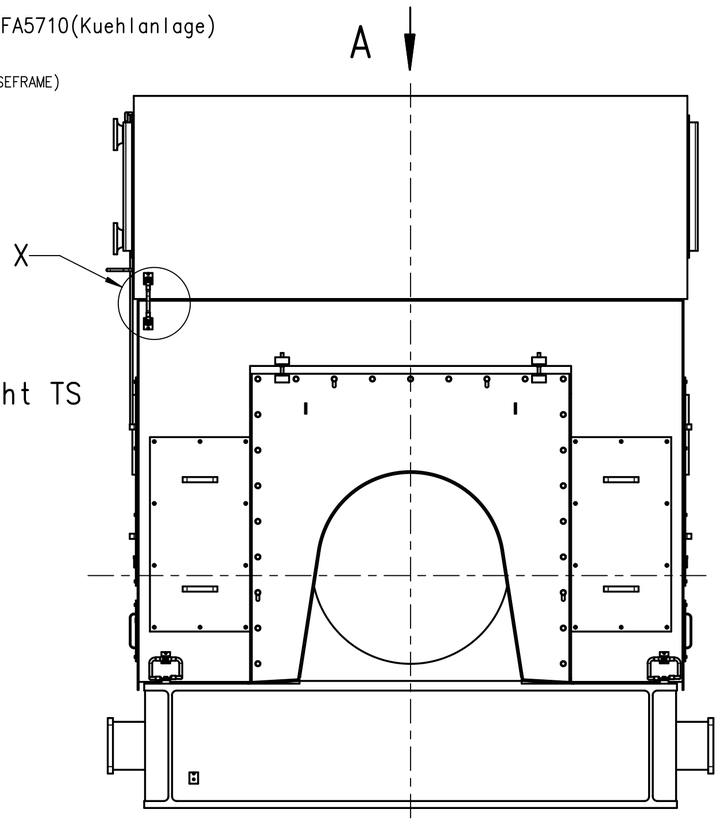
PE112167		1	grease Molykote 1000			1.000	KG			X		40	KG
0130 L	X X X X		ZZ00018989-000	MOLYKOTE_1000									MM
1.000	KG	X 0.0											
	P0056912300												

SPE	DPQD-00007418	000	B	PE112167 FETT MOLYKOTEPASTE 10	RL
SPE	DPQD-00008127	000	A	PE112167 FETT MOLYKOTEPASTE	RL

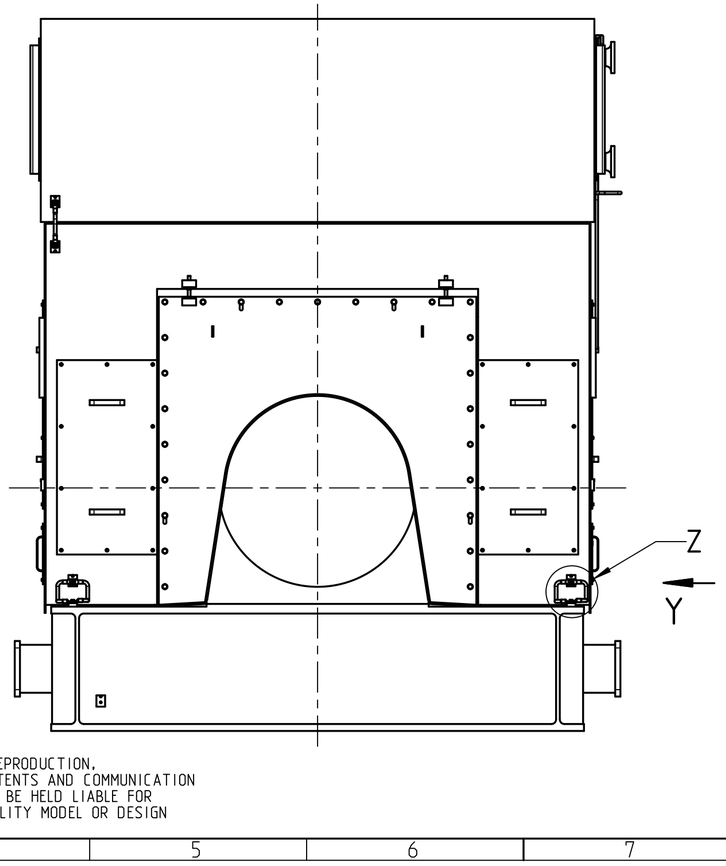
INTERNAL COMMENT:
Internal comment Exists In Language D

1 Erdungsplatten in BG STA1110(Grundrahmen), SFA5710(Kuehlanlage) und SFA5600(Abdeckhaube) vorhanden.
GROUND TERMINALS ALREADY ASSEMBLED AT DESIGN GROUP STA1110(BASEFRAME) SFA5710(COOLING PLANT) AND SFA5600(COVER).

Lage der Anschluesse bei Endmontage von Werkstatt bestimmt.
POSITION OF CONNECTIONS DETERMINED DURING FINAL ASSEMBLY BY WORKSHOP.

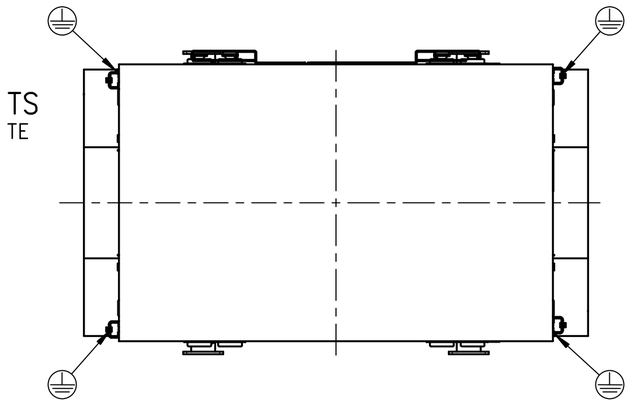


Ansicht TS
VIEW TE

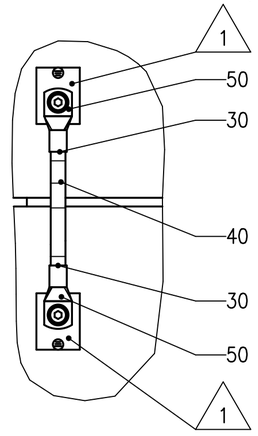


Ansicht ES
VIEW EE

A(A5) Erdungspunkte (Draufsicht)
1:50 GROUNDING POINTS (TOP VIEW)

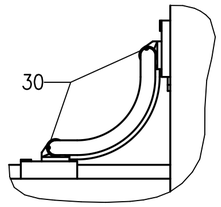


X(B4) Anschluesse Kuehler (2x)
1:5 CONNECTIONS COOLER (2X)

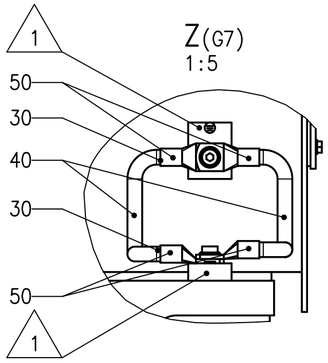


Anschluesse an Stirnseiten der Haube (4x)
CONNECTIONS ON FRONT WALL OF COVER (4X)

Y(G7)
1:5



Z(G7)
1:5



US and EU Export Controls

Technology Classification:

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Siemens AG
Energy Sector

WEIGHT: 10 KG	SCALE: 1:20	SPEC.:KUN351.00	
ORIGINATED: 2014-05-19 KRAUSS	TITLE: ERDUNGSANSCHLUESSE GROUNDING CONNECTIONS		
CHECKED: 2014-05-19 PARBS			
RELEASED: 2014-05-19 KRAUSS			
CONFIDENTIAL	LANG. - DRAWING NO. / VALUE: DPPPG-70067569		
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DO NOT SCALE, WORK TO DIMENSIONS SHOWN

Pro/ENGINEER A2

MATERIAL: P0053048300 **REVISION:** A **EFFECTIVE:** 2017-09-29 **BAS.QTY:** 1.000 **REQ.QTY:** 1.000 **PLANT:** **APPL.:** ZEN1 **X-STATUS:** 40 **BASE UOM:** ST **ENG. UNIT:** MM
DESCRIPTION: GROUNDING CONNECTIONS **TITLE ID:** MKSFA7210-000 **PROJECT ID:** **ANCHOR ID:** **SERVICE CODE:**
DOCUMENT-STD/GRAPHIC: 22-SFA7210-70067569 **VARIANT:** **NET WEIGHT:** 10,000 KG **CAL. WEIGHT:** 0,000 KG **SER. REQ.:** **SER. INH.:**
B.TRACK:

DOCUMENT LINKS:

TYP	DOCUMENT ID	PAR	VER	ALTERNATIVE ID	ST	DESCRIPTION
DWG	DPPPG-70067569	000	A	22-SFA7210-70067569	RL	SFA7210 ERDUNGSANSCHLUESSE

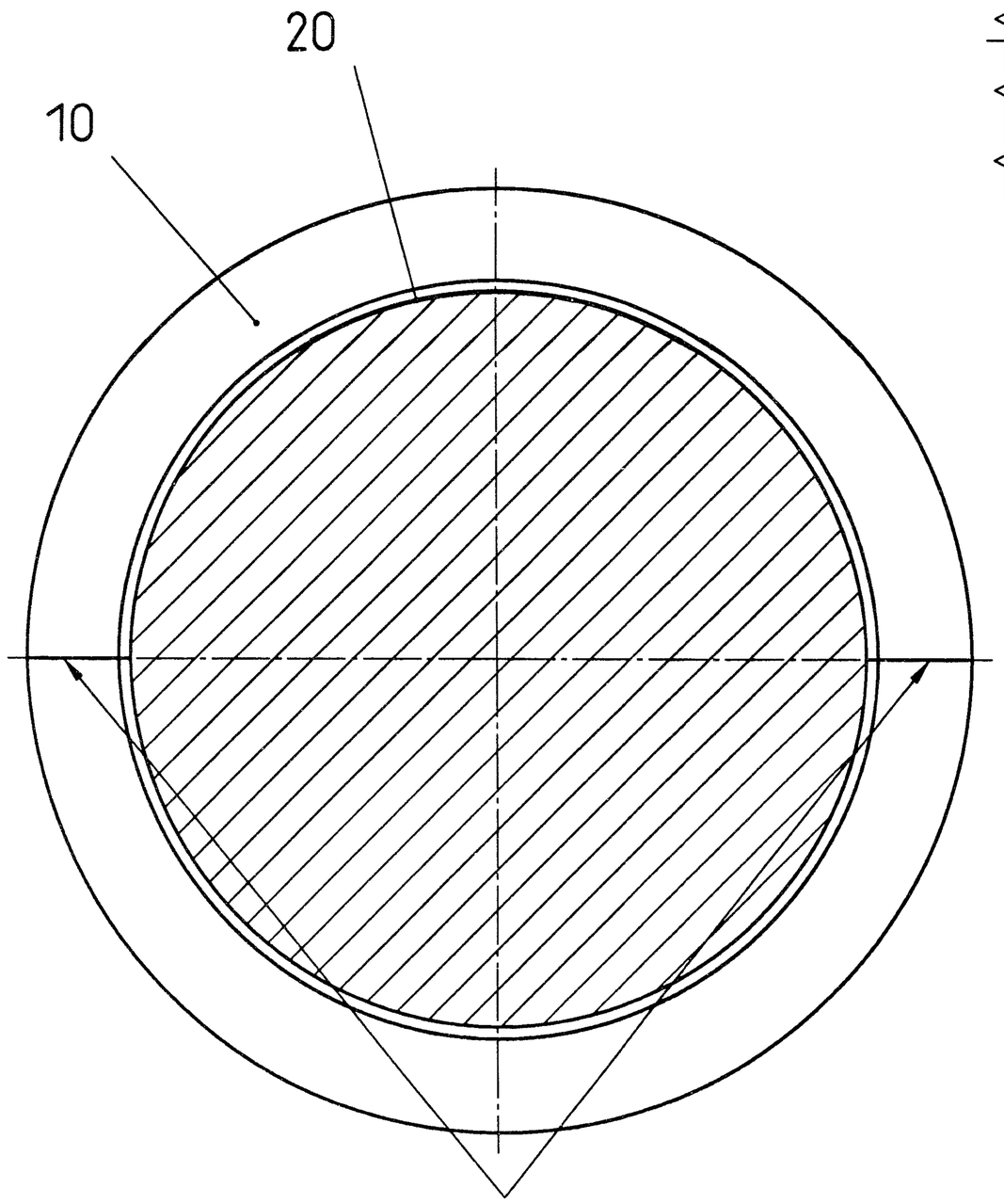
CLASSIFICATION:

Classification Data Exists

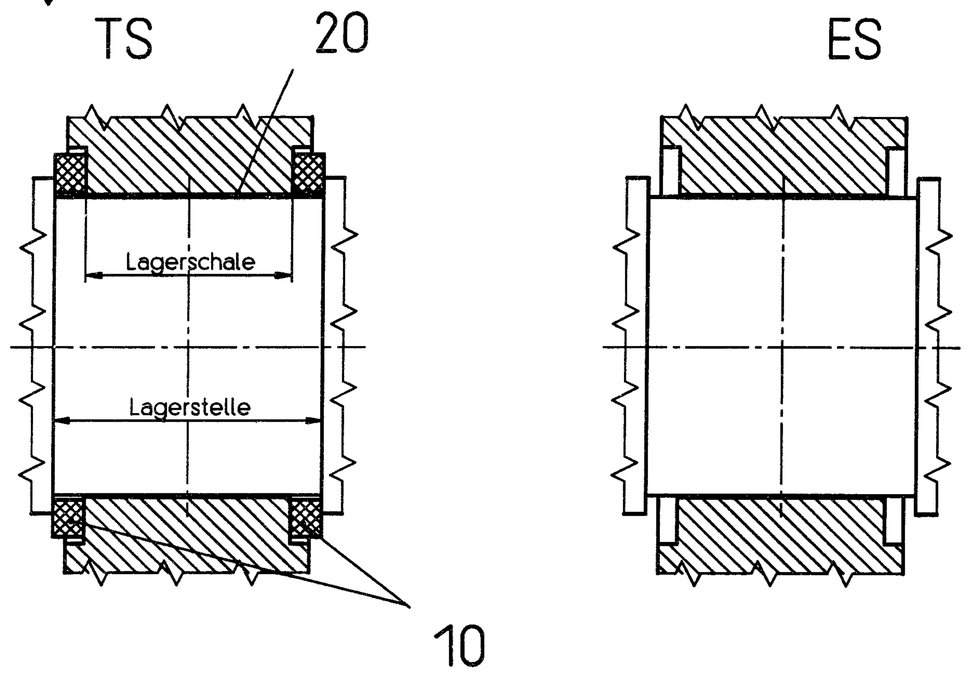
MATERIAL / ITEM / QUANTITY / REL.	RV / Level / UOM / REFERENCE POINT / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE / DOCUMENT ID	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / SIZE/DIM 4 / PART / VR / ALTERNATIVE ID	VAR / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE) / ST / DIR DESCRIPTION	CAL. WEIGHT / RAW MATERIAL SPEC. / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE)	WU / SR / SI / BT / SC / X-STATUS / SURFACE TREAT.	BUOM / EUOM
PE127679 0010 L X X X X 0.0 1.500 M P0053048300	1 REK	MULTINORM-EINZELADER ZZ00101030-000 CU-ETP SIZE/DIMENSION (FROM LEGACY SYSTEM)	SIEHEINT.VERMERK	0.000 120 NO DOCUMENT ASSIGNED	KG 40	M MM
		INTERNAL COMMENT: Internal comment Exists In Language D Internal comment Exists In Language E				
PE127680 0020 L X X X X 0.0 6.000 EA P0053048300	1 REK	PIPE CABLE TERMINAL & ZZ00101329-000 SIZE/DIMENSION (FROM LEGACY SYSTEM)	SIEHEINTERNERVERMERK	2.000 KRF/120/12 NO DOCUMENT ASSIGNED	G 40	EA MM
		INTERNAL COMMENT: Internal comment Exists In Language D Internal comment Exists In Language E				
PE111523 0030 L X X X X 0.0 3.250 M P0053048300	1 REK	HEAT SHRINKABLE TUB. POLYOLEFIN SIZE/DIMENSION (FROM LEGACY SYSTEM)		0.200 RNF300039/13-0 NO DOCUMENT ASSIGNED	KG 40	M MM
P0002737200 0040 L X X X X 0.0 5.000 M P0053048300	1 REK	Multinorm-Einzelader ZZ10004285-000 KUPFER SUPPLIER ORDER NUMBER		2.550 240 NO DOCUMENT ASSIGNED	KG 40	M MM
		RECOMMENDED SUPPLIER NAME: LAPP KABEL **RECOMMENDED SUPPLIER PART ID NO.:** 4521009				
		INTERNAL COMMENT: Internal comment Exists In Language D Internal comment Exists In Language E				

MATERIAL / ITEM / QUANTITY / REL.	RV / Level / S / I / N / M / c / REK / UOM / REFERENCE POINT / BOM MM NO.	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE	DOCUMENT STD/GRAPHIC / BASIC MATERIAL / SIZE/DIM 4 / DOCUMENT ID	PART	VR	ALTERNATIVE ID	VAR / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 5 (HEAD TYPE) / ST	CAL. WEIGHT / RAW MATERIAL / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE) / DIR DESCRIPTION	WU / SPEC.	SR	SI	BT	SC	X-STATUS / SURFACE TREAT.	BUOM / EUOM
P0003091200 0050 L X X X X 0.0 20.000 EA P0053048300	1	ROHRKABELSCHUH ZZ00101329-000 SUPPLIER ORDER NUMBER	- 712F12MS NO DOCUMENT ASSIGNED				0.040	KG					40	EA MM	
		RECOMMENDED SUPPLIER NAME: KLAUKE **RECOMMENDED SUPPLIER PART ID NO.:** 712F12MS													
		INTERNAL COMMENT: Internal comment Exists In Language D Internal comment Exists In Language E													
0100 T X .0 1.000 P0053048300	1	ITEM TEXT : Pos. 10, 20, 30 beziehen sich auf Zeichnung: DPPPG-70026499 und 3-6496-508586 IT. 10, 20, 30 ACCORDING TO DRAWING: DPPPG-70026499 AND 3-6496-508586 Pos. 30, 40, 50 beziehen sich auf Zeichnung: DPPPG-70067569 IT. 30, 40, 50 ACCORDING TO DRAWING: DPPPG-70067569					NO DOCUMENT ASSIGNED								
0110 D X .0 1.000 P0053048300	1	DWG	DPPPG-70026499	000	A	4-SFA7210-70026499	RL	SFA7210 GROUNDING CONNECTIONS							
0120 D X .0 2.000 P0053048300	1	DWG	3-6496-508586	000	A		RL	ERDUNGSANSCHLUESSE							

- Teil 10 zur axialen Sicherung nur in TS- Lager eingebaut
- Teil 20 als Verdrehsicherung in beiden Lagern zwischen Welle und Oberschale beigelegt



Ring mittig geteilt; straff eingepasst!



279889

Abmessungen Teil 10 und Teil 20 - siehe Stückliste!

Index	Datum date	Name name	geprüft checked	Änderungsbeschreibung / description of change

Entst. aus / orig. of — Grund / reason

	Datum date	Name name	Maßstab scale	Specification: KUN 351.00	UAS: doc. key:
gezeich. drawn	13.05.04	Parbs	Benennung / title		Inhaltskennzeichen code:
bearb. coord.	13.05.04	Parbs	Transportsicherung		
geprüft checked	14.05.04	Antonik	shipping precaution		
Abtlg. dept.	S472 G1		Form. 33	Z-Sy.	Spra.

Zeichnungs-Nummer / drawing no. / Kennwert / value: 3-279889 — Index: 00

Siemens AG
Power Generation PG

N-tech. gepr. ch. acc. stand.	F-tech. gepr. ch. acc. prod.					Ges.Gew. total wt. in kg		MF
						2,5		

EUKLID DESIGN
Klass.: RESTRIKTIV

ISO128

CAD-File: TransportSicherung

Maße nicht abgreifbar / Not To Scale

WEITERGABE SOWIE VERVIELFÄLTIGUNG DIESER UNTERLAGE, VERWERTUNG UND MITTEILUNG IHRES INHALTS NICHT GESTATTET, SOWEIT NICHT AUSDRÜCKLICH ZUGESTANDEN. ZUWIDERHANDLUNGEN VERPFLICHTEN ZU SCHADENERSATZ. ALLE RECHTE FÜR DEN FALL DER PATENTERTEILUNG ODER GM-EINTRAGUNG VORBEHALTEN.

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MATERIAL: P0037239800 **REVISION:** A **EFFECTIVE:** 2015-09-14 **BAS.QTY:** 1.000 **REQ.QTY:** 1.000 **PLANT:** **APPL.:** ZEN1 **X-STATUS:** 40 **BASE UOM:** ST **ENG. UNIT:** MM
DESCRIPTION: SHIPPING PRECAUTION **TITLE ID:** MKSFA5000-000 **PROJECT ID:** **ANCHOR ID:** **SERVICE CODE:**
DOCUMENT-STD/GRAPHIC: 3-279889 **VARIANT:** **NET WEIGHT:** 5,000 KG **CAL. WEIGHT:** 0,000 KG **SER. REQ.:** **SER. INH.:**
B.TRACK:
STD. BOM NO./VARIANT: - **SIZE/DIM STD. BOM:** **FITTING TYPE:**

DOCUMENT LINKS:

TYP	DOCUMENT ID	PAR	VER	ALTERNATIVE ID	ST	DESCRIPTION
DWG	3-279889	000	-		RL	SHIPPING PRECAUTION

CLASSIFICATION:

Classification Data Exists

MATERIAL / ITEM / QUANTITY / REL. / BOM MM NO.	RV / Level / UOM / REFERENCE POINT	DESCRIPTION / MATERIAL TITLE ID / SIZE/DIM DESCRIPTION / SIZE/DIM 3 / TYPE / DOCUMENT ID	BASIC MATERIAL / PART / VR / ALTERNATIVE ID	DOCUMENT STD/GRAPHIC / TLV NO / SIZE/DIM 1 (STD. BOM NO./VAR) / SIZE/DIM 4 / SIZE/DIM 5 (HEAD TYPE) / ST / DIR DESCRIPTION	VAR / CAL. WEIGHT / RAW MATERIAL / SIZE/DIM 2 (SIZE/DIM STD. BOM) / SIZE/DIM 6 (FITTING TYPE)	WU / SPEC.	SR / SI / BT / SC / SURFACE TREAT.	X-STATUS / BUOM / EUOM
P0037240300 0010 L X X X X 0.0 2.000 EA P0037239800	1	LOCKING RING ZZ10002380-000 OD/ID/THICKNESS 35 NO DOCUMENT ASSIGNED	PFCP201	370 325	0.425 IEC60893	KG	40 EA MM	
		INTERNAL COMMENT: Internal comment Exists In Language D						
		ITEM TEXT : Fase am Ring: 7 x 45° geteilte Ringe zum Transport des Generators als Axialsicherung im TS-Lager eingepasst CHAMFER: 7 x 45° DIVIDED RINGS FITTED IN FOR THE TRANSPORT OF THE GENERATOR AS AN AXIAL SAFEQUARDING IN THE TE BEARING						
PE271655 0020 L X X X X 0.0 2.000 EA P0037239800	1	SHIM ZZ00005853-000 SIZE/DIMENSION (FROM LEGACY SYSTEM) NO DOCUMENT ASSIGNED	ARAMID-NBR	0,5X250X150	0.000	KG	40 EA MM	
		ITEM TEXT : als Verdrehsicherung zum Transport des Gen. in allen Lagern zwischen Welle u. Oberschale beigelegt AS LOCKING DEVICE FOR TRANSPORT OF THE GENERATOR ENCLOSED BEWEEN ROTOR SHAFT AND UPPER BEARING SHELL						