

Wilo-Rexa PRO-S04



en Installation and operating instructions



Rexa PRO-S
<http://qr.wilo.com/415>



Rexa PRO
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1 General

1.1 About these instructions

These instructions form part of the product. Compliance with the instructions is essential for correct handling and use:

- Read the instructions carefully before all activities.
- Keep the instructions in an accessible place at all times.
- Observe all product specifications.
- Observe the markings on the product.

The language of the original operating instructions is German. All other languages of these instructions are translations of the original operating instructions.

1.2 Copyright

WILO SE © 2024

The reproduction, distribution and utilisation of this document in addition to communication of its contents to others without express consent is prohibited. Offenders will be held liable for payment of damages. All rights reserved.

1.3 Subject to change

Wilo shall reserve the right to change the listed data without notice and shall not be liable for technical inaccuracies and/or omissions. The illustrations used may differ from the original and are intended as an exemplary representation of the product.

1.4 Exclusion from warranty and liability

Wilo shall specifically not assume any warranty or liability in the following cases:

- Inadequate configuration due to inadequate or incorrect instructions by the operator or the client
- Non-compliance with these instructions
- Improper use
- Incorrect storage or transport
- Incorrect installation or dismantling
- Insufficient maintenance
- Unauthorised repairs
- Inadequate construction site
- Chemical, electrical or electrochemical influences
- Wear

2 Safety

This section contains basic information about the individual stages in the life cycle of the pump. Failure to observe this information leads to:

- Danger to persons
- Danger to the environment
- Property damage
- Loss of claims for damages

2.1 Identification of safety instructions

These installation and operating instructions set out safety instructions for preventing personal injury and damage to property. These safety instructions are shown differently:

- Safety instructions relating to personal injury start with a signal word, are **preceded by a corresponding symbol** and are shaded in grey.



DANGER

Type and source of the danger!

Consequences of the danger and instructions for avoidance.

- Safety instructions relating to property damage start with a signal word and are displayed **without** a symbol.

CAUTION

Type and source of the danger!

Consequences or information.

Signal words

- **DANGER!**
Failure to observe the safety instructions will result in serious injuries or death!
- **WARNING!**
Failure to follow the instructions can lead to (serious) injuries!
- **CAUTION!**
Failure to follow the instructions can lead to property damage and a possible total loss.
- **NOTICE!**
Useful information on handling the product

Markups

- ✓ Prerequisite
- 1. Work step/list
 - ⇒ Notice/instructions
 - ▶ Result

Identifying cross references

The name of the section or table is in inverted commas [“ ”]. The page number follows in square brackets [].

Symbols

These instructions use the following symbols:



Danger caused by electric voltage



Danger of bacterial infection



Danger of explosion



Danger caused by explosive atmosphere



Warning of hand injuries (being crushed, cut)



Warning of hot surfaces



General warning symbol



Observe instructions



Useful information

2.2 Personnel qualifications

- Personnel have been instructed on locally applicable regulations governing accident prevention.
- Personnel have read and understood the installation and operating instructions.
- Electrical work: qualified electrician
Person with appropriate technical training, knowledge and experience who can identify and prevent electrical hazards.
- Installation/dismantling work: trained sewage technology professional
Fixation and pipework in wet well and dry well installation, lifting equipment, basic knowledge of wastewater facilities
- Maintenance work: trained sewage technology professional
Application/disposal of operating fluids used, basic engineering knowledge (installation/dismantling)
- Lifting work: trained specialist for the operation of lifting devices
Lifting equipment, lifting gear, attachment points

Children and persons with limited abilities

- Persons under the age of 16: Use of this product is prohibited.
- Persons under the age of 18: Supervise them during use of the product (supervisor)!
- Persons with limited physical, sensory or mental capacities: Use of this product is prohibited!

2.3 Personal protective equipment

The protective equipment specified is the minimum requirement. Observe the requirements of the work regulations.

Protective equipment: Transport, installation, removal and maintenance

- Safety shoes: Protection class S1 (uvex 1 sport S1)
- Protective gloves (EN 388): 4X42C (uvex C500 wet)
- Safety helmet (EN 397): Conforms to standards, protection against lateral deformation (uvex pheos)
(If lifting equipment is used)

Protective equipment: Cleaning work

- Protective gloves (EN ISO 374-1): 4X42C + Type A (uvex protector chemical NK2725B)
- Safety goggles (EN 166): (uvex skyguard NT)
 - Labelling frame: W 166 34 F CE
 - Labelling disc: 0-0.0* W1 FKN CE
 - * Protection level according to EN 170 not relevant for this work.
- Breathing protection mask (EN 149): Half mask 3M series 6000 with filter 6055 A2

Article recommendations

The branded products in the parentheses constitute non-binding suggestions. Similar products from other brands can also be used. Adherence to the standards mentioned is required.

WILO SE does not assume any liability for the adherence of the aforementioned products to the corresponding standards.

2.4 Electrical work

- Electrical work must be carried out by a qualified electrician.
- Disconnect device from the mains and secure it against being switched on again without authorisation.
- Observe applicable local regulations when connecting to the mains power supply.
- Comply with the requirements of the local energy supply company.
- Train personnel on how to make electrical connections.
- Train personnel on the options for switching off the device.
- Observe the technical information in these installation and operating instructions as well as on the rating plate.
- Earth the device.
- Observe provisions for connection to the electrical switching system.
- Comply with the specifications on electro-magnetic compatibility when using electronic start-up controllers (e.g. soft starter or frequency converter). If required, take special measures into account (e.g. shielded cables, filters, etc.).
- Replace defective connection cables. Contact customer service.

2.5 Monitoring devices

The following monitoring devices must be provided on-site:

Circuit breaker

- Design the power and switching characteristics of the circuit breakers according to the rated current of the connected product.
- Observe local regulations.

Motor protection switch

- Product without plug: install a motor protection switch!
The minimum requirement is a thermal relay/motor protection switch with temperature compensation, differential trip and re-activation lock according to local regulations.
- Instable mains supply systems: if necessary, install further protective devices on-site (e.g. overvoltage, undervoltage or phase failure relays, etc.).

Residual-current device (RCD)

- Install a residual-current device (RCD) in accordance with the regulations of the local energy supply company.
- If people can come into contact with the device and conductive fluids, install a residual-current device (RCD).

- 2.6 Fluids hazardous to health** Hazardous germs form in sewage or in stagnant water. There is a danger of bacterial infections!
- Wear protective equipment!
 - Clean and disinfect the product thoroughly after removal!
 - Inform all persons about the pumped fluid and the danger it poses!
- 2.7 Transport**
- Locally applicable laws and regulations on work safety and accident prevention must be complied with.
 - Always carry the product by the handle!
- 2.8 Use of lifting equipment** If lifting equipment (lifting device, crane, chain hoist ...) is used, observe the following points:
- Wear a safety helmet according to EN 397!
 - Comply with local regulations on the use of lifting equipment.
 - The technically correct use of the lifting equipment is the operator's responsibility!
 - **Lifting gear**
 - Use legally specified and approved lifting gear.
 - Select lifting gear based on the attachment point.
 - Attach lifting gear to the attachment point according to local regulations.
 - **Lifting equipment**
 - Check its functions properly before use!
 - Sufficient bearing capacity.
 - Ensure stability during use.
 - **Lifting operation**
 - Do not jam the product when lifting and lowering it.
 - Do not exceed the max. permissible bearing capacity!
 - If necessary (e.g. blocked view), assign a second person to coordinate.
 - No one should stand under suspended loads!
 - Do not move loads over workplaces where persons are present!
- 2.9 Installing/dismantling**
- Locally applicable laws and regulations on work safety and accident prevention must be complied with.
 - Disconnect device from the mains and secure it against being switched on again without authorisation.
 - All rotating parts must stop.
 - Ensure enclosed spaces have sufficient ventilation.
 - When working in enclosed spaces, a second person must be present for safety reasons.
 - Toxic or asphyxiating gases may build up in enclosed spaces or buildings. Observe protective measures in accordance with work regulations, e.g. carry a gas detector with you.

- Clean the device thoroughly.
 - If the product has been used in fluids that are hazardous to health, disinfect the product!
- 2.10 During operation**
- Demarcate and cordon off the working area.
 - No persons are allowed in the working area during operation.
 - Depending on the process, the product is activated and deactivated using separate controls. The product may automatically be activated following power cuts.
 - If the motor emerges, the motor housing can heat up to above 40 °C (104 °F).
 - Superior must be informed immediately of any faults or irregularities.
 - The product must be switched off immediately if faults occur.
 - Never reach into the suction port. The rotating parts can crush and sever limbs.
 - Open all gate valves in the inlet and pressure pipe.
 - Ensure minimum water submersion by using dry-running protection.
 - Sound-pressure level depends on several factors (installation, duty point, etc.). Measure the current noise level under operating conditions. Wear hearing protection at noise levels of 85 dB(A) and over. Demarcate the working area!
- 2.11 Clean and disinfect**
- If a disinfectant is used, wear protective equipment according to the manufacturer's instructions!
 - Inform all persons about the disinfectant and how to use it correctly!
- 2.12 Maintenance tasks**
- Disconnect device from the mains and secure it against being switched on again without authorisation.
 - Clean the device thoroughly.
 - If the product has been used in fluids that are hazardous to health, disinfect the product!
 - Carry out maintenance work in a clean, dry and well-lit place.
 - Only carry out maintenance tasks described in these installation and operating instructions.
 - Only original parts of the manufacturer may be used. The use of any non-original parts releases the manufacturer from any liability.
 - Collect any leakage of fluid and operating fluid immediately and dispose of it according to the locally applicable guidelines.
- 2.13 Operating fluid**
- The following white oils are used:
- ExxonMobile: Marcol 52
 - ExxonMobile: Marcol 82
- General remarks**
- Absorb leakages immediately.

- If major leakages occur, contact customer service.
- If the seal is defective, the oil enters the pumped fluid.

First aid measures

- **Skin contact**
 - Rinse skin areas thoroughly with soap and water.
 - If skin irritation occurs, consult a doctor.
 - In case of contact with open skin, consult a doctor!
- **Eye contact**
 - Remove the contact lenses.
 - Rinse eye thoroughly with water.
 - If eye irritation occurs, consult a doctor.
- **Inhalation**
 - Remove from the contact area!
 - Create air exchange!
 - If the respiratory tract becomes irritated or there is dizziness or nausea, consult a doctor immediately!
- **Ingestion**
 - Consult a doctor **immediately!**
 - **Do not** induce vomiting!

2.14 Operator responsibilities

- Provide installation and operating instructions in a language which the personnel can understand.
- Make sure that the personnel have received the required training for the specified work.
- Provide protective equipment. Ensure that the protective equipment is worn by personnel.
- Ensure that safety and information signs mounted on the device are always legible.
- Train the personnel on how the system operates.
- Fit dangerous components within the system with an on-site guard.
- Demarcate and cordon off the working area.
- Measure the noise level. At noise levels of 85 dB(A) and over, wear hearing protection. Demarcate the working area!

3 Transportation and storage

3.1 Delivery

- After receiving the shipment, check it immediately for defects (damage, completeness).
- Defects must be noted on the freight documentation.
- Defects must be notified to the transport company or the manufacturer on the day of receipt of shipment.
- Subsequently notified defects can no longer be asserted.

3.2 Transport

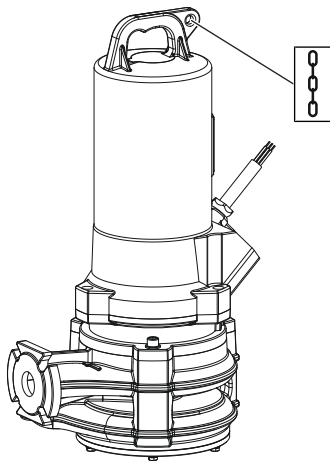


Fig. 1: Slings point

3.3 Storage

- Wear protective equipment! Observe the work regulations.
 - Protective gloves: 4X42C (uvex C500 wet)
 - Safety shoes: Protection class S1 (uvex 1 sport S1)
- Attach the pump to the slinging point!
- Protect the connection cable against water ingress.
- Only remove the outer packaging at the place of utilisation to ensure that the pump is not damaged during transport.
- Use tear-proof plastic sacks of sufficient size to package the used pump for transport in a leak-proof manner.



DANGER

Danger due to fluids which are hazardous to health!

Danger of bacterial infection!

- Disinfect the pump after removal!
- Observe the specifications of the work regulations!



WARNING

Risk of injury from sharp edges on the cutting device!

The macerator has extremely sharp edges. In addition, sharp edges can form on the suction port. There is a danger of cuts!

- Wear protective gloves!
- Do not touch the macerator!

CAUTION

Defective macerator due to objects lying around!

Hard objects can damage the macerator! When setting down, ensure that no objects come into contact with the macerator.

CAUTION

Total damage due to moisture ingress

The ingress of moisture into the connection cable damages the cable and the pump! Never immerse the ends of the connection cable in fluid. Seal them tightly during storage.

- Place the pump upright (vertical) on a firm bearing surface.
- Secure the pump against falling over and slipping!
- Store the pump for a maximum of one year. Consult the customer service before storing the device for more than one year.
- Storage conditions:
 - Maximum: -15 to $+60$ °C (5 to 140 °F), max. humidity: 90 %, non-condensing.
 - Recommended: 5 to 25 °C (41 to 77 °F), relative humidity: 40 to 50 %.
 - Protect the pump from direct exposure to sunlight. Extreme heat can cause damage!
- Do not store the pump in rooms where welding work is carried out. The resulting gases or radiation can corrode the elastomer parts and coatings.
- Seal the suction and discharge connection tightly.

4 Application/use

4.1 Intended use

For pumping in commercial areas of:

- Sewage containing faeces
- Wastewater (with small amounts of sand)

Sewage pumping according to 12050

The pumps meet the requirements of DIN EN 12050-1.

4.2 Improper use



DANGER

Explosion due to pumping of explosive fluids!

Pumping highly inflammable and explosive fluids (e.g. petrol, paraffin, etc.) in their pure form poses a risk of fatal injury due to explosion!

- The pumps are not designed for these fluids.
- The pumping of highly inflammable and explosive fluids is prohibited.

The submersible pumps must **not be used** for pumping:

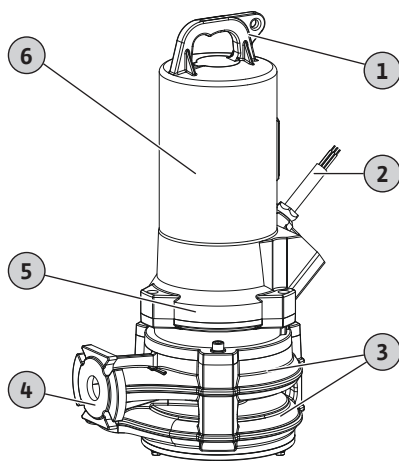
- Untreated sewage
- Drinking water
- Fluids containing hard components (such as stones, wood, metal, etc.)
- Fluids containing high quantities of abrasive contents (e.g. sand, gravel).

Intended use also includes compliance with this manual. Any other use is regarded as non-compliant with intended use.

5 Product description

5.1 Description

Fully submersible grinder pump for stationary and portable wet well installation in continuous operation.



1	Handle/slinging point
2	Connection cable
3	Two-stage hydraulics housing
4	Discharge port
5	Seal housing
6	Motor housing

Rexa PRO-S04 .../T .../O

Two-stage sewage pump with radial macerator with double shear effect. Horizontal discharge port with flange connection. Hydraulics housing and impellers made of grey cast iron; macerator made of hardened cutting steel. Surface-cooled 3~ motor with thermal motor monitoring (temperature controller with two temperatures). Oil-filled sealing chamber with two mechanical seals. Motor housing made of grey cast iron. Connection cable with bare cable ends. Unit with Ex-rating as standard.

Fig. 2: Overview

5.2 Materials

- Pump housing: EN-GJL-250 (ASTM A48 Class 35/40B)
- Impeller: EN-GJL-250 (ASTM A48 Class 35/40B)
- Macerator: 1.4528/59 HRC (AISI 440B+Co)
- Motor housing: EN-GJL-250 (ASTM A48 Class 35/40B)
- Shaft:
 - Up to 2.5 kW: 1.4401 (AISI 316)
 - From 3.9 kW: Stainless steel AISI 1.4021 (420)
- Seal on the motor side: C/MgSiO₄
- Seal on the fluid side: SiC/SiC
- Seal, static: NBR (nitrile)

5.3 Technical data

General	
Date of manufacture* [MFY]	See rating plate
Mains connection [U/f]	See rating plate
Power consumption [P ₁]	See rating plate
Rated power [P ₂]	See rating plate
Max. delivery head [H]	See rating plate
Max. volume flow [Q]	See rating plate
Activation type [AT]	See rating plate
Fluid temperature [t]	3 ... 40 °C (37 ... 104 °F)
Fluid temperature, short-term	60 °C (140 °F) for 3 min
Protection class	IP68
Insulation class [Cl.]	H
Speed [n]	See rating plate
Max. switching frequency	15/h
Cable length	10 m (33 ft)
Immersion depth, max.	20 m (66 ft)
Operating modes	
Immersed	S1
Non-immersed	**
Discharge port	
Flange connection	DN 40/50, PN 16; ANSI B16.1, Size 2, Class 125
Oval connection	-
Extended use	
Explosion protection	IECEX, ATEX, FM
Operation on frequency converter	Allowed

*The date of manufacture is stated in accordance with ISO 8601: JJJJWww

- JJJJ = year
- W = abbreviation for week
- ww = calendar week

** The motor can be run non-immersed. The motor temperature defines the maximum operating time. The motor is fitted with temperature control (thermal motor monitoring with two temperatures) at the factory for this purpose. When the low temperature is reached, the motor switches off. After the motor has cooled down, the motor can switch on again automatically.

CAUTION! If the motor is equipped with a temperature limiter (thermal motor monitoring with one temperature), do not emerge the motor during operation!

5.4 Type key

Example:	Rexa PRO-S03-112A/21T011X540/O
Rexa	Submersible sewage pump
PRO	Series
S	Macerator
03	Nominal diameter of the discharge port: <ul style="list-style-type: none"> • 03 = DN 32/40 • 04 = DN 40/50
112	Hydraulics type
A	Identifier for material and coating type
2	No. of poles
1	IE class
T	Mains connection version: <ul style="list-style-type: none"> • M = single-phase current (1~) • T = three-phase current (3~)

- 11** Value/10 = rated power P_2 in kW
- X** Ex rating
- 5** Mains frequency: 5 = 50 Hz/6 = 60 Hz
- 40** Rated voltage code
- O** Additional electrical equipment:
 - O = with bare cable end
 - P = with plug

5.5 Operation in an explosive atmosphere

IECEX certification

The pumps are suitable for operation in potentially explosive atmospheres:

- Device group: II
- Category: 2, zone 1 and zone 2

These pumps must not be used in zone 0!

ATEX approval

The pumps are suitable for operation in potentially explosive atmospheres:

- Device group: II
- Category: 2, zone 1 and zone 2

These pumps must not be used in zone 0!

FM approval

The pumps are suitable for operation in potentially explosive atmospheres:

- Protection class: Explosionproof
- Category: Class I, Division 1

Notice: If the cabling is carried out according to Division 1, installation in Class I, Division 2 is also permitted.

5.6 Scope of delivery

- Pump
- Installation and operating instructions

5.7 Accessories

- Connection cable with fixed cable lengths up to max. 50 m (164 ft).
- External pencil electrode for monitoring the sealing chamber
- Suspension unit for wet well installation
- Pump support foot for portable installation
- Level control devices
- Fixation sets with anchor bolts
- Fixation accessories and chains
- Switchgear, relays and plugs

6 Installation and electrical connection

6.1 Personnel qualifications

- Electrical work: qualified electrician
Person with appropriate technical training, knowledge and experience who can identify and prevent electrical hazards.
- Installation/dismantling work: trained sewage technology professional
Fixation and pipework in wet well and dry well installation, lifting equipment, basic knowledge of wastewater facilities

6.2 Installation types

- Vertical stationary wet well installation with suspension unit
- Vertical portable wet well installation with pump support foot

6.3 Operator responsibilities

- Observe locally applicable accident prevention and safety regulations.
- Observe all regulations for working with heavy loads and under suspended loads.
- Provide protective equipment. Ensure that the protective equipment is worn by personnel.
- Observe local sewage technology regulations for the operation of sewage systems.
- Avoid pressure surges!
Pressure surges can occur in long pressure pipes with steep terrain. These pressure surges can lead to the destruction of the pump!
- Ensure the cooling time of the motor depending on the operating conditions and the size of the pump chamber.

- Structural components and foundations must be of sufficient stability in order to allow the device to be fixed in a secure and functional manner. The operator is responsible for the provision and suitability of the structural component/foundation!
- Check that the available consulting documents (installation plans, installation location, inflow conditions) are complete and accurate.

6.4 Installation



DANGER

Danger of death due to dangerous lone working practices!

Work in chambers and narrow rooms as well as work involving risk of falling are dangerous work. Such work may not be carried out autonomously!

- Only carry out work with another person!

- Wear protective equipment! Observe the work regulations.
 - Protective gloves: 4X42C (uvex C500 wet)
 - Safety shoes: Protection class S1 (uvex 1 sport S1)
 - Safety helmet: EN 397 Conforms to standards, protection against lateral deformation (uvex pheos)
(When using lifting equipment)
- Prepare the installation site:
 - Clean, free of coarse solids
 - Dry
 - Frost-free
 - Disinfected
- Toxic or asphyxiating gases may build up during work:
 - Observe protective measures in accordance with work regulations (gas measurement, carry a gas detector with you).
 - Ensure adequate ventilation.
 - If toxic or asphyxiating gases accumulate, leave the workplace immediately!
- Always carry the pump by the handle!
- Install lifting equipment: even surface, clean, firm base. Warehouse and installation location must be easily accessible.
- Attach chain or wire rope to handle/attachment point with a shackle. Only use lifting gear that has been technically approved.
- All connection cables must be laid properly. The connection cables must not pose any risk (i.e. tripping, damage during operation). Check whether the cable cross-section and the cable length are sufficient for the selected installation type.
- Installation of switchgear: Observe information in the manufacturer's instructions (IP class, overflow-proof, potentially explosive atmospheres)!
- Avoid air intake into the fluid. Use baffles or deflector plates at the inlet. Install the ventilation systems!
- Do not allow the pump to run dry! Avoid air pockets. Do not go below the minimum water level. Installation of dry-running protection is recommended!

6.4.1 Indications for double pump operation

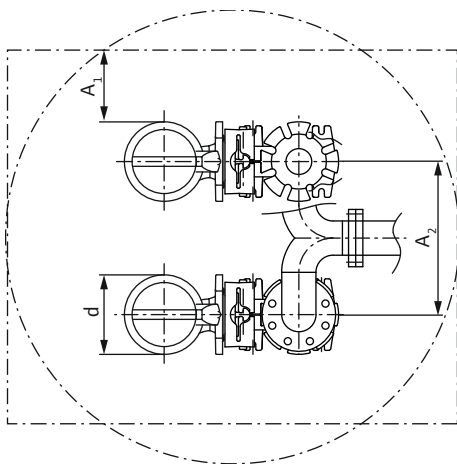


Fig. 3: Minimum distances

6.4.2 Maintenance tasks

6.4.3 Stationary wet well installation

If several pumps are used in an operating space, minimum distances between the pumps and the wall must be complied with. Here there is a difference in the distances depending on the type of system: Alternating operation or parallel operation.

d	Diameter hydraulics housing
A ₁	Minimum distance from the wall: - alternating operation: min. $0.3 \times d$ - parallel operation: min. $1 \times d$
A ₂	Distance to pressure pipes - alternating operation: min. $1.5 \times d$ - parallel operation: min. $2 \times d$

After a storage period of more than 12 months, carry out the following maintenance tasks before installation:

- Check the oil in the sealing chamber and replace it if necessary. See section “Oil change in sealing chamber”.

The pump is installed in a pump chamber or basin. A suspension unit is installed to connect the pump to the pressure pipe. The on-site pressure pipe is connected to the suspension unit. The pump is connected to the suspension unit via a coupling connection.

The pressure pipe must meet the following requirements:

- The connected pressure pipe is self-supporting. The pressure pipe must **not** be supported by the suspension unit!
- The pressure pipe must not be smaller than the pump’s discharge connection.
- All prescribed valves (gate valves, backflow preventers ...) are present.
- Pressure pipe laid frost-proof.
- Ventilation systems (e.g. air vent valves) installed. Air pockets in the pump and in the pressure pipe can lead to delivery problems.

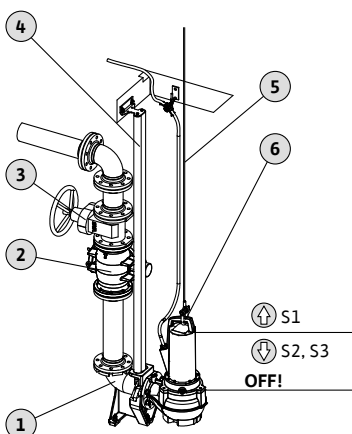


Fig. 4: Stationary wet installation

1	Suspension unit
2	Non-return valve
3	Stop valve
4	Guide pipes (provided by the customer)
5	Lifting accessories
6	Slings point for lifting accessories
⬆	Fill level above: Immersed operating mode
⬇	Fill level below: Non-immersed operating mode

- ✓ Place of use prepared.
- ✓ Suspension unit installed.
- ✓ Coupling connection mounted on the pump.

1. Use a shackle to attach the lifting equipment to the attachment point on the pump.
2. Lift the pump and swing it over the opening of the pump chamber.
3. Slowly drain the pump and thread the guide pipes into the coupling connection.
4. Lower the pump until it sets on the suspension unit and is connected automatically.
CAUTION! Hold the connection cables slightly taut when lowering the pump!
5. Loosen the lifting gear from the lifting equipment and secure it against falling at the pump chamber outlet.

6. Correctly route the connection cables and lead them out of the pump chamber. **CAUTION! Do not damage the connection cables!**
 - No chafing or kinking.
 - Do not immerse the cable end in the fluid.
 - Observe the bending radii.
 - ▶ Pump installed, make the electrical connection.

6.4.4 Portable wet well installation

Attach the pump support foot (available separately as an accessory) to the pump. The pump support foot allows the pump to be positioned anywhere at the place of use. A pressure hose is connected on the discharge side.

- Use a hard surface or underlay at the place of use to prevent sinking on a soft bearing surface.
- If the pump is used at the same location for a longer period of time, bolt the pump support foot to the floor. This reduces vibrations and enables quiet operation.

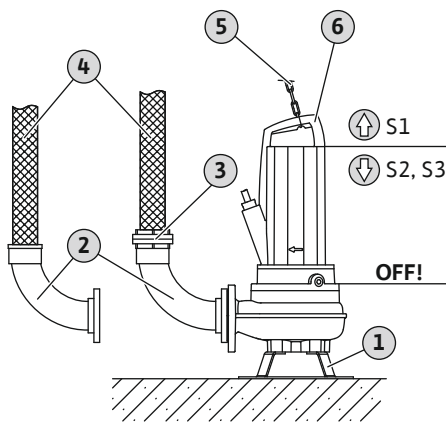


Fig. 5: Wet installation, portable

1	Pump support foot
2	Pipe elbow with hose connection or Storz fixed coupling
3	Storz hose coupling
4	Pressure hose
5	Lifting accessories
6	Slinging point
⬆	Fill level above: Immersed operating mode
⬇	Fill level below: Non-immersed operating mode

- ✓ Place of use prepared.
- ✓ Pump support foot mounted.
- ✓ Discharge connection prepared: Hose connection or Storz coupling fitted.
- ✓ Soft bearing surface: solid surface available.

1. Use a shackle to attach the lifting equipment to the attachment point on the pump.
2. Lift and align the pump at the installation location.
3. Place the pump on a firm bearing surface. Avoid sinking!
4. Secure the pump against moving and falling over: Bolt the pump support foot to the floor.
5. Lay the pressure hose and fasten it properly at the appropriate place (e.g. drainage).
6. Correctly route the connection cables. **CAUTION! Do not damage the connection cables!**
 - No chafing or kinking.
 - Do not immerse the cable end in the fluid.
 - Observe the bending radii.
 - ▶ Pump installed, make the electrical connection.

6.4.5 Level control

Provide a level control on site for level-dependent control of the pump.



DANGER

Risk of explosion due to incorrect installation!

If the level control device is installed within a potentially explosive atmosphere, there is a risk of explosion if the level control device is connected incorrectly!

- Always have connection carried out by a qualified electrician.
- Signal transmitter must be connected via an Ex cut-off relay or a Zener barrier.

6.4.6 Dry-running protection

Dry-running protection prevents the pump from being operated without fluid and air from entering the hydraulics. For this purpose, the minimum permissible fill level is monitored using an external control. When the minimum fill level is reached, the pump is switched off. Furthermore, depending on the control, a visual and acoustic alarm is triggered.

The dry-running protection can be integrated into existing controls as an additional measuring point. Alternatively, the dry-running protection can also work as a stand-alone shut-off device. Depending on the system security, the pump can be restarted automatically or manually.

Installation of dry-running protection is recommended for optimum operational reliability.

6.5 Electrical connection



DANGER

Risk of fatal injury due to electrical current!

Improper conduct when carrying out electrical work can lead to death due to electric shock!

- Electrical work must be carried out by a qualified electrician!
- Observe local regulations!



DANGER

Risk of explosion due to incorrect connection!

If the pump is used inside potentially explosive atmospheres, there is a risk of fatal injury from explosion if the connection is incorrect! If used in potentially explosive atmospheres:

- The connection must always be carried out by a qualified electrician.
- Always connect the pump to an electrical outlet outside the explosive area. If the connection must be established within explosive atmospheres, the connection must be carried out in an Ex-rated housing (ignition protection class according to DIN EN 60079-0)!
- Connect the equipotential bonding conductor to the earth terminal indicated. The earth terminal is installed in the area near the connection cables. Use cable cross-sections as per locally applicable regulations for the equipotential bonding conductor.
- Connect thermal motor monitoring using an Ex-certified evaluation relay.
- The temperature limit deactivation must take place with a reactivation lock.
Reactivation must only be possible if an unlock button has been pressed manually!
- Connect the external pencil electrode via an Ex-approved evaluation relay with an intrinsically safe circuit.
- Observe the further information in the explosion protection section for the electrical connection!

- Mains connection corresponds to the information on the rating plate.
- Power supply on mains side with clockwise rotating field for three-phase AC motors (3-motor).
- Route the connection cables according to the local regulations and connect them according to the wire assignment.
- Connect **all** of the monitoring devices and check their function.
- Secure the earthing in accordance with the local regulations.

6.5.1 Fuse on mains side

Circuit breaker

- Design the power and switching characteristics of the circuit breakers according to the rated current of the connected product.
- Observe local regulations.

Motor protection switch

- Product without plug: install a motor protection switch!
The minimum requirement is a thermal relay/motor protection switch with temperature compensation, differential trip and reactivation lock according to local regulations.
- Instable mains supply systems: if necessary, install further protective devices on-site (e.g. overvoltage, undervoltage or phase failure relays, etc.).

6.5.2 Maintenance tasks

6.5.2.1 Checking the insulation resistance of the motor winding

6.5.2.2 Test the resistor of the temperature sensor

6.5.3 Connection of the three-phase AC motor (3~ motor)

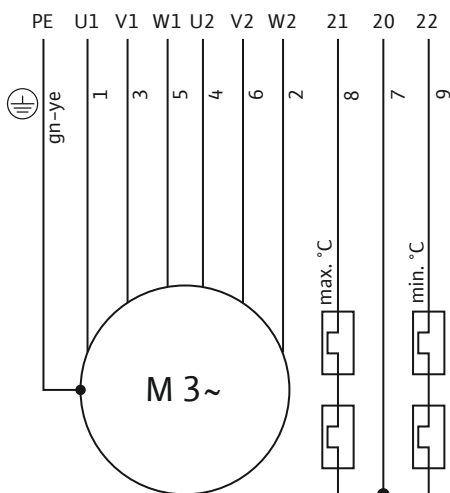


Fig. 6: Connection diagram 3~ motor: Star-delta starting, bimetallic sensor

6.5.4 Optional equipment

Residual-current device (RCD)

- Install a residual-current device (RCD) in accordance with the regulations of the local energy supply company.
- If people can come into contact with the device and conductive fluids, install a residual-current device (RCD).

- Check the insulation resistance of the motor winding.
- Check the resistance of the temperature sensors.

✓ Insulation tester 1000 V

✓ Motors with **capacitor**: Short-circuited windings!

1. Check the insulation resistance.

⇒ Measured value at initial commissioning: $\geq 20 \text{ M}\Omega$.

⇒ Measured value at interval measurement: $\geq 2 \text{ M}\Omega$.

▶ Insulation resistance checked. If the measured values deviate from the specifications, consult the customer service.

✓ Ohmmeter available.

1. Measure the resistance.

⇒ Measured value **Bimetallic strip**: 0 ohms (passage).

⇒ Measured value **3x PTC sensor**: between 60 and 300 ohm.

⇒ Measured value **4x PTC sensor**: between 80 and 400 ohm.

▶ Resistance checked. If the measured value deviates from the specification, consult the customer service.

Wire	Designation	Terminal
7	20	Thermal motor monitoring: Centre connection
8	21	Thermal motor monitoring: high temperature
9	22	Thermal motor monitoring: low temperature
1	U1	L1 (winding start)
3	V1	L2 (winding start)
5	W1	L3 (winding start)
4	U2	L1 (winding end)
6	V2	L2 (winding end)
2	W2	L3 (winding end)
Green/yellow (gn-ye)	PE	Earth

- Connection cable with bare cable ends.
- Connection in the switchgear according to the connection diagram.
- Mains connection with clockwise-rotating field
- Thermal motor monitoring:
 - Sensor: Bimetallic sensor
 - Number of temperature circuits: 2, temperature controller
 - Connection values: max. 250 V~, 2.5 A, $\cos \phi = 1$
 - Threshold value: is set by sensor.
 - Trigger state:
 - Low temperature (wire 7/9): Switch off pump – automatic restart.
 - High temperature (wire 7/8): Switch off pump – **manual** (by hand) reactivation.

Information on electrical accessory connection or possible special configurations. Please refer to the order confirmation or configuration overview for details on the special configuration.

6.5.4.1 Connection of three-phase AC motor (3~ motor) with PTC sensor

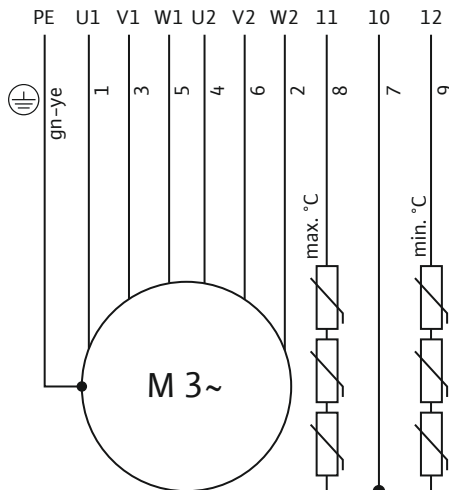


Fig. 7: Connection diagram 3~ motor: Star-delta starting, PTC sensor

Wire	Designation	Terminal
7	10	Thermal motor monitoring: Centre connection
8	11	Thermal motor monitoring: high temperature
9	12	Thermal motor monitoring: low temperature
1	U1	L1 (winding start)
3	V1	L2 (winding start)
5	W1	L3 (winding start)
4	U2	L1 (winding end)
6	V2	L2 (winding end)
2	W2	L3 (winding end)
Green/yellow (gn-ye)	PE	Earth

- Thermal motor monitoring:
 - The connection must be made via an evaluation relay (e.g. “CM-MSS”).
 - Sensor: PTC sensors
 - Number of temperature circuits: 2, temperature controller
 - Connection values: 2.5 to 7.5=; max. 30 V=
 - Threshold value: is set by sensor.
 - Trigger state:
 - Low temperature (wire 7/9): Switch off pump – automatic restart.
 - High temperature (wire 7/8): Switch off pump – **manual** (by hand) reactivation.

6.5.4.2 Connection of thermal motor monitoring as temperature limiter

Thermal motor monitoring is designed as a temperature controller (2 temperature circuit) as standard. Optionally, the thermal motor monitoring can also be designed as temperature limiter (1 temperature circuit):

- Sensor:
 - Bimetallic sensor: Wire labelling 20/21
 - PTC sensor: Wire labelling 10/11
- Triggering status: If the threshold value is reached, switch off the pump. Reactivation **must be done manually** (by hand)!

When connecting within potentially explosive atmospheres, observe further information in the explosion protection section!

6.5.4.3 Connection external pencil electrode

CAUTION

Trigger status for sealing chamber monitoring

The pencil electrode detects water ingress into the sealing chamber. The threshold value is reached when a certain amount of water is present in the oil. An alarm is triggered or the pump is switched off via the evaluation relay:

- The pump may be a total loss if only an alarm occurs.
- Recommendation: Always switch off the pump!

The connection must be made via an evaluation relay (e.g. “NIV 101/A”):



- Sensor: Electrode
- Connection values: max. 250 V~, 2.5 A, cos phi = 1
- Threshold: 30 kOhm
- Triggering status: If the threshold value is reached, trigger the alarm or switch off the pump!

6.5.5 Motor protection adjustment

6.5.5.1 Direct activation

- **Full load**
Set the motor protection to the rated current according to the rating plate.
- **Partial load operation**
Set the motor protection to 5 % above the current measured at the duty point.

6.5.5.2 Star-delta starting

6.5.5.3	Soft starter	<ul style="list-style-type: none"> • The motor protection setting depends on the installation: <ul style="list-style-type: none"> – Motor protection in the motor line: Set the motor protection to 0.58 x rated current. – Motor protection installed in the mains supply cable: Set the motor protection to the rated current. • The maximum start-up time in the star connection: 3 s • Full load Set the motor protection to the rated current according to the rating plate. • Partial load operation Set the motor protection to 5 % above the current measured at the duty point. <p>Please observe the following points:</p> <ul style="list-style-type: none"> • Current consumption must always be below the rated current. • Complete starting and stopping within 10 s. • To avoid power dissipation, bypass the electronic starter (soft start) once normal operation is reached.
6.5.6	Operation with frequency converter	Operation on the frequency converter is permitted. Refer to the appendix for the relevant requirements!
7	Commissioning	<hr/> <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px; text-align: center;">  </div> <div> <p>NOTICE</p> <p>Automatic activation after power cut</p> <p>Depending on the process, the product is switched on and off using separate controls. The product may automatically switch on following power cuts.</p> </div> </div> <hr/>
7.1	Personnel qualifications	<ul style="list-style-type: none"> • Operation/control: Operating personnel, instructed in the functioning of the complete system
7.2	Operator responsibilities	<ul style="list-style-type: none"> • Providing installation and operating instructions by the pump or at a place specially reserved for it. • Making the installation and operating instructions available in the language of the personnel. • Making sure that the installation and operating instructions are read and understood by all personnel. • All safety devices and emergency cut-outs on the system-side must be active and checked to ensure that they work properly. • The pump is suitable for use under the specified operating conditions.
7.3	Direction of rotation check for three-phase AC motor	<p>The pump has been checked and adjusted to the correct direction of rotation at the factory. To allow the correct direction of rotation, a clockwise rotating field must be available at the mains connection. The pump is not approved for operation with a counter-clockwise rotating field!</p> <ul style="list-style-type: none"> • Check the direction of rotation. Check the rotating field at the mains connection with a rotating-field testing device. • Correct the direction of rotation. If the direction of rotation is incorrect, change the connection as follows: <ul style="list-style-type: none"> – Direct starting: swap two phases. – Star-delta starting: Swap the connections of two windings (e.g. U1/V1 and U2/V2).
7.4	Operation in an explosive atmosphere	<div style="display: flex; align-items: flex-start;"> <div style="margin-right: 10px; text-align: center;">  </div> <div> <p>DANGER</p> <p>Risk of explosion due to flying sparks in the hydraulics!</p> <p>The hydraulics must be completely filled with pumped fluid during operation. If air cushions form in the hydraulics, there is a risk of explosion due to sparking!</p> <ul style="list-style-type: none"> • Prevent air intake into the fluid. Install deflector plate at inlet. • Do not allow the hydraulics to emerge. Switch off the pump at the appropriate level. • Install additional dry-running protection. • Carry out dry-running protection with a reactivation lock. </div> </div>

Overview of Ex ratings

- IECEx certification: yes
- Approval according to ATEX: yes
- Approval according to FM: yes
- Approval according to CSA-Ex: **no**

Identification of Ex-rated pumps

The pump is labelled as follows on the rating plate for use in explosive atmospheres:

- “Ex” symbol of the corresponding approval
- Ex classification

Observe the explosion protection section!

7.5 Before switching on

Check the following prior to activation:

- Has the electrical connection been carried out in accordance with regulations?
- Has the connection cable been routed safely?
- Can the float switch move freely?
- Accessories attached correctly?
- Temperature of the pumped fluid observed?
- Immersion depth observed?
- Are the pressure pipe and pump sump free of deposits?
- All gate valves in the pressure pipe open?
- Are ventilation systems present in the pressure pipe?
Air pockets in the pump and in the pressure pipe can lead to delivery problems.

7.6 Switching on and off

- When the pump starts, the rated current is exceeded for a short time.
- During operation, do not exceed the rated current any more.

CAUTION! Material damage! If the pump does not start, switch off the pump immediately. Motor failure! Remove the fault first before reactivation.

Observe the following points for transportable installation:

- Place the pump on a firm bearing surface. Avoid sinking!
- If the pump has fallen over, place it upright again before activating it.
- If the pump “moves away”, screw the pump to the ground.

Pump with bare cable end

The pump is switched on and off using a separate operating point (on/off switch, switchgear) provided by the customer.

7.7 During operation



WARNING

Risk of injury from rotating components!

No persons are allowed to be present in the working area of the pump. There is a risk of injury!

- Demarcate and cordon off the working area.
- If there are no persons in the working area, activate the pump.
- If persons enter the working area, switch off the pump immediately.



WARNING

Risk of burns from hot surfaces!

Motor housing can become hot during operation. It may cause burns.

- Allow the pump to cool down at ambient temperature after switching it off!

CAUTION

Do not allow the pump to dry run!

Dry running of the pump is prohibited. When the minimum delivery level is reached, switch off the pump. Dry running may destroy the seal and cause the pump to be irreparably damaged.



NOTICE

Emerge the motor during operation

The motor is fitted with a temperature controller at the factory. This can emerge the motor during operation. The motor temperature defines the maximum operating time in the non-immersed state.

- Connect thermal motor monitoring with temperature controller correctly!
 - Low temperature: Switch off pump – **automatic** reactivation.
 - High temperature: Switch off pump – **manual** (by hand) reactivation.
- If the motor is equipped with a temperature limiter, **do not emerge** the motor during operation!



NOTICE

Cleaning cloths and wipes can cause clogging in the macerator!

To prevent cleaning cloths and wipes in the fluid, mechanically pre-clean the incoming fluid.



NOTICE

Pumping problems due to water level being too low

The hydraulics are self-venting. Smaller air cushions are resorbed during pumping. If the fluid is lowered too much, separation of the volume flow may occur. The minimum permissible water level must reach the upper edge of the hydraulics housing!

Please regularly check the following points:

- Inlet quantity corresponds to the pump delivery rate.
- The level control device and dry-running protection work correctly.
- Minimum water submersion ensured.
- Connection cable is not damaged.
- Pump free from deposits and encrustations.
- No air intake in the pumped fluid.
- All gate valves open.
- Quiet and low-vibration running.
- Max. switching frequency not exceeded.
- Mains connection tolerances:
 - Operating voltage: +/- 10 %
 - Frequency: +/- 2 %
 - Current consumption between the individual phases: max. 5 %
 - Voltage difference between the individual phases: max. 1 %

8 Shut-down/dismantling

8.1 Personnel qualifications

- Operation/control: Operating personnel, instructed in the functioning of the complete system
- Electrical work: qualified electrician
Person with appropriate technical training, knowledge and experience who can identify and prevent electrical hazards.
- Installation/dismantling work: trained sewage technology professional
Fixation and pipework in wet well and dry well installation, lifting equipment, basic knowledge of wastewater facilities

8.2 Operator responsibilities

- Locally applicable accident prevention and safety regulations of trade associations.
- Observe regulations for working with heavy loads and under suspended loads.
- Provide the necessary protective equipment and make sure that the personnel wears it.

- Provide adequate aeration in closed rooms.
- Take immediate countermeasures if there is a build-up of toxic or suffocating gases!

8.3 Shut-down

The pump is deactivated, but remains installed. This ensures that the pump is always ready for operation.

- ✓ Completely immerse the pump in the fluid to protect the pump from frost and ice.
- ✓ Minimum fluid temperature: +3 °C (+37 °F).

1. Switch off the pump.
2. Secure the operating point against being switched on again by unauthorised persons (e.g. lock main switch).
 - ▶ The pump is decommissioned.

If the pump remains installed after decommissioning, observe the following points:

- Ensure that the aforementioned requirements are maintained for the complete period of shutdown. Remove the pump if meeting these requirements cannot be guaranteed!
- For an extended period of shutdown, carry out a function test at regular intervals:
 - Period: monthly to quarterly
 - Running time: 5 minutes
 - Only run a function test in valid operating conditions!

8.4 Removal



DANGER

Danger due to fluids which are hazardous to health!

Danger of bacterial infection!

- Disinfect the pump after removal!
- Observe the specifications of the work regulations!



DANGER

Risk of fatal injury due to electrical current!

Improper conduct when carrying out electrical work can lead to death due to electric shock!

- Electrical work must be carried out by a qualified electrician!
- Observe local regulations!



DANGER

Danger of death due to dangerous lone working practices!

Work in chambers and narrow rooms as well as work involving risk of falling are dangerous work. Such work may not be carried out autonomously!

- Only carry out work with another person!



WARNING

Risk of burns from hot surfaces!

Motor housing can become hot during operation. It may cause burns.

- Allow the pump to cool down at ambient temperature after switching it off!

Wear the following protective equipment while performing the work:

- Safety shoes: Protection class S1 (uvex 1 sport S1)
- Protective gloves: 4X42C (uvex C500 wet)
- Safety helmet: EN 397 Conforms to standards, protection against lateral deformation (uvex pheos)
(When using lifting equipment)

If contact with hazardous fluid occurs during work, wear the following additional protective equipment:

- Safety goggles: uvex skyguard NT
 - Labelling frame: W 166 34 F CE
 - Labelling disc: 0–0.0* W1 FKN CE
- Breathing protection: Half mask 3M series 6000 with filter 6055 A2

The protective equipment specified is the minimum requirement. Observe the specifications of the work regulations!

* Protection level according to EN 170 not relevant for this work.

8.4.1 Stationary wet well installation

- ✓ Pump is decommissioned.
 - ✓ Gate valves on the inlet and pressure sides are closed.
1. Disconnect the pump from the mains.
 2. Attach the lifting equipment to the attachment point.
 3. Slowly raise the pump and lift it over the guide pipes out of the operating space. **CAUTION! Do not damage the connection cable! Hold the connection cables slightly taut when lifting!**
 4. Coil up the connection cables and attach them to the motor.
 - Do not kink.
 - Do not crush.
 - Observe the bending radii.
 5. Thoroughly clean the pump (see section “Cleaning and disinfecting”).

8.4.2 Portable wet well installation

- ✓ Pump has been decommissioned.
1. Disconnect the pump from the mains.
 2. Coil up the connection cables and attach them to the motor.
 - Do not kink.
 - Do not crush.
 - Observe the bending radii.
 3. Loosen the pressure pipe from the pressure port.
 4. Attach the lifting equipment to the attachment point.
 5. Lift the pump out of the operating space. **CAUTION! Do not damage the connection cable! Pay attention to the connection cable when setting down the pump!**
 6. Thoroughly clean the pump (see section “Cleaning and disinfecting”).

8.4.3 Clean and disinfect

- Wear protective equipment! Observe the work regulations.
 - Safety shoes: Protection class S1 (uvex 1 sport S1)
 - Breathing protection: Half mask 3M series 6000 with filter 6055 A2
 - Protective gloves: 4X42C + Type A (uvex protector chemical NK2725B)
 - Safety goggles: uvex skyguard NT
 - Use of disinfectants:
 - Use strictly according to the manufacturer’s instructions!
 - Wear protective equipment according to the manufacturer’s instructions!
 - Dispose of rinsing water in accordance with the local regulations, e.g. feed it into the sewer!
 - ✓ Pump removed.
1. Ensure that the plug or bare cable ends are packed and stored in a watertight manner!
 2. Attach the lifting equipment to the attachment point on the pump.
 3. Lift the pump approximately 30 cm (10 in) above the ground.
 4. Spray the pump with clean water from top to bottom.
 5. Guide the water jet inwards through the discharge port to clean the impeller and pump interior.
 6. Disinfect the pump.
 7. Dispose of dirt residue on the ground, e.g. flush it into the sewer.
 8. Allow the pump to dry out.

9 Maintenance and repair

- 9.1 Personnel qualifications**
- Electrical work: qualified electrician
Person with appropriate technical training, knowledge and experience who can identify and prevent electrical hazards.
 - Maintenance work: trained sewage technology professional
Application/disposal of operating fluids used, basic engineering knowledge (installation/dismantling)
- 9.2 Operator responsibilities**
- Provide the necessary protective equipment and make sure that the personnel wears it.
 - Collect operating fluids in suitable tanks and dispose of properly.
 - Dispose of protective clothing used in accordance with regulations.
 - Use only original parts of the manufacturer. The use of any non-original parts releases the manufacturer from any liability.
 - Collect any leakage of fluid and operating fluid immediately and dispose of it according to the locally applicable guidelines.
 - Provide the tools required.
 - If flammable solvents and cleaning agents are used, fire, naked flames and smoking are prohibited.
 - Document maintenance tasks in the system's inspection list.
- 9.3 Operating fluid**
- 9.3.1 Oil types**
- ExxonMobile: Marcol 52
 - ExxonMobile: Marcol 82
 - Total: Finavestan A 80 B (NSF-H1 certified)
- 9.3.2 Filling quantities**
- The filling quantity is 1,800 ml (61 US.fl.oz.).
- 9.4 Maintenance intervals**
- Regularly carry out maintenance tasks.
 - Contractually adjust maintenance intervals depending on the actual environmental conditions. Contact customer service.
 - If strong vibrations occur during operation, check the installation.
- 9.4.1 Maintenance intervals for normal conditions**
- 8000 operating hours or after 2 years**
- Visual inspection of the connection cables
 - Visual inspection of accessories
 - Visual inspection of the coating and housing
 - Function test of monitoring devices
 -
- Sealing chamber oil change **NOTICE! If a sealing chamber monitoring is installed, the oil is changed according to the indicator!**
- 15,000 operating hours or after 10 years**
- Complete overhaul
- 9.4.2 Maintenance intervals for use in sewage lifting units**
- When the pump is used in sewage lifting units inside buildings or on plots of land, carry out maintenance intervals and measures in accordance with **DIN EN 12056-4!**
- 9.4.3 Maintenance intervals for harsh conditions**
- Under the following operating conditions, shorten the specified maintenance intervals in consultation with the customer service:
- Fluids with long-fibre components
 - Turbulent inlet (e.g. due to air entry, cavitation)
 - Highly corrosive or abrasive fluids
 - Strongly gassing fluids
 - Operation at an unfavourable duty point
 - Pressure surges
- If there are harsh operating conditions, it is recommended to conclude a maintenance contract.

9.5 Maintenance measures



WARNING

Risk of injury from sharp edges on the cutting device!

The macerator has extremely sharp edges. In addition, sharp edges can form on the suction port. There is a danger of cuts!

- Wear protective gloves!
- Do not touch the macerator!

Before starting maintenance work, meet the following requirements:

- Wear protective equipment! Observe the work regulations.
 - Safety shoes: Protection class S1 (uvex 1 sport S1)
 - Protective gloves: 4X42C (uvex C500 wet)
 - Safety goggles: uvex skyguard NT
- For detailed marking of frame and disc, see the section on “Personal protective equipment [► 6]”.
- The pump has been thoroughly cleaned and disinfected.
 - Motor must have cooled down to the ambient temperature.
 - Workplace:
 - Clean, good lighting and ventilation.
 - Firm and stable work surface.
 - Secured against falling over and slipping.

NOTICE! Only perform the maintenance work described in these installation and operating instructions.

9.5.1 Recommended maintenance measures	Regular inspection of power consumption and the operating voltage in all three phases is recommended for smooth operation. In normal operation, these values remain constant. Slight fluctuations depend on the characteristics of the fluid. Power consumption can provide an early indication of damage or malfunctions in the impeller, bearings or motor, which can be rectified. Larger voltage fluctuations strain the motor winding and can cause the pump to break down. Regular inspections can therefore largely prevent major secondary damage and reduce the risk of total breakdown. In this regard, it is recommended to use remote monitoring for regular inspections.
9.5.2 Visual inspection of the connection cable	<p>Check connection cable for:</p> <ul style="list-style-type: none"> • Bubbles • Cracks • Scratches • Abrasion • Pinch points <p>If the connection cable is damaged:</p> <ul style="list-style-type: none"> • Decommission the pump immediately! • Have the connection cable replaced by the customer service! <p>CAUTION! Material damage! Damaged connection cables cause water to enter the motor. Water in the motor leads to total damage of the pump.</p>
9.5.3 Visual inspection of accessories	<p>Accessories must be checked for:</p> <ul style="list-style-type: none"> • Correct fixation • Smooth function • Signs of wear, e.g. cracks caused by frequencies <p>Any defects detected must be repaired immediately or the accessories must be replaced.</p>
9.5.4 Visual inspection of the coatings and housings	<p>Coatings and housings must not show any damage. If there are defects, observe the following:</p> <ul style="list-style-type: none"> • Repair damaged coating. Order repair kits from the customer service. • If housings are worn out, consult the customer service!
9.5.5 Function test of the monitoring device	To test resistances, the pump must be cooled down to the ambient temperature!
9.5.5.1 Test the resistor of the temperature sensor	<ul style="list-style-type: none"> ✓ Ohmmeter available. <ol style="list-style-type: none"> 1. Measure the resistance.

- ⇒ Measured value **Bimetallic strip**: 0 ohms (passage).
- ⇒ Measured value **3x PTC sensor**: between 60 and 300 ohm.
- ⇒ Measured value **4x PTC sensor**: between 80 and 400 ohm.
- ▶ Resistance checked. If the measured value deviates from the specification, consult the customer service.

9.5.5.2 Testing the resistor of the external electrode for sealing chamber control

- ✓ Ohmmeter available.
- 1. Measure the resistance.
 - ⇒ Measured values “infinite (∞)”: Monitoring device OK.
 - ⇒ Measured value ≤ 30 kOhm: Water in oil. Change oil.
 - ▶ Resistance checked. If the measured value still deviates after the oil change, consult customer service.

9.5.6 Oil change in sealing chamber



WARNING

Operating fluid under pressure!

High pressure can build up in the motor! This pressure is released when the screw plugs are **opened**.

- If screw plugs are opened without due caution, they can be ejected at high speed!
- Hot operating fluid may spray out!
 - Wear protective equipment!
 - Allow the motor to cool down to ambient temperature before carrying out any work!
 - Adhere to the prescribed sequence of work steps!
 - Unscrew the screw plugs slowly.
 - As soon as the pressure escapes (audible whistling or hissing of air), stop turning the screw plug any further!
 - Only when the pressure has been completely released, fully unscrew the screw plug.

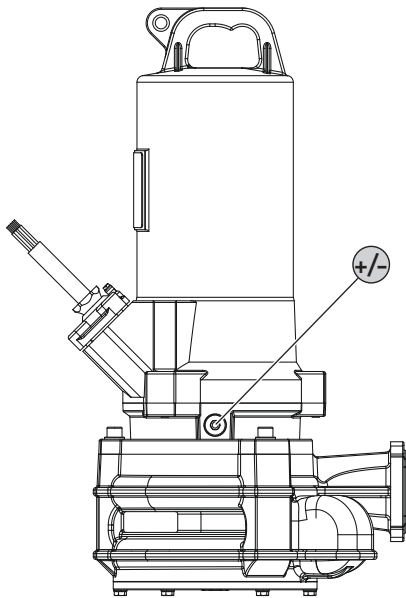


Fig. 8: Sealing chamber: Oil change

+/- Sealing chamber screw plug

- ✓ Protective equipment used!
 - ✓ Pump has been removed, cleaned and disinfected.
1. Place the pump on a firm work surface in a horizontal position. The screw plug should face upwards.
 2. Secure the pump against falling over and slipping!
 3. Unscrew the screw plug slowly.
 4. When the pressure has been released, completely unscrew the screw plug.
 5. Position a suitable tank to collect the operating fluid.
 6. Drain the operating fluid: Rotate the pump until the opening points downwards.
 7. Check the operating fluid:
 - ⇒ Operating fluid clear: Operating fluid can be reused.
 - ⇒ Operating fluid contaminated (black): fill with new operating fluid.
 - ⇒ Operating fluid milky/cloudy: Water in oil. Minor leakage through the mechanical seal is normal. If the ratio of oil to water is less than 2:1, the mechanical seal may be damaged. Change the oil and check again four weeks later. If water is again present in the oil during the second check, contact customer service!
 - ⇒ Metal chips in the operating fluid: Contact the customer service!
 8. Pour in operating fluid: Rotate the pump until the opening points upwards. Pour the operating fluid into the opening.
 - ⇒ Comply with the specifications for the operating fluid type and quantity!
 9. Clean the screw plug, replace the seal ring and screw it back in. **Max. tightening torque: 8 Nm (5.9 ft-lb)!**

9.5.7 General overhaul

During the general overhaul, the motor bearings, shaft sealings, O-rings and connection cables are checked for wear and damage. Damaged components are replaced with original parts. This ensures correct operation.

The general overhaul is performed by the manufacturer or an authorised service centre.

9.6 Repairs



WARNING

Risk of injury from sharp edges on the cutting device!

The macerator has extremely sharp edges. In addition, sharp edges can form on the suction port. There is a danger of cuts!

- Wear protective gloves!
- Do not touch the macerator!

The following preconditions must be met prior to starting repair work:

- Wear protective equipment! Observe the work regulations.
 - Safety shoes: Protection class S1 (uvex 1 sport S1)
 - Protective gloves: 4X42C (uvex C500 wet)
 - Safety goggles: uvex skyguard NT

For detailed marking of frame and disc, see the section on “Personal protective equipment [▶ 6]”.

- The pump has been thoroughly cleaned and disinfected.
- Motor must have cooled down to the ambient temperature.
- Workplace:
 - Clean, good lighting and ventilation.
 - Firm and stable work surface.
 - Secured against falling over and slipping.

NOTICE! Only carry out the repair work described in these installation and operating instructions.

For repair work, the following applies:

- Wipe up spillage quantities of fluid and operating fluid immediately!
- Always replace O-rings, gaskets and screw locking devices!
- Observe the tightening torques in the appendix!
- The use of force is strictly prohibited!

9.6.1 Instructions on using screw locking devices

A screw locking device can be used on the screws. Screw locking is done at the factory using two different methods:

- Thread-locking fluid
- Mechanical screw locking device

Always re-apply the screw locking device!

Thread-locking fluid

Medium-strength thread-locking fluid (e.g. Loctite 243) is used for the liquid screw locking compound. This threadlocker can be loosened with increased force. If the thread-locking fluid cannot be loosened, then the compound must be heated to approx. 300 °C (572 °F). Clean the components thoroughly after dismantling.

Mechanical screw locking device

The mechanical screw locking device consists of two Nord-Lock wedge lock washers. The screw connection is secured by the clamping force. The Nord-Lock screw locking device must only be used on bolts with strength class 10.9 which have been coated with Geomet.

The use of stainless screws is prohibited!

9.6.2 Replace macerator

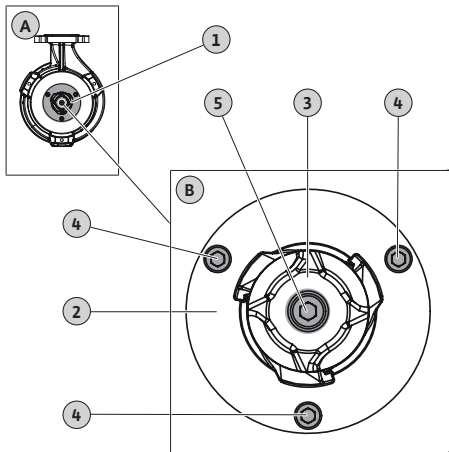


Fig. 9: Replacing the macerator

A	Overview: View from below
B	Detail view: Macerator with fixation
1	Macerator
2	Cutting plate
3	Cutting head
4	Cutting plate fixation M6
5	Cutting head fixation M8

- ✓ Wear protective glove!
- ✓ Pump cleaned and disinfected if necessary.
- ✓ Hexagon socket with T-handle, sizes 5 and 6.
- ✓ Torque wrench.
- ✓ Wedge (width: approx. 10 ... 15 mm) made of hardwood or plastic to secure the cutting head.

CAUTION! Do not use a metal wedge! A metal wedge can damage the blades.

- ✓ Liquid thread-locking fluid, medium strength (e.g. Loctite 243).
1. Secure the cutting head: Insert wedge between cutting head and cutting plate.
 2. Loosen and remove fastening screw on cutting head.
 3. Remove wedge.
 4. Pull off cutting head. **WARNING! Cut injury! Do not touch cutting head on cutting blade!**
 5. Fit new cutting head.
 6. Wet fastening screw with thread-locking fluid and screw it into cutting head. Tighten the fastening screw hand-tight.
 7. Secure the cutting head: Insert wedge between cutting head and cutting plate. **CAUTION! Tighten fastening screw hand-tight before inserting wedge! The wedge can displace the cutting head.**
 8. Tighten fastening screw on cutting head to 18.5 Nm (13.5 ft lb).
 9. Remove wedge.
 10. Loosen and unscrew cutting plate fastening screws.
 11. Carefully lever out cutting plate with wedge.
 12. Remove cutting plate. **WARNING! Cut injury! Do not touch cutting plate on blade!**
 13. Insert new cutting plate.
 14. Wet cutting plate fastening screws with thread-locking fluid and screw in.
 15. Tighten cutting plate fastening screws crosswise to 7.5 Nm (5.5 ft lb).
 - ▶ Macerator changed.

NOTICE! Observe drying time! Allow the thread-locking fluid to dry before using the pump.

10 Faults, causes and remedies



WARNING

Risk of injury from rotating components!

No persons are allowed to be present in the working area of the pump. There is a risk of injury!

- Demarcate and cordon off the working area.
- If there are no persons in the working area, activate the pump.
- If persons enter the working area, switch off the pump immediately.

Fault: Pump does not start

1. Electricity supply interrupted or short-circuit/earth fault in the cable or motor winding.

- ⇒ Have the connection and motor checked by a qualified electrician and replace if necessary.
- 2. Tripping of fuses, of the motor protection switch or the monitoring device
 - ⇒ Have the connection and the monitoring device checked by a qualified electrician and change it if necessary.
 - ⇒ Have the motor protection switches and fuses installed and adjusted according to the technical specifications by a qualified electrician and reset monitoring device.
 - ⇒ Check the impeller to make sure that it runs smoothly, clean the hydraulics if necessary.
- 3. The sealing chamber control (optional) has interrupted the electric circuit (connection-related)
 - ⇒ See “Fault: Mechanical seal leakage, sealing chamber control reports a fault and switches the pump off”.

Fault: Pump starts up, motor protection trips after short period

1. Motor protection switch set incorrectly.
 - ⇒ Have the adjustment of the trigger checked and corrected by a qualified electrician.
2. Increased power consumption due to major voltage drop.
 - ⇒ Have the voltage of individual phases checked by a qualified electrician. Contact the electricity distribution network.
3. There are only two phases at the connection.
 - ⇒ Have the connection checked and corrected by a qualified electrician.
4. Excessive differences in voltage between the phases.
 - ⇒ Have the voltage of individual phases checked by a qualified electrician. Contact the electricity distribution network.
5. Incorrect direction of rotation.
 - ⇒ Have the connection corrected by a qualified electrician.
6. Increased power consumption through jammed hydraulics.
 - ⇒ Clean the hydraulics and check the inlet.
7. The density of the fluid is too high.
 - ⇒ Contact customer service.

Fault: Pump runs, there is no volume flow

1. There is no fluid.
 - ⇒ Check the inlet, open all gate valves.
2. Inlet clogged.
 - ⇒ Check the inlet and remove clogging.
3. Hydraulics jammed.
 - ⇒ Clean the hydraulics.
4. Pipe system on the pressure side or pressure hose clogged.
 - ⇒ Remove clogging and replace the damaged components if necessary.
5. Intermittent operation.
 - ⇒ Check the switching system.

Fault: Pump starts, duty point is not reached

1. Inlet clogged.
 - ⇒ Check the inlet and remove clogging.
2. Slide valves on the pressure side closed.
 - ⇒ Completely open all gate valves.
3. Hydraulics jammed.
 - ⇒ Clean the hydraulics.
4. Incorrect direction of rotation.
 - ⇒ Have the connection corrected by a qualified electrician.

5. Air cushion in the pipe system.
 - ⇒ Vent the pipe system.
 - ⇒ If air cushions occur frequently: Locate and prevent the air intake, if required install ventilation systems at specified locations.
6. Pump pumping against excessive pressure.
 - ⇒ Open all gate valves on the pressure side completely.
7. Signs of wear on the hydraulics.
 - ⇒ Have the components (impeller, suction port, pump housing) checked and replaced by customer service.
8. Pipe system on the pressure side or pressure hose clogged.
 - ⇒ Remove clogging and replace the damaged components if necessary.
9. Strongly gassing fluid.
 - ⇒ Contact customer service.
10. The connection only has two phases.
 - ⇒ Have the connection checked and corrected by a qualified electrician.
11. Excessive decrease in the fill level during operation.
 - ⇒ Check supply/capacity of the system.
 - ⇒ Have the switching points of the level control checked and adjusted if necessary.

Fault: The pump does not run smoothly and is noisy

1. Improper duty point.
 - ⇒ Check the pump configuration and the duty point, contact customer service.
2. Hydraulics jammed.
 - ⇒ Clean the hydraulics.
3. Strongly gassing fluid.
 - ⇒ Contact customer service.
4. There are only two phases at the connection.
 - ⇒ Have the connection checked and corrected by a qualified electrician.
5. Incorrect direction of rotation.
 - ⇒ Have the connection corrected by a qualified electrician.
6. Signs of wear on the hydraulics.
 - ⇒ Have the components (impeller, suction port, pump housing) checked and replaced by customer service.
7. Motor bearings have worn.
 - ⇒ Inform customer service; send the pump back to the factory for overhauling.
8. Pump is installed under tension.
 - ⇒ Check installation, install rubber compensators if necessary.

Fault: Sealing chamber control reports fault or switches the pump off

1. Condensation water build-up due to extended storage or high temperature fluctuations.
 - ⇒ Operate the pump for a short period (max. 5 min.) without pencil electrode.
2. Increased leakage when running in new mechanical seals.
 - ⇒ Change the oil.
3. Pencil electrode cable is defective.
 - ⇒ Replace the pencil electrode.
4. Mechanical seal is defective.
 - ⇒ Inform customer service.

Further steps for troubleshooting

If the points listed here do not rectify the fault, contact customer service. Customer service can assist in the following ways:

- Telephone or written support.

- On-site support.
- Inspection and repair at the factory.

Costs may be incurred if you request customer services! Please contact customer services for more information.

11 Spare parts

Spare parts are ordered via customer service. To avoid return queries and incorrect orders, the serial or article number must always be supplied. **Subject to change without prior notice!**

12 Disposal

12.1 Oils and lubricants

Operating fluids must be collected in suitable containers and disposed of in accordance with the locally applicable guidelines. Wipe up drips immediately!

12.2 Protective clothing

Used protective clothing must be disposed off in accordance with the locally applicable guidelines.

12.3 Information on the collection of used electrical and electronic products

Proper disposal and appropriate recycling of this product prevents damage to the environment and danger to your personal health.



NOTICE

Disposal in domestic waste is prohibited!

In the European Union this symbol may be included on the product, the packaging or the accompanying documentation. It means that the electrical and electronic products in question must not be disposed of along with domestic waste.

Please note the following points to ensure proper handling, recycling and disposal of the used products in question:

- Hand over these products at designated, certified collection points only.
- Observe the locally applicable regulations!

Please consult your local municipality, the nearest waste disposal site, or the dealer who sold the product to you for information on proper disposal. See www.wilo-recycling.com for more information about recycling.

Subject to change without prior notice!

13 Appendix

13.1 Tightening torques

Rust-free screws A2/A4			
Threaded	Tightening torque		
	Nm	kp m	ft-lb
M5	5.5	0.56	4
M6	7.5	0.76	5.5
M8	18.5	1.89	13.5
M10	37	3.77	27.5
M12	57	5.81	42
M16	135	13.77	100
M20	230	23.45	170
M24	285	29.06	210
M27	415	42.31	306
M30	565	57.61	417

Geomet-coated screws (strength 10.9) with Nord-Lock washer			
Threaded	Tightening torque		
	Nm	kp m	ft-lb
M5	9.2	0.94	6.8
M6	15	1.53	11
M8	36.8	3.75	27.1
M10	73.6	7.51	54.3
M12	126.5	12.90	93.3
M16	155	15.81	114.3
M20	265	27.02	195.5

13.2 Frequency converter operation

The motor in series design (confirming to IEC 60034-17) can be operated with a frequency converter. Contact customer service if the rated voltage is above 415 V/50 Hz or 480 V/60 Hz. Plan the rated power of the motor to be approx. 10% higher than the power requirement of the pump due to the additional heating caused by harmonics. For frequency converters with a low-harmonic output, it is possible to reduce the 10 % power reserve. Harmonic waves are reduced by means of output filters. Synchronise the frequency converter and the filter with each other!

The configuration of the frequency converter depends on the rated motor current. Make sure that the pump operates without jerks and vibrations (without oscillations, resonances, pendulum torques) across the entire control range. Otherwise, the mechanical seals may leak or be damaged. Pay attention to the flow rate in the piping. If the flow rate is too low, there is an increased danger of deposits in the connected piping. A minimum flow rate of 0.7 m/s (2.3 ft/s) with a pumping pressure of 0.4 bar (6 psi) is recommended.

Make sure that the pump operates without jerks and vibrations (without oscillations, resonances, pendulum torques) across the entire control range. Otherwise, the mechanical seals may leak or be damaged. Increased motor noise caused by the harmonics of the power supply is normal.

During parameterisation of the frequency converter, observe the setting of the quadratic characteristic curve (U/f characteristic curve) for submersible motors! The U/f characteristic curve ensures that the output voltage at frequencies below the rated frequency (50 Hz or 60 Hz) is adjusted to the power requirement of the pump. Newer models of frequency converters feature an automatic power optimisation function – this automation achieves the same effect. For the frequency converter setting, refer to its installation and operating instructions.

Motor monitoring faults may occur if the motor is operated with a frequency converter. The following measures can reduce or avoid these faults:

- Keeping within the limit values stated in IEC 60034-25 for overvoltage and rise speed. If necessary, install output filters.
- Vary the pulse frequency of the frequency converter.
- In the event of a fault in the internal sealing chamber monitoring, use the external double-rod electrode.

The following construction measures can help to reduce or prevent faults:

- Separate connection cables for the main and control cable (depending on the motor size).
- Keep an adequate distance between main and control cable during routing.
- Use shielded connection cables.

Summary

- Min./max. frequency during continuous duty:
 - Asynchronous motors: 30 Hz up to rated frequency (50 Hz or 60 Hz)
 - Permanent magnet motors: 30 Hz up to the stated maximum frequency as per rating plate
- **NOTICE! The maximum frequency may be below 50 Hz!**
 - Comply with the minimum flow velocity!
- Observe additional measures with regard to EMC regulations (choice of frequency converter, using filters, etc.).
- Do not exceed the rated current or rated speed of the motor.
- Connection for bimetallic strip or PTC sensor.

13.3 Ex rating

This section contains further information on the operation of the pump in an explosive atmosphere. All personnel must read this section. **This section applies only to Ex-rated pumps!**

13.3.1 Identification of Ex-rated pumps

The pump is labelled as follows on the rating plate for use in explosive atmospheres:

- “Ex” symbol of the corresponding approval
- Ex classification
- Certification number (depending on the approval)

If required by the approval, the certification number is printed on the rating plate.

13.3.2 Protection class

The motor's design version corresponds to the following protection classes:

- Flameproof enclosure (ATEX)
- Explosionproof (FM)

Thermal motor monitoring version

- In order to limit the surface temperature, the motor must be equipped with a thermal winding monitor as a temperature controller (2-circuit temperature monitoring).
- The thermal winding monitor can be optionally designed as a temperature limiter (1-circuit temperature monitoring).

13.3.3 Intended use

IECEx certification

The pumps are suitable for operation in potentially explosive atmospheres:

- Device group: II
- Category: 2, zone 1 and zone 2

These pumps must not be used in zone 0!

ATEX approval

The pumps are suitable for operation in potentially explosive atmospheres:

- Device group: II
- Category: 2, zone 1 and zone 2

These pumps must not be used in zone 0!

FM approval

The pumps are suitable for operation in potentially explosive atmospheres:

- Protection class: Explosionproof
- Category: Class I, Division 1

Notice: If the cabling is carried out according to Division 1, installation in Class I, Division 2 is also permitted.

13.3.4 Electrical connection



DANGER

Risk of fatal injury due to electrical current!

Improper conduct when carrying out electrical work can lead to death due to electric shock!

- Electrical work must be carried out by a qualified electrician!
- Observe local regulations!

- Always connect the pump to an electrical outlet outside the explosive area. If the connection must be made within the explosive area, then the connection must be made in an Ex-rated housing (ignition protection class EN 60079-0)! Non-compliance may lead to danger of death from explosion! The connection must always be made by a qualified electrician.
- All monitoring devices outside the “spark-proof areas” must be connected via an intrinsically safe circuit (e.g. Ex-i relay XR-4...).
- The voltage tolerance may not be higher than max. $\pm 10\%$.

13.3.4.1 Thermal motor monitoring



DANGER

Risk of explosion due to overheating of the motor!

If the thermal motor monitoring is connected incorrectly there is a risk of explosion due to overheating of the motor!

- Thermal motor monitoring deactivation must take place with a reactivation lock!
Reactivation must only be possible if an unlock button has been manually actuated!

- Connect thermal motor monitoring via an Ex-approved evaluation relay (e.g. “CM-MSS”).
- If a frequency converter is used, connect the thermal motor monitoring to the Safe Torque Off (STO). Deactivation on hardware side is thus ensured.

The threshold value for thermal motor monitoring is determined by the built-in sensor. Depending on the version of the thermal motor monitoring, the following triggering status must arise:

- Temperature limiter (1 temperature circuit)
If the threshold value is reached, deactivation must take place **with a reactivation lock!**
- Temperature control (2 temperature circuits)
 - Deactivation with automatic reactivation can occur if the low temperature threshold is reached.
CAUTION! Motor damage due to overheating! If automatic reactivation takes place, comply with the specifications for max. switching frequency and switching break!
 - If the high temperature threshold is reached, deactivation must take place **with a reactivation lock!**

13.3.4.2 External pencil electrode

13.3.4.3 Frequency converter operation

- Connect pencil electrode via an Ex-approved evaluation relay (e. g. “XR-4 ...”).
- Make connection with intrinsically safe circuit!
- Converter type: Pulse-width modulation
- Min./max. frequency during continuous duty:
 - Asynchronous motors: 30 Hz up to rated frequency (50 Hz or 60 Hz)
 - Permanent magnet motors: 30 Hz up to the stated maximum frequency as per rating plate
NOTICE! The maximum frequency may be below 50 Hz!
 - Comply with the minimum flow velocity!
- Min. switching frequency: 4 kHz
- Max. overvoltage at the terminal board: 1350 V
- Output current at the frequency converter: max. 1.5 times rated current
- Max. overload time: 60 s
- Torque applications: quadratic pump curve or automatic energy optimisation procedure (e.g. VVC+)
Required speed/torque curves are available on request!
- Observe additional measures with regard to EMC regulations (choice of frequency converter, filters, etc.).
- Do not exceed the rated current or rated speed of the motor.
- It must be possible to connect the motor's own temperature monitoring (bimetallic strip or PTC sensor).
- If the temperature class is marked as T4/T3, temperature class T3 applies.

13.3.5 Commissioning



DANGER

Risk of explosion if incorrect pumps are used!

There is a risk of fatal injury from explosion if non-approved pumps are used in potentially explosive atmospheres!

- Only use approved pumps inside potentially explosive atmospheres.
- Check the Ex labelling on the rating plate.



DANGER

Risk of explosion due to flying sparks in the hydraulics!

The hydraulics must be completely filled with pumped fluid during operation. If air cushions form in the hydraulics, there is a risk of explosion due to sparking!

- Prevent air intake into the fluid. Install deflector plate at inlet.
- Do not allow the hydraulics to emerge. Switch off the pump at the appropriate level.
- Install additional dry-running protection.
- Carry out dry-running protection with a reactivation lock.



DANGER

There is a risk of explosion if dry-running protection is connected incorrectly!

Provide dry-running protection inside potentially explosive atmospheres!

- Implement dry-running protection with a separate signal transmitter (redundant fuse for level control).
- Deactivation of the pump must take place with a manual reactivation lock.

- The operator is responsible for defining the potentially explosive area.
- Only use pumps with the appropriate Ex rating within potentially explosive atmospheres.
- Do not exceed the **max. fluid temperature!**
- Do not allow the pump to dry run! The customer must take appropriate precautions (e.g. dry-running protection) to prevent the hydraulics from emerging.

Provide the following safety device in accordance with EN 50495 for category 2:

- SIL Level 1
- Hardware fault tolerance 0

13.3.6 Maintenance and repair

- Carry out maintenance tasks according to the regulations.
- Only carry out maintenance tasks described in these installation and operating instructions.
- The spark-proof gaps must **only** be repaired according to the manufacturer's design specifications. Carrying out repairs according to the values in tables 2 and 3 of EN 60079-1 is **not** permitted.
- Only use screws as stipulated by the manufacturer, which at a minimum correspond to a strength class of 600 N/mm² (38.85 long tons-force/inch²).

13.3.6.1 Repair of housing coating

If the housing coating has to be repaired, the maximum coat thickness is 2 mm (0.08 in)! The paint layer can become electrostatically charged in cases of thicker coats.

DANGER! Risk of explosion! A discharge can cause an explosion in explosive atmospheres!

13.3.6.2 Replacing the connection cable

Damaged connection cables may only be replaced by customer service or a certified workshop.

13.3.6.3 Changing the mechanical seal

Fluid and motor seals may only be replaced by customer service or a certified workshop.





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Local contact at
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