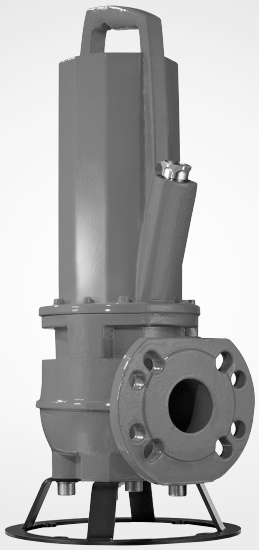
Pioneering for You

Wilo-Rexa PRO



US Installation and operating instructions
fr Notice de montage et de mise en service
es Instrucciones de instalación y funcionamiento

6065992 Ed.03-11/2014 WH

Fig. 1

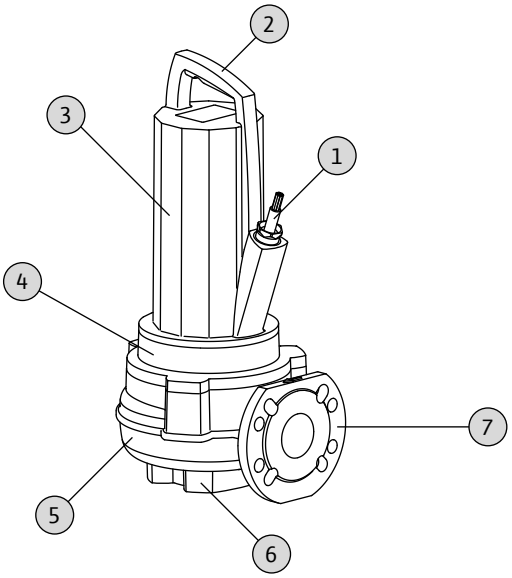


Fig. 3

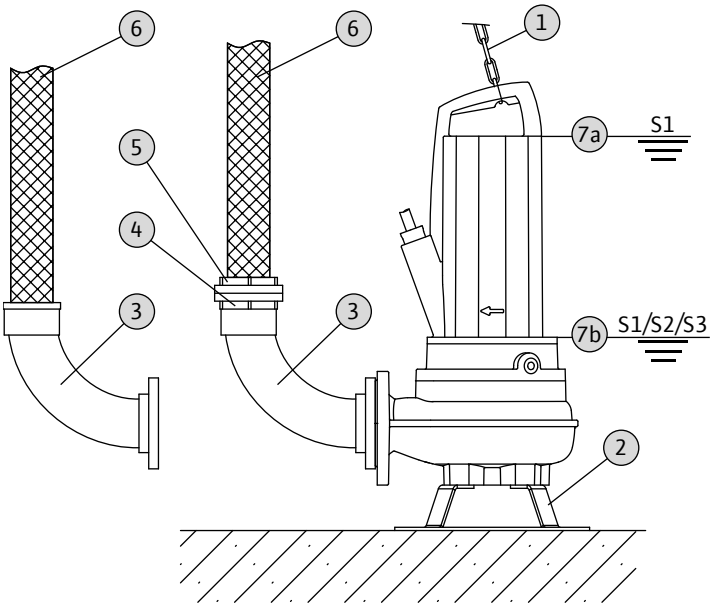
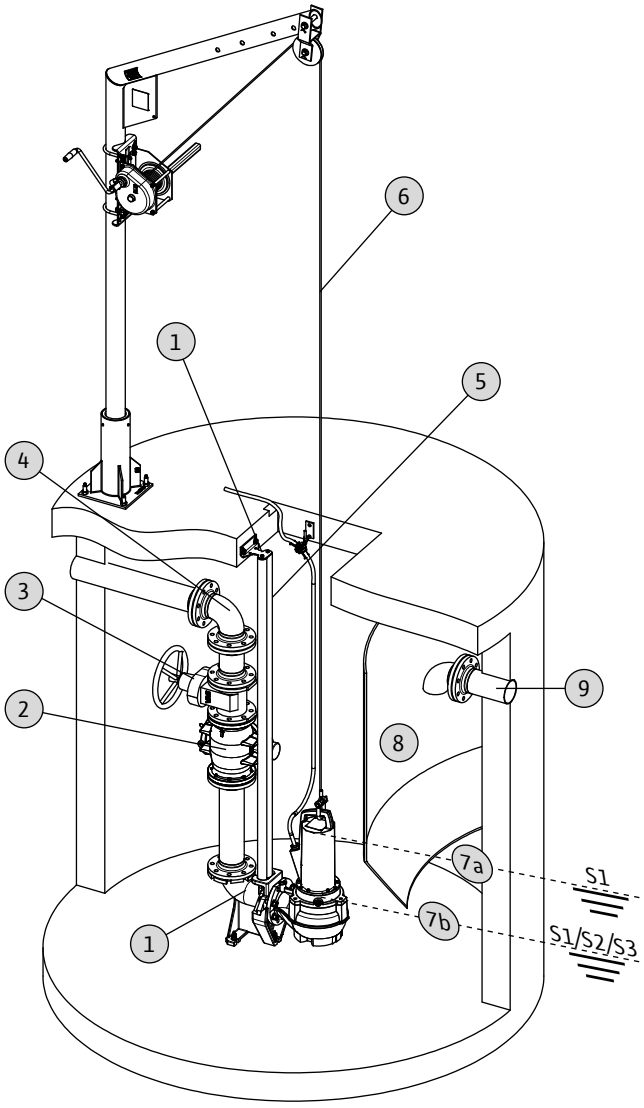
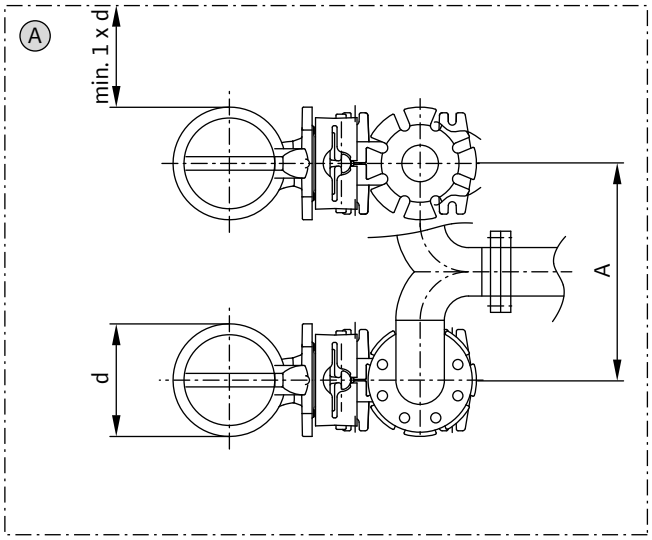


Fig. 2





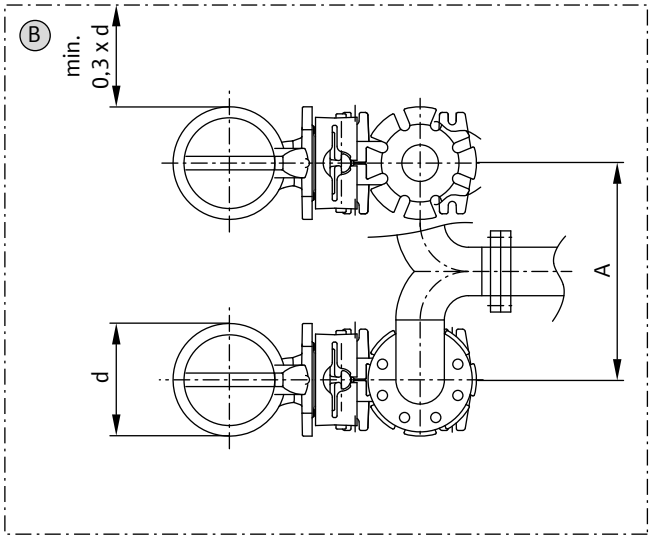


Fig. 4

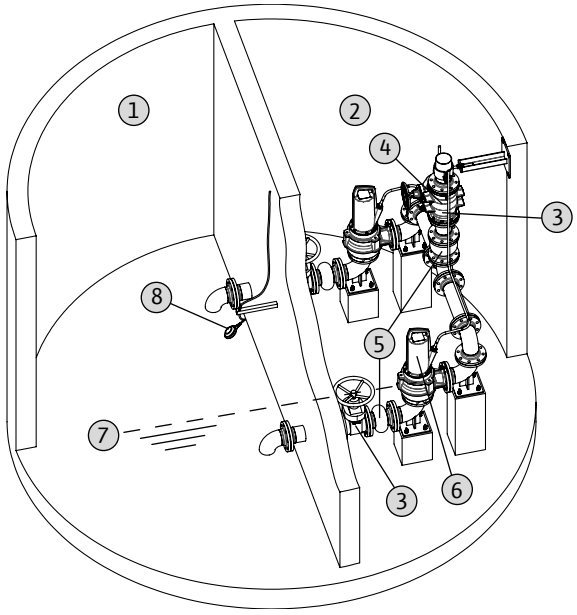
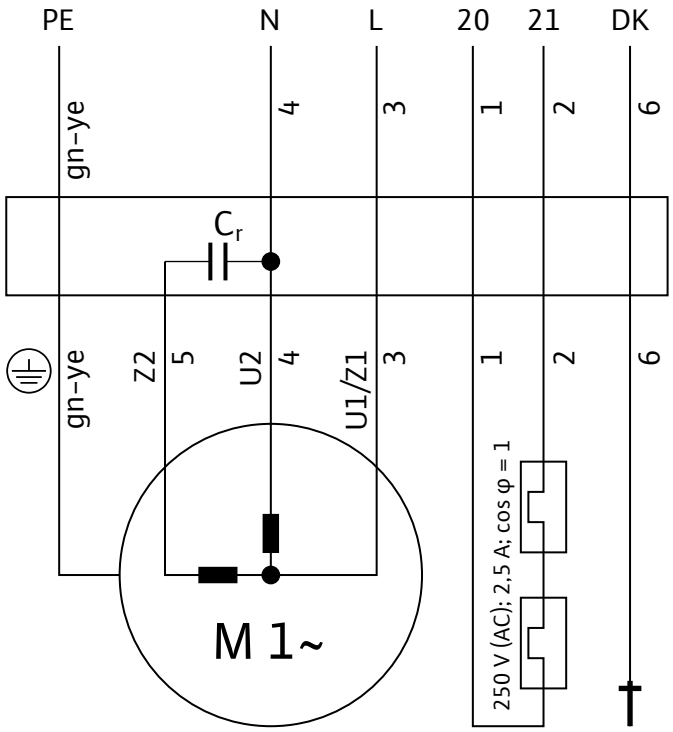


Fig. 5



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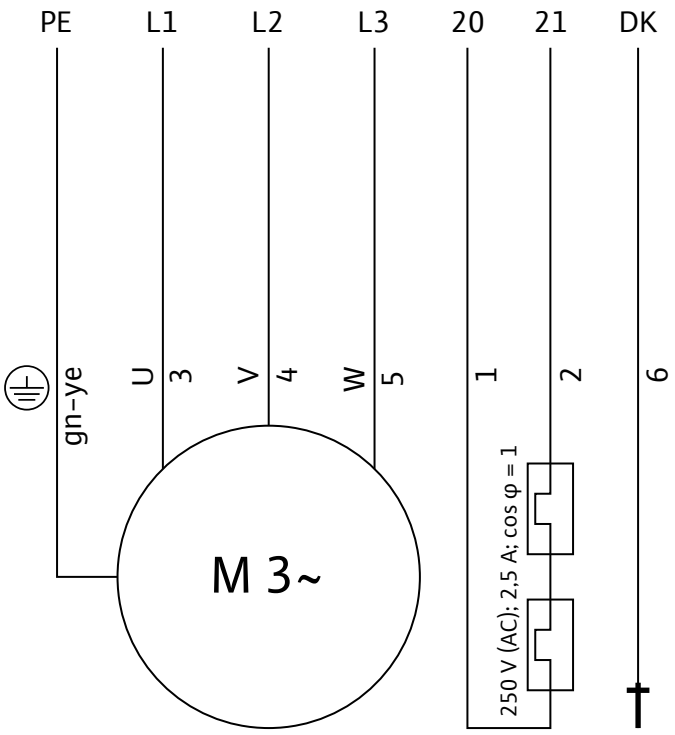


Fig. 7

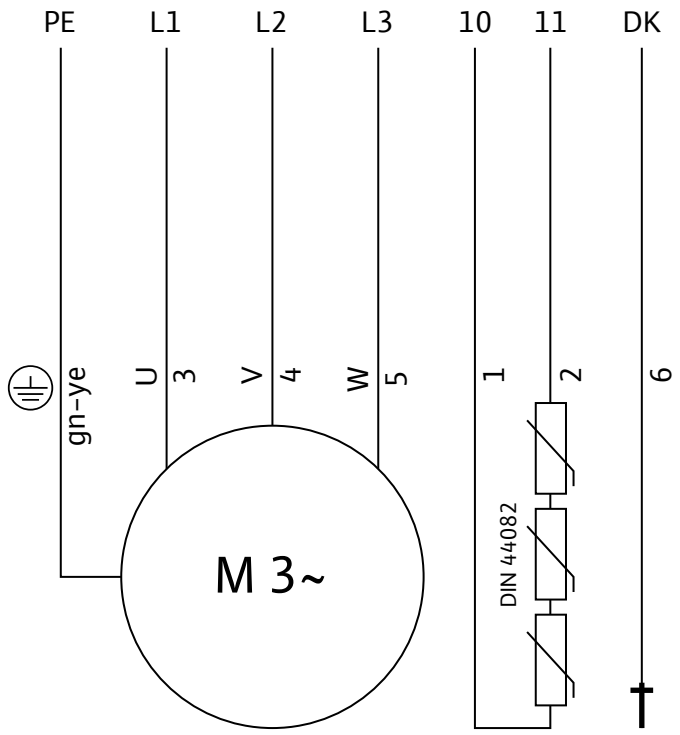
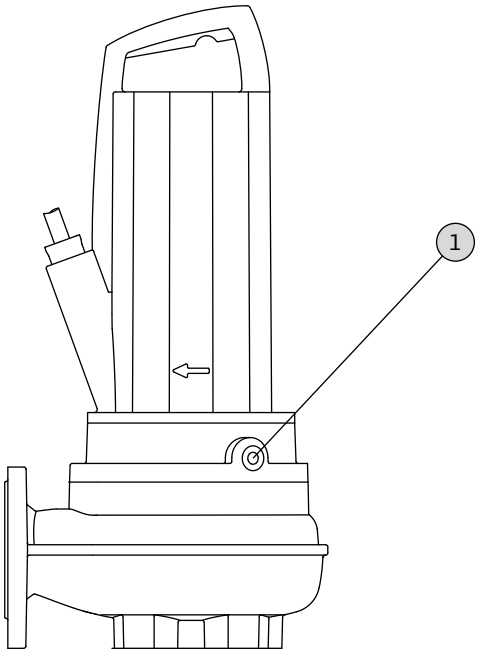


Fig. 8



1. Introduction

1.1. About this document

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

The instructions are divided into individual sections, which are listed in the table of contents. Each section has a heading that clearly describes its content.

A copy of the EC declaration of conformity is a component of these operating instructions.

If a technical modification is made on the designs named there without our agreement, this declaration loses its validity.

1.2. Personnel qualifications

All personnel who work on or with the pump must be qualified for such work; electrical work, for example, may only be carried out by a qualified electrician. All personnel must be of legal age.

Operating and maintenance personnel must also observe national accident prevention regulations.

It must be ensured that personnel have read and understood the instructions in this operating and maintenance manual; if necessary, this manual must be ordered from the manufacturer in the required language.

This pump is not intended for use by persons (including children) with limited physical, sensory, or mental capacities or without the relevant experience or knowledge, unless they are supervised by a person responsible for their safety and receive instructions from that person on how to use the pump.

Children must be supervised in order to ensure that they do not play with the pump.

1.3. Copyright

This operating and maintenance manual has been copyrighted by the manufacturer. The operating and maintenance manual is intended for use by installation, operating, and maintenance personnel. It contains regulations and drawings which may not be reproduced or distributed, either completely or in part, or used for any competitive purpose without the expressed consent of the manufacturer. Illustrations may differ from the original and serve only as example illustrations of the pumps.

1.4. Subject to changes

The manufacturer reserves the right to make technical modifications to units or components. This operating and maintenance manual refers to the pump shown on the title page.

1.5. Warranty

In general, the specifications in the current "general terms and conditions" apply for the warranty. You can find these here: www.wilo.com/legal/

Any deviations must be contractually agreed and shall then be given priority.

1.5.1. General

The manufacturer is obliged to correct any defects found in the pumps it sells, provided that the defects meet one or more of the following requirements:

- The defects are caused by the materials used or the way the product was manufactured or designed.
- The defects were reported in writing to the manufacturer within the agreed warranty period.
- The pump was used only as prescribed.
- All monitoring devices are connected and were tested before commissioning.

1.5.2. Warranty period

The duration of the warranty period is stipulated in the "general terms and conditions."

Any deviations must be contractually agreed.

1.5.3. Spare parts, attachments, and modifications

Only genuine spare parts from the manufacturer may be used for repairs, replacements, attachments, and modifications. Unauthorized add-ons and modifications or the use of non-original spare parts can seriously damage the pump and/or injure personnel.

1.5.4. Maintenance

The prescribed maintenance and inspection work should be carried out regularly. This work may only be carried out by qualified, trained, and authorized personnel.

1.5.5. Damage to the product

Damage and malfunctions that endanger safety must be eliminated immediately by trained personnel. The pump may only be operated if it is in perfect working order.

In general, repairs should only be carried out by Wilo customer service.

1.5.6. Disclaimer

No warranty claims will be accepted and no liability will be assumed for pump damage if any of the following items apply:

- Inadequate dimensioning by the manufacturer due to insufficient and/or incorrect information provided by the end user or customer
- Non-compliance with safety instructions and working instructions as specified in this operating and maintenance manual
- Improper use
- Incorrect storage and transport
- Improper assembly/dismantling
- Insufficient or incorrect maintenance
- Incorrect repairs
- Inadequate construction site or construction work
- Chemical, electrochemical, and electrical influences
- Wear

This means the manufacturer's liability excludes all liability for personal injury, material damage, or financial losses.

2. Safety

This section lists all the generally applicable safety information and technical instructions. In addition, all the other sections contain specific safety information and technical instructions. All instructions and information must be observed and followed during the various phases of the pump's life cycle (installation, operation, maintenance, transport, etc.). The end user is responsible for ensuring that all personnel follow these instructions and guidelines.

2.1. Instructions and safety information

This manual uses instructions and safety information regarding possible injury and damage to property. To identify them clearly for personnel, the instructions and safety information are distinguished as follows:

- Instructions appear in bold and refer directly to the preceding text or section.
- Safety information is slightly indented and bold and always starts with a signal word.
  - **Danger**
    Serious or fatal injuries can occur!
  - **Warning**
    Serious injuries can occur!
  - **Caution**
    Injuries can occur!
  - **Caution** (instruction without symbol)
    Substantial property damage can occur. Irreparable damage is possible!
- Safety information that refers to personal injury appears in black and is always accompanied by a safety symbol. Danger, prohibition, or instruction symbols are used as safety symbols.
  Example:


Danger symbol: General hazard


Danger symbol, for example, electrical current


Prohibition symbol, for example, Keep out!


Instruction symbol, for example, wear protective clothing

The safety symbols used conform to generally applicable directives and regulations, such as DIN and ANSI.

- Safety information that refers only to material damage is printed in gray, without safety symbols.

2.2. General safety

- When installing or removing the pump, never work alone in rooms or sumps. A second person must always be present.
- The pump must always be switched off before any work is performed on it (assembly, dismantling, maintenance, installation). The pump must be disconnected from the electrical system and secured against being switched on again. All rotating parts must have come to a stop.
- The operator should inform his/her superior immediately should any defects or irregularities occur.
- The operator must shut down the equipment immediately if defects occur that represent a safety risk. These include:
  - Failure of the safety and/or monitoring devices
  - Damage to important parts
  - Damage to electrical equipment, cables, and insulation.
- Tools and other objects should be kept in their designated places to ensure they can be used safely.
- Sufficient ventilation must be provided when working in enclosed rooms.
- When welding or working with electronic devices, make sure there is no risk of explosion.
- Use only lifting gear which is legally defined as such and officially approved.
- The lifting gear must be adapted to the conditions of use (weather, guide system, load, etc.) and be stored carefully.
- Mobile equipment for lifting loads should be used in such a way that it is guaranteed to remain stable during operation.
- When using mobile equipment for lifting non-guided loads, take action to prevent tipping, shifting, sliding, etc.
- Take measures to prevent anyone standing under suspended loads. Furthermore, it is prohibited to move suspended loads over working areas occupied by people.
- If using mobile operating equipment for lifting loads, get a second person to coordinate the procedure if necessary (e.g. blocked visibility).
- The load to be lifted must be transported in such a way that no one will be injured if there is a power failure. Furthermore, if such work is being carried out outdoors, it must be cancelled if the weather conditions worsen.

These instructions must be strictly observed. Non-observance can result in injury or substantial material damage.

2.3. Electrical work

DANGER: electrical hazard!
Incorrectly performed electrical work can result in fatal injury! This work may only be carried out by a qualified electrician.

CAUTION: beware of moisture!
Moisture penetrating the cable will damage both the pump and the cable. Never immerse the cable end in fluid and always protect it from moisture. Unused wires must be insulated!

Our pumps are operated with single or three phase alternating current. The governing national directives, standards, and regulations (e.g. VDE 0100) as well as the requirements of the local energy supply company must be observed.

The person operating the pump must know where it is supplied with power and how to cut off the supply. A motor protection switch must be installed by the customer for three phase AC motors. It is advisable to install a residual-current device (RCD). If there is a possibility that people can come into contact with the pump and the fluid (for example on construction sites), the connection **must** be equipped with an additional residual current device (RCD).

The section entitled "Electrical connection" must be observed when connecting the product. The technical specifications must be observed strictly. Our pumps must always be grounded.

If the pump has been switched off by a protective device, it must not be switched on again until the fault has been eliminated.

When the pump is connected to the electrical control panel, particularly when electronic devices such as soft start control or variable frequency drives are used, the switchgear manufacturer's specifications must be followed to comply with the electromagnetic compatibility (EMC) requirements. Special separate shielding measures (e.g. shielded cables, filters, etc.) may be necessary for the power supply and control cables.

The connection may only be made if the switchgear complies with the harmonized EU standards. Cellphones and other mobile radio equipment may cause malfunctions in the system.

WARNING: electromagnetic radiation!
Electromagnetic radiation can pose a fatal risk for people with cardiac stimulators. Affix corresponding signs to the unit and inform affected persons accordingly!

2.4. Safety and monitoring devices

The pumps are equipped with a thermal winding monitor and motor leakage detection. If the motor becomes too hot during operation or if fluid leaks into the motor, the pump is switched off.

These devices must be connected by an electrician and checked to ensure that they function correctly before commissioning.

Personnel must be informed about the installed devices and how they work.

CAUTION!
Never operate the pump if the monitoring devices have been removed or damaged, or if they do not work.

2.5. Conduct during operation

When operating the pump, always follow the locally applicable laws and regulations for work safety, accident prevention, and handling electrical machinery. To help ensure safe working practice, the responsibilities of employees should be clearly specified by the operator. All personnel are responsible for ensuring that regulations are observed.

Due to their design, centrifugal pumps have rotating parts that are easily accessible. Depending on the operating conditions, sharp edges can develop on these parts.

WARNING: danger of crushing and amputation of limbs!
Sharp edges can form on the rotating parts in the hydraulics. These can result in crushing and amputation of limbs.

- **Never reach into the hydraulics when the machine is in operation.**
- **Before performing maintenance or repairs, switch off the pump, disconnect it from the power supply, and secure it against being switched on again without authorization.**
- **Always allow the rotating parts to come to a standstill!**

2.6. Fluids

Each fluid differs in respect of composition, corrosiveness, abrasiveness, dry matter content, and in many other aspects. Generally, our pumps can be used for many applications. Please note that if requirements change (density, viscosity, or general composition), this can also affect many parameters of the pump.

If the pump is used in or switched over to a different fluid, observe the following points:

- The fluid can be contaminated by oil from the sealing chamber if the mechanical seal is defective.

Use with potable water is not permitted!

- Pumps that have been operated in dirty waste water must be cleaned thoroughly before being used for other fluids.
- Pumps that have been operated in sewage water containing feces and/or fluids that are hazardous to health must be decontaminated before being used with other fluids.

Clarification must be sought as to whether the pump can be used with another fluid at all.

2.7. Sound pressure

Depending on the size and performance (kW) of the pump, it has a sound pressure level of approximately 70 dB (A) to 90 dB (A) during operation.

However, the actual sound pressure level depends on several factors. These include, for example, the installation depth, installation method, fixation of accessories and piping, the duty point, immersion depth, etc.

We recommend that the end user takes an additional measurement at the workplace once the pump is running at its duty point and under all operating conditions.

CAUTION: Wear ear defenders!
According to applicable laws and regulations, ear protection must be worn if the sound pressure level is 85 dB(A) or more. The end user is responsible for ensuring compliance with this regulation.

2.8. Note on conformity

This product was developed and manufactured in accordance with the applicable EU product directives, to which all products sold in the EU must conform.

This product therefore complies with the general safety and health requirements of the European Union relevant to the product, as well as the relevant published

European standards and internationally recognized German standards.

Since this product was not intended to be sold and used in the European Union, it does not have a CE marking.

It is therefore not permitted to sell it in the European Union.

3. Product description

The pump is manufactured with great care and is subject to constant quality controls. Trouble-free operation is guaranteed if it is installed and maintained correctly.

3.1. Intended use and fields of application

DANGER: electrical hazard
When using the pump in swimming pools or other basins that can be entered, there is a risk of electrocution. Note the following:

- **Use is strictly forbidden if there are people in the pool or basin!**
- **If there are no people in the pool or basin, protective measures must be taken in accordance with DIN VDE 0100-702.46 (or the appropriate national regulations).**

DANGER: explosive fluids!
Pumping explosive fluids (e.g. gasoline, kerosene, etc.) is strictly prohibited. The pumps are not designed for these fluids!

Wilo-Rexa PRO... submersible pumps are suitable for pumping the following fluids, in intermittent or permanent operation:

- Drainage and sewage
- Sewage containing feces
- Municipal and industrial wastewater
- Sludges with up to 8% dry matter (depending on pump type)

The pumps can be used in building and site drainage systems and in sumps and tanks.

The submersible pumps must not be used for pumping the following:

- Potable water
- Fluids containing hard components such as stone, wood, metal, sand, etc.
- Highly flammable and explosive fluids in pure form .

Intended use also includes compliance with these instructions. Any other use is regarded as improper use.

3.2. Setup

The Wilo-Rexa pumps are submersible sewage pumps that can be operated vertically in stationary or portable wet well installation and vertically in stationary dry well installation.

Fig. 1.: Description

1	Cable	5	Hydraulics housing
2	Handle	6	Suction connection
3	Motor housing	7	Pressure connection
4	Seal housing		

3.2.1. Hydraulics

Rotodynamic hydraulics with vortex impeller, with horizontal flange connection on the pressure side.

The hydraulics are not self-priming, in other words, the fluid must flow in either under natural pressure or under supply pressure.

3.2.2. Motor

Single or three phase AC glanded motors are used as the motors. The motor is cooled by the fluid around it. The waste heat is transferred directly to the fluid via the motor housing. The motor may emerge from immersion during operation.

NOTE
When the motor is non-immersed, observe and comply with the specifications for "non-immersed operating mode."

With AC motors, the operating capacitor is integrated in an external capacitor switchgear in the connection cable.

The connection cable has a length of 40 ft (12.5 m), is longitudinally watertight, and is available in following versions:

- Cable with plug
- Bare cable end

3.2.3. Monitoring equipment

- **Motor compartment monitor:**
  The motor compartment monitor signals water ingress into the motor compartment.
- **Thermal motor monitor:**
  The thermal motor monitor protects the motor winding from overheating. Bimetallic strips are used for this as standard. The motors can be equipped with PTC sensors as an option.

  The motor can also be fitted with an external pencil electrode to monitor the sealing chamber. This signals if there is water ingress into the sealing chamber through the mechanical seal on the fluid side.

3.2.4. Seal

The seal for the fluid and the motor compartment is made via two mechanical seals. The sealing chamber between the mechanical seals is filled with environmentally safe medicinal white oil.

3.2.5. Materials

- Motor housing:
  ASTM A48 Class 35/40B (EN-GJL-250)
- Hydraulic housing:
  ASTM A48 Class 35/40B (EN-GJL-250)
- Impeller:
  ASTM A48 Class 35/40B (EN-GJL-250)
- Shaft end: AISI 420 (1.4021)
- Static gaskets: Nitrile (NBR)
- Seal
  - On pump side: SiC/SiC
  - On motor side: C/MgSiO4

3.2.6. Attached plug

In the "P" version, a shockproof plug is attached for single phase AC motors and a CEE-plug is attached for three phase AC motors.

These plugs are designed for use in commercially available shock-proof or CEE sockets and are not submersible.

CAUTION: beware of moisture!
Ingress of moisture will result in damage to the plug. Never immerse the plug in fluid and always protect it from moisture.

3.3. Operation in an explosive atmosphere

Pumps with the "Ex" marking are suitable for operation in an explosive atmosphere. The pumps must meet certain guidelines for this type of use. Certain rules of conduct and guidelines must be also followed by the operator.

Pumps that have been approved for use in an explosive atmosphere must be marked as follows on the rating plate:

- "Ex" symbol
- Information on Ex classification

For use in an explosive atmosphere, observe the further specifications in the appendix to this manual

DANGER: from incorrect use!
When used in an explosive atmosphere, the pump must have a corresponding approval. Also, the accessories must be approved for this application. Check the pump as well as all accessories before use to verify that they are approved in accordance with regulations.

3.4. Operating modes

3.4.1. Operating mode S1 (permanent operation)

The pump can operate continuously at the rated load without exceeding the permissible temperature.

3.4.2. Operating mode S2 (short term operation)

The maximum operating period is specified in minutes, e.g. S2-15. The pause must last until the machine temperature is no more than 2 K away from the temperature of the coolant.

3.4.3. Operating mode S3 (intermittent operation)

This operating mode defines a combination of periods of operation and standstill. With S3 operation, the values given are always calculated based on a period of 10 minutes.

Examples

- S3 20 %
  Operation 20 % of 10 min = 2 min / standstill 80 % of 10 min = 8 min
- S3 3 min
  Operation 3 min / standstill 7 min

If two values are specified, they are related to each other, e.g.:
- S3 5 min/20 min
  Operation 5 min / standstill 15 min
- S3 25 %/20 min
  Operation 5 min / standstill 15 min

3.5. Technical data

General data	
Line power [V/F]:	See rating plate
Power consumption [P_1]:	See rating plate
Rated motor power [P_2]:	See rating plate
Maximum delivery head [H]:	See rating plate
Maximum volume flow [Q]:	See rating plate
Activation type [AT]:	See rating plate
Fluid temperature [t]:	37..104 °F (3...40 °C)
Protection class:	IP 68
Insulation class [Cl.]:	F (optionally H)
Speed [n]:	See rating plate
Max. immersion depth:	66 ft (20 m)
Explosion protection:	FM
Operating modes	
Immersed [OT_S]:	S1
Non-immersed [OT_E]:	S1*, S2 30min, S3 25%**
Switching frequency	
Recommended:	20 /h
Maximum:	50 /h
Free ball passage	
PRO V05-...:	2.0 in (50 mm)
PRO V06-...:	2.5 in (65 mm)
PRO V08-...:	3.0 in (80 mm)
Suction connection:	
PRO ...05-...:	DN 50/PN 10
PRO ...06-...:	DN 65/PN 10
PRO ...08-...:	DN 80/PN 10
Pressure connection:	
PRO ...05-...:	ANSI B16.1 125lbs 2/Npt2
PRO ...06-...:	ANSI B16.1 125lbs 2.5/3
PRO ...08-...:	ANSI B16.1 125lbs 3

* S1 operation when non-immersed is **not** possible with all motors. Observe the information on the rating plate.

** Operating mode S3 50% is permissible if the necessary motor cooling is guaranteed by complete immersion for at least 1 minute before the motor is switched back on again.

The specified technical data apply to the standard pumps in the PRO series.

The technical data for freely configured pumps in the PRO series can be found in the relevant order confirmation.

3.6. Type key

Example:	Wilo-Rexa PRO V06DA-110/EAD1F2-T0015-646-O
PRO	Series
V	Impeller shape V = vortex impeller C = single-channel impeller
06	Pressure connection size 05 = ANSI B16.1 125lbs 2/Npt2 06 = ANSI B16.1 125lbs 2.5/3 08 = ANSI B16.1 125lbs 3
D	Hydraulic version D = suction side drilled acc. to DIN N = suction side drilled acc. to North American Standard (ANSI)
A	"Hydraulic" material version A = standard version Y = special version
110	Hydraulics type
E	Motor version E = glanded motor R = reduced-power glanded motor
A	"Hydraulic" material version A = standard version Y = special version
D	Seal version D = 2 independent mechanical seals B = cartridge seal
1	IE efficiency class, e.g.: 1 = IE1 (based on IEC 60034-30)
F	With Ex-rating: X = ATEX F = FM C = CSA
2	Number of poles
T	Line power version M = 1~ T = 3~
0015	/10 = rated power P_2 in kW
6	Frequency 5 = 50 Hz 6 = 60 Hz
46	Key for rated voltage
O	Additional electrical equipment O = with bare cable end P = with plug

3.7. Scope of delivery

Standard product

- Pump with 40 ft (12.5 m) cable
- Single phase version with capacitor switchgear and free cable end
- Three phase version with
  - bare cable end
  - with CEE plug
- Installation and operating instructions

Freely configured products

- Pump with cable length per customer request
- Cable version
  - with bare cable end
  - with plug
  - with float switch and bare cable end
  - with float switch and plug
- Installation and operating instructions

3.8. Accessories

- Cable lengths up to 160 ft (50 m) in fixed length increments of 40 ft (12.5 m) or customized cable lengths on request
- Guide system
- Pump foot
- External pencil electrode for sealing chamber control
- Level controls
- Fixing accessories and chains
- Switchgears, relays, and plugs
- Ceram coating
- Thermal motor monitoring with PTC sensors

4. Transport and storage

4.1. Delivery

On delivery, check immediately that the shipment is complete and undamaged. If any parts are damaged or missing, the transport company or the manufacturer must be notified on the day of delivery. Claims made after this date cannot be recognized. Any damage to parts must be noted on the freight documentation.

4.2. Transport

Only the appropriate and approved fastening devices and transportation and lifting equipment may be used. These must have sufficient load bearing capacity to ensure that the pump can be transported safely. If chains are used they must be secured against slipping.

The personnel must be qualified for the tasks and must follow all applicable national safety regulations during the work.

The pumps are delivered by the manufacturer or shipping agency in suitable packaging. This normally precludes the possibility of damage occurring during transport and storage. The packaging should be stored in a safe place for reuse if the product is frequently used at different locations.

4.3. Storage

Newly supplied pumps are prepared so that they can be stored for at least 1 year. The pump should be cleaned thoroughly before it is put into temporary storage.

The following should be taken into consideration for storage:

- Place the pump on a firm surface and secure it against slipping and falling over. Submersible sewage pumps are stored vertically.

DANGER: from falling
Never set the pump down unsecured. If the pump falls over, it could cause an injury.

- Our pumps can be stored at temperatures down to +5 °F (–15 °C). The storage area must be dry. We recommend a frost-protected room for storage with a temperature between 41 °F (5 °C) and 77 °F (25 °C).
- Do not store the pump in rooms in which welding work is carried out, because the resulting gases or radiation can damage the elastomer components and coating.
- Suction and pressure connections must be sealed securely to prevent the entry of contamination.
- All power supply cables must be protected against kinking, damage, and moisture ingress.

DANGER: electrical hazard!
Damaged power supply cables can cause fatal injury! Defective cables must be replaced by a qualified electrician immediately.

CAUTION: beware of moisture!
Moisture penetrating the cable will damage both the pump and the cable. Never immerse the cable end in fluid and always protect it from moisture.

- The pump must be protected from direct sunlight, heat, dust, and frost. Heat or frost can cause serious damage to impellers and coatings!
- The impellers should be checked at regular intervals. This presents jamming of the bearings and it renews the film of lubrication on the mechanical seal.

WARNING: sharp edges!
Sharp edges can form on the impellers and hydraulic openings. There is a risk of injury! Wear the necessary protective clothing, such as protective gloves.

- If the pump has been stored for a long period of time, it should be cleaned of contaminants such as dust and oil residue before commissioning. Check

that the impellers move freely and check the housing coatings for damage.
Prior to commissioning, the fill level in the sealing chamber should be checked and topped up, if necessary.
Damaged coatings must be repaired immediately. Only an intact coating fulfils its intended purpose.

Please note that elastomer parts and coatings become brittle over time. If the product is to be stored for longer than 6 months, we recommend checking these parts and replacing them as necessary. Consult the manufacturer for details.

4.4. Return delivery

Pumps that are returned to the factory must be properly packaged. This means that contaminants have been removed from the pump and that it has been hygienically decontaminated if used with fluids that are hazardous to health.

For shipping, the parts must be packed in tear-proof plastic bags of sufficient size in such a manner that they are tightly sealed and leak proof. Furthermore, the packaging must protect the pump from damage during transportation. If you have any questions, please contact the manufacturer.

5. Installation

In order to prevent damage to the product or serious injury during installation, the following points must be observed:

- Installation work – assembly and installation of the pump – may only be carried out by qualified persons. The safety instructions must be followed at all times.
- The pump must be inspected for transport damage before any installation work is carried out.

5.1. General

For planning and operation of sewage systems, observe the applicable local regulations and directives for sewage technology (such as those of the German Association for Water, Wastewater and Waste).

Note that pressure surges can occur, in particular with stationary installations where water is pumped with relatively long discharge pipes (especially with steady ascents or steep terrain).

Pressure surges can result in destruction of the pump/system and noise pollution due to valves opening and closing suddenly. Pressure surges can be prevented by applying suitable measures (e.g. non-return valves with an adjustable closing time, or special routing of the discharge pipeline).

After pumping water containing calcium, clay, or cement, the pump should be flushed with pure water to prevent encrustation and to avoid related breakdowns later on.

If you are using level control, make sure that the minimum water coverage is present. Air pockets in the hydraulic housing or pipe system must be avoided at all costs and must be removed by using a suitable ventilation system and/or by placing the pump at a slight angle (if installed as a portable pump). Protect the pump from frost.

5.2. Installation methods

- Vertical stationary wet well installation with guide system
- Vertical portable wet well installation with pump foot
- Vertical stationary dry well installation

5.3. Installation

DANGER: from falling!
When installing the pump and its accessories, work is sometimes performed directly at the edge of the basin or sump. Carelessness or wearing inappropriate clothing could result in a fall. There is a risk of fatal injury! Take all necessary safety precautions to prevent this.

The following information should be taken into consideration when installing the pump:

- This work must be carried out by a qualified person and electrical work must be carried out by an electrician.
- The operating space must be clean, free of coarse solids, dry, frost-free and, if necessary, decontaminated. It must also be suitable for the particular pump.
- When working in sumps, a second person must be present for safety reasons. If there is a risk of toxic or asphyxiating gases building up, the necessary precautions must be taken.
- The system planner should select the sump size and motor cooling time according to the ambient conditions in operation.
- Ensure that lifting equipment can be set up without any trouble, since this is required for assembly and removal of the pump. It must be possible to reach the pump safely in its operating and storage locations using the lifting equipment. The machine must be positioned on a firm bearing surface. For transporting the pump, the lifting gear must be secured to the lifting eyelets or handle provided. When using chains, they must be connected with a shackle to the lifting eyelets or the handle. Lifting gear must be technically approved.
- Power supply cables must be laid out in such a way that safe operation and trouble-free assembly/dismantling are possible at all times. The pump must never be carried or dragged by the power supply cable. Check whether the cable present is adequate for the type of installation selected, in terms of its cross-section and its length.
- When using switchgear, the corresponding protection class must be observed. In general, switchgear

is to be installed outside potentially explosive areas in such a way that it is protected from submersion.
- When used in an explosive atmosphere, it must be ensured that the pump and all accessories are approved for this purpose.
- Structural components and foundations must be of sufficient stability in order to allow the product to be fixed securely and functionally. The end user or the supplier is responsible for the provision of the foundations and their suitability in terms of dimensions, stability, and strength.
- If the motor housing is to be taken out of the fluid during operation, the operating mode for non-immersed operation should be applied.
  To keep glanded motors sufficiently cooled in S3 mode, they must be flooded completely before being switched back on if the motor has been taken out of the fluid!

- Never let the pump run dry. The water level must never fall below the minimum. Therefore, we recommend installing a level control system or a dry-running protection system where there are great variations in the level.
- Use guide and deflector plates for the fluid intake. If the water jet reaches the surface of the water, air will be introduced into the fluid, which can accumulate in the pipe system. This can result in inadmissible operating conditions and to deactivation of the entire system.
- Check that the available planning documentation (installation plans, layout of the operating space, intake ratios) is complete and correct.
- Also observe all regulations, rules, and legal requirements for working with and underneath heavy suspended loads. Wear appropriate protective clothing/equipment.
- Please also observe the applicable national accident prevention regulations and trade association safety provisions.

5.3.1. Maintenance work

After a storage period of more than 6 months, the following maintenance work must be carried out before installation:
- Rotate impeller
- Check oil level in the sealing chamber

Rotate impeller

1. Position the pump horizontally on a firm surface.
   Make sure that the pump cannot fall over and/or slip.

2. Carefully and slowly reach into the hydraulics housing from below and rotate the impeller.

WARNING: sharp edges!
Sharp edges can form on the impellers and hydraulic opening. There is a risk of injury! Wear the necessary protective clothing, such as protective gloves.

Check oil level in sealing chamber

The sealing chamber has a hole for draining and filling the chamber.

1. Position the pump horizontally on a firm surface with the screw plug facing upward.
   Make sure that the pump cannot fall over and/or slip.

2. Unscrew the screw plug (see Fig. 8).
3. The oil should reach up to about 0.4 in (1 cm) below the hole for the screw plug.
4. If there is not enough oil in the sealing chamber, top it up. To do so, follow the instructions under “Oil change” in the “Maintenance and repair” section.
5. Clean the screw plug, replace the joint ring if necessary, and screw it back in.

5.3.2. Stationary wet well installation

A guide system must be installed for wet well installation. This must be ordered from the manufacturer separately. The pipe system on the pressure side is connected to this.

The connected pipe system must be self-supporting, i.e. it must not be supported by the guide system.

The operating space must be laid out so that the guide system can be installed and operated without difficulty.

If the motor emerges from immersion during operation, the following operating parameters must be strictly observed:
- The **max. fluid temperature and ambient temperature** is **104 °F (40 °C)**.
- Specifications for “non-immersed operating mode”

Fig. 2.: Wet well installation

1	Guide system	6	Lifting gear
2	Non-return valve	7a	Min. water level for immersed operation
3	Gate valve	7b	Min. water level for non-immersed operation*
4	Pipe elbow	8	Impact protection plate
5	Guide pipe (to be provided by the customer)	9	Inlet
A	Minimum distances in parallel operation		
B	Minimum distances in alternating operation		

Clearance “A”	
DN 50	308 mm
DN 65	385 mm
DN 80	615 mm
DN 100	615 mm

Work steps

1. Installation of the guide system: about 3–6 h
   (see the installation and operating instructions for the guide system).
2. Preparing the pump for operation on a guide system: about 1–3 h
   (see the installation and operating instructions for the guide system).
3. Installing the pump: about 3–5 h
   - Check that the guide system is firmly fixed and functions properly.
   - Secure the lifting equipment to the pump with the shackle, lift the pump, and then lower slowly onto the guide pipes in the operating space.
   - Hold the power supply cables slightly taut when lowering.
   - When the pump is connected to the guide system, ensure that the power supply cables are secured adequately to prevent them falling down and or being damaged.
   - Have the electrical connections made by a qualified electrician.
   - The pressure connection is sealed by its own weight.
4. Installing optional accessories, such as dry-running protection or level controls.
5. Starting up the pump: about 2–4 h
   - As described in the “Commissioning” section
   - For new installation: Flood the operating space
   - Vent the pressure pipe.

5.3.3. Portable wet well installation

In this installation type, the pump has to be equipped with a pump foot (available as an option). This is attached to the suction port and ensures the minimum ground clearance and a secure footing if placed on a solid bearing surface. In this version, the pump can be positioned anywhere in the operating space. If used in an operating space with a soft bearing surface, a hard base must be used to prevent sinking. A pressure hose is connected on the pressure side.

If operated for longer periods of time in this installation type, the pump must be fastened to the floor. This prevents vibration and ensures quiet and low-wearing running.

If the motor emerges from immersion during operation, the following operating parameters must be strictly observed:

- The **max. fluid temperature and ambient temperature** is **104 °F (40 °C)**.
- Specifications for “non-immersed operating mode”

CAUTION: beware of burns!
The housing parts can heat up to well above 104 °F (40 °C). There is a risk of burns! After switching it off, let the pump cool down to ambient temperature.

Fig. 3.: Portable installation

1	Lifting gear	5	Storz hose coupling
2	Pump foot	6	Pressure hose
3	Pipe elbow for hose connection or Storz pipe coupling	7a	Min. water level for immersed operation
4	Storz pipe coupling	7b	Min. water level for non-immersed operation

Work steps

1. Preparing pumps: about 1 h
   - Install the pump foot on the suction connection.
   - Install the pipe elbow on the pressure connection.
   - Fasten the pressure hose to the pipe elbow with a hose clip.
     Alternatively, a Storz pipe coupling can be installed on the pipe elbow and a Storz hose coupling can be installed on the pressure hose.
2. Installing the pump: about 1–2 h
   - Position pump in installation location. If necessary, secure lifting equipment to the pump with a shackle, lift the pump, and then lower to the intended location (sump, pit).
   - Check that the pump is vertical and on a solid bearing surface. Avoid sinking.
   - Route the power supply cable so it cannot be damaged.
   - Have the electrical connections made by a qualified electrician.
   - Route the pressure hose so that it is not damaged and fasten it at certain points (e.g. outflow).

DANGER: risk of pressure hose becoming separated!
Uncontrolled separation or movement of the pressure hose can result in injuries. Secure the pressure hose appropriately. Prevent buckling of the pressure hose.

3. Starting up the pump: about 1–3 h
   - As described in the “Commissioning” section

5.3.4. Stationary dry well installation

In this installation type, the operating space is divided into a collector tank and a machine room. The fluid is collected in the collector tank and the pump is installed in the machine room. The operating space must be prepared according to the manufacturer's configuration or planning guide. The pump

is connected to the pipe system on the suction and pressure sides at the specified point in the machine room. The pump itself is not immersed in the fluid.

The pipe system on the suction and pressure sides must be self-supporting, i.e. it may not be supported by the pump. In addition, the pump connection to the pipe system must be free of stress and vibrations. We therefore recommend using elastic connection pieces (expansion joints).

The following operating parameters must be observed for dry well installation.

- The **max. fluid temperature and ambient temperature** is **104 °F (40 °C)**.
- Specifications for "non-immersed operating mode"
  The pump is not self-priming, so the hydraulics housing must be completely filled with the fluid. The minimum level in the collector tank must be at the same height as the upper edge of the hydraulics housing.

CAUTION: beware of burns!
The housing parts can heat up to well above 104 °F (40 °C). There is a risk of burns! After switching it off, let the pump cool down to ambient temperature.

Fig. 4.: Stationary dry well installation

1	Collector tank	5	Expansion joint
2	Machine room	6	Pump
3	Gate valve	7	Min. water level
4	Non-return valve	8	Dry-running protection

Work steps

1. Installing the pump: about 3-5 h
   - Check that the pipe system is secured firmly.
   - Secure lifting equipment to the pump with a shackle, lift the pump, and then lower slowly on to the pipe system.
   - When lowering the pump, be mindful of the power supply cables.
   - When the pump is resting on the piping, fasten the pump to the pipe system on the suction and pressure sides.
   - Route the power supply cables in accordance with local requirements.
   - Have the electrical connections made by a qualified electrician.
2. Install optional accessories, such as dry-running protection or level controls.
3. Starting up the pump: about 2-4 h
   - As described in the "Commissioning" section
   - Open slide valves on suction and pressure sides.
   - Vent the pressure pipe.

5.3.5. Level control

Level control can be used to detect fluid levels and to switch the pump on and off automatically. The fluid levels can be recorded using float switches, pressure and ultrasound measurements, or electrodes.

Note the following:

- When using float switches, ensure that they can move freely in the operating area.
- The water level must not fall below the minimum.
- The maximum switching frequency must not be exceeded.
- If the fluid levels fluctuate strongly, then level control should be implemented using two measuring points as standard. This allows larger intervals before control is triggered.

Installation

For correct installation, please see the installation and operation instructions for the level control device.

Observe the information on the maximum switching frequency and the minimum water level!

5.4. Dry-running protection

To ensure the necessary cooling, the pump may need to be immersed when in operation, depending on the operating mode. In addition, it is also important to ensure that no air enters the hydraulics housing.

The pump must therefore always be immersed in the fluid up to the top edge of the hydraulic housing or, if applicable, up to the top edge of the motor housing. For optimum operational reliability, we recommend installing a dry-running protection system.

This can be implemented using float switches or electrodes. The float switch or electrode is fixed in the sump and switches off the pump when the water level falls below the minimum coverage level. If the dry-running protection only includes one floater or electrode and the fluid levels deviate significantly, then the pump may switch on and off constantly. This can result in the maximum number of motor activations (switching cycles) being exceeded.

5.4.1. Remedies for avoiding excessive switching cycles

- Manual reset
  The motor is switched off when the water level falls below the minimum coverage level and switched back on when a sufficient water level is reached.
- Separate reactivation point
  A second switching point (additional floater or electrode) is used to obtain a sufficient difference between the activation and deactivation points. This prevents constant switching. This function can be implemented using a level control relay.

5.5. Electrical connection

ELECTROCUTION hazard!
Incorrect electrical connections can cause fatal electric shocks. Electrical connections may only be carried out by a qualified electrician approved by the local energy supply company, in accordance with locally applicable regulations.

DANGER: from incorrect connection!
With Ex-rated pumps, the power supply cable must be connected outside the potentially explosive area, or inside a housing with an approved level of ignition protection. Non-observance may lead to fatal injury due to explosion!

- **Always have the connection carried out by a qualified electrician.**
- **Note the additional information about this in the appendix.**

- The line power current and voltage must be as stated on the rating plate.
- Connect the power supply cable in accordance with the applicable standards and regulations and according to the wire assignment.
- Any monitoring equipment to be used, e.g. for thermal motor monitoring, must be connected and tested to ensure that it is working properly.
- For three-phase AC motors, a clockwise phase sequence must be present.
- Ground the pump properly.
  Pumps that are permanently installed must be grounded in compliance with nationally applicable standards. If a separate grounding conductor is available, it must be connected to the marked hole or ground terminal (⏚) using a suitable screw, nut, tooth lock washer, and flat washer. The cross section of the cable for the grounding conductor connection must comply with the local regulations.
- **A motor protection switch must be used for motors with a free cable end.** We recommend using a residual current device (RCD).
- Switchgear must be purchased as accessories.

5.5.1. Line-side fuse protection

The backup fuse required must be rated according to the starting current. Refer to the rating plate for the starting current.

Only slow-blow fuses or K-type circuit breakers can be used as the backup fuse.

5.5.2. Checking the insulation resistance and monitoring devices before commissioning

If the values measured deviate from the specifications, moisture may have penetrated into the motor or the power supply cable or the monitoring unit may be defective. Do not connect the pump, and consult Wilo customer service.

Insulation resistance of the motor winding

Before connecting the power supply cable, the insulation resistance must be tested. This can be measured with an insulation tester (measuring voltage = 1000 V):

- On initial commissioning: insulation resistance may not be less than 20 MΩ.
- For further measurements: value must be larger than 2 MΩ.

For motors with an integrated capacitor, the windings must be short circuited before checking.

Temperature sensor and pencil electrode (available as an option) for sealing chamber control

Before connecting the monitoring devices, these must be checked with an ohmmeter. The following values must be complied with:

- Bimetallic strip: Value = “0” passage
- PTC thermistor sensor: A PTC thermistor sensor has a cold resistance of between 20 and 100 Ω.
  If there are 3 sensors in series, this results in a value of 60 to 300 Ω.
  If there are 4 sensors in series, this results in a value of 80 to 400 Ω.
- Pencil electrode: This value must approach infinity. If the value is low, there is water in the oil. Also observe the instructions of the optional evaluation relay.

5.5.3. Single phase AC motor

Fig. 5.: Connection diagram

L	Line power	DK	Leakage detection for motor compartment
N			
20	Bimetallic strip	Cr	Operating capacitor
21		PE	Ground

The single phase version has a capacitor switchgear (operating capacitor) and free cable ends.

The connection to line power is made in the switchgear.

Electrical connections may only be made by a qualified electrician!

The wires of the connection cable are assigned as follows:

7-wire connection cable	
Wire number	Terminal
1	Temperature monitor for winding
2	
3	L (U1/Z1)
4	N (U2)
5	Z2 – connection for the operating capacitor
6	Leakage detection for motor compartment
Green/yellow	Ground (PE)

If the pump is fitted with a plug, it is connected to the power supply by inserting the plug into a socket.

5.5.4. Three phase AC motor

Fig. 6.: Connection diagram with bimetallic strip

L1	Line power	DK	Leakage detection for motor compartment
L2			
L3		20	Bimetallic strip
PE	Ground	21	

Fig. 7.: Connection diagram with PTC sensor

L1	Line power	DK	Leakage detection for motor compartment
L2			
L3		10	PTC sensor (in acc. with DIN 44082)
PE	Ground	11	

The three phase version is supplied with free cable ends. The connection to line power is made in the switchgear.

Electrical connections may only be made by a qualified electrician!

The wires of the connection cable are assigned as follows:

7-wire connection cable	
Wire number	Terminal
1	Temperature monitor for winding
2	
3	U
4	V
5	W
6	Leakage detection for motor compartment
Green/yellow	Ground (PE)

If the pump is fitted with a plug, it is connected to the power supply by inserting the plug into a socket.

The specified wire assignments apply to the standard pumps in the PRO series.

The wire assignment for freely configured pumps in the PRO series can be found in the connection diagram enclosed with this manual.

5.5.5. Connecting the monitoring devices

RISK of fatal injury due to explosion!
If the monitors are not connected correctly, there is a risk of fatal injury due to explosion if used in potentially explosive areas! Always have the connection carried out by an electrician. If the pump is used in potentially explosive areas:

- **The temperature monitor must be connected via an evaluation relay. We recommend the "CM-MSS" relay for this. The threshold comes preset.**
- **Deactivation by the temperature limiter must be conducted with an anti-reactivation mechanism, meaning that reactivation should only be possible if the "release button" has been pressed manually!**
- **The pencil electrode for sealing chamber control must be connected via an intrinsically safe circuit with an evaluation relay. We recommend the "XR-42x" relay for this. The threshold is 30 kΩ.**
- **Also note the additional information in the appendix!**

All monitoring devices must be connected at all times.

Motor temperature monitor

The pump is equipped with a temperature limiter as standard (one-circuit temperature monitoring). When the threshold is reached, the pump must switch off.

If a temperature controller and limiter are fitted (two-circuit temperature monitoring; can be ordered as an option), a "preliminary warning" **can** take place at the low value and "deactivation" **must** take place at the higher value.

- When used **outside potentially explosive areas**, the bimetallic strips can be connected directly in the switchgear.
  Connection values: max. 250 V(AC), 2.5 A, cos φ = 1
- PTC sensors (optionally available and in accordance with DIN 44082) must be connected via an evaluation relay. We recommend the "CM-MSS" relay for this. The threshold is already preset.
  For this reason, no warranty claims can be accepted for any damage to the winding resulting from unsuitable motor monitoring.

Motor compartment monitor

- The motor compartment monitor must be connected via an evaluation relay. We recommend the "NIV 101/A" relay for this. The threshold is 30 kΩ. When the threshold is reached, the pump must switch off.

Connecting the pencil electrode (available as an option) for sealing chamber control

- When used **outside potentially explosive areas**, the pencil electrode can be connected via the NIV 101/A relay. The threshold is 30 kΩ. When the threshold is reached, a warning must be given or the unit switched off.

CAUTION!
If there is only a warning, the pump could be irreparably damaged by water ingress. We recommend always switching the pump off!

5.6. Motor protection and activation types

5.6.1. Motor protection

The minimum requirement for motors with a free cable end is a thermal relay/motor protection switch with temperature compensation, differential triggering, and an anti-reactivation device, in accordance with national regulations.

If the pump is connected to electrical systems in which faults frequently occur, we recommend installing additional protective devices, to be provided by the customer (e.g. relays for overvoltage, undervoltage, or phase failure; lightning protection, etc.). We also recommend installing a residual current device (RCD).

Local and national regulations must be observed when connecting the pump.

5.6.2. Activation types

Direct activation

At full load, the motor protection should be set to the rated current shown on the rating plate. At partial load, we recommend that the motor protection be set 5% above the current measured at the duty point.

Soft start activation

- At full load, the motor protection should be set to the rated current at the duty point. At partial load, we recommend that the motor protection be set 5% above the current measured at the duty point.
- The current consumption must be below the rated current throughout the entire operation.
- Due to the upstream motor protection, starting or stopping should be completed within 30 seconds.
- To avoid power dissipation during operation, bypass the electronic starter (soft start) once normal operation is reached.

Pumps with a plug

At full load, the motor protection should be set to the rated current shown on the rating plate. At partial load, we recommend that the motor protection be set 5% above the current measured at the duty point.

Plugs are not immersion-proof. Note the protection class (IP). The socket must be installed where it will not be submersed.

5.6.3. Operation with variable frequency drives

Operation on a variable frequency drive is possible. Note the information about this in the appendix.

6. Commissioning

The "Commissioning" section contains all the important instructions for the operating personnel for starting up and operating the pump.

The following conditions must be adhered to and monitored:

- Type of installation
- Operating mode
- Minimum water submersion/max. immersion depth

These general conditions must also be checked after a long period without operation, and any defects detected must be repaired!

Always keep this manual either by the pump or in a place specially reserved for it, where it is accessible for the entire operating personnel at all times.

In order to prevent damage or serious injury when commissioning the pump, the following points must be observed:

- Commissioning of the pump may only be carried out by qualified and trained personnel in accordance with the safety instructions.
- All persons working on or with the pump must have received, read, and understood this operating and maintenance manual.
- All safety devices and emergency cut-outs must be connected and checked to ensure that they work properly.
- Electrical and mechanical adjustments must be made by qualified personnel.
- The pump is suitable for use under the specified operating conditions.
- In general, people should be kept out of the working area of the pump. No persons should be allowed in the working area during startup or operation.
- When working in sumps, a second person must be present. Adequate ventilation must be ensured if there is danger of toxic gases forming.

6.1. Electrical system

Connect the pump and install the power supply cables as described in the “Installation” section and in accordance with applicable national regulations.

The pump must be properly protected and grounded.

Ensure correct direction of rotation. If the direction of rotation is incorrect, the pump will not perform as specified and may be damaged.

Ensure all monitoring devices are connected and have been tested.

DANGER: electrical hazard!
Electrical current can cause fatal injuries if not handled correctly! All pumps with free cable ends (i.e. without plugs) must be connected by a qualified electrician.

6.2. Rotation control

The pump is checked and adjusted in the factory to ensure that the direction of rotation is correct. The connection must be made according to the wiring markings.

A test run must be performed under general operating conditions!

6.2.1. Checking the direction of rotation

The direction of rotation must be checked by a local electrician using a phase sequence tester. For the correct direction of rotation, a clockwise phase sequence must be present.

The pump is not approved for operation with a counterclockwise phase sequence!

6.2.2. If the direction of rotation is incorrect

If the direction of rotation is incorrect for direct start motors, two phases must be swapped. In the case of motors with star-delta starting, the connections of two windings must be swapped, e.g. U1 with V1 and U2 with V2.

6.3. Level control

Check that the level control device is installed properly and inspect the switching points. For the required information please refer to the installation and operating instructions for the level control device, as well as the planning documentation.

6.4. Operation in potentially explosive areas

If the pump is marked accordingly, it can be used inside potentially explosive areas.

RISK of fatal injury due to explosion!
Pumps without Ex marking must not be used in potentially explosive areas! There is a risk of fatal injury due to explosion! Check your pump before use to verify that it has the relevant approval:

- **Ex symbol**
- **Ex classification, e.g. II 2G Ex d IIB T4**
- **Also note the additional information in the appendix!**

6.5. Commissioning

The pump must have been installed properly as specified in the “Installation” section. This must be checked before the system is switched on.

Minor oil leakage at the mechanical seal on delivery is no cause for concern. However, it must be removed prior to submersion in the fluid.

Keep people out of the pump's working area. No persons should be allowed in the working area during startup or operation.

If the pump falls over, it must be switched off before setting it up again.

WARNING: danger of crushing!
In portable installations, the pump can fall over when it is switched on or during operation. Make sure that the pump is positioned on a firm bearing surface and that the pump foot is mounted correctly.

In the version with a plug, note the plug's IP protection class.

6.5.1. Before switching on

- Check the following, in general:
  - Cable guidance – no loops, slightly taut
  - Min./max. temperature of the fluid
  - Max. immersion depth
  - Clean the pipe system on the pressure side (hose, piping) – flush with clean water to prevent deposits causing clogging
  - The hydraulics housing must be completely filled by the fluid and there must be no air in the housing. It can be vented by suitable venting devices in the system or, if available, using vent screws on the pressure port.
  - Check switching points of level control and dry-running protection systems
  - Check to ensure all accessories are properly fitted
- The following points must also be checked in the case of wet well installation:
  - Clean the pump sump of coarse contaminants
  - Open all slide valves on the pressure side
- The following points must also be checked in the case of dry well installation:

- Clean the piping on the suction side – flush with clean water to prevent deposits causing clogging.
- Open all slide valves on the pressure and suction sides

If the slide valves on the suction and pressure sides are closed during operation, the fluid in the hydraulics housing is heated up by the pumping movement. This heating creates strong pressure in the hydraulics housing. The pressure can result in the pump exploding. Before switching on the pump, ensure that all the slide valves are open and open any closed slide valves.

6.5.2. Switching on/off

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

During the start-up procedure, the rated current is temporarily exceeded. After the start-up procedure is finished, the current must not exceed the rated current again.

If the motor does not start up, it must be switched off without delay. Before switching it on again, wait for the specified start pause and make sure to rectify the fault.

6.6. Conduct during operation

When operating the pump, always follow the locally applicable laws and regulations for work safety, accident prevention, and handling electrical machinery. To help ensure safe working practice, the responsibilities of employees should be clearly specified by the operator. All personnel are responsible for ensuring that regulations are observed.

Due to their design, centrifugal pumps have rotating parts that are easily accessible. Depending on the operating conditions, sharp edges can develop on these parts.

WARNING: danger of crushing and amputation of limbs!
Sharp edges can form on the rotating parts in the hydraulics. These can result in crushing and amputation of limbs. Never reach into the hydraulics when the machine is in operation.

The following must be checked at regular intervals:

- Operating voltage (permissible deviation +/-5% of the rated voltage)
- Frequency (permissible deviation +/- 2% of the rated frequency)
- Current consumption (permissible deviation between phases is a maximum of 5%)
- Voltage difference between the individual phases (max. 1%)
- Switching frequency and switching pauses (see technical data)
- Avoid air entry in the inlet; a deflector plate should be fitted if necessary
- Minimum water submersion
- Switching points for level control or dry-running protection
- Smooth running
- All slide valves must be open.

If the slide valves on the suction and pressure sides are closed during operation, the fluid in the hydraulics housing is heated up by the pumping movement. This heating creates strong pressure in the hydraulics housing. The pressure can result in the pump exploding. Make sure that all slide valves are open during operation.

7. Decommissioning/disposal

- All work must be carried out with the greatest care.
- Proper protective clothing is to be worn.
- When carrying out work in basins and/or tanks, the applicable local protection measures must be observed. A second person must be present for safety reasons.
- Only lifting equipment that is in a technically perfect condition and load carrying equipment that has been officially approved may be used for lowering and raising the pump.

RISK of fatal injury due to malfunctions!
Load carrying and lifting equipment must be in a perfect technical condition. Work may only commence once the lifting equipment has been checked and found to be in perfect working order. If it is not checked, fatal injuries may result.

7.1. Temporary decommissioning

For this type of deactivation, the pump remains installed and is not cut off from the electricity supply. In the event of temporary decommissioning the pump must remain completely immersed so that it is protected from frost and ice. Ensure that the temperature of the fluid and in the operating space does not fall below +37 °F (+3 °C).

This ensures that the pump is always ready for operation. For extended downtime, a regular (monthly to quarterly) 5 minute test run should be carried out.

CAUTION!
Only perform test runs under the proper operating and usage conditions. Never run the machine dry! This can result in irreparable damage!

7.2. Decommissioning for maintenance work or storage

The system must be switched off and the pump must be disconnected from the power supply by an electrician and secured against being switched on again without permission. Pumps with plugs must be unplugged (do not pull the cable!). Work

on removal, maintenance, and storage can then commence.

DANGER: from toxic substances!
Pumps that pump liquids hazardous to health must always be decontaminated before undertaking any other work. Otherwise, there is a risk of fatal injury! Wear the necessary physical protection equipment!

CAUTION: beware of burns!
The housing parts can heat up to well above 104 °F (40 °C). There is a risk of burns! After switching it off, let the pump cool down to ambient temperature.

7.3. Removal

7.3.1. Portable wet well installation

Pumps in portable wet well installation can be lifted out of the pit once they have been disconnected from the power supply and the pressure pipe has been drained. It may be necessary to detach the hose first. It may be necessary to use a suitable lifting device.

7.3.2. Stationary wet well installation

Pumps in stationary wet well installations with a guide system are raised out of the sump using the appropriate lifting equipment. During lifting, always hold the power supply cable slightly taut to prevent it being damaged.

The operating space does not have to be emptied especially for this purpose. All pressure- and suction-side slide valves must be closed to prevent the operating space overflowing or the discharge pipe being emptied.

7.3.3. Stationary dry well installation

For pumps in stationary dry well installation, the suction- and pressure-side slide valves have to be closed before removal. Note that the fluid in the hydraulics housing will escape during removal. Suitable collector tanks should be positioned to collect all of the escaping fluid.

After undoing the screwed connections on the suction and pressure connections, the pump can be removed using suitable lifting equipment. The operating space must be cleaned thoroughly after the pump is removed and any drips must be wiped up.

7.4. Return delivery/storage

For shipping, the parts must be packed in tear-proof plastic bags of sufficient size in such a manner that they are tightly sealed and leak proof.

For return delivery and storage please also refer to the “Transport and storage” section!

7.5. Disposal

7.5.1. Operating materials

Oils and lubricants must be collected in suitable vessels and disposed of in accordance with local directives.

7.5.2. Protective clothing

The protective clothing worn during cleaning and maintenance work must be disposed of in accordance with local directives.

7.5.3. Product

Proper disposal of this product avoids damage to the environment and risks to personal health.

- Use the services of public or private waste disposal companies, or consult them for the disposal of the product or parts thereof.
- For more information on proper disposal, please contact your local council or waste disposal office or the supplier from whom you obtained the product.

8. Maintenance and repair

ELECTROCUTION hazard!
There is a risk of fatal electric shocks when performing work on electrical devices. With all maintenance or repair work, the pump must be disconnected from the power supply and secured against being switched on again without permission. Damage to the power supply cable may only be rectified by a qualified electrician.

UNAUTHORIZED work could result in fatal injuries!
Maintenance and repair work that affects the safety of Ex protection must be carried out only by the manufacturer or authorized service workshops.
Also note the additional information in the appendix!

- Before any maintenance or repair work, the pump must be deactivated and dismantled as described in the “Decommissioning/disposal” section.
- After maintenance or repair work, the pump must be installed and connected as described in the “Installation” section.
- The pump must be switched on as described in the “Commissioning” section.

Note the following:

- All maintenance and repair work must be carried out by Wilo customer service, authorized service workshops, or trained specialists, with the greatest of care and in a safe workplace. Proper protective clothing is to be worn.

- This manual must be available to and followed by the maintenance staff. Only maintenance and repair work described in this manual may be carried out.
  Any other work and/or alterations to the construction may only be carried out by Wilo customer service.

- When carrying out work in basins and/or tanks, the applicable local protection measures must be observed in all cases. A second person must be present for safety reasons.
- Only lifting equipment that is in a technically perfect condition and load carrying equipment that has been officially approved may be used for lowering and raising the pump. Make sure that the pump does not jam during lifting and lowering. If the pump does jam, do not apply lifting forces greater than 1.2 times the pump weight. The maximum permissible bearing capacity should never be exceeded!
  Make sure that the lifting gear, ropes, and the lifting equipment's safety devices are in perfect working order. Work may only commence if the lifting equipment has been checked and found to be in perfect working order. If it is not checked, fatal injuries may result.

- Electrical work on the pump and the system must be carried out by a qualified electrician. Blown fuses must be replaced immediately. They must never be repaired. Only fuses for the specified electric current and of the specified type may be used.
- If flammable solvents and cleaning agents are used, naked flames and smoking are prohibited.
- Pumps that circulate fluids that are hazardous to health or come into contact with such fluids must be decontaminated. In addition, make sure that no gases that are hazardous to health form or are present.
  If injuries are caused by fluids or gases that are hazardous to health, apply the first aid measures specified at the working premises and notify a doctor immediately.

- Make sure that the necessary tools and materials are available. Tidiness and cleanliness ensure safe and smooth work on the pump. After working on the pump, remove any used cleaning materials and tools from the pump. Store all materials and tools in their proper place.
- Operating materials should be collected in suitable containers and disposed of properly. Always wear appropriate protective clothing when performing maintenance and repair work. This must also be disposed of properly.

8.1. Operating materials

8.1.1. Overview of white oil

The sealing chamber is filled with white oil that is potentially biodegradable.
When changing the oil, we recommend the following oil types:

- Aral Autin PL*
- Shell ONDINA 919
- Esso MARCOL 52* or 82*
- BP WHITEMORE WOM 14*
- Texaco Pharmaceutical 30* or 40*

All oil types marked with "*" are approved for use with foods in accordance with USDA-H1.

Filling quantities

The filling quantities depend on the motor:

- P 13.1: 30 oz (900 ml)
- P 13.2: 50 oz (1500 ml)
- P 17: 61 oz (1800 ml)

8.1.2. Overview of grease

The following lubricating grease can be used in accordance with DIN 51818/NLGI Class 3:

- Esso Unirex N3

8.2. Maintenance intervals

To ensure reliable operation, various maintenance tasks must be carried out regularly.
The maintenance intervals must be specified according to the load on the pump. Regardless of the specified maintenance intervals, the pump or installation must be checked if strong vibrations occur during operation.
When used in sewage lifting units inside buildings or on areas of land, the maintenance intervals and tasks should be in accordance with the requirements of local directives. Please check the requirements in your area!

8.2.1. Intervals for normal operating conditions

2 years

- Visual inspection of the power supply cable
- Visual inspection of accessories
- Visual inspection of the coating and housing for wear
- Functional inspection of all safety and monitoring devices
- Inspection of the switchgear/relays used
- Oil change

NOTE
If sealing chamber control is installed, the oil is changed according to the indicator!

15000 operating hours or after 10 years at the latest

- General overhaul

8.2.2. Intervals for harsh operating conditions

Under harsh operating conditions, the specified maintenance intervals must be shortened accordingly. In this case, please contact Wilo customer service. If using the pump under harsh conditions, we also recommend signing a maintenance contract.

Harsh operating conditions include:

- A large proportion of fibrous material or sand in the fluid
- Turbulent intake (e.g. due to air entry, cavitation)
- Strongly corrosive fluids
- Strongly gassing fluids
- Unfavorable duty points
- Operating states subject to water hammer

8.2.3. Recommended maintenance measures to ensure smooth operation

We recommend regular inspections of the current consumption and the operating voltage in all 3 phases. In normal operation, these values remain constant. Slight fluctuations may occur depending on the characteristics of the fluid. The current consumption can provide an early indication of damage and/or malfunctions in the impeller, bearings, and/or motor, which can be rectified. Large 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. We recommend the use of remote monitoring for regular inspections. Please contact Wilo customer service.

8.3. Maintenance work

Before carrying out maintenance work:

- Disconnect the pump from the power supply and secure it against being switched on inadvertently.
- Allow the pump to cool down and clean it thoroughly.
- Make sure that all the operationally relevant parts are in good condition.

8.3.1. Visual inspection of the power supply cable

The power supply cables must be checked for blisters, cracks, scratches, abrasion and/or crushing. If any damage is detected, the pump must be decommissioned immediately and the damaged power supply cable must be replaced.

The cables may only be replaced by Wilo customer service or an authorized or certified service workshop. The pump may only be started up again once the damage has been properly remedied.

8.3.2. Visual inspection of accessories

Accessories must be checked to ensure they are properly fitted and function correctly. Loose and/or faulty accessories must be repaired or replaced immediately.

8.3.3. Visual inspection of coating and housing for wear

The coatings and housing parts must not show any signs of damage. If there is visible damage to the coatings, repair the coating accordingly. If there is visible damage to housing parts, contact Wilo customer service.

8.3.4. Functional inspection of safety and monitoring devices

Monitoring devices include the temperature sensors in the motor, humidity electrodes, overload relay, overvoltage relay, etc.

- Motor protection and overvoltage relays and other triggers can usually be triggered manually for test purposes.
- To check the pencil electrode or the temperature sensor, the pump has to be cooled to the ambient temperature and the electrical connection for the monitoring equipment has to be disconnected in the switchgear. The monitoring equipment can then be checked with an ohmmeter. The values measured should be as follows:
  - Bimetallic strip: Value = “0” passage
  - PTC thermistor sensor: A PTC thermistor sensor has a cold resistance of between 20 and 100 Ω. If there are 3 sensors in series, this results in a value of 60 to 300 Ω.
    If there are 4 sensors in series, this results in a value of 80 to 400 Ω.
  - Pencil electrode: This value must approach infinity. If the value is low, there is water in the oil. Also observe the instructions of the optional evaluation relay.

If there are relatively large deviations, consult the manufacturer.

8.3.5. Inspection of the switchgear/relays used

See the relevant installation and operating instructions for a description of the individual work steps for inspecting the switchgear/relays. Faulty devices must be replaced immediately as they provide no protection to the pump.

8.3.6. Oil change in sealing chamber

The sealing chamber has a hole for draining and filling the chamber.

WARNING: risk of injury from hot and/or pressurized oil!
After the pump is switched off, the oil is still hot and pressurized. This can cause the screw plug to be ejected and hot oil to escape. There is a risk of injury or burns! First allow the oil to cool down to ambient temperature.

Fig. 8.: Screw plugs

1	Screw plug

1. Position the pump horizontally on a firm surface with the screw plug facing upward.
   Make sure that the pump cannot fall over and/or slip.
2. Carefully and slowly unscrew the screw plug.
   Attention: The oil may be pressurized! This can cause the screw to be ejected at speed.
3. Empty out oil by rotating the pump until the hole points downwards. Collect the oil in a suitable container and dispose of it in accordance with the requirements in the “Disposal” section.
4. Rotate the pump back until the hole is pointing upwards again.
5. Pour the new oil in through the hole for the screw plug. The oil should reach up to about 0.4 in (1 cm) below the hole. Note the recommended oils and filling quantities.
6. Clean the screw plug, replace the joint ring, and screw it back in.

8.3.7. General overhaul

In a general overhaul, in addition to the normal maintenance work, the motor bearings, shaft seals, O-rings, and power supply cables are checked and replaced if necessary. This work may be performed only by the manufacturer or an authorized service workshop.

9. Troubleshooting

In order to prevent damage or serious injury while rectifying pump faults, the following points must be observed:

- Only attempt to rectify a fault if you have qualified staff. This means that each job must be carried out by trained specialist staff. For example, electrical work must be performed by a trained electrician.
- Always secure the pump against an accidental restart by disconnecting it from the power supply. Take appropriate safety precautions.
- Always have a second person on hand to ensure the pump is switched off in an emergency.
- Secure moving parts to prevent injury.
- Unsanctioned changes to the pump are made at the operator's own risk and release the manufacturer from any warranty obligations.

Fault: the unit will not start

1. Electricity supply interrupted, short circuit or ground fault in the cable or motor windings
   - Have the motor and wires checked by a specialist and replaced if necessary
2. Fuses, the motor protection switch, and/or monitoring devices were triggered
   - Have a specialist inspect the connections and correct them as necessary.
   - Have the motor protection switches and fuses installed or adjusted according to the technical specifications; reset the monitoring equipment.
   - Check that the impeller runs freely. If necessary clean it and ensure it runs freely again
3. The sealing chamber control (optional) has interrupted the power circuit (depends on end user)
   - See Fault: mechanical seal leak, sealing chamber control reports a fault or switches the pump off

Fault: the unit starts, but the motor protection switch triggers shortly after startup

1. The thermal trigger on the motor protection switch is incorrectly set
   - Have a specialist compare the setting of the trigger with the technical specifications and correct it as necessary
2. Increased power consumption due to major voltage drop
   - Have an electrician check the voltage on each phase and rewire if necessary
3. Two-phase operation
   - Have a specialist inspect the connection and correct it as necessary
4. Excessive voltage differences on the three phases
   - Have a specialist inspect the connection and the switching system and correct as necessary
5. Incorrect direction of rotation
   - Swap two phases of the power supply
6. Impeller slowed by accumulation, clogging, and/or solid matter; increased current consumption
   - Switch off the pump, secure it against being switched back on again, and free the impeller or clear the suction port
7. The fluid is too dense
   - Consult the manufacturer

Fault: unit is running but not pumping

1. No fluid available
   - Open inlet for tank or slide valve
2. Inlet blocked
   - Clean the supply line, slide valve, suction piece, suction port, or suction strainer
3. Impeller blocked or slowed
   - Switch off pump, secure it against being switched back on again, and free the impeller
4. Faulty hose/piping
   - Replace faulty parts
5. Intermittent operation
   - Check switching system

Fault: the unit runs, but not within the specified operating parameters

1. Intake blocked
   - Clean the supply line, slide valve, suction piece, suction port, or suction strainer

2. Slide valve in the pressure pipe is closed
   • Open the slide valve completely
3. Impeller blocked or slowed
   • Switch off pump, secure it against being switched back on again, and free the impeller
4. Incorrect direction of rotation
   • Swap two phases of the power supply
5. Air in the system
   • Check the pipelines, pressure shroud, and/or hydraulics, and vent if necessary
6. Pump pumping against excessive pressure
   • Check the slide valve in the pressure pipe and open it completely if necessary; use a different impeller; consult the manufacturer
7. Signs of wear
   • Replace worn parts
8. Faulty hose/piping
   • Replace faulty parts
9. Inadmissible levels of gas in the fluid
   • Consult the manufacturer
10. Two-phase operation
    • Have a specialist inspect the connection and correct it as necessary
11. Excessive decrease in the water table during operation
    • Check the supply and capacity of the system, and inspect the level control settings and functionality

Fault: the unit does not run smoothly and is noisy

1. Pump is operating in an inadmissible range
   • Check the operational data of the pump and correct if necessary and/or adjust the operating conditions
2. Suction port, suction strainer, and/or impeller clogged
   • Clean the suction port, suction strainer, and/or impeller
3. Impeller stiff
   • Switch off pump, secure it against being switched back on again, and free the impeller
4. Inadmissible levels of gas in the fluid
   • Consult the manufacturer
5. Two-phase operation
   • Have a specialist inspect the connection and correct it as necessary
6. Incorrect direction of rotation
   • Swap two phases of the power supply
7. Signs of wear
   • Replace worn parts
8. Defective motor bearing
   • Consult the manufacturer
9. Pump is installed under tension
   • Check installation, use rubber expansion joints if necessary

Fault: mechanical seal leak, sealing chamber control reports a fault or switches the unit off

1. Condensation build-up due to extended storage and/or high temperature fluctuations
   • Operate the pump briefly (max. 5 min.) without pencil electrode
2. Increased leakage when running in new mechanical seals
   • Change the oil
3. Defective pencil electrode cable
   • Replace pencil electrode
4. Mechanical seal is defective
   • Replace the mechanical seal; consult the manufacturer!

Further steps for troubleshooting

If the points listed here do not rectify the fault, contact Wilo customer service, who can assist you further as follows:

- Telephone or written support from Wilo customer service
- On-site support from Wilo customer service
- Inspection or repair of the pump at the factory

Please note that you may be charged for some services provided by our customer service. For more details, please contact Wilo customer service.

10. Appendix

10.1. Operation with variable frequency drives

Any standard motor can be used, subject to compliance with IEC 60034-17. If the rated voltage is above 415 V/50 Hz or 480 V/60 Hz, you must consult the manufacturer. Because of the additional heating caused by harmonics, the rated power of the motor should be around 10% more than the power requirement of the pump. For variable frequency drives with low harmonic output, it may be possible to reduce the 10% power buffer. This is normally done by using output filters. **Furthermore, the standard motors are not equipped with shielded cables.** The variable frequency drive and filter must be synchronized with each other. Ask the manufacturer.

The configuration of the variable frequency drive depends on the rated motor current. Make sure that the pump operates without jerking or vibrating, especially in the lower speed range. Otherwise, the mechanical shaft seals could be damaged and start leaking. Also consider the flow rate in the pipe. The slower the flow rate, the greater the risk of solids depositing in the pump and piping. **We therefore recommend a minimum flow rate of 2.3 ft/s (0.7 m/s) at a pumping pressure of 5.8 psi (0.4 bar).**

It is important that the pump operates across the entire control range without vibrations, resonance, oscillation, or excessive noise (consult the manufac-

turer if necessary). Increased motor noise caused by the harmonics of the power supply is normal.
When configuring the variable frequency drive, always make sure the quadratic curve (V/F curve) for pumps and fans is correctly set! This ensures that the output voltage at frequencies greater than the rated frequency (50 Hz or 60 Hz) is adjusted to the power requirement of the pump. Newer variable frequency drives feature an automatic power optimization function which achieves the same effect. To set the variable frequency drive, please refer to its installation and operating instructions.

Faults in motor monitoring may occur on motors fed by a variable frequency drive depending on the type of variable frequency drive used and the installation conditions present. The following general measures could help to reduce or avoid faults:

- Keep within the thresholds stated in IEC 60034-17 for the voltage peaks and rise rate (output filters may be necessary).
- Vary the pulse frequency of the variable frequency drive.
- In the case of faults with the sealing chamber monitor, use our external double rod electrode.
  The following construction measures could also help to reduce or prevent faults:
- Use shielded power supply cables.

Summary

- Continuous operation between 1 Hz and the rated frequency (50 Hz or 60 Hz), while observing the min. flow rate
- Consider additional measures with regard to EMC (choice of variable frequency drive, using filters, etc.).
- Never exceed the rated current or rated speed of the motor.
- It must be possible to connect the motor's own temperature monitor (bimetallic strip or PTC sensor).

10.2. Ex approval

This section contains special information for owners and operators of pumps which have been built and certified for use in environments where explosions may occur.

It expands on and therefore supplements the standard instructions for this pump. It also expands on and supplements the "general safety information" section and must be read and fully understood by all users and operators of the pump.

This section applies only to Ex-rated pumps and contains additional instructions for these pumps!

10.2.1. Identification of Ex-rated pumps

Pumps that have been approved for use in an explosive atmosphere are marked as follows on the rating plate:

- "Ex" symbol for the relevant approval
- Information on Ex classification

10.2.2. FM approval

The motors are certified and approved by the recognized testing and licensing authority "FM Approvals" according to standards FM 3600, 3615, 3615.80, and ANSI/UL-1004. The motors are approved for operation in potentially explosive areas that require electrical devices with the protection class "Explosionproof, Class 1, Division 1."

Operation is therefore also possible in areas with the required protection class "Explosionproof, Class 1, Division 2" according to the FM standards.

10.2.3. FM classification

Example of Ex marking:

FM
APPROVED

CLASS I, DIV. 1, GROUPS C, D
CLASS II, DIV. 1, GROUPS E, F, G
CLASS III
TEMPERATURE CODE T3C

Meaning:

- Class 1=gases, fumes, mist
  Division 1 = explosive atmosphere constantly or occasionally present under normal conditions
  Groups C, D = gas groups: ethylene (C), propane (D)
- Class 2=dust
  Division 1 = explosive atmosphere constantly or occasionally present under normal conditions
  Groups E, F, G = dust groups: metal (E), carbon (F), grain (G)
- Class 3=fibers and lint
- T3C=max. surface temperature of the pump 320 °F (160 °C)
  The specifications for the max. immersion depth and the max. temperature of the fluid are likewise noted on the rating plate.

"Explosion proof" protection class

Motors in this protection class must be equipped with a temperature limiter.

Non-immersed operation

The motor must always be immersed during operation!

10.2.4. Electrical connection

ELECTROCUTION hazard!
Incorrect electrical connections can cause fatal electric shocks and/or explosion. Electrical connections may only be carried out by a qualified electrician approved by the local energy supply company, in accordance with locally applicable regulations.

In addition to the information in the "Electrical connection" section, the following points must be observed for Ex-rated pumps:

- The power supply cable must be connected outside the potentially explosive area, or inside a housing with an approved level of ignition protection.

- Voltage tolerance: ±10%
- All monitoring devices outside the "spark-proof areas" must be connected via an Ex cut-off relay. We recommend the XR-42x relay for this.

Temperature monitoring device connection
The motor is equipped with a temperature limiter (1-circuit temperature monitoring).
As an option, the motor can be fitted with a temperature controller and limiter (2-circuit temperature monitoring).

RISK of fatal injury due to incorrect connection! Risk of explosion due to overheating of the motor! The temperature monitoring device must be connected in such a way that, when triggered, a restart is possible only after the "release button" is pressed by hand.

In 2-circuit temperature monitoring, automatic restarting can be implemented via the temperature control. The maximum switching frequency (15/h with a 3-minute pause) must be observed.

- Bimetallic strips must be connected via an evaluation relay. We recommend the "CM-MSS" relay for this. The threshold is already preset.
  Connection values: max. 250 V(AC), 2.5 A, cos φ = 1
- PTC sensors (optionally available and in accordance with DIN 44082) must be connected via an evaluation relay. We recommend the "CM-MSS" relay for this. The threshold is already preset.
  When the threshold is reached, the pump must switch off.

Motor compartment monitor

- The motor compartment monitor must be connected via an evaluation relay. We recommend the "NIV 101/A" relay for this. The threshold is 30 kΩ.
  When the threshold is reached, the pump must switch off.

Connection of sealing chamber control

- The pencil electrode must be connected via an evaluation relay. We recommend the "XR-42x" relay for this. The threshold is 30 kΩ.
- The connection must be made using an intrinsically safe electric circuit.
  The following connection values must be complied with:
  - Max. 30 Vrms (60 V peak)
  - Max. 60 VDC
  - Max. 0.5 mA

Operation on variable frequency drive

- Continuous operation up to rated frequency (50 Hz or 60 Hz), observing the min. flow rate
- Consider additional measures with regard to EMC (choice of variable frequency drive, using filters, etc.).
- Never exceed the rated current or rated speed of the motor.
- It must be possible to connect the motor's own temperature monitor (bimetallic strip or PTC sensor).

10.2.5. Commissioning

RISK of fatal injury due to explosion! Pumps without Ex marking must not be used in potentially explosive areas! There is a risk of fatal injury due to explosion! Observe the following when using the pump in explosion hazard areas:

- **The pump must be approved for use in potentially explosive areas!**
- **The power supply cable must be connected outside the potentially explosive area, or inside a housing with an approved level of ignition protection.**
- **Switchgear must be connected outside the potentially explosive area, or inside a housing with an approved level of ignition protection. Furthermore, it must be configured for operation of pumps with explosion approval.**
- **The mounted accessories must be approved for use on Ex pumps.**

RISK of fatal injury due to explosion! The housing of the hydraulics must be fully flooded (completely filled with the fluid) during operation. If the housing is not immersed or there is air in the hydraulics, flying sparks may cause an explosion, for example due to static charge. Ensure that dry-running protection is in place for pump deactivation.

In addition to the information in the "Commissioning" section, note the following points for Ex-rated pumps:

- The end user is responsible for defining the potentially explosive area. Only pumps with Ex approval may be used within a potentially explosive area.
- Ex-rated pumps must be identified accordingly.
- To keep dry motors sufficiently cooled, after being removed from immersion, they must be flooded completely before being switched back on!

10.2.6. Maintenance and repair

ELECTROCUTION hazard! There is a risk of fatal electric shocks when performing work on electrical devices. With all maintenance or repair work, the pump must be disconnected from the power supply and secured against being switched on again without permission. Damage to the power supply cable may only be rectified by a qualified electrician.

In addition to the information in the “Maintenance and repair” section, note the following points for Ex-rated pumps:

- The maintenance and repair work described in this operating and maintenance manual must be carried out properly.
- Repairs and alterations to the construction which are not listed in this operating and maintenance manual or which may impair explosion protection may only be performed by the manufacturer or by service dealers certified by the manufacturer.
- The spark-proof gaps may only be repaired according to the manufacturer’s design specifications. These must not be repaired using standard gap dimensions.
- Only the screw plugs stipulated by the manufacturer, fulfilling at least a strength category of 600 N/mm², may be used.

Cable changes

Cable changes are strictly prohibited and may only be carried out by the manufacturer or by service centers certified by the manufacturer.

10.3. Spare parts

Spare parts can be ordered from Wilo customer service. To avoid return queries and incorrect orders, the serial and/or article number should always be supplied.

Subject to change without prior notice!

wilo

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