

ATEX APPENDIX - INSTALLATION & MAINTENANCE MANUAL

Hägglunds Atom

Radial piston hydraulic motor,
in accordance with ATEX Directive 2014/34/EU
For explosive environments 

The data specified only serve to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. Catalog specifications do not constitute assured characteristics. The information given does not release the user from the obligation of own judgment and verification. It must be remembered that our products are subject to a natural process of wear and aging.

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The cover shows an example application. The product delivered may differ from the image on the cover.

Original instruction manual

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1 About this documentation

1.1 Validity of the documentation

This documentation is valid for Hägglunds Atom radial piston hydraulic motor for potentially explosive areas. This is an addition to the standard product documentation and forms an integrated and required part of the complete documentation for a Hägglunds motor used in explosive atmospheres.

This documentation is intended for machine/system manufacturers, assemblers, users and service engineers.

This documentation contains important information on the safe and appropriate assembly, transport, commissioning, operation, maintenance, disassembly and simple troubleshooting of the product.

- ▶ Prior to working with the Hägglunds motors, read the entire documentation carefully, in particular the “Safety instructions” chapter

1.2 Required and additional documentations






- ▶ Before commissioning the product, make sure to have received and fully understood the standard documentations for the relevant motor(s) identified by the book symbol  and observe the instructions included in these documentations.

Table 1: Required and additional documentations

Title	Document number	Document type
 Order confirmation	Contains the order-related technical data for your Hägglunds motor.	Order confirmation
 Hägglunds Atom	RE 15354	Data sheet
 Hägglunds Atom	RE 15354-WA	Installation & Maintenance manual
 Explosion-proof Hägglunds products	RE 15417-X-B1	Manual

1.3 Presentation of information

Consistent safety instructions, symbols, terms and abbreviations are used in the present documentation to facilitate orientation for the reader and to ensure safe product handling. The explanations in the following sections will provide for easy understanding.

1.3.1 Safety messages




This documentation includes safety messages placed before sequential operating procedures that may involve the risk of personal or property damage. The described precautionary measures must be observed.

Safety messages are structured as shown below:

 SIGNAL WORD
<p>Type and source of risk Consequences if disregarded</p> <ul style="list-style-type: none"> ▶ Precautionary measures

- Warning sign: draws attention to the risk
- Signal word: identifies the hazard level
- Type and source of risk: identifies the type and source of the hazard
- Consequences: describes what occurs when the safety messages are not complied with
- Precautions: indicates how the hazard can be avoided


Table 2: Risk categories to ANSI Z535.6-2006

Warning sign, signal word	Meaning
 DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
 WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
 CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates potential property damage: the product or the environment may be damaged.

1.3.2 Symbols

The following symbols identify notices that are not safety-relevant, but enhance the comprehensibility of the documentation.

Table 3: Meaning of the symbols

Symbol	Meaning
	When this information is not observed, optimum use or operation of the product cannot be ensured.
▶	Single, independent step
1.	Numbered instructions: The number indicates that the different steps are to be performed successively.
2.	
3.	

2 Safety instructions

2.1 About this chapter

This product has been manufactured in strict compliance with the generally accepted rules of technology. However, this does not exclude the risk of damage to persons or property if this chapter and the safety instructions included in the present documentation are not observed.

- ▶ Read the entire documentation carefully before starting to use the product.
- ▶ Keep this documentation in a location where it is accessible to all users at any time.
- ▶ When passing over the product to third parties, make sure to include the necessary documentation.

2.2 Intended use

The product is intended for professional and not for private use. Intended use includes having read and understood this “ATEX appendix” and the additional documentation (Table 1), in particular this chapter, 2 Safety instructions.

The radial piston motor intended for use in explosive atmospheres fulfills the requirements of the EU ATEX Directive 2014/34/EU. Information on the equipment group and category can be found in the Declaration of Conformity and on the identification plate of the radial piston motor.

Under the “ATEX Workplace Directive” 1999/92/EC, the user/operator is required to divide explosive areas into zones. [RE 15417-X-B1](#) “General information, Explosion proof Hägglunds products” compares the zones with the equipment groups and categories. The radial piston motor is to be used in an area and zone corresponding to the appropriate equipment group and category (or in an area with lower requirements).

It must also be operated in accordance with the technical data, operating conditions or other requirements and performance limits as specified in the product-specific documentation, in the order confirmation and in this instruction manual.

Note! In case of any discrepancies between the product-specific documentation and this ATEX appendix, the restrictions and requirements in this appendix takes precedence.

2.3 Personnel qualification

In addition to the personnel qualifications specified in the product-specific documentation, knowledge about working with equipment for, and in areas with, potentially explosive environments is required.

2.4 Specific conditions of use (X conditions)

In order to meet the required level of explosion protection, the following conditions must be met:

- ▶ Ambient temperature: $-20\text{ °C} \leq T_{amb} \leq +60\text{ °C}$.
- ▶ The maximum allowed motor speed is limited to 230 rpm for temperature class T4 (T135 °C) (no limitation for other temperature classes).
- ▶ The maximum allowed case drain temperature is 65 °C for T4 (T135 °C) and 70 °C for T3-T1 (T200-T450 °C).
- ▶ For equipment category 2G/2D and M2 (Equipment Protection Level Gb/Db/Mb), flushing of radial lip seals and bearings is required, as specified in chapter "5.2.2 ATEX flushing".
Depending on the operating conditions and the required level of explosion protection, flushing of radial lip seals and bearing may also be required to fulfil equipment category 3G/3D (Equipment Protection Level Gc/Dc). See product-specific data sheet for conditions.
- ▶ For equipment category 2G/2D and M2 (Equipment Protection Level Gb/Db/Mb), a case drain temperature sensor must be installed, as specified in chapter "5.3.1 Temperature sensor", to detect increased temperatures. The temperature signal must be integrated in the process monitoring circuit to make sure that the motor immediately can be stopped as soon as the maximum temperature is exceeded, or as soon as a malfunction is detected in the temperature monitor system.
- ▶ Running below an operating viscosity of 20 cSt is not allowed.
Implication: If a hydraulic fluid with lower viscosity than ISO VG 68 is used, a lower max temperature than indicated above may have to be used. Contact your Bosch Rexroth representative.
- ▶ When used in areas where propagating brush discharge can occur (as per EN ISO 80079-36), a motor approved for gas group IIC (conductive paint) should be used to ensure that no hazardous electrostatic energy levels can occur on the surfaces. See product-specific data sheet or contact your Bosch Rexroth representative.
- ▶ Integrate the equipment into the equipotential bonding system, see chapter "5.4 Voltage equalization".
- ▶ Follow the inspection instructions, see chapter "8.2 Inspection".

2.5 Product and technology-related safety messages

In addition to the safety messages stipulated in the product-specific documentation, the following safety messages must also be observed in potentially explosive environments. The following safety instructions apply to chapters 4 to 9.

DANGER

Dust layers

Danger to life or risk of serious injuries due to explosion and/or fire caused by ignition of an explosive atmosphere or of combustible dust.

- ▶ Take care to remove the dust layer in a timely manner in order to reduce the risk of ignition.

Overheating due to excessive pressure

Danger to life or risk of serious injuries due to explosion and/or fire caused by ignition of an explosive atmosphere or of combustible dust on a hot surface.

- ▶ Secure the system against pressure overload.
- ▶ Set the pressure relief valve in the system so that the maximum permissible pressure cannot be exceeded; see product-specific data sheet.
- ▶ Make sure the maximum permissible case pressure stated in the data sheet is never exceeded, as excessive case pressure or pressure peaks can cause impermissible temperatures on the shaft seal and thus a risk of ignition.

Overheating due to excessive speed

Danger to life or risk of serious injuries due to explosion and/or fire caused by ignition of an explosive atmosphere or of combustible dust on a hot surface.

- ▶ Make certain that the maximum permissible speed as specified in the product-specific data sheet is not exceeded.
- ▶ If necessary, take measures to ensure that the speed is limited.

 **DANGER****Overloading and damage to shaft coupling or splines causing shaft to slip!**

Danger to life or risk of serious injuries due to explosion and/or fire caused by ignition of an explosive atmosphere or of combustible dust on a hot surface.

- ▶ Make sure the shaft is designed, manufactured and installed correctly; see product-specific data sheet and I&M manual.
- ▶ Make sure the permissible shaft load according to the product-specific data sheet is not exceeded under any operating conditions.
- ▶ Make sure the splines are lubricated and filled with oil according to product specific I&M manual.

Overheating

Danger to life or risk of serious injuries due to explosion and/or fire caused by ignition of an explosive atmosphere or of combustible dust on a hot surface.

- ▶ For ATEX category II 2G/2D and I M2, the hydraulic motor may only be operated if it is equipped with a flushing system in combination with a case drain temperature monitoring system, which in the event of an exceeded maximum allowed case drain temperature deactivates the system so that the temperature cannot continue to rise. For ATEX category II 3G/3D there are also occasions which may require flushing and a monitoring of the case drain temperature. Observe the relevant information in chapters “5.2.2 ATEX flushing“ and “5.3.1 Temperature sensor“.
- ▶ Wear or damage on parts within the hydraulic motor may result in an increase in the case drain temperature, caused by heat from mechanical friction. A gradual increase in the case drain temperature can, therefore, indicate the onset of a damage. If you cannot trace the reason for the increased temperature, please contact Bosch Rexroth Service.
- ▶ A moderate temperature increase could also be caused by a deteriorated flushing. Make sure the flushing is working properly.
- ▶ A sudden increase in the case drain temperature could e.g indicate severe damage with extreme friction or lost flushing. If this occurs, bring the hydraulic motor to an immediate standstill and initiate maintenance measures with Bosch Rexroth Service.

 **DANGER**

Mechanically generated impact, friction or abrasion!

Danger to life or risk of serious injuries due to explosion and/or fire caused by ignition of an explosive atmosphere or of combustible dust.

- ▶ Make sure that parts which are able to move relative to each other do not touch (e.g. coupling components), as this could create sparks and/or heat, meaning that explosion protection is no longer guaranteed.
- ▶ Ensure that no objects hit the equipment and also that no foreign objects come in contact with rotating parts of the motor, e.g. by appropriate installation location or other preventive measure.
- ▶ Do not perform any mechanical activities on or near the equipment in potentially explosive areas, e.g. transport, unpacking or maintenance work.

Sparks caused by electrostatic discharge!

Danger to life or risk of serious injuries due to explosion and/or fire caused by ignition of an explosive atmosphere or of combustible dust.

- ▶ The equipment has been painted as specified in Section 6.7 (Static Electricity) of ISO 80079-36. Additional coats of paint should only be applied as specified in ISO 80079-36, otherwise explosion protection cannot be guaranteed.
- ▶ Include the equipment in the potential equalization and remember to periodically check the grounding connections, especially make sure that all parts for grounding are properly remounted after any maintenance work. See information in chapter “5.4 Voltage equalization“.
- ▶ Do not perform transport, storage, unpacking, installation, maintenance or other handling of the equipment in potentially explosive areas.
- ▶ When cleaning do not use material that can induce static electricity e.g. a dry rug!

3 Product identification

- 1 Type code
- 2 Serial number
- 3 Weight
- 4 Manufacturer
- 5 Max pressure

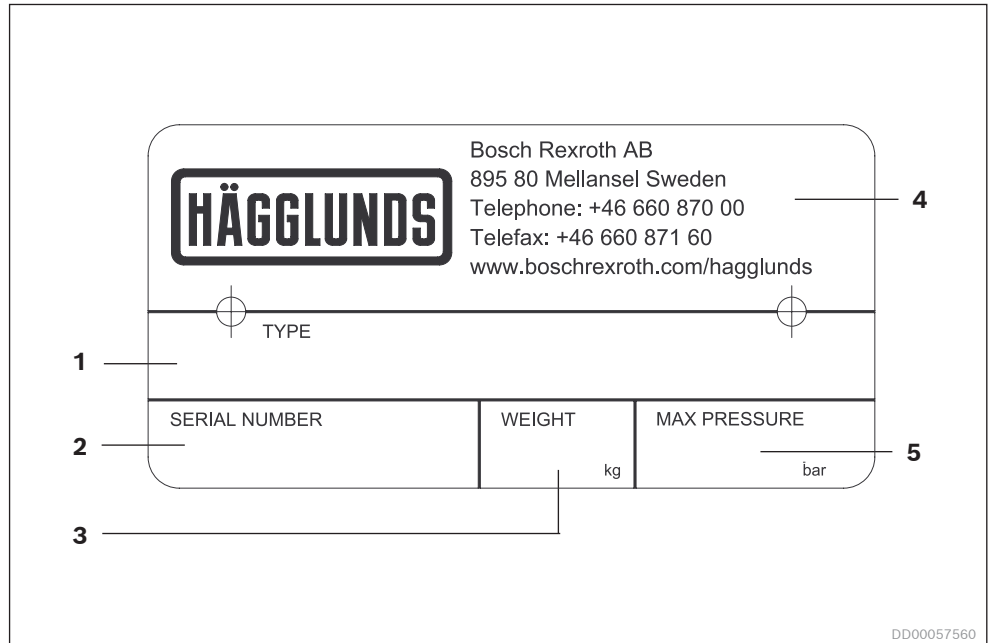


Fig. 1: Standard product identification

- 6 Name of the certificate (DoC) issuer
- 7 Year and reference for the certificate (DoC)
X= Specific conditions of use applies (see 2.4)
- 8 ATEX classification
- 9 CE marking acc. to ATEX directive
- 10 Ambient temperature

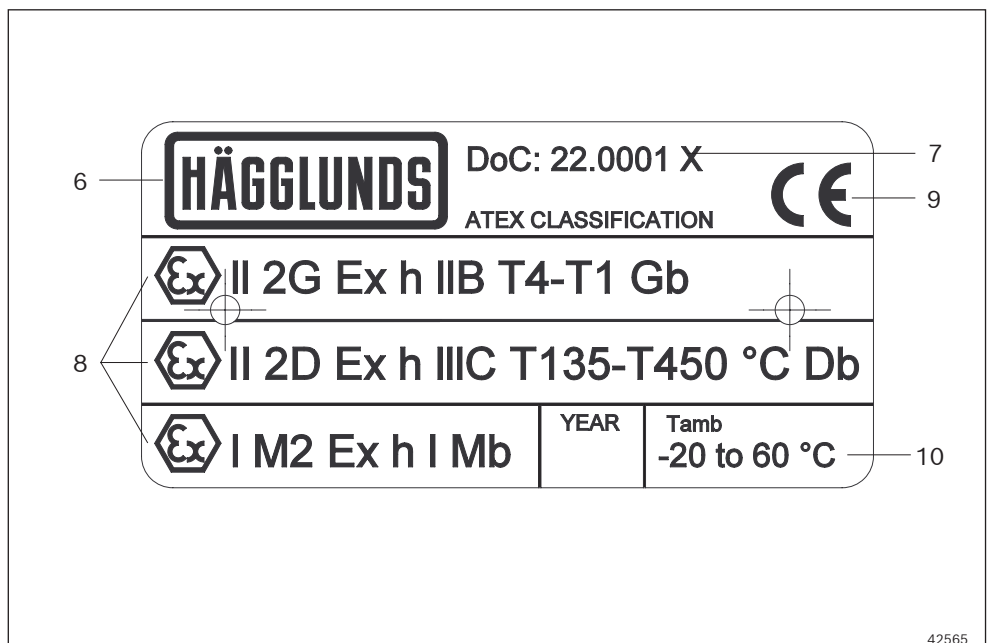


Fig. 2: Additional ATEX identification (example)

4 Transport and storage

In addition to the instructions in the product-specific documentation, the following instructions must also be observed for transport and storage in potentially explosive environments.

DANGER

Static discharges and sparking resulting from material contact in an explosive atmosphere

Danger to life or risk of serious injuries due to explosion and/or fire caused by ignition of an explosive atmosphere or of combustible dust.

- ▶ Do not transport or store the equipment in potentially explosive areas.
- ▶ Do not unpack or pack the equipment in potentially explosive areas.

5 Installation

In addition to the instructions in the product-specific documentation, the following instructions must also be observed for installation in potentially explosive environments.

DANGER

Sparks caused by electrostatic discharge or from material contact in an explosive atmosphere!

Danger to life or risk of serious injuries due to explosion and/or fire caused by ignition of an explosive atmosphere or of combustible dust

- ▶ Unpacking and assembly work must only be performed in a non-explosive atmosphere.
- ▶ The system operator must ensure appropriate ambient conditions. Installation is the responsibility of the operator.

5.1 Installation conditions

The installation location and position of the hydraulic motor essentially determine the procedures during installation and commissioning, but the following conditions must explicitly be observed for installation in potentially explosive environments:

- ▶ Fix the equipment so that the expected forces and torques can be transferred without any danger.
- ▶ To prevent heat generation in the motor due to damage on bearings, the permissible external loads as indicated in the product-specific data sheet must not be exceeded.
- ▶ Perform assembly carefully to prevent damage to the bearings, case or other parts of the equipment.
- ▶ Make sure the splines are lubricated and filled with oil according to product specific I&M manual.
- ▶ Make sure that parts which are able to move relative to each other cannot touch and cause friction or impact.
- ▶ Install in location or position so that no debris or objects can come in contact with the equipment and cause friction or impact.
- ▶ Direct the case drain fluid to the reservoir through the highest drain port. Use a line size that matches the port.
- ▶ Connect the case drain line with a minimum of restrictions, to ensure that the maximum case pressure is not exceeded. Particular attention must be paid to situations when shared drain lines is used or at cold starts.
- ▶ Make sure that the working environment at the installation site is completely free of dust and foreign substances. The complete hydraulic system must be installed in clean conditions. Contamination of the hydraulic fluid can considerably affect the function and service life of the hydraulic motor and its suitability for use in explosive areas.

5.2 Motor installation

5.2.1 Pressure limitation

If there is a risk for pressure peaks over 350 bar in the hydraulic system, a crossover pressure relief valve should be installed to limit the pressure levels and thereby mitigate fatigue on attachments and fasteners. The system should then also be equipped with a secondary pressure limiting function, e.g. a pressure compensated pump, which is set 30 bar **below** the crossover pressure relief valve.

5.2.2 ATEX flushing

When flushing of radial sealings and bearings is required, it shall be installed according to Fig. 3 (required for equipment category 2G/2D and M2, but also for equipment category 3G/3D in some circumstances, see product-specific data sheet).

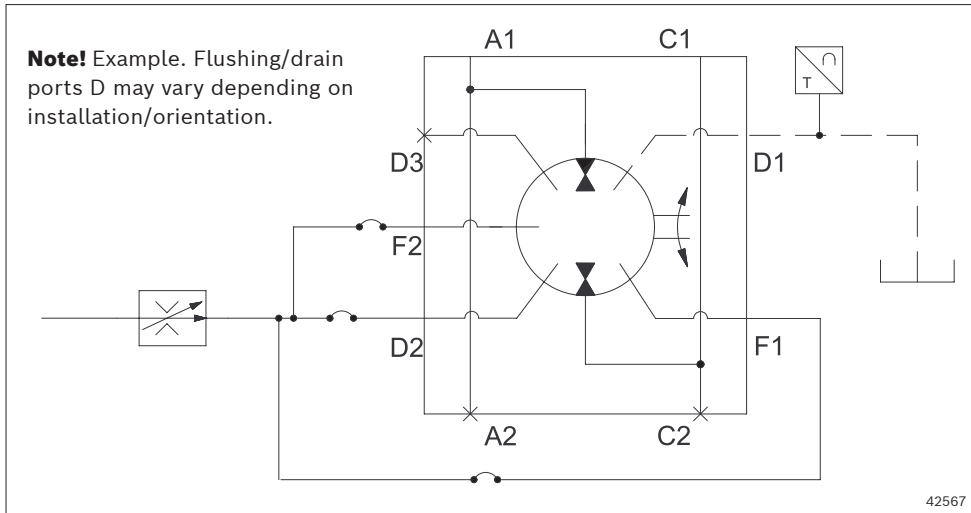


Fig. 3: Hydraulic circuit: ATEX flushing of radial seal

For motors intended for use in explosive atmospheres, the small orifices that normally are mounted in ports F1/F2 are removed to minimize the risk for a defective flushing. Instead, the total flushing flow to the motor is to be set by a pressure compensated flow control valve close to the motor. The reason that a pressure compensated flow control valve should be used is to ensure a sufficient flushing flow independent of e.g. the motor case pressure (an increased case pressure would otherwise result in a reduced flushing flow). The flow after the valve is then split into three ports according to Fig. 3: The main flushing inlet and the two connections for flushing of the radial sealings (F1/F2), without orifices in any of the three lines. In this way the risk for a defective flushing is reduced and a malfunctioning flushing would be easier to detect from an increased drain temperature. See recommended flushing kit in specific hydraulic motor data sheet!

Observe that the required minimum pressure level for the pressure compensated flow control valve must be fulfilled to ensure proper function!



Note!

For zone 2/22 (equipment category 3G/3D), a case drain temperature sensor is not a requirement, but it is still recommended since a defective flushing otherwise can be difficult to detect. In any case, it is of most importance that the flushing is working properly upon commissioning of the hydraulic motor!

Note!

When “ATEX flushing” is required, the total amount of flushing flow should be according to the standard flushing requirements in the product specific data sheet, but minimum 10 l/min. That is, if the required flushing flow according to the data sheet is below 10 l/min or if no motor case flushing normally is needed, the flushing flow at the constant flow control valve should be set to 10 l/min.

5.3 Sensors

5.3.1 Temperature sensor

Depending on the installation conditions and the required level of explosion protection, the case drain temperature may have to be monitored. Since no connection is available to mount the sensor directly to the motor housing, the sensor needs to be mounted in an adapter tube connected to the drain line output of the motor, see Fig. 4. The sensor needs to be mounted as close as possible to the motor, maximum 50 cm from the motor drain port. (It is not recommended to use the D ports on the Atom motor for temperature measurements since a sensor would not reach in to the actual motor case, but would only measure in the port cavity.)

For equipment category 2G/2D and M2, a temperature sensor is mandatory and the signal must be integrated in the process monitoring circuit to make sure that the motor immediately is stopped as soon as the specified maximum case drain temperature is exceeded. The operation of the motor shall also be stopped in case of sensor faults, cable breaks or faults in the control unit itself.

For equipment category 3G/3D, a temperature sensor is recommended, especially when flushing is needed since a malfunctioning flushing otherwise can be difficult to detect.

See recommended temperature sensor equipment in specific hydraulic motor data sheet!

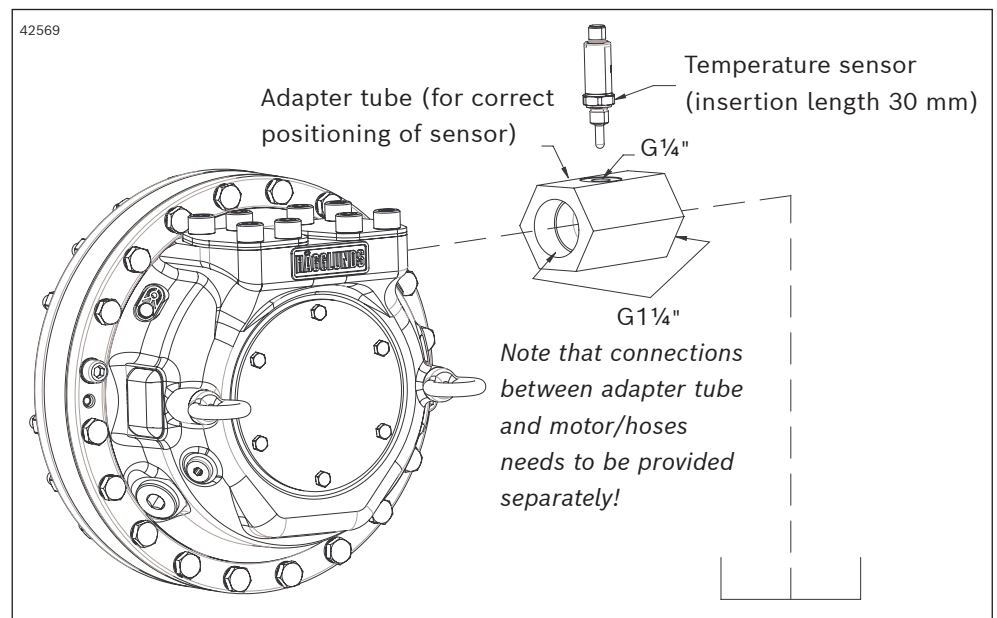


Fig. 4: Temperature sensor in motor drain line.

Note!

The temperature sensor may have to be operated via an intrinsically safe amplifier to limit the energy to the explosive zone. For electrical installation, see instructions in specific documentation for chosen sensor.

5.4 Voltage equalization

DANGER

Sparks caused by electrostatic discharge!

Danger to life or risk of serious injuries due to explosion and/or fire caused by ignition of an explosive atmosphere or of combustible dust.

- ▶ To prevent the buildup of static electricity, include all equipment in the potential equalization.
- ▶ Avoid insulating surfaces.
- ▶ Make sure all conductive parts of the liquid handling system (e.g. pipes and tanks) are included in the earthing/bonding system.
- ▶ High charge levels in the hydraulic fluid can be avoided e.g. by using anti-static filters and/or by using a hydraulic fluid with high conductivity.
- ▶ Make sure assembled parts, tools and personnel have the same potential before they come into contact with each other.

The Hägglunds hydraulic motor must be connected to external ground for voltage equalization. For grounding point of Hägglunds Atom see *Fig. 5*.

The parts for grounding (washers, screws and terminal lug) are delivered in a small bag attached to the motor. The bag contains parts to fit all motor types so all parts will not be used. Cable is not included in the delivery, but the included terminal lug is suitable for a conductor up to 10 mm².

It is important to follow the grounding point instruction. Flange for connection can be selected to best fit the installation, see *Fig. 5*.

Besides the hydraulic motor, there can be accessories and system components that also need to be included in the potential equalization. Make sure all equipment are bonded or earthed properly.

Before the equipment is brought into use, checks of earth connections should be made. For all-metal equalization systems, a resistance to earth is usually less than 10 Ω. If a significantly higher value is found, further investigations should be made to check for possible problems (e.g. a loose connection or corrosion).

Check grounding / bonding connection lines and their contacts regularly, see Table 5.

Note!

Grounding of the shaft/machine should be done separately as the internal parts of the motor may be isolated from the motor housing due to oil films inside the motor.

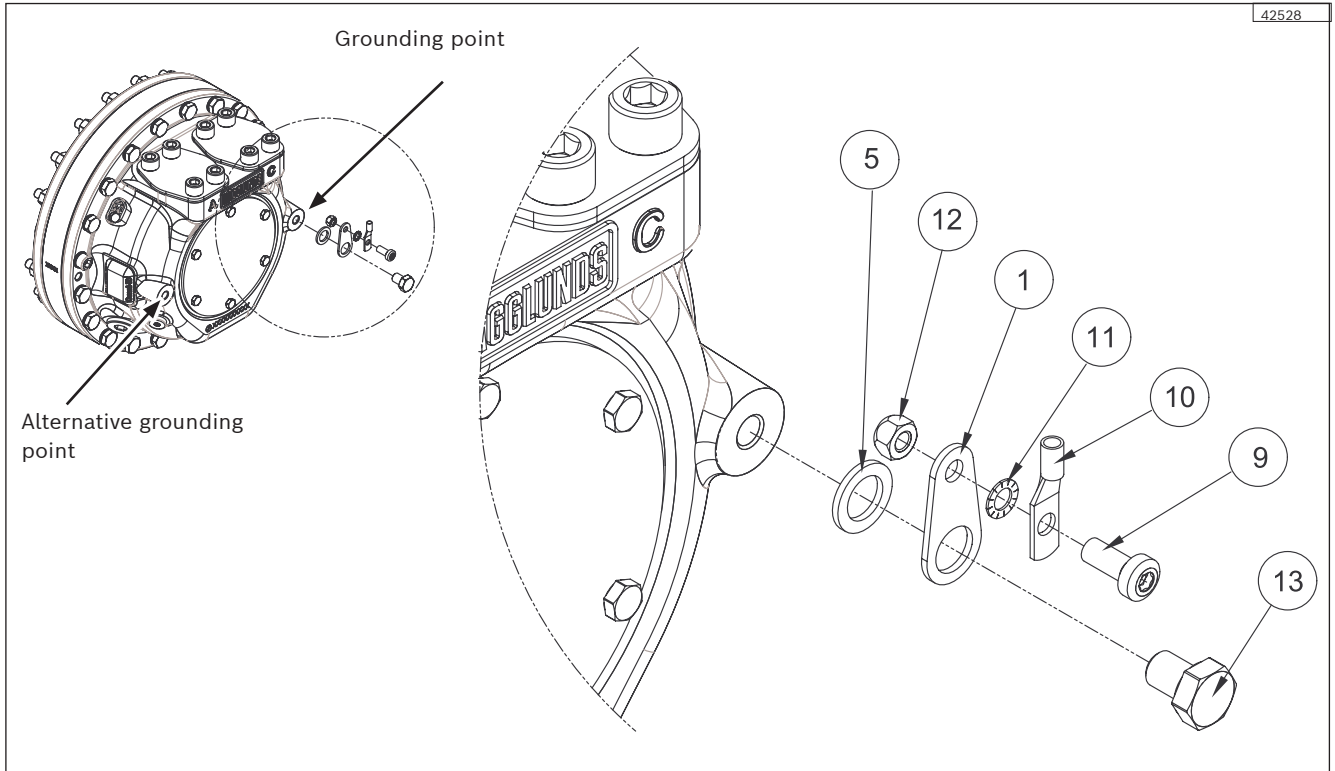


Fig. 5: Grounding point instruction, Hägglunds Atom

Table 4: Grounding assembly details (assembly R939062516 included in delivery)

Pos	Qty	Mat.nr.	Description
1	1	R939062517	Washer M12-M6-EN1.4401
5	1	R913018264	Washer ISO7092-12-200HV-A4
9	1	R913049670	Pan-head screw ISO14583-M6X16-A4-70 Tightening torque 6.3 Nm (4.6 lbf ft)
10	1	R911373380	Terminal lug KR-M6/0,75-10,0NN11,0-11,5
11	1	R913015031	Serrated lock washer M6 DIN6798-A6,4-A4
12	1	R913049671	Hexagon Nut M6 ISO7042-M6-A4-70
13	1	R913015261	Hexagon screw ISO4017-M10X14-8.8-A3K

6 Commissioning

During commissioning and first period of operation, adhere to the instructions in the product-specific documentation, but also to the instructions in this section, which must explicitly be observed in a potentially explosive environment.

DANGER

Overheating during commissioning

Danger to life or risk of serious injuries due to explosion and/or fire caused by ignition of an explosive atmosphere or of combustible dust on a hot surface.

- ▶ Comply with the specified case pressure and case drain temperature.
- ▶ Maintain the operating data according to product-specific data sheet and order-related documentation.
- ▶ Use a suitable filter system to filter the hydraulic fluid during filling to minimize particle and water contamination in the hydraulic system.

Selection of hydraulic fluid

The hydraulic motor is approved for temperature classes T4 to T1 according to ISO 80079-36 and -37. According to ISO 80079-37, only hydraulic fluids with an ignition temperature at least 50 K above the maximum surface temperature of the approved temperature class should be used.

Further, to reduce the likelihood of ignition of the explosive atmosphere by burning liquid, the hydraulic fluid shall have a suitable fire resistance rating. To ensure that high charge level in the hydraulic fluid is avoided, antistatic filters and/or a hydraulic fluid with high conductivity can be used.

For mining installations also consider the additional requirements in ISO 80079-38.

Commissioning and first period of operation

Prior to the initial start-up, but also at recommissioning, observe the instructions in the product-specific documentation and the information and safety instructions detailed in chapter "2 Safety instructions" in this manual. Also, it must be ensured that the equipment is properly installed in the machine/system. If possible, perform the commissioning work and the start-up in a non-explosive atmosphere to ensure the equipment is working properly during the first period of operation:

- ▶ Make sure that parts which are able to move relative to each other cannot touch and cause friction or impact.
- ▶ When flushing is needed, make sure it is installed correctly and that the flushing flow is sufficient, see "5.2.2 ATEX flushing".
- ▶ Monitor the working pressure, the case pressure and the temperatures of the hydraulic fluid to ensure that they remain within the permissible limits according to the technical data and within the expected limits according to the dimensioning of the system.
- ▶ Pay attention to vibrations and noise development.
- ▶ Make sure the shut-off chain of the machine/system is compliant with the needed ignition protection level and check its function in accordance with the switch-off temperatures specified in section "7 Operation".

If any unexpected event occur that could indicate a fault, the drive has to be stopped in order to analyze and clarify the situation.

7 Operation

In addition to the instructions in the product-specific documentation, the following instructions must also be observed for operation in potentially explosive environments.

DANGER

Overheating during operation

Danger to life or risk of serious injuries due to explosion and/or fire caused by ignition of an explosive atmosphere or of combustible dust on a hot surface.

- ▶ Observe the operating data according to product-specific data sheet and order-related documentation. Do not operate outside any of the specified limits.
- ▶ Monitor the case drain temperature in accordance with the specifications in this manual.
- ▶ Check the case drain temperature and the system pressure level on a daily basis. A gradual increase in temperature and/or load (compared to previous readings) may indicate mechanical friction from wear or damage on parts within the hydraulic motor.
- ▶ To detect any impending bearing malfunction, perform a daily inspection for unusual noise, vibrations or heat development.
- ▶ Use a suitable filter system to filter the hydraulic fluid in the hydraulic system during operation to minimize particle and water contamination.
- ▶ Observe the maintenance instructions for the hydraulic motor and its accessories.

7.1 Drain temperature monitoring

When a temperature sensor is installed in the case/drain line of a motor, as specified in chapter 5.3.1, the signal is to be monitored as specified below.

Temperature class	Maximum case drain temperature
T4 (T135 °C)	65 °C (149 °F)
T3-T1 (T200-450 °C)	70 °C (158 °F)

For equipment category 2G/2D and M2 (Equipment Protection Level Gb/Db/Mb):

As soon as the specified maximum drain temperature is exceeded or as soon as a malfunction is detected in the temperature monitor system, the control unit should immediately stop the operation of the hydraulic motor.

For all equipment categories / Equipment Protection Levels:

When a temperature sensor is installed, check the case drain temperature on a daily basis. In case the limit is exceeded or if the temperature level is noticeable higher than normal, the drive has to be stopped in order to analyze and clarify the cause.



Depending on the application and the moment of inertia, the load can continue to drive the rotation during the shut down phase. In order to stop the heat generation and make sure that an effective ignition source can be avoided, it is the responsibility of the system operator to ensure that the drive can be stopped at any situation.

8 Maintenance and repair

In addition to the instructions in the product-specific documentation, the following instructions must also be observed for maintenance and repair work in potentially explosive environments.

DANGER

Ignition hazards arising from maintenance and repair work

Danger to life or risk of serious injuries due to explosion and/or fire caused by ignition of an explosive atmosphere or of combustible dust.

- ▶ Any service, repair or modifications should be carried out by qualified personnel. All work performed at own risk.
- ▶ Maintenance and repair work should only be performed in a non-explosive atmosphere. The system operator is responsible for ensuring the appropriate ambient conditions.
- ▶ Non-conductive coatings (e.g. painting) may only be applied according to the provisions of ISO 80079-36 (section 6.7). Otherwise, explosion protection cannot be ensured.
- ▶ The ignition temperature of the lubrication and cleaning agents used as well as of the hydraulic fluid must be 50 K higher than the operating temperature.

8.1 Cleaning and care

DANGER

Ignition hazards from inappropriate cleaning

Danger to life or risk of serious injuries due to explosion and/or fire caused by ignition of an explosive atmosphere or of combustible dust.

- ▶ The equipment must **not** be cleaned with compressed air, solvents, aggressive detergents or high-pressure cleaners since these can result in changes that could result in the loss of the explosion protection.
- ▶ Only clean the equipment with a damp, lint-free cloth; cleaning with a dry cloth could cause a buildup of electrostatic charge.

8.2 Inspection

When Hägglunds hydraulic motors are used in potentially explosive environments, Bosch Rexroth recommends to perform inspections according to the schedule below, in addition to the inspection and maintenance instructions in the product-specific documentation.

Table 5: Inspection schedule

Task	Interval
Check that the case drain temperature is within limit values	Continuously (for equipment category 2G/2D and M2)
Check the operating temperature at the case drain port under comparable load conditions. A gradual or moderate increase in temperature and/or load, compared to previous readings, may indicate a deteriorated flushing or the onset of a damage within the motor.	Daily (when a temperature sensor is installed)
Check hydraulic motor for unusual noise, vibrations or heat development (any change may indicate e.g. a impending bearing malfunction)	Daily
Visual inspection of shaft/splines area to make sure the splines are lubricated and filled with oil	Daily
Check grounding / bonding connection lines and their contacts (resistance to earth usually <10 Ω)	Every 3 months or After any maintenance / modification
Visual inspection of condition and tightness of fasteners, fittings and other mounting parts	Every 3 months or After any maintenance / modification
Check that no debris or foreign objects can come in contact with the equipment and cause friction or impact	Depending on ambient conditions
Remove dust deposits	Depending on ambient conditions

8.3 Service life, maintenance and repair

The service life of the equipment is dependent on that the recommended maintenance and inspection plans in the product-specific documentation is adhered to and that any repair is properly conducted.

To maintain the explosion protection, it is also important to replace the equipment or parts after unacceptable wear or at the end of its recommended life, whichever comes first. If you are uncertain of the service life for your equipment, contact your sales engineer or other Bosch Rexroth representative for a custom calculation.

9 Removal and replacement

In addition to the instructions in the product-specific documentation, the following instructions must also be observed for removal and replacement work in potentially explosive environments.

DANGER

Ignition hazards during removal or replacement work

Danger to life or risk of serious injuries due to explosion and/or fire caused by ignition of an explosive atmosphere or of combustible dust.

- ▶ Disassembly and replacement work must only be performed in a non-explosive atmosphere.
- ▶ The system operator is responsible for ensuring the appropriate ambient conditions.

9.1 Preparing the components for storage or future use

DANGER

Ignition hazards from used equipment

Danger to life or risk of serious injuries due to explosion and/or fire caused by ignition of an explosive atmosphere or of combustible dust.

- ▶ Make sure used units are not reused in a potentially explosive environment.
- ▶ Make sure used units are tested by Bosch Rexroth Service before reusing them in a potentially explosive environment.

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We reserve the right to make changes, these could pertain to this document and/or the product

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