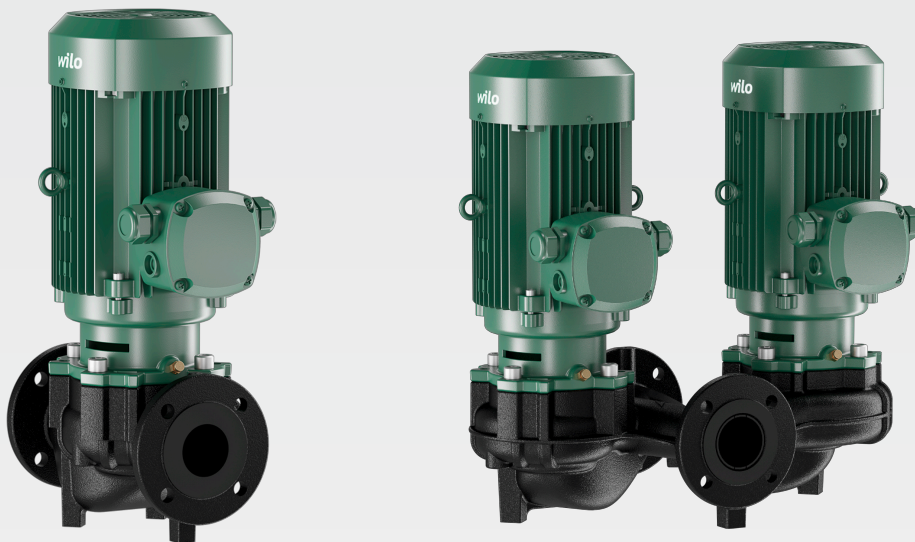


## Wilo-VeroLine-IPL (1,1-7,5 kW) Wilo-VeroTwin-DPL (1,1-7,5 kW)



en Installation and operating instructions

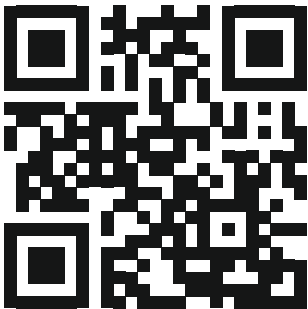
zh-CHS 安装及操作说明



VeroLine-IPL  
<https://qr.wilo.com/221>



VeroTwin-DPL  
<https://qr.wilo.com/231>



Motor data acc. to EU2019/1781  
<https://qr.wilo.com/motors>

Fig. I: VeroLine-IPL

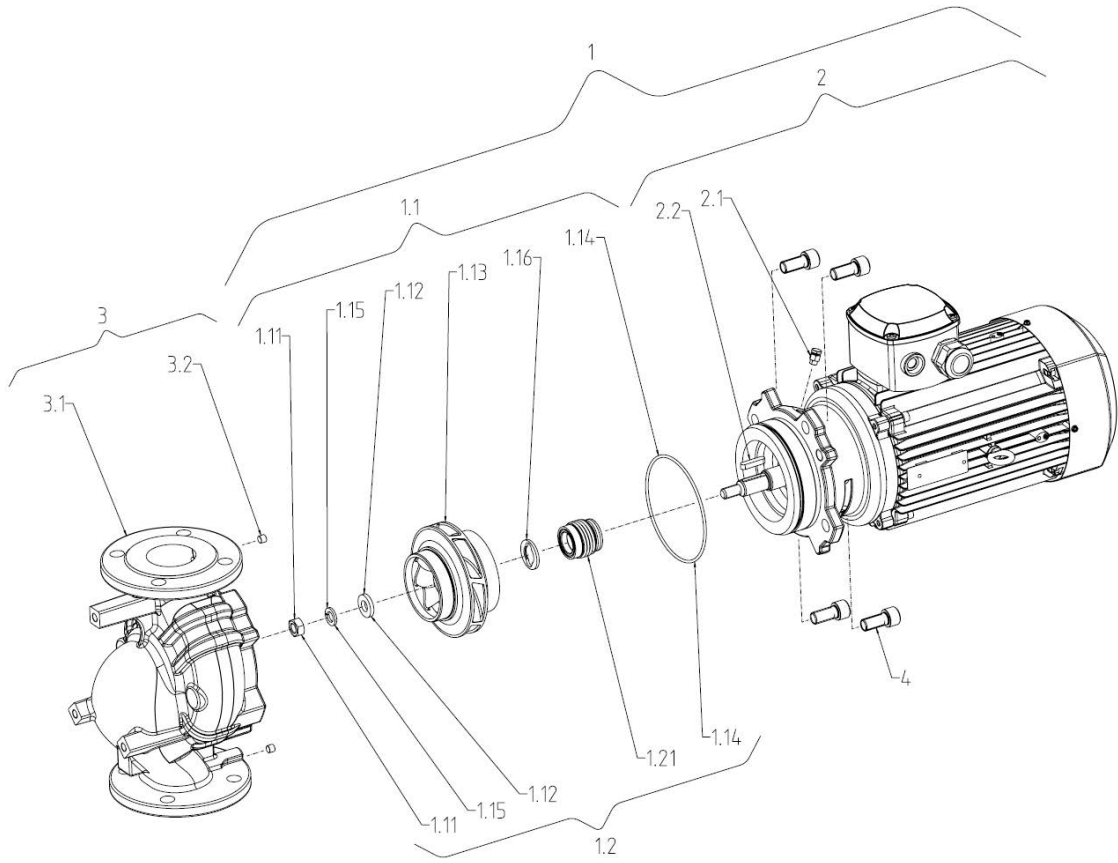


Fig. II: VeroTwin-DPL

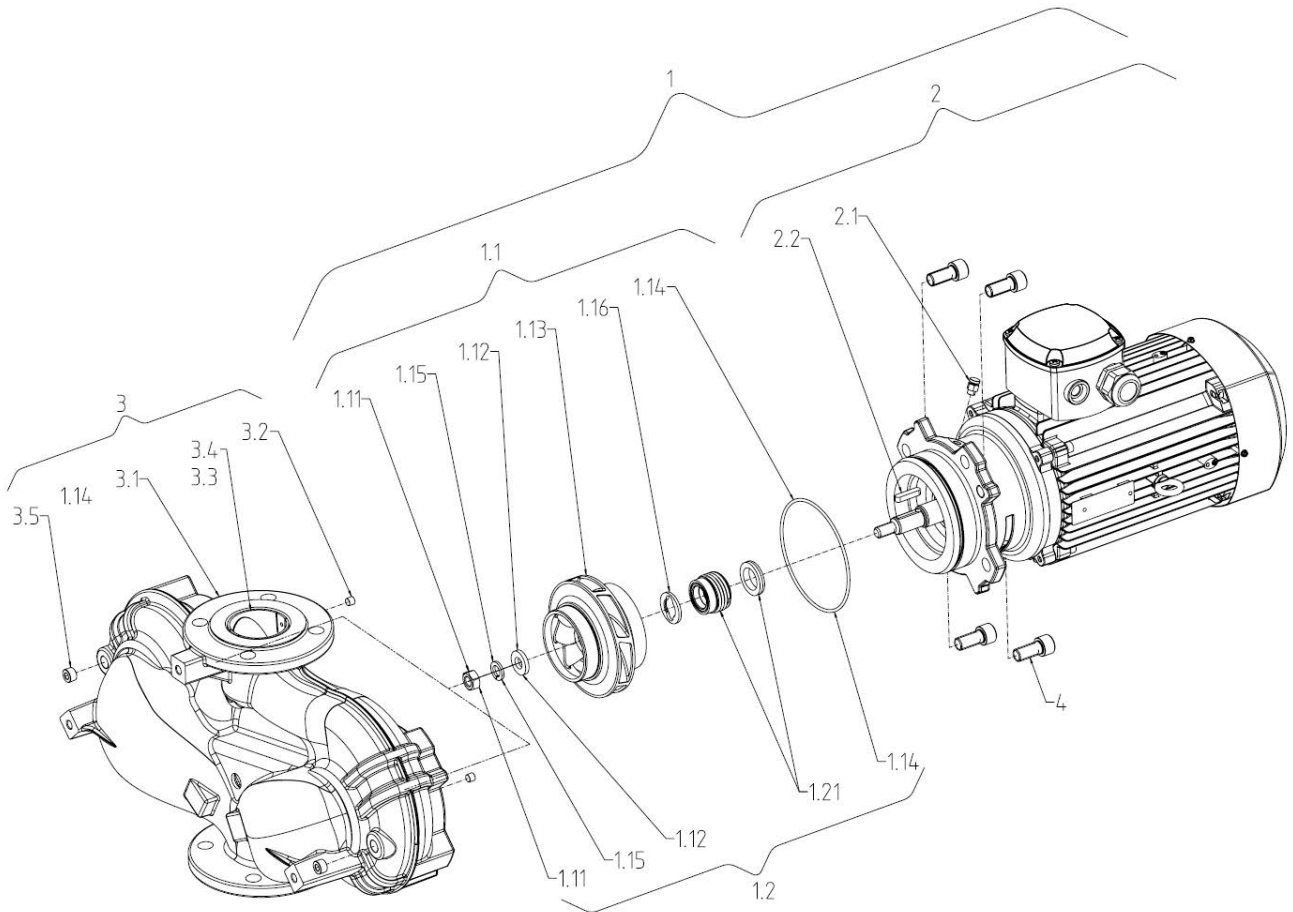


Fig. III a:  $\leq$  DN 80

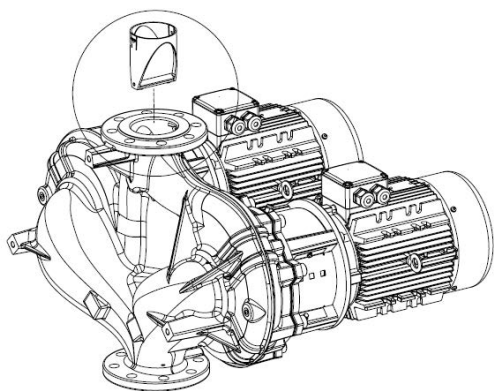
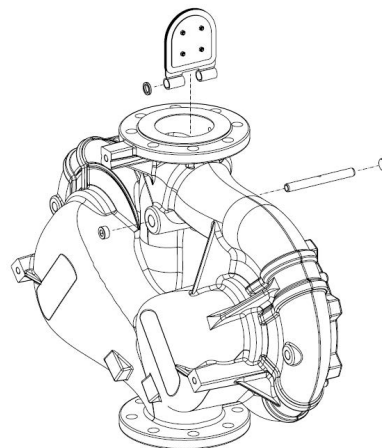


Fig. III b: DN 100



English .....	6
中文 .....	35

## Table of contents

<b>1</b>	<b>General</b> .....	<b>7</b>
1.1	About these instructions .....	7
1.2	Copyright .....	7
1.3	Subject to change.....	7
<b>2</b>	<b>Safety</b> .....	<b>7</b>
2.1	Identification of safety instructions .....	7
2.2	Personnel qualifications.....	8
2.3	Electrical work.....	8
2.4	Transport.....	9
2.5	Installing/dismantling.....	9
2.6	During operation.....	10
2.7	Maintenance work .....	10
2.8	Operator responsibilities .....	11
<b>3</b>	<b>Transport and storage</b> .....	<b>11</b>
3.1	Shipping .....	11
3.2	Transport inspection .....	11
3.3	Storage .....	12
3.4	Transport for installation/dismantling purposes.....	13
<b>4</b>	<b>Intended use and misuse</b> .....	<b>14</b>
4.1	Intended use .....	14
4.2	Misuse.....	14
<b>5</b>	<b>Product information</b> .....	<b>14</b>
5.1	Type key.....	15
5.2	Technical data .....	15
5.3	Scope of delivery.....	16
5.4	Accessories .....	16
<b>6</b>	<b>Description of the pump</b> .....	<b>16</b>
6.1	Anticipated noise levels.....	17
<b>7</b>	<b>Installation</b> .....	<b>18</b>
7.1	Personnel qualifications.....	18
7.2	Operator responsibilities .....	18
7.3	Safety.....	18
7.4	Permissible forces and torques on the pump flanges ...	19
7.5	Preparing the installation .....	20
<b>8</b>	<b>Electrical connection</b> .....	<b>22</b>
8.1	Anti-condensation heater.....	25
<b>9</b>	<b>Commissioning</b> .....	<b>25</b>
9.1	Filling and venting .....	26
9.2	Activation.....	27
9.3	Switching off .....	27
9.4	Operation .....	28
<b>10</b>	<b>Maintenance</b> .....	<b>28</b>
10.1	Air supply .....	29
10.2	Maintenance work .....	30
<b>11</b>	<b>Faults, causes and remedies</b> .....	<b>32</b>
<b>12</b>	<b>Spare parts</b> .....	<b>33</b>
<b>13</b>	<b>Disposal</b> .....	<b>34</b>
13.1	Oils and lubricants .....	34

13.2	Information on the collection of used electrical and electronic products.....	34
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## 1 General

### 1.1 About these instructions

These installation and operating instructions are an integral part of the device. Read these instructions before commencing any work and keep them in an accessible place at all times. Strict adherence to these instructions is a requirement for the intended use and correct operation of the product.

All specifications and markings on the device must be observed. These installation and operating instructions correspond to the relevant version of the device and the underlying safety standards valid at the time of going to print.

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

### 1.2 Copyright

WILO SE © 2024

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

### 1.3 Subject to change

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

## 2 Safety

This chapter contains basic instructions for the individual life cycles of the product. Failure to observe this information carries the following risks:

- Danger to persons from electrical, mechanical and bacteriological effects as well as electromagnetic fields
- Environmental damage from discharge of hazardous substances
- Damage to property
- Failure of important product functions
- Failure of required maintenance and repair procedures

Failure to observe the instructions will result in the loss of any claims for damages.

**The directions and safety instructions in the other sections must also be observed!**

### 2.1 Identification of safety instructions

These installation and operating instructions set out safety instructions for preventing personal injury and damage to property, which are displayed in different ways:

- Safety instructions relating to personal injury start with a signal word and are **preceded by a corresponding symbol**.
- Safety instructions relating to property damage start with a signal word and are displayed **without** a symbol.






#### Signal words

- **DANGER!**  
Failure to follow the instructions will result in serious injury or death!
- **Warning!**  
Failure to follow instructions can lead to (serious) injury!

- **Caution!**  
Failure to follow instructions can lead to property damage and possible total loss.
- **Notice!**  
Useful information on handling the product

### Symbols

These instructions use the following symbols:

-  General danger symbol
-  Danger of electric voltage
-  Warning of hot surfaces
-  Warning of high pressure
-  Notices

## 2.2 Personnel qualifications

Staff must:

- be instructed about locally applicable regulations governing accident prevention,
- have read and understood the installation and operating instructions.

Personnel must have the following qualifications:

- Electrical work: a qualified electrician must carry out the electrical work.
- Installation/dismantling: The technician must be trained in the use of the necessary tools and fixation materials.
- The product must be operated by persons who have been instructed on how the complete system functions.
- Maintenance work: The technician must be familiar with the use of operating fluids and their disposal.

### Definition of “qualified electrician”

A qualified electrician is a person with appropriate technical education, knowledge and experience who can identify **and** prevent electrical hazards.

The operator must confirm and ensure the field of authority, the competence and the monitoring of the personnel. If the personnel do not possess the necessary knowledge, they must be trained and instructed. If required, this can be carried out by the product manufacturer at the operator’s request.

## 2.3 Electrical work

- Have electrical work carried out by a qualified electrician.
- When connecting to the mains supply, comply with the nationally applicable guidelines, standards and regulations as well as specifications issued by the local energy supply companies.



- Before commencing work, disconnect the product from the mains and secure it against being switched on again.
- Give staff training on how to establish the electrical connection and the methods for switching off the product.
- Protect the electrical connection with a residual-current device (RCD).
- Observe the technical information in these installation and operating instructions as well as on the rating plate.
- Earth the product.
- Comply with the manufacturer's specifications when connecting the product to electrical switching systems.
- Have a defective connection cable replaced immediately by a qualified electrician.
- Never remove operating elements.
- Comply with the specifications on electromagnetic compatibility when using electronic start-up controllers (e.g. soft starter or frequency converter). If required, consider special measures (shielded cables, filters, etc.).

## 2.4 Transport

- Wear protective equipment:
  - Safety gloves for protection against cuts
  - Safety shoes
  - Sealed safety glasses
  - Safety helmet (when using lifting equipment)
- Only use legally specified and approved lifting slings.
- Select the lifting sling based on the prevailing conditions (weather, slinging point, load etc.).
- Always attach the lifting sling to the designated slinging points (lifting eyes).
- Position the lifting accessory in a way that ensures stability during use.
- When using lifting equipment, a second person must be present to coordinate the procedure if required (e.g. if the operator's field of vision is blocked).
- Persons must not stand underneath suspended loads. Do **not** move suspended loads over workplaces where people are present.

## 2.5 Installing/dismantling

- Wear protective equipment:
  - Safety shoes
  - Safety gloves for protection against cuts
  - Safety helmet (when using lifting equipment)
- Locally applicable laws and regulations on work safety and accident prevention must be complied with.

- The procedure described in the installation and operating instructions for shutting down the product/unit must be strictly observed.
- Disconnect the device from the mains and secure it against being switched on again without authorisation.
- All rotating parts must be at a standstill.
- Close the gate valve in the inlet and in the discharge line.
- Provide adequate aeration in enclosed spaces.
- Make sure that there is no risk of explosion when carrying out any type of welding work or work with electrical devices.

## 2.6 During operation

- The operator must immediately notify the person in charge of every fault or irregularity.
- If hazardous defects occur, the operator must immediately deactivate the device. Hazardous defects include:
  - Malfunction of safety and monitoring devices
  - Damage to housing parts
  - Damage to electrical equipment
- Collect any leakage of fluids and operating fluids immediately and dispose of it according to the locally applicable guidelines.
- Tools and other objects should only be kept in their designated places.

## 2.7 Maintenance work

- Wear protective equipment:
  - Sealed safety glasses
  - Safety shoes
  - Safety gloves for protection against cuts
- Locally applicable laws and regulations on work safety and accident prevention must be complied with.
- The procedure described in the installation and operating instructions for shutting down the product/unit must be strictly observed.
- Only perform the maintenance work described in these installation and operating instructions.
- Only original parts from the manufacturer may be used for maintenance and repairs. The use of any non-original parts releases the manufacturer from any liability.
- Disconnect the device from the mains and secure it against being switched on again without authorisation.
- All rotating parts must be at a standstill.
- Close the gate valve in the inlet and in the discharge line.
- Collect any leakage of fluid and operating fluid immediately and dispose of it according to the locally applicable guidelines.
- Store tools at the designated locations.
- After completing work, reattach all safety and monitoring devices and check that they function properly.

## 2.8 Operator responsibilities

- Provide installation and operating instructions in a language which the personnel can understand.
- Make sure that personnel are suitably trained for the specified work.
- Verify the area of responsibility and individual responsibilities of personnel.
- Provide the necessary protective equipment and make sure that personnel wear it.
- Ensure that safety and information signs mounted on the device are always legible.
- Train personnel with regard to the operating principles of the system.
- Eliminate risks from electrical current.
- Equip hazardous components (extremely cold, extremely hot, rotating, etc.) with a guard to be provided by the customer.
- Remove leakages of hazardous fluids (e.g. explosive, toxic or hot) in such a way that no danger is posed to persons or the environment. Comply with national statutory provisions.
- Keep highly flammable materials at a safe distance from the product.
- Ensure compliance with the regulations for accident prevention.
- Ensure compliance with local directives or general directives [e.g. IEC, VDE, etc.] and instructions from local energy supply companies.

Follow all information that appears on the product and ensure that it remains permanently legible:

- Warning and hazard notices
- Rating plate
- Direction of rotation arrow/symbol for direction of flow
- Labelling of connections

This device can be used by children from 8 years of age as well as people with reduced physical, sensory or mental capacities or lack of experience and knowledge if they are supervised or instructed on the safe use of the device and they understand the dangers that can occur. Children are not allowed to play with the device. Cleaning and user maintenance must not be carried out by children without supervision.

## 3 Transport and storage

### 3.1 Shipping

The pump is secured to a pallet ex works, packaged in a box and protected against dirt and moisture.

### 3.2 Transport inspection

Check delivery immediately for damage and completeness. Defects must be noted on the freight documentation! Defects must be notified to the transport company or the manufacturer immediately on the day of receipt of shipment. Subsequently notified defects can no longer be claimed for.

Only remove the outer packaging at the place of utilisation to ensure that the pump is not damaged during transport.

### 3.3 Storage

---

#### CAUTION

##### **Damage due to incorrect handling during transport and storage!**

Protect the product from moisture, frost and mechanical damage during transport and temporary storage.

---

If available, leave the covers on the pipe connections so that no dirt and other foreign matter can get into the pump housing.

To avoid scoring at the bearings and sticking, turn the pump shaft once a week using a socket wrench.

If a longer storage time is required, contact Wilo for preservation measures.



#### WARNING

##### **Risk of injury due to incorrect transport!**

If the pump is transported again at a later date, it must be packaged so that it cannot be damaged during transport. Use the original packaging for this or choose equivalent packaging.

### 3.4 Transport for installation/dismantling purposes



#### WARNING

##### Risk of personal injury!

Incorrect transport can lead to personal injury!

- Unload boxes, lathed spaces, pallets or cartons, depending on the size and construction, with forklift trucks or with slings.
- Always lift heavy parts of more than 30 kg with hoisting gear that is in accordance with local regulations.
  - The bearing capacity has to be adapted to the weight!
- Transport the pump using approved lifting gear (block and tackle, crane etc.). Lifting gear must be attached to the pump flanges and, if necessary, to the outer motor diameter.
  - Securing against slipping is required for this!
- When lifting machines or parts with eyelets, only use load hooks or shackles that are in accordance with local safety regulations.
- Transport lugs on the motor, if present, are only for transporting the motor. They are not approved for transporting the complete pump.
- Use a guard if load chains or ropes are guided over or through eyelets or over sharp edges.
- When using a block and tackle or similar hoisting gear, make sure that the load is lifted vertically.
  - Prevent the suspended load from swinging.
    - Swinging can be avoided by using a second block and tackle. The direction of pull of both block and tackles must be less than 30° to the vertical.
- Never subject load hooks, eyelets or shackles to bending forces – their load axes have to be in the direction of the tractive forces!
- When lifting, make sure that the load limit of a load rope is reduced for diagonal pulling.
  - The safety and effectiveness of a stranding is best ensured when all load-bearing elements are loaded in the vertical direction to the greatest extent possible. If required, use a lifting arm to which the load ropes can be attached vertically.
- Set up a safety zone in such a way that there is no danger if the load or a part of the load slips or the hoisting gear breaks or tears.
- Never leave a load longer than necessary in a suspended position! Ensure there is no danger to personnel when accelerating and slowing down during the lifting procedure.

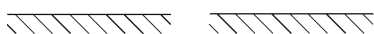
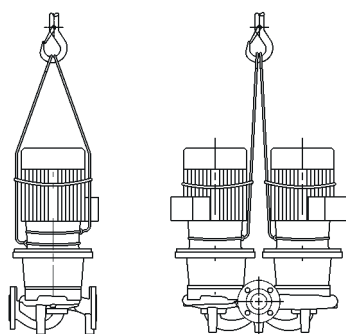


Fig. 1: Transporting the pump

For lifting with a crane, the pump must be supported by suitable belts or load ropes, as shown. Place belts or load ropes in loops around the pump, which tighten from the pump's own net weight.

Transport lugs on the motor, if present, are only for guiding when the load is being carried!



#### WARNING

##### Damaged transport lugs can break off and cause considerable personal injury.

- Check the transport lugs before use for damage and secure fixation.

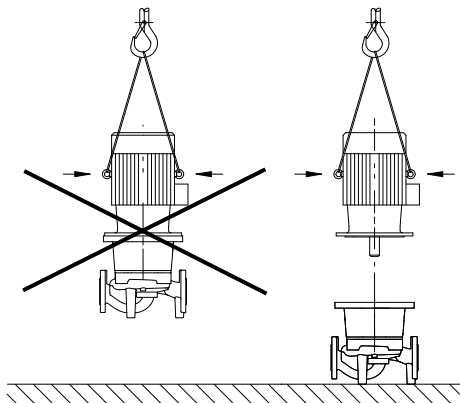


Fig. 2: Transporting the motor

Transport lugs on the motor, if present, are only for transporting the motor. They are not approved for transporting the complete pump!



## DANGER

### Danger of death from falling parts!

The pump itself and pump parts can have a very high net weight. Falling parts pose a risk of cuts, crush injuries, bruises or impacts, which can be fatal.

- Always use suitable lifting accessories and secure parts against falling.
- Never stand below a suspended load.
- During storage and transport, as well as before all installation and assembly work, ensure that the pump is in a safe position and standing securely.



## WARNING

### Personal injury due to unsecured installation of the pump!

The base with the threaded holes is used for fixation only. When standing freely, the pump might not be sufficiently stable.

- Never place the pump unsecured on the pump support feet.

## 4 Intended use and misuse

### 4.1 Intended use

The glanded pumps of this series are intended for use as circulators in building services.

They may be used for:

- Hot-water heating systems
- Cooling and chilled water circulation systems
- Process water systems
- Industrial circulation systems
- Heat transfer circuits

Intended use includes compliance with these instructions as well as the information and markings on the pump.

Any use beyond the intended use is considered misuse and will result in the loss of all liability claims.

### 4.2 Misuse

The operational reliability of the supplied product is only guaranteed for intended use in accordance with chapter "Intended use" of the installation and operating instructions. The limit values must not fall below or exceed those values specified in the catalogue/data sheet.

#### **WARNING! Misuse of the pump can lead to dangerous situations and damage.**

- Never use fluids other than those approved by the manufacturer.
- Non-permitted substances in the fluid can destroy the pump. Abrasive solids (e.g. sand) increase pump wear.
- Pumps without an Ex rating are not suitable for use in potentially explosive atmospheres.
- Highly flammable materials/fluids should always be kept at a safe distance from the device.
- Never allow unauthorised persons to carry out work.
- Never operate the pump beyond the specified limits of use.
- Never carry out unauthorised conversions.
- Use authorised accessories and genuine spare parts only.

Typical installation locations are technical rooms within the building with other domestic installations. No provision has been made for direct installation of the pump in rooms used for other purposes (residential and work rooms).

Outdoor installation requires a corresponding, special version (motor with anti-condensation heater). See chapter "Anti-condensation heater connection".

## 5 Product information

### 5.1 Type key

#### Example:

VeroLine-IPL 80/135-5.5/2-xx

VeroTwin-DPL 80/135-5.5/2-xx

VeroLine-IPL	Flange-end pump as in-line single pump
VeroTwin-DPL	Flange-end pump as in-line twin-head pump
80	Nominal diameter DN of the flange connection in mm
135	Nominal impeller diameter in mm <sup>1)</sup>
5.5	Rated power P2 in kW
2	Number of poles, motor
-xx	Variant, e.g. S1

<sup>1)</sup> Does not correspond to the actual impeller diameter. Use the spare parts catalogue for spare parts.

Table 1: Type key

### 5.2 Technical data

Property	Value	Note
Rated speed	<ul style="list-style-type: none"> <li>(2-/4-pole): 2900 rpm or 1450 rpm</li> </ul>	For special versions (e.g. for other voltage, operating pressures, fluids, etc), see rating plate or <a href="http://www.wilo.com">www.wilo.com</a> .
Nominal diameters DN	IPL: 32 to 100 mm DPL: 32 to 100 mm	
Pipe and pressure measurement connections	Flanges PN 16 in accordance with DIN EN 1092-2 with pressure measurement connections Rp 1/8 in accordance with DIN 3858.	
Permissible min./max. fluid temperature	-20 °C to +120 °C	Depending on the fluid, operating pressure and type of mechanical seal
Ambient temperature during operation min./max.	0 °C to +40 °C	Lower or higher ambient temperatures on request
Temperature during storage min./max.	-30 °C to +60 °C	
Max. permissible operating pressure	10 bar (to +120 °C)	
Insulation class	F	
Protection class	IP55	
Permissible fluids	Heating water in accordance with VDI 2035 part 1 and part 2 process water cooling/chilled water water-glycol mixture up to 40 % vol.	Standard version Standard version Standard version Standard version
Permissible fluids	Heat transfer oil	Special version or auxiliary equipment (at additional charge)
Permissible fluids	Other fluids (on request)	Special version or auxiliary equipment (at additional charge)
Electrical connection	3~400 V, 50 Hz	Standard version

Property	Value	Note
Electrical connection	3~230 V, 50 Hz to 3 kW including	Standard version
Electrical connection	3~230 V, 50 Hz from 4 kW	Special version or auxiliary equipment (at additional charge)
Special voltage/frequency	Pumps with motors with different voltages or other frequencies are available on request.	Special version or auxiliary equipment (at additional charge)
PTC thermistor sensor		Special version (at additional charge)
Speed control, pole switchover	Wilo control devices (e.g. Wilo-CC-HVAC system)	Standard version

Table 2: Technical data

The detailed motor data as per EU2019/1781 can be consulted via the motor's article number here: <https://qr.wilo.com/motors>

Additional information CH	Permissible fluids
Heating pumps	<p>Heating water (in accordance with VDI 2035/VdTÜV Tch 1466/<b>CH: in accordance with SWKI BT 102-01</b>)</p> <p>...</p> <p>No oxygen binding agents, no chemical sealants (ensure closed system from corrosion perspective according to VDI 2035 (<b>CH: SWKI BT 102-01</b>); rework leaky points).</p>

### Fluids

Water-glycol mixtures or fluids with a different viscosity than pure water increase the power consumption of the pump. Only use mixtures with corrosion protection.

#### Observe the relevant manufacturer's specifications!

- Adjust the motor power if required.
- The fluid must be sediment-free.
- Wilo's approval must be obtained for the use of other fluids.
- When using water-glycol mixtures, the use of an S1 variant with a corresponding mechanical seal is generally recommended.
- The compatibility of the standard seal / standard mechanical seal with the fluid is generally given under normal system conditions.  
Special circumstances may require special seals, for example:
  - solids, oils or EPDM-attacking substances in the fluid,
  - air content in the system, etc.

#### Observe the safety data sheet for the fluid to be pumped!

### 5.3 Scope of delivery

- Pump
- Installation and operating instructions

### 5.4 Accessories

Accessories must be ordered separately:

- PTC thermistor tripping unit for switch cabinet installation
- 2 or 3 mounting brackets with fixation material for installation on a base
- Blind flanges for repair work

For a detailed list, consult the catalogue and spare parts documentation.



## 6 Description of the pump

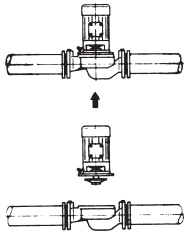


Fig. 3: View of IPL – pipe installation

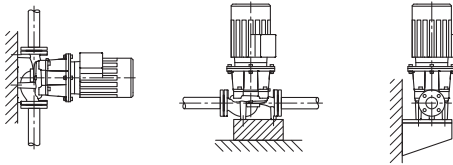


Fig. 4: View of IPL – installation on a base (≤ 7.5 kW)

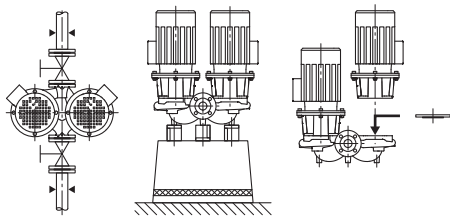


Fig. 5: View of DPL

All the pumps described here are low-pressure centrifugal pumps with a compact construction. The motor is constructed with a one-piece shaft towards the pump. The mechanical seal is maintenance-free. The pumps can be installed both directly as a pipe installation pump in a sufficiently anchored pipe or placed on a foundation base.

The installation options depend on the pump size. Suitable Wilo control devices (e.g. Wilo-CC-HVAC system) can control the power of the pumps continuously. This allows optimisation of the pump output for the demands of the installation and economically efficient pump operation.

### IPL version

The pump housing has an in-line design, i.e. the flanges on the suction and discharge sides lie along a centre line. All pump housings are provided with pump support feet. Installation on a foundation base is recommended for rated powers of 5.5 kW and higher.

### DPL version

Two pumps are arranged in a shared housing (twin-head pump). The pump housing has an in-line design. All pump housings are provided with pump support feet. Installation on a foundation base is recommended for rated powers of 4 kW and higher.

Only the base-load pump is operated in control mode in connection with a control device. The second pump is available to fulfil full load operation requirements as an auxiliary peak load. The second pump can adopt the reserve function in the event of a fault.



### NOTICE

Blind flanges (accessories) are available for all pump types/housing sizes from this series. When replacing the motor impeller unit (motor with impeller and terminal box), a drive can therefore remain in operation.



### NOTICE

To ensure the standby pump is ready for operation, operate the standby pump every 24 h at least once a week.

### 6.1 Anticipated noise levels

Motor power [kW]	Measuring surface sound-pressure level $L_p, A$ [dB(A)] <sup>1)</sup>			
	2900 rpm		1450 rpm	
	IPL/DPL (DPL in individual operation)	DPL (DPL in parallel operation)	IPL/DPL (DPL in individual operation)	DPL (DPL in parallel operation)
1.1	60	63	51	54
1.5	64	67	55	58
2.2	64	67	60	63
3	66	69	55	58
4	68	71	57	60
5.5	71	74	63	66
7.5	71	74	63	66

<sup>1)</sup> Spatial mean value of sound-pressure levels on a square measuring surface at a distance of 1 m from the surface of the motor.

Table 3: Anticipated noise levels (50 Hz)

## 7 Installation

### 7.1 Personnel qualifications

- Installation/dismantling: The technician must be trained in the use of the necessary tools and fixation materials.

### 7.2 Operator responsibilities

- Observe national and regional regulations!
- Observe locally applicable accident prevention and safety regulations of professional and trade associations.
- Provide protective equipment and ensure that the protective equipment is worn by personnel.
- Observe all regulations for working with heavy loads.

### 7.3 Safety



#### DANGER

##### Danger of death due to lack of protective devices!

Due to missing protection devices of the terminal box or near the coupling/motor, electric shock or contact with rotating parts can lead to life-threatening injuries.

- Before commissioning, protection devices such as terminal box covers that were removed must be reinstalled!



#### DANGER

##### Danger of death from falling parts!

The pump itself and pump parts can have a very high net weight. Falling parts pose a risk of cuts, crush injuries, bruises or impacts, which can be fatal.

- Always use suitable lifting accessories and secure parts against falling.
- Never stand below a suspended load.
- During storage and transport, as well as before all installation and assembly work, ensure that the pump is in a safe position and standing securely.



#### WARNING

##### Hot surface!

The entire pump can become very hot. There is a risk of burns!

- Allow the pump to cool down before commencing any work!



#### WARNING

##### Risk of scalding!

At high fluid temperatures and system pressures, allow the pump to cool down first and then depressurise the system.

#### CAUTION

##### Damage to the pump due to overheating!

The pump must not be allowed to run dry for more than 1 minute. Dry running causes a build-up of energy in the pump, which can damage the shaft, impeller, and mechanical seal.

- Make sure that the volume flow does not fall below the minimum value  $Q_{min}$ .

Approximate calculation of  $Q_{min}$ :

$$Q_{\min} = 10 \% \times Q_{\max \text{ pump}} \times \text{actual speed} / \text{max. speed}$$

**7.4 Permissible forces and torques on the pump flanges**

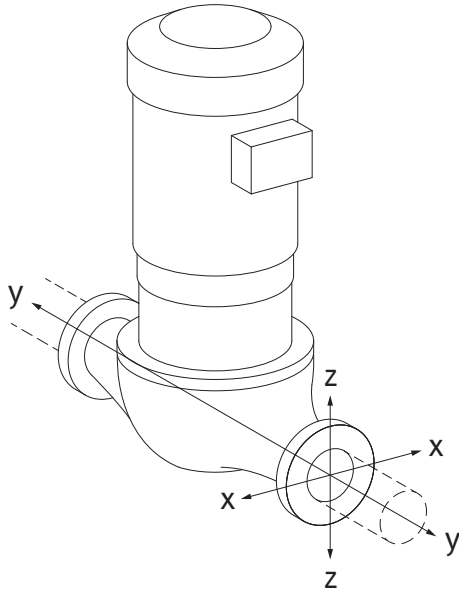


Fig. 6: Load case 16A, EN ISO 5199, Appendix B

Pump suspended in pipe, case 16A

DN	Forces F [N]				Torques M [Nm]			
	F <sub>x</sub>	F <sub>y</sub>	F <sub>z</sub>	Σ Forces F	M <sub>x</sub>	M <sub>y</sub>	M <sub>z</sub>	Σ Torques M
<b>Discharge and suction flange</b>								
32	450	525	425	825	550	375	425	800
40	550	625	500	975	650	450	525	950
50	750	825	675	1300	700	500	575	1025
65	925	1050	850	1650	750	550	600	1100
80	1125	1250	1025	1975	800	575	650	1175
100	1500	1675	1350	2625	875	625	725	1300

*Values in acc. with ISO/DIN 5199 – class II (2002) – Appendix B*

Table 4: Permissible forces and torques on pump flanges in vertical pipe

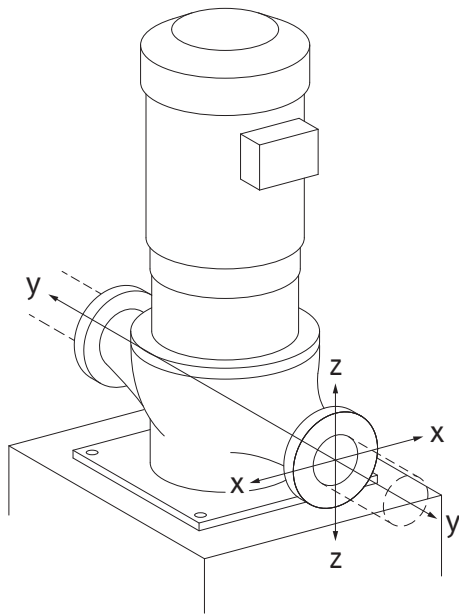


Fig. 7: Load case 17A, EN ISO 5199, Appendix B

Vertical pump on pump feet, case 17A

DN	Forces F [N]				Torques M [Nm]			
	F <sub>x</sub>	F <sub>y</sub>	F <sub>z</sub>	Σ Forces F	M <sub>x</sub>	M <sub>y</sub>	M <sub>z</sub>	Σ Torques M
<b>Discharge and suction flange</b>								
32	338	394	319	619	300	125	175	550
40	413	469	375	731	400	200	275	700
50	563	619	506	975	450	250	325	775
65	694	788	638	1238	500	300	350	850
80	844	938	769	1481	550	325	400	925
100	1125	1256	1013	1969	625	375	475	1050

*Values in acc. with ISO/DIN 5199 – class II (2002) – Appendix B*

Table 5: Permissible forces and torques on pump flanges in horizontal pipe

If not all working loads reach the maximum permitted values, one of these loads may exceed the normal limit value. Provided that the following additional conditions are fulfilled:

- All force and torque components are limited to 1.4 times the maximum permitted value.
- The forces and torques acting on each flange meet the requirements of the compensation equation.

$$\left( \frac{\sum |F|_{\text{effective}}}{\sum |F|_{\text{max. permitted}}} \right)^2 + \left( \frac{\sum |M|_{\text{effective}}}{\sum |M|_{\text{max. permitted}}} \right)^2 \leq 2$$

Fig. 8: Compensation equation

Σ F<sub>effective</sub> and Σ M<sub>effective</sub> are the arithmetic sums of the effective values of both pump flanges (inlet and outlet). Σ F<sub>max. permitted</sub> and Σ M<sub>max. permitted</sub> are the arithmetic sums of the maximum permitted values of both pump flanges (inlet and outlet). The algebraic signs of Σ F and Σ M are not taken into consideration in the compensation equation.

**Influence of material and temperature**

The maximum permissible forces and torques apply for the grey cast iron base material and for an initial temperature value of 20 °C.

For higher temperatures, the values must be corrected as follows depending on the ratio of their modulus of elasticity:

$$E_{t, EN-GJL} / E_{20, EN-GJL}$$

$E_{t, EN-GJL}$  = Modulus of elasticity grey cast iron at the selected temperature

$E_{20, EN-GJL}$  = Modulus of elasticity grey cast iron at 20 °C

## 7.5 Preparing the installation

Check whether the pump complies with the specifications on the delivery note; report any damage or missing parts to Wilo immediately. Check slatted crates/boxes/wrapping for spare parts or accessories that could be included with the pump.



### WARNING

#### Risk of personal injury and property damage due to improper handling!

- Install only after completion of all welding and soldering work and after the pipeline system has been flushed, if required.
  - Dirt can cause the pump to fail.

### Installation location

- The pump must be protected from the weather and installed in a frost-/dust-free, well ventilated, oscillation-isolated environment that is not potentially explosive. The pump must not be installed outdoors! Observe the specifications in "Intended use" section!
- Mount the pump in a readily accessible place. This makes it easier to complete inspections, maintenance (e.g. mechanical seal change) or replacement in the future. Observe the minimum axial distance between the wall and the fan cover of the motor: free removal dimension of at least 200 mm + diameter of the fan cover.
- Install a device for attaching hoisting gear above the set-up site of the pumps. Total weight of the pump: see catalogue or data sheet.

### Base

### CAUTION

#### A faulty foundation or incorrect installation of the unit!

A faulty foundation or incorrect installation of the unit on the foundation can lead to defects of the pump.

- These defects are not covered by the warranty.
- Never set up the pump unit on unfortified surfaces or surfaces that cannot bear loads.

Setting up the pump on an elastically supported base can provide better structure-borne sound insulation between the pump and the building.

When a pump is at a standstill, it can be protected from bearing damage caused by the oscillation of other units (e.g. in a system with multiple redundant pumps). For this purpose, the pump is placed on its own base.

When pumps are installed on floor slabs, elastic support is strongly recommended.

Particular care must be taken with variable-speed pumps.

Wilo recommends taking into account all constructionally and acoustically relevant criteria. A qualified building acoustics specialist should be tasked with dimensioning and design where necessary.

Select elastic elements according to the lowest excitation frequency. This is usually the speed. If speed is variable, the lowest speed is to be assumed.

To achieve an insulation level of at least 60%, the lowest excitation frequency must be at least twice as high as the natural frequency of the elastic support. Therefore, the lower the speed, the smaller the spring resilience of the elastic elements must be.

In general, the following materials can be used:

- For a speed of 3000 rpm and more, natural cork panels
- For a speed between 1000 rpm and 3000 rpm, rubber-metal elements
- For a speed under 1000 rpm, screw springs

When constructing the base, avoid acoustic bridges – through plaster, tiles or auxiliary constructions – which could render the insulation ineffective or greatly reduce its effect.

In the case of pipe connection, the flexure of the elastic elements under the weight of the pump and base must be taken into account.

Consultants and installers must ensure that the pipe connections to the pump are designed in such a way that they are completely free of stress and have no mass or oscillation influence on the pump housing whatsoever. The use of compensators makes sense here.



## NOTICE

For some pump types, simultaneous separation of the foundation block itself from the building structure by means of an elastic intermediate layer (e.g. cork or MAFUND® plate) is required for vibration-insulated installation.

### Example of a foundation screwed connection

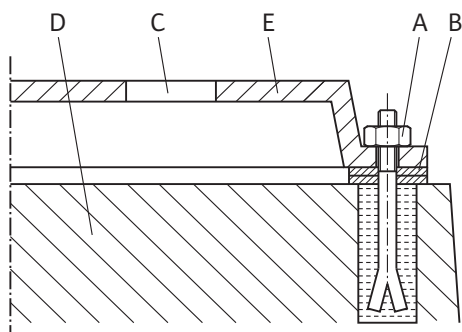


Fig. 9: Example of a foundation screwed connection

- Align the complete unit when installing it on the foundation with the help of the spirit level (at the shaft/discharge port).
- Always put the washers (B) to the left and right directly at the fixation material (e.g. stone bolts (A)) between the baseplate (E) and foundation (D).
- Evenly and firmly tighten the fixation material.
- For distances > 0.75 m, support the baseplate at the centre between the fixation elements.



## WARNING

### Personal injury and property damage due to improper handling!

Transport lugs mounted on the motor housing can tear out if the load is too heavy. This can lead to serious injuries and damage to the product!

- Only lift the pump with approved lifting gear (e.g. block and tackle, crane). See also chapter “Transport and storage”.
- Transport lugs mounted on the motor housing are only permitted for transporting the motor!

Transport lugs are not always found on the motor. See the “Transport and storage” section.



## NOTICE

### Simplify subsequent work on the unit!

- To ensure the entire unit does not have to be emptied, install shut-off valves upstream and downstream of the pump.

If need be, the necessary non-return valves are to be provided.

### Condensate drainage

- When using the pump in air conditioning or cooling systems:  
The condensate that forms in the lantern can be drained specifically via an existing drilled hole. A drain pipe can also be connected to this opening and a small amount of escaping liquid can be drained off.
- Installation position:  
All installation positions except for “motor facing down” are allowed.
- The air vent valve (Fig. I/II, Item 2.1) must always point upward.

### IPL/DPL

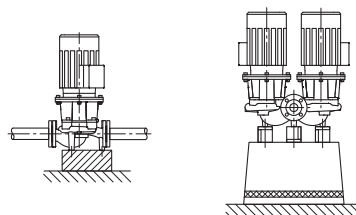


Fig. 10: IPL/DPL

Suction and pressure flange are marked with the direction of flow by means of a cast arrow. The direction of flow must correspond to the directional arrow on the flange.



### NOTICE

The motor terminal box must not face downward. If necessary, the motor impeller unit can be rotated once the interior hexagonal head screws have been loosened. While rotating the motor or motor impeller unit, ensure that the housing O-ring seal is not damaged.



### NOTICE

When pumping from an open tank (e.g. cooling tower), ensure that there is always a sufficient liquid level above the pump's suction port. This prevents the pump from running dry. The minimum inlet pressure must be observed.



### NOTICE

In the case of insulated systems, only the pump housing may be insulated. Never insulate the lantern and motor.

The motors are each equipped with holes for condensation water which are sealed with a plug at the factory (in order to guarantee that protection class IP55 is achieved). If condensation water occurs (for example, when used in air-conditioning/cooling systems), this plug must be removed downwards so that condensation water can drain off.

#### Connection of the pipes

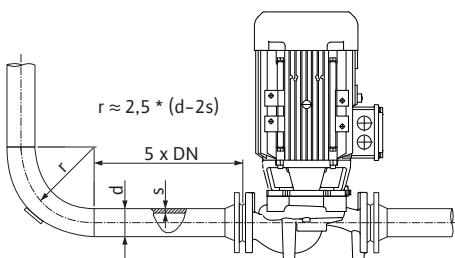


Fig. 11: Settling section upstream and downstream of the pump

### CAUTION

#### Risk of damage due to incorrect handling!

The pump may never be used as a fixed point for the pipe.

- The present NPSH of the system always has to be greater than the required NPSH of the pump.
- The forces and torques being exerted by the pipeline system on the pump flange (e.g., by warping, thermal expansion) may not exceed the permitted forces and torques.
- The pipes and pump must be free of mechanical stress when installed.
- The pipes must be fixed in such a way that the pump does not have to support the weight of the pipes.
- The suction line is to be kept as short as possible. Lay the suction line to the pump so that it continuously rises while the inlet falls. Avoid possible air entry points.
- If a dirt trap in the suction line is required, its free cross-section has to be 3 – 4 times the cross-section of the pipe.
- For short pipes, the nominal diameters must be at least those of the pump connections. For long pipes, determine the most economical nominal diameter in each case.
- To avoid higher pressure losses, make adapters for larger nominal diameters with an extension angle of approx. 8°.



### NOTICE

#### Avoid flow cavitation!

- A settling section must be provided upstream and downstream of the pump in the form of a straight pipe. The length of the settling section must be at least 5 times the nominal diameter of the pump flange.

#### Final check

- Remove the flange covers at the suction and discharge ports of the pump before attaching the piping.

Check the alignment of the unit again according to the "Installation" section.

- Tighten the foundation bolts if necessary.
- Check all connections for correctness and function.

**DANGER****Risk of fatal injury due to electrical current!****The use of a thermal overload protection is recommended!**

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

- Electrical connection may only be carried out by a qualified electrician and in accordance with the applicable regulations!
- Adhere to accident prevention regulations!
- Before beginning work on the product, make sure that the pump and drive are electrically isolated.
- Make sure that no one can turn on the power supply again before work is completed.
- Electrical machines must always be earthed. Earthing must be appropriate for the drive and meet the relevant standards and regulations. Earth terminals and fixation elements must be suitably dimensioned.
- Observe the installation and operating instructions for the accessories!

**DANGER****Danger of death due to contact voltage!**

Touching live parts will result in serious injuries or death!

Even when it is disconnected, high contact voltages can still occur in the terminal box due to non-discharged capacitors. Therefore, work on the terminal box module must not be started until 5 minutes have elapsed!

- Disconnect all poles of the supply voltage and secure against reconnection!
- Check whether all connections (including potential-free contacts) are voltage-free!
- Never insert objects (e.g. nail, screwdriver, wire) into openings on the terminal box!
- Reinstall removed safety devices (such as terminal box cover)!

**CAUTION****Material damage due to improper electrical connection!****An inadequate mains design can lead to system failures and cable fires due to mains overload!**

- When designing the mains supply with regard to the used cable cross-sections and fuses, pay special attention to the fact that, in multi-pump operation, it is possible that all pumps operate at the same time for short periods.

**Preparation/notes**

- Establish electrical connection via a fixed connection cable with a connector device or an all-pole switch with at least 3 mm contact opening width (VDE 0730/Part 1).
- To protect against leakage water and for strain relief to the threaded cable gland, use a connection cable with sufficient outer diameter and screw them so they are tight enough.
- The cables near the screwed connection are to be bent to form a drain loop, to drain any accumulated drips.  
Position the threaded cable gland and, by laying the cables accordingly, ensure that no drips are able to run into the terminal box. Unoccupied threaded cable glands must remain closed with the plugs provided by the manufacturer.
- Lay the connection cable in such a way that it touches neither the pipes nor the pump.
- Use a heat-resistant connection cable if fluid temperatures exceed 90 °C.
- The current type and voltage of the mains connection must correspond to the specifications on the rating plate.
- Fuse protection on mains side: Dependent on rated motor current.

- When connecting an external frequency converter, observe the corresponding installation and operating instructions! If necessary, carry out additional earthing due to higher leakage currents.
- The motor must be secured against overloading by a motor protection switch or by the PTC thermistor tripping unit (accessory).

#### Standard pumps on external frequency converters

If standard pumps are used on external frequency converters, the following aspects have to be considered regarding the insulation system and current-insulated bearings:

#### 400 V power supply

The motors used by Wilo for glanded pumps are suitable for operation on external frequency converters.

It is strongly recommended to set up and operate the installation in compliance with IEC TS 60034-25:2014. Due to the rapidly advancing development in the field of frequency converters, WILO SE does not guarantee fault-free use of the motors on third-party converters.

#### 500 V/690 V power supply

The motors which Wilo uses as standard for glanded pumps are not suited to be used on external frequency converters with 500 V/690 V.

For use in 500 V or 690 V mains, motors with appropriate winding and reinforced insulation system are available. This must be explicitly stated when ordering. The overall installation must comply with IEC TS 60034-25:2014.

#### Current-insulated bearings

Due to increasingly fast switching processes of the frequency converter, drops in voltage can occur across the motor bearing even with motors of lower power. In case of premature breakdown due to bearing current, use current-insulated bearings!

Always observe the following instructions when connecting the frequency converter to the motor:

- Observe the installation notes of the frequency converter manufacturer.
- Observe the rise times and peak voltages depending on the cable length in the respective installation and operating instructions of the frequency converter.
- Use an appropriate cable with a sufficient cross-section (max. 5 % voltage loss).
- Connect the correct shielding according to the recommendation of the frequency converter manufacturer.
- Lay the data cables (e.g. PTC analysis) separately from the mains cable.
- If necessary, use a sine filter (LC) in consultation with the frequency converter manufacturer.



#### NOTICE

The connection diagram for electrical connections is in the terminal box cover.

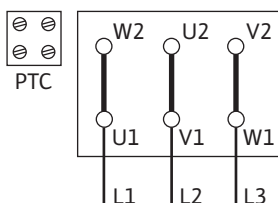


Fig. 12: Δ connection

#### Setting the motor protection switch:

- Set according to the rated motor current specified on the rating plate of the motor.  
Y-Δ starting: If the motor protection switch is switched in the supply line to a Y-Δ contactor combination, adjust the switch as for direct starting. If the motor protection switch is switched in a thread of the motor supply line (U1/V1/W1 or U2/V2/W2), set the motor protection switch to the value 0.58 x rated motor current.
- If the motor is equipped with a PTC thermistor sensor (special version), attach the PTC thermistor sensor to the PTC thermistor tripping unit (provided by the customer).

#### CAUTION

##### Risk of property damage!

Only a maximum voltage of 7.5 V DC may be applied to the PTC thermistor sensor terminals. A higher voltage will destroy the PTC thermistor sensor.



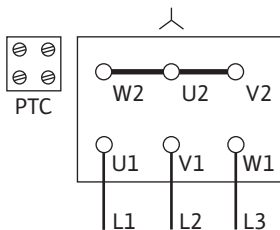


Fig. 13: Y-connection

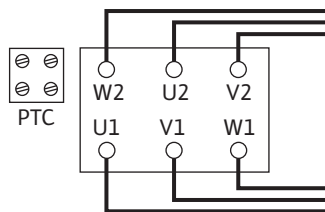


Fig. 14: Y-Δ-connection

- The mains connection is dependent on the motor power P2, mains voltage and activation type. Refer to the following table and Fig. 12, 13 and 14 for the required connection of the connecting bridges in the terminal box.
- When connecting automatic switchgears, observe the corresponding installation and operating instructions.

Activation type	Motor power P2 ≤ 3 kW		Motor power P2 ≥ 4 kW
	Mains voltage 3~ 230 V	Mains voltage 3~ 400 V	Mains voltage 3~ 400 V
Direct	Δ-connection (Fig. 12)	Y-connection (Fig. 13)	Δ-connection (Fig. 12 above)
Y-Δ start	Remove connection bridges. (Fig. 14)	Not possible	Remove connection bridges. (Fig. 14)

Table 6: Terminal assignment



**NOTICE**

Use of soft starters is recommended to limit the starting current and preventing tripping of overcurrent protection devices.

Terminal	Tightening torque in Nm	Screw
L1/L2/L3	1.8 ± 0.2	M4
L1/L2/L3	2.2 ± 0.2	M5
L1/L2/L3	3.8 ± 0.3	M6

Table 7: Tightening torques of terminal board

**8.1 Anti-condensation heater**

We recommend an anti-condensation heater for motors which, due to climatic conditions, are at risk of condensation. These are, for example, idle motors in humid environments or motors that are exposed to large temperature fluctuations. Motors equipped with an anti-condensation heater at the factory can be ordered as special versions. The anti-condensation heater is used to protect the motor windings against condensation water inside the motor.

- The anti-condensation heater is connected to the terminals HE/HE in the terminal box (connection voltage: 1~230 V/50 Hz).

**CAUTION**

**Risk of damage due to incorrect handling!**

The anti-condensation heater may not be switched on during motor operation.

**9 Commissioning**

- Electrical work: a qualified electrician must carry out the electrical work.
- Installation/dismantling: The technician must be trained in the use of the necessary tools and fixation materials.
- The product must be operated by persons who have been instructed on how the complete system functions.



## DANGER

### **Danger of death due to lack of protective devices!**

Due to missing protection devices of the terminal box, an electric shock can lead to life-threatening injuries.

- Before commissioning, protection devices such as terminal box covers that were removed must be reinstalled!
- An authorised technician must check the functionality of the safety devices on the pump and motor prior to commissioning!



## WARNING

### **Danger of injury due to fluid shooting out and components coming loose!**

Not installing the pump/system correctly can lead to serious injuries during commissioning!

- Carry out all work carefully!
- Keep a safe distance during commissioning!
- Always wear protective clothing, safety gloves and safety glasses when working.



## NOTICE

It is recommended to have the pump commissioned by the Wilo customer service.

## Preparation

### 9.1 Filling and venting

The pump has to reach ambient temperature before commissioning.

## CAUTION

### **Dry running will destroy the mechanical seal! It may cause leakage.**

- Ensure that a dry run of the pump is not possible.



## WARNING

### **There is a risk of burns or freezing upon coming into contact with the pump/system.**

Depending on the pump and system operating conditions (fluid temperature), the entire pump can become very hot or very cold.

- Keep a safe distance during operation!
- Allow the system and pump to cool down to room temperature!
- Always wear protective clothing, safety gloves and safety glasses when working.



## DANGER

### **Danger of personal injury and material damage due to extremely hot or extremely cold pressurised fluid!**

Depending on the temperature of the fluid, when the venting device is opened completely, **extremely hot** or **extremely cold** fluid may escape in liquid or vapour form. Fluid may shoot out at high pressure depending on the system pressure.

- Always exercise caution when opening the venting device.

Fill and vent the system correctly.

1. To do this, loosen the air vent valves and vent the pump.
2. After venting the pump, tighten the air vent valves again so that no more water can escape.



## NOTICE

- Always keep to the minimum pressure!

- To avoid cavitation noises and damage, a minimum inlet pressure must be guaranteed at the suction port of the pump. The minimum inlet pressure depends on the operating situation and the pump's duty point. Accordingly, the minimum pressure must be determined.
  - The main parameters for defining the minimum inlet pressure are the NPSH value of the pump at its duty point and the vapour pressure of the fluid. The NPSH value can be found in the technical documentation of the respective pump type.
1. By briefly switching on, check whether the direction of rotation agrees with the arrow on the fan cover or lantern. If the direction of rotation is incorrect, proceed as follows:
    - For direct starting: Swap two phases on the motor terminal board (e.g. L1 for L2).
    - For Y- $\Delta$  starting:  
Swap the thread start and thread end of two windings on the motor terminal board (e.g. V1 for V2 and W1 for W2).
  - The unit may only be switched on when the shut-off device on the discharge side is closed! Only after full speed has been reached may the shut-off device be slowly opened and be adjusted to the duty point.

## 9.2 Activation

The unit must run smoothly and free of vibration.

During the running-in period and normal operation of the pump, a small amount of leakage, i.e. a few drops, is normal. A visual inspection is required from time to time. If there is clearly detectable leakage, the gasket must be replaced.



## DANGER

### Danger of death due to lack of protective devices!

Due to missing protective devices of the terminal box or near the coupling/motor, electric shock or contact with rotating parts can lead to life-threatening injuries.

- Immediately after the conclusion of all work, all the provided safety and protection equipment items must be properly installed and put into operation!

## 9.3 Switching off

- Close the shut-off device in the discharge line.



## NOTICE

If a non-return valve is installed in the discharge line, and there is counterpressure, the shut-off device can remain open.

## CAUTION

### Risk of damage due to incorrect handling!

When switching off the pump, the shut-off device in the inlet pipe must not be closed.

- Switch off the motor and allow it to coast down completely. Ensure the coasting is smooth.
- For longer downtimes, close the shut-off device in the inlet pipe.
- For longer periods of non-use and/or danger of freezing, drain the pump and secure it against freezing.
- After removing the pump, store it in a dry and dust-free place.

**NOTICE**

The pump must always run smoothly and vibration-free and must not be operated in conditions other than those specified in the catalogue/data sheet.

**DANGER****Danger of death due to lack of protective devices!**

Due to missing protection devices of the terminal box, an electric shock can lead to life-threatening injuries.

- Immediately after the conclusion of all work, all the provided safety and protection equipment items must be properly installed and put into operation!

**WARNING****There is a risk of burns or freezing upon coming into contact with the pump/system.**

Depending on the pump and system operating conditions (fluid temperature), the entire pump can become very hot or very cold.

- Keep a safe distance during operation!
- Allow the system and pump to cool down to room temperature!
- Always wear protective clothing, safety gloves and safety glasses when working.

The pump can be switched on and off in different ways. This depends on the different operating conditions and the degree of automation of the installation. Observe the following points:

**Stop procedure:**

- Prevent return flow to the pump.
- Do not operate for too long with the volume flow being too low.

**Start procedure:**

- Make sure that the pump is completely filled up.
- Do not operate for too long with the volume flow being too low.
- Larger pumps require a minimum flow rate amount to operate properly.
- Operating against a closed shut-off device can lead to overheating in the centrifugal chamber and to damage of the shaft seal.
- Ensure a continual flow to the pump with a sufficiently large NPSH.
- Avoid that insufficient counter pressure leads to a motor overload.
- To avoid significant increases in motor temperature and excessive load on the pump, coupling, motor, gaskets and bearings, perform no more than 10 switch-on procedures per hour.

**Dual-pump operation**

To ensure the standby pump is ready for operation, operate the standby pump every 24 h at least once a week.

**10 Maintenance**

- Maintenance work: The technician must be familiar with the use of operating fluids and their disposal.
- Electrical work: a qualified electrician must carry out the electrical work.
- Installation/dismantling: The technician must be trained in the use of the necessary tools and fixation materials.

It is recommended to have the pump serviced and checked by the Wilo customer service.



## DANGER

### Danger of death due to electrical current!

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

- Any work on electrical devices may only be carried out by a qualified electrician.
- Before carrying out any work, disconnect the unit from the power supply and secure it against accidental switch-on.
- Any damage to the pump connection cable should only ever be rectified by a qualified electrician.
- Follow the installation and operating instructions for the pump, level control device and other accessories.
- Never poke around in the motor openings or insert anything into them.
- After completing the work, refit previously dismantled protective devices, for example, terminal box covers or coupling covers.



## DANGER

### Danger of death from falling parts!

The pump itself and pump parts can have a very high net weight. Falling parts pose a risk of cuts, crush injuries, bruises or impacts, which can be fatal.

- Always use suitable lifting accessories and secure parts against falling.
- Never stand below a suspended load.
- During storage and transport, as well as before all installation and assembly work, ensure that the pump is in a safe position and standing securely.



## DANGER

### Danger of death due to ejected tools!

The tools used during maintenance work on the motor shaft can be thrown away if they come into contact with rotating parts. Injuries and even death are possible!

- The tools used during maintenance work must be removed completely before the pump is started up!



## WARNING

### There is a risk of burns or freezing upon coming into contact with the pump/system.

Depending on the pump and system operating conditions (fluid temperature), the entire pump can become very hot or very cold.

- Keep a safe distance during operation!
- Allow the system and pump to cool down to room temperature!
- Always wear protective clothing, safety gloves and safety glasses when working.

## 10.1 Air supply

Check the air supply to the motor housing at regular intervals. Dirt impairs the cooling of the motor. If necessary, remove dirt and restore unrestricted air supply.

## 10.2 Maintenance work



### DANGER

#### Danger of death from falling parts!

Falling pumps or individual pump components may result in life-threatening injuries!

- During installation work, secure pump components against falling down with suitable lifting gear.



### DANGER

#### Risk of fatal electrical shock!

Check for absence of voltage and cover or cordon off adjacent live parts.

### 10.2.1 On-going maintenance

Replace all gaskets that have been removed for maintenance.

### 10.2.2 Replacing the mechanical seal

There may be a slight amount of drip leakage during the running-in period. Even during normal operation of the pump, it is normal for there to be slight leakage with the occasional formation of drops.

In addition, carry out a visual inspection regularly. If leakage is clearly visible, replace the gasket.

Wilo offers a repair kit which contains the necessary parts for replacement.

#### Dismantling:



### WARNING

#### Risk of scalding!

At high fluid temperatures and system pressures, allow the pump to cool down first and then depressurise the system.

1. Disconnect the system from the power supply and secure it against being switched on again without authorisation.
2. Make sure it is not live.
3. Earth the work area and short-circuit.
4. Close the shut-off devices upstream and downstream of the pump.
5. Depressurise the pump by opening the air vent valve (Fig. I/II, Item 2.1).



### NOTICE

For all subsequent work, observe the torque specified for the respective thread type (see tightening torques table)!

6. Disconnect the motor and mains connection cables if the cable is too short for dismantling the drive.
7. Remove the motor impeller unit with mechanical seal and impeller from the pump housing by loosening the lantern fastening screws (Fig. I/II, Item 4).
8. Insert an open-end wrench (27 mm width across flats) into the lantern window and hold the shaft by the wrench flats. Loosen the impeller fastening nut (Fig. I/II, Item 1.11). Remove the discs underneath (Fig. I/II, Item 1.12, 1.15) and pull the impeller (Fig. I/II, Item 1.13) off the pump shaft.
9. Remove the shim (Fig. I/II, Item 1.16) and, if necessary, the key (Fig. I/II, Item 2.2).
10. Remove the mechanical seal spring (Fig. I/II, Item 1.21) from the shaft.
11. Thoroughly clean the sliding/seat surfaces of the shaft.
12. Remove the stationary ring on the mechanical seal with the collar from the lantern flange and the O-ring (Fig. I/II, Item 1.14). Clean the gasket seats.

### Installation

1. Press a new mechanical seal stationary ring with collar into the gasket seat of the lantern flange. Elastomers (O-ring, bellows mechanical seal) are easier to install with "wetted water" (e.g. mixture of water and washing up liquid).
2. Install a new O-ring in the groove of the O-ring seat of the lantern.
3. Pull a new mechanical seal onto the shaft. Elastomers (O-ring, bellows mechanical seal) are easier to install with "wetted water" (e.g. mixture of water and washing up liquid). If present, insert the key and the shim again.
4. Install the impeller with washer(s) and nut, countering at the impeller's outer diameter or holding the shaft with spanners while doing so. Avoid damage to the mechanical seal due to jamming.
5. Insert the motor impeller unit carefully into the pump housing and screw together.
6. Connect the motor and mains connection cables.

### 10.2.3 Changing the motor

Increased bearing noises and unusual vibrations indicate bearing wear. The bearings or motor must then be replaced. The drive may only be replaced by the Wilo customer service!

#### Dismantling:



#### WARNING

##### Risk of scalding!

At high fluid temperatures and system pressures, allow the pump to cool down first and then depressurise the system.



#### WARNING

##### Personal injury!

Incorrect dismantling of the motor can result in personal injury.

- Before dismantling the motor, ensure that the centre of gravity is not above the holding point.
- Secure the motor against tipping over during transport.
- Always use suitable lifting accessories and secure parts against falling.
- Never stand below a suspended load.

1. Disconnect the system from the power supply and secure it against being switched on again without authorisation.
2. Make sure it is not live.
3. Earth the work area and short-circuit.
4. Close the shut-off devices upstream and downstream of the pump.
5. Depressurise the pump by opening the air vent valve (Fig. I/II, Item 2.1).



#### NOTICE

For all subsequent work, observe the torque specified for the respective thread type (see tightening torques table)!

6. Disconnect the motor connection cables.
7. Loosen the lantern fastening screws (Fig. I/II, Item 4) and lift the drive off the pump using suitable hoisting gear.
8. Carefully insert the new motor with impeller and shaft seal into the pump housing using suitable hoisting gear and screw it into place.
9. Connect the motor cable or mains connection cable.

**Always tighten screws diagonally.**

Screw connection				Tightening torque Nm $\pm$ 10 %
Post	Shaft size	Size/tensile strength class		
Impeller – Shaft <sup>1)</sup>	D28	M14	A2-70	70
Pump housing – Lantern		M16	8.8	100

**Installation information:**

1) Lubricate the thread with Molykote® P37 or comparable.

Table 8: Tightening torques

Terminal	Tightening torque in Nm	Screw
L1/L2/L3	1.8 $\pm$ 0.2	M4
L1/L2/L3	2.2 $\pm$ 0.2	M5
L1/L2/L3	3.8 $\pm$ 0.3	M6

Table 9: Tightening torques of terminal board

## 11 Faults, causes and remedies



### WARNING

Have faults remedied by qualified personnel only! Observe all safety instructions!

If the malfunction cannot be rectified, consult a specialist technician or the nearest Wilo customer service or representative location.

Faults	Causes	Remedies
Pump does not start or stops working.	Pump blocked.	Electrically isolate the motor. Remove the cause of the blocking. Motor blocking: Overhaul/replace motor/motor impeller unit.
	Cable terminal loose.	Check all cable connections.
	Electric fuse defective.	Check fuses; replace faulty fuses.
	Motor damaged.	Have the motor checked by the Wilo customer service or a specialised service centre and repaired if necessary.
	Motor protection switch has triggered.	Set the pump to the rated volume flow on the discharge side (see rating plate).
	Motor protection switch set incorrectly	Set the motor protection switch to the correct rated current (see rating plate).
	Motor protection switch affected by excessive ambient temperature	Move the motor protection switch or protect it using heat insulation.
PTC thermistor tripping unit has triggered.	Check the motor and fan cover for contamination and clean them if necessary. Check the ambient temperature and, if necessary, set the ambient temperature to $\leq$ 40 °C by forced ventilation.	



Faults	Causes	Remedies
Pump runs at reduced performance.	Incorrect direction of rotation.	Check the direction of rotation and change it if necessary.
	Stop valve on the discharge side throttled.	Slowly open the stop valve.
	Speed too slow	Incorrect terminal bridging (Y instead of Δ).
	Air in the suction line	Eliminate leakage at flanges. Vent pump. In case of visible leakage, replace the mechanical seal.
Pump makes noises.	Cavitation due to insufficient suction pressure.	Increase the suction pressure. Observe the minimum inlet pressure at the suction port. Check slide valve and filter on the suction side and clean if need be.
	Motor has bearing damage.	Have the pump checked by Wilo customer service or a specialised service centre and repaired if necessary.
	Impeller grinding.	Check faces and centrigs between lanterns and pump housing; clean if necessary.

Table 10: Faults, causes and remedies

## 12 Spare parts

Obtain original spare parts only from a qualified specialist or Wilo customer service. To avoid queries and order errors, please provide all pump and drive rating plate data with every order.

### CAUTION

#### Risk of material damage!

Trouble-free pump operation can only be guaranteed when original spare parts are used.

Use only original Wilo spare parts!

Information to be provided when ordering spare parts: Spare part numbers, spare part designations, all data from pump and drive rating plate. This helps prevent return queries and incorrect orders.

For assembly assignment, see Fig. I/II.

No.	Part	Details	No.	Part	Details
1	Exchange kit (complete)		2	Motor	
1.1	Impeller (kit) with:		2.1	Air vent valve	
1.11		Nut	2.2	Key	
1.12		Conical spring washer	4	Fastening screws for lantern/pump housing	
1.13		Impeller	3	Pump housing (kit) with:	
1.14		O-ring	1.14		O-ring
1.15		Disc	3.1		Pump housing
1.16		Shim	3.2		Stopper for pressure measurement connections
1.2	Mechanical seal (kit) with:		3.3		DN 100 switchover valve (Fig. III b)

No.	Part	Details	No.	Part	Details
1.11		Nut	3.4		Valve insert ≤ DN 80 (Fig. III a)
1.12		Conical spring washer	3.5		Screw plug for drain hole
1.14		O-ring	4	Fastening screws for lantern/pump housing	
1.15		Disc			
1.21		Mechanical seal			

Table 11: Spare parts table

## 13 Disposal

### 13.1 Oils and lubricants

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

### 13.2 Information on the collection of used electrical and electronic products

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



#### NOTICE

##### Disposal in domestic waste is prohibited!

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

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

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

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

**Subject to change without prior notice!**

## 目录

<b>1</b>	<b>概述</b>	<b>36</b>
1.1	关于本说明书	36
1.2	版权	36
1.3	保留更改权力	36
<b>2</b>	<b>安全</b>	<b>36</b>
2.1	安全说明的标识	36
2.2	工作人员资格鉴定	37
2.3	电气作业	37
2.4	运输	37
2.5	安装/拆卸工作	38
2.6	运行期间	38
2.7	保养工作	38
2.8	运营者的责任	39
<b>3</b>	<b>运输和存放</b>	<b>39</b>
3.1	发货	39
3.2	运输检验	39
3.3	存放	39
3.4	为了安装/拆卸目的运输	40
<b>4</b>	<b>规定用途和滥用</b>	<b>41</b>
4.1	规定用途	41
4.2	滥用	41
<b>5</b>	<b>产品相关数据</b>	<b>41</b>
5.1	型号代码	41
5.2	技术数据	42
5.3	供货范围	43
5.4	附件	43
<b>6</b>	<b>水泵说明</b>	<b>43</b>
6.1	预期噪声水平	44
<b>7</b>	<b>安装</b>	<b>44</b>
7.1	工作人员资格鉴定	44
7.2	运营者的责任	44
7.3	安全	44
7.4	水泵法兰处允许的力和扭矩	45
7.5	准备安装	46
<b>8</b>	<b>电气连接</b>	<b>49</b>
8.1	停机加热装置	51
<b>9</b>	<b>试运行</b>	<b>51</b>
9.1	填充和排气	52
9.2	开启	52
9.3	关闭	53
9.4	运行	53
<b>10</b>	<b>保养</b>	<b>53</b>
10.1	供风装置	54
10.2	维护工作	54
<b>11</b>	<b>故障、原因、排除方法</b>	<b>56</b>
<b>12</b>	<b>备件</b>	<b>57</b>
<b>13</b>	<b>废弃处置</b>	<b>58</b>
13.1	油和润滑剂	58
13.2	关于收集损耗的电气产品和电子产品的相关信息	58

## 1 概述

### 1.1 关于本说明书

本安装及操作说明书是产品的固定组成部分。开始操作之前，请先阅读说明书并将其妥善保存在方便易取之处。严格遵守说明书中列出的要求和操作步骤，是按规定使用及正确操作产品的前提条件。

注意遵守产品上标注的所有参数和标识。排印时，安装及操作说明书符合装置的规格和基本安全技术规程及标准的最新版本。

原版操作说明书以德语撰写。所有其他语种的说明书均为其翻译件。

### 1.2 版权

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除非明确允许，否则禁止转发和复制本文档，以及使用和传播其内容。若出现违规行为，则有义务支付损失赔偿。保留所有权利。

### 1.3 保留更改权力

Wilo保留更改所述数据的权利，恕不另行通知，对于技术性描述不准确和/或遗漏不承担任何责任。说明书中使用的图片可能与实际设备存在偏差，仅用于举例介绍产品。

## 2 安全

本章节主要介绍产品各寿命阶段适用的基础提示信息。不遵守提示会导致下列危险：

- 电气、机械和细菌作用以及电磁场危害人身安全
- 有害物质泄漏会污染环境
- 物资损失
- 产品重要功能失灵
- 规定的保养和维修方法无效

不遵守提示信息会导致丧失索赔权利。

此外也应遵守其他章节列出的各项指导说明和安全说明！

### 2.1 安全说明的标识

本安装及操作说明针对物资损失和人身安全问题列举了多项安全说明，其表现形式各有不同：


- 涉及到人身安全问题的安全说明以一个信号词作为开端，而且配套使用相应的符号。
- 涉及到物资损失问题的安全说明也以一个信号词作为开端，但是没有符号。


#### 信号词

- **危险！**  
如不注意，会导致死亡或重伤！
- **警告！**  
如不注意，可能导致人员受（重）伤！
- **小心！**  
如不遵守，可能造成物资损失，甚至导致全损。
- **提示！**  
操作产品时有用的注意事项

#### 图标

在本说明书中使用以下图标：

 一般性危险图标

 电击危险

 高温表面警告



高压警告



提示

## 2.2 工作人员资格鉴定

工作人员必须：

- 了解当地现行的事故预防条例。
- 已阅读安装及操作说明书并且理解其中内容。

工作人员必须具备下列资质：

- 电气作业：电气作业必须由专业电工执行。
- 安装/拆卸工作：必须由专业人员执行，而且要求该人员接受过相关培训，了解工作中会用到的工具以及固定材料。
- 操作人员必须了解整台设备的工作原理。
- 保养工作：必须由熟悉所使用工作介质及其废弃处置的专业人员执行。

### “专业电工”定义

所谓“专业电工”，是指接受过相关培训，具备所需知识和经验，能够发现并且规避电力危险的人员。

运营者必须确保相关人员的责任范围、职责并对其进行监督。如果操作人员不具备必要的知识，则必须接受培训和指导。如果有必要，运营者可以委托产品的生产商进行培训和指导。

## 2.3 电气作业

- 电气作业由专业电工负责执行。
- 接入本地电网时，遵守所在国颁布的现行指令、标准和法规，以及当地能源供应公司的相关规定。
- 在对产品开始任何作业之前，都应先将其断电并采取措施防止重新接通。
- 告知相关人员电气连接方式和如何关闭产品。
- 使用漏电断路器 (RCD) 保证电气连接的安全性。
- 遵守本安装及操作说明以及铭牌上给出的技术参数。
- 将产品接地。
- 将产品连接到电气开关设备时，注意遵守生产商的规定。
- 接线电缆一旦损坏，必须立刻安排专业电工进行更换。
- 切勿取下操作元件。
- 如果使用启动控制器（比如软启动或变频器等），注意遵守电磁兼容性规定。如果需要，考虑采取专业措施（屏蔽电缆、滤波器等）。

## 2.4 运输

- 佩戴防护装备：
  - 安全手套，用以预防切割伤害
  - 安全鞋
  - 封闭式护目镜
  - 安全头盔（使用提升设备的情况下）
- 只使用合法且获得认证的提升装置。
- 根据实际情况（天气、吊装孔、负载等）选择提升装置。

- 始终将提升装置固定到指定的吊装孔（如吊孔）上。
- 放置提升设备，确保使用过程中的稳定性。
- 使用提升设备时，如果需要（比如视线受阻），必须安排另外一位工作人员负责协调。
- 切勿在悬挂物下停留。悬挂物切勿从有人员停留的工作位置上方经过。

## 2.5 安装/拆卸工作

- 佩戴防护装备：
  - 安全鞋
  - 安全手套，用以预防切割伤害
  - 安全头盔（使用提升设备的情况下）
- 遵从当地有关作业安全和事故防范措施的现行法律法规。
- 遵守安装及操作说明书中所描述的关闭产品/设备的步骤。
- 将产品断电并采取安全措施防止意外接通。
- 所有旋转零部件均须保持静止。
- 关闭入口和压力管路中的截止阀。
- 在封闭的空间内需提供足够的通风条件。
- 进行所有焊接作业或使用电气装置工作时，确保不存在爆炸风险。

## 2.6 运行期间

- 一旦发生故障或者出现异常，操作人员必须立即报告主管。
- 一旦出现危及人身安全的缺陷，操作人员必须立刻关闭设备：
  - 安全和监控设备故障
  - 外壳部件损坏
  - 电气装置损坏
- 一旦发生流体和工作介质泄露事故，立即收集泄漏物并按照当地现行法规进行废弃处理。
- 只能将工具和其他物体保管在指定位置。

## 2.7 保养工作

- 佩戴防护装备：
  - 封闭式护目镜
  - 安全鞋
  - 安全手套，用以预防切割伤害
- 遵从当地有关作业安全和事故防范措施的现行法律法规。
- 遵守安装及操作说明书中所描述的关闭产品/设备的步骤。
- 只执行本安装及操作说明书中列出的保养工作。
- 进行维护和维修时，只能使用生产商提供的原装部件。由于使用非原装部件而造成的任何损失，生产商概不承担任何责任。
- 将产品断电并采取安全措施防止意外接通。
- 所有旋转零部件均须保持静止。
- 关闭入口和压力管路中的截止阀。
- 一旦发生流体和工作介质泄露事故，立即收集泄漏物并按照当地现行法规进行废弃处理。

## 2.8 运营者的责任

- 将工具保管在指定位置。
- 工作结束后，重新安装所有安全和监控设备，并检查其功能是否正确。
- 为工作人员提供以其母语写成的安装及操作说明。
- 为工作人员提供必要的培训，确保其能胜任指派的工作。
- 确保工作人员的责任范围和职责。
- 提供必要的防护装备并保证工作人员佩戴防护装备。
- 使产品上安装的安全和信息标志牌长期保持清晰可读状态。
- 使工作人员了解设备的功能原理。
- 排除触电危险。
- 为危险部件（极冷、极热、旋转等）配备安装方提供的防护装置。
- 如果危险（例如易爆、有毒、灼热）的流体发生泄漏，要将其妥善排放，避免对人员和环境造成危害。遵守国家法规。
- 高度易燃材料应始终与产品保持安全距离。
- 确保遵守事故防范规定。
- 确保遵守当地或通用法规 [如 IEC、VDE 等]，以及当地能源供应公司的指示。

遵守直接贴在产品上的说明，并使其保持清晰可辨：

- 警告和危险提示
- 型号铭牌
- 旋转方向箭头/流向符号
- 接口标记

此设备可由 8 岁以上的儿童及生理、感知或心理有缺陷或缺少经验和相关知识的人员进行操作，但前提是有人对其进行监管或其经过有关安全使用设备的培训且已了解操作设备可能带来的危险。禁止将此装置当做儿童玩具。在无人监管的情况下，禁止由儿童进行清洁和维护。

## 3 运输和存放

### 3.1 发货

出厂时水泵装在纸壳箱内或固定在托盘上，并已做好防尘及防潮保护措施。

### 3.2 运输检验

到货后立即检查产品有无受损以及是否完整。如有缺陷，必须标注在运单上！在到货当天，将所有损坏情况告知运输公司或者生产商。如果不在当天通知，就会丧失索赔权利。

为了避免水泵在运输途中受损，到达使用地之后再拆除包装。

### 3.3 存放

#### 小心

运输和存放时操作不当会导致产品损坏！

运输和临时存放时，避免产品受潮、受霜冻影响和出现机械损伤。

如果有盖子，将盖子盖到管道接口上，避免污物和其他异物进入水泵壳体。

每周用套筒扳手旋转一次泵轴，避免轴承擦伤、泵轴粘住。

如果需要存放较长时间，请联系 Wilo 公司咨询应采取哪些防腐措施。





### 警告

错误运输可能导致人员受伤！

若以后再次运输该水泵，则须将其正确包装以保证安全运输。为此应使用原厂包装，或者使用与此相当的包装。

## 3.4 为了安装/拆卸目的运输



### 警告

有人身伤害危险！

不规范地运输可能会导致人身伤害！

- 根据尺寸和结构不同，用叉车或者索环卸载包装箱、木质板条箱、托盘或者纸壳箱。
- 始终使用符合当地法规的升降装置吊起重量超过 30 kg 的重型件。
  - 承载能力必须与重量相符！
- 必须使用允许的吊具（例如滑轮组、吊车等）运输水泵。吊具必须固定在水泵法兰上，必要时固定在电机外径上。
  - 其中必须采取安全措施，防止滑脱！
- 在用吊环起吊机器或部件时，只能使用符合当地安全规程的羊角吊钩或卸扣。
- 电机上的运输吊环（如有）只允许用于运输电机，不得用于运输整个水泵。
- 吊链或者吊绳在通过吊环上方或者穿过吊环，或者通过锋利边缘上方时，要使用保护装置。
- 使用滑轮组或类似升降装置时，注意垂直提升吊重。
- 避免提升起来的吊重摆动。
  - 使用第二套滑轮组可以避免摇摆。操作期间，两套滑轮组的牵引方向与垂直方向的夹角必须小于 30°。
- 绝不能使羊角吊钩、吊环或卸扣承受弯曲力，其负重轴必须在拉力方向上！
- 提升时注意，吊绳的负重极限在斜拉中会降低。
  - 使所有承重元件尽可能朝垂直方向承受负荷，能在最大程度上保证绳具的安全性和有效性。如果有必要就使用一个起吊臂，吊绳可以垂直固定在上面。
- 划出一个安全区，避免在负载或部分负载滑落，或提升设备断裂或有裂纹时，发生任何危险状况。
- 绝不能将吊重保持在升高位置上超过必要时间！在起吊过程中进行加速和制动时，避免危及人身安全。

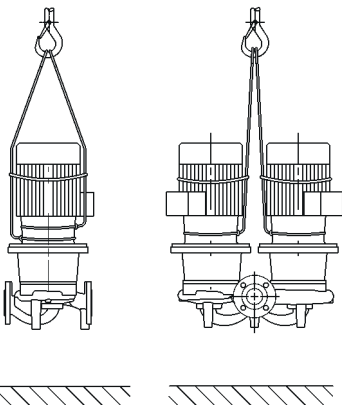


Fig. 1: 运输水泵

在用吊车起吊时，必须如图所示，使用适当的皮带或吊绳缠绕水泵。将水泵套在皮带或吊绳套圈中，皮带或吊绳套圈在水泵重力的作用下拉紧。

电机上的运输吊环（如有）在此只用于起吊时穿引吊具！



### 警告

损坏的运输吊环可能发生断裂，造成重大人身伤害。

- 每次使用时，都必须检查运输吊环有无损坏，以及固定是否牢固。



电机上的运输吊环（如有）只允许用于运输电机，不得用于运输整个水泵！

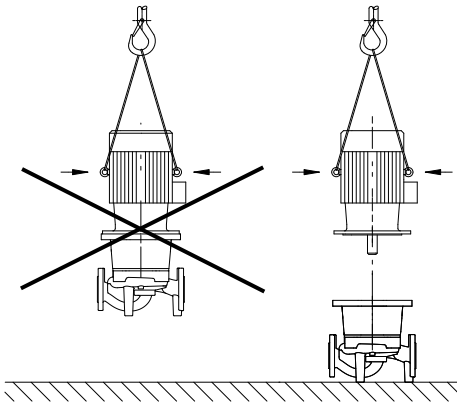


Fig. 2: 运输电机



## 危险

### 零件掉落导致生命危险！

水泵本身以及水泵的零件可能具有很大的自重。零件掉落会造成割伤、挤伤、挫伤或者可能发生致人死亡的撞击。

- 始终使用适当的提升设备，并固定住零件防止其掉落。
- 严禁在悬吊的吊重下逗留。
- 存放和运输时，以及开始所有安装和装配工作之前，确保水泵位置稳定或者固定良好。



## 警告

### 如因未固定而导致水泵掉落，会造成人身伤害！

带螺纹孔的支脚只用于固定用途。在未经固定状态下，水泵可能稳定性不足。

- 切勿使水泵在未经固定状态下依靠支脚站立。

## 4 规定用途和滥用

### 4.1 规定用途

该系列干转子泵设计用作楼宇技术领域的循环泵。

允许用于：

- 热水供暖系统
- 冷却水和冷水循环回路
- 工业用水系统
- 工业循环系统
- 热载体循环回路

按规定使用还包括遵守本说明书的规定以及水泵上的参数和标识。

任何超出所述范围的使用都视为滥用，滥用会导致质保失效。

### 4.2 滥用

只有符合安装及操作说明书“规定用途”章节中的要求时，才能保证产品运行可靠。切勿超过或低于目录/数据表中给出的极限值。

**警告！** 滥用水泵可能导致危险情况和损失。

- 切勿使用其他未经生产商许可的流体。
- 流体中不允许存在的物质可能造成水泵损坏。研磨性固体（例如沙子）会增大水泵的磨损。
- 未经防爆许可，水泵不适合在潜在爆炸环境中使用。
- 将高度易燃材料/流体与产品保持安全距离。
- 切勿执行未获许可的作业。
- 切勿超出规定的应用范围。
- 切勿擅自改装。
- 请只使用获得授权的附件和原装备件。

典型的安装地点是设备间，设备间位于建筑物内部，安装有其他建筑设备。不允许将本水泵直接安装在具有其他用途的室内（起居间和工作间）。

只有相应的特殊版本（电机备有停机加热装置）方可安装在室外。参见“连接停机加热装置”章节。

## 5 产品相关数据

### 5.1 型号代码

示例：

VeroLine-IPL 80/135-5.5/2-xx

VeroTwin-DPL 80/135-5.5/2-xx

VeroLine-IPL	法兰泵作为内联单头泵
VeroTwin-DPL	法兰泵作为内联双头泵
80	法兰接口的公称直径 DN，单位 mm
135	叶轮标称直径，单位 mm <sup>1)</sup>

示例：

VeroLine-IPL 80/135-5.5/2-xx  
VeroTwin-DPL 80/135-5.5/2-xx

5.5 电机额定功率 P2，单位 kW

2 电机极数

-xx 款型，例如S1

<sup>1)</sup> 与实际叶轮直径不符。使用备件目录查找备件。

表 1: 型号代码

## 5.2 技术数据

特性	数值	备注
额定转速	• (2/4极) : 2900 rpm 或 1450 rpm	特殊版本，例如用于其他电压、工作压力、介质等，参见铭牌或访问 <a href="http://www.wilo.com">www.wilo.com</a> 。
公称直径 DN	IPL:32 ... 100 mm DPL:32 ... 100 mm	
管道接口和测压接口	符合 DIN EN 1092-2 标准的 PN 16 法兰，带符合 DIN 3858 标准的 Rp ½ 测压接口。	
允许的最低/最高介质温度	-20 °C ... +120 °C	取决于介质、工作压力和机械密封类型
运行时的最低/最高环境温度	0 °C ~ +40 °C	更低或更高环境温度敬请垂询
存放时的最低/最高温度	-30 °C ~ +60 °C	
允许的最大工作压力	10 bar (最高+ 120 °C)	
绝缘等级	F	
防护等级	IP55	
允许的介质	符合 VDI 2035 第 1 和 2 部分的暖气水 工业用水 冷却水/制冷水 乙二醇体积含量最高 40% 的水-乙二醇混合物	标准规格 标准规格 标准规格 标准规格
允许的介质	热载油	特殊版本或辅助设备 (另行收费)
允许的介质	其他介质 (敬请垂询)	特殊版本或辅助设备 (另行收费)
电气连接	3~400 V, 50 Hz	标准规格
电气连接	3~230 V, 50 Hz, 3 kW 以下 (含)	标准规格
电气连接	3~230 V, 50 Hz, 4 kW 以上	特殊版本或辅助设备 (另行收费)
特殊电压/频率	使用不同电压或其他频率电机的水泵请垂询。	特殊版本或辅助设备 (另行收费)
PTC热敏电阻传感器		特殊规格 (另行收费)
转速调节, 换极	Wilo 控制器 (比如 Wilo-CC-HVAC 系统)	标准规格

表 2: 技术数据

凭电机商品号即可在此查阅符合欧盟指令EU2019/1781的详尽电机数据：<https://qr.wilo.com/motors>

补充说明 CH	允许的流体
供暖泵	暖气水 (符合 VDI 2035/VdTÜV Tch 1466/CH : 符合 <b>SWKI BT 102-01</b> ) ... 无除氧剂, 无化学密封剂 (注意防腐密封设备符合 VDI 2035 (CH: <b>SWKI BT 102-01</b> ) ; 需处理泄漏位置)。

### 介质

水-乙二醇混合物或者黏度与纯水不同的介质会使水泵的功耗升高。仅使用含缓蚀剂的混合物。

注意遵守相应的生产商说明！

- 必要时调节电机功率。
- 流体必须不含沉淀物。
- 如果使用其他介质, 需要 Wilo 公司的许可。
- 使用水-乙二醇混合物时, 一般建议使用带有相应机械密封的 S1 款型。
- 标准密封/标准机械密封与介质的兼容性通常在常规设备条件下给出。特殊情况下可能需要特殊密封, 比如:
  - 流体中含有固体、油或腐蚀 EPDM 的物质,
  - 系统中含有空气等

注意所输送流体的安全数据表！

### 5.3 供货范围

- 水泵
- 安装及操作说明书

### 5.4 附件

附件必须单独订购：

- 用于开关柜安装的 PTC 热敏电阻跳闸单元
- 2或3个托架, 带用于底座安装的地脚螺栓
- 用于修理插件的盲法兰

详细列表请参见产品目录及备件资料。

## 6 水泵说明

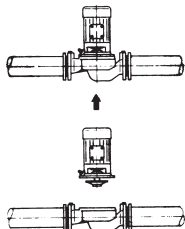


Fig. 3: IPL视图 - 管道安装

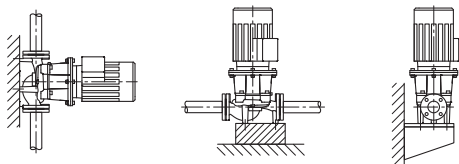


Fig. 4: IPL视图 - 底座安装 (≤ 7.5 kW)

此处所述的所有水泵均为结构紧凑的低压离心泵。电机采用一个不可分割的轴连接到水泵。机械密封免维护。这些水泵既可以作为管道泵直接安装在充分固定的管路中, 也可以放在地基基座上。

安装方式取决于水泵规格。合适的 Wilo 控制器 (例如 Wilo-CC-HVAC 系统) 可以连续调节水泵的功率。这样便可根据系统需要理想调节水泵功率, 实现经济的水泵运行。

### IPL规格

水泵壳体采用串联结构形式, 也就是入口侧和出口侧的法兰位于同一条中线上。所有泵壳都配有支脚。对于 5.5 kW 及以上额定功率, 建议安装到地基基座上。

### DPL规格

将两个水泵放置在共同的外壳中 (双头泵)。水泵壳体采用串联结构形式。所有泵壳都配有支脚。对于 4 kW 及以上额定功率, 建议安装到地基基座上。

与一个控制器相连接, 只能使基本负荷水泵在控制模式下运行。在满负荷运行中, 第二个水泵可用作高峰负荷泵组。发生故障时, 第二个水泵可承担备用功能。

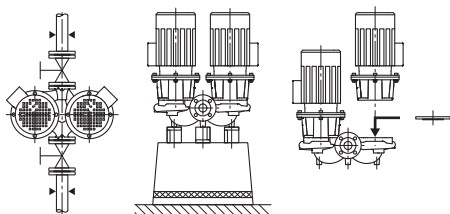


Fig. 5: DPL视图



## 注意

可订购适用于该系列所有水泵类型/壳体尺寸的盲法兰（附件）。使用盲法兰的情况下，更换电机叶轮组（配备叶轮和接线盒的电机）时，驱动装置可以保持运转。



## 注意

为了确保备用水泵的运行就绪状态，必须每 24 个小时，或者至少每周一次，将其投入运行。

### 6.1 预期噪声水平

电机功率 [kW]	测量平面声压级 $L_p, A [dB(A)]^{1)}$			
	2900 rpm		1450 rpm	
	IPL/DPL (DPL处于单独运行模式)	DPL (DPL处于并联运行模式)	IPL/DPL (DPL处于单独运行模式)	DPL (DPL处于并联运行模式)
1.1	60	63	51	54
1.5	64	67	55	58
2.2	64	67	60	63
3	66	69	55	58
4	68	71	57	60
5.5	71	74	63	66
7.5	71	74	63	66

<sup>1)</sup> 在距离电机表面 1 m 处的一个方形测量面上测得的声压级空间平均值。

表 3: 预期噪声水平 (50 Hz)

## 7 安装

### 7.1 工作人员资格鉴定

- 安装/拆卸工作：必须由专业人员执行，而且要求该人员接受过相关培训，了解工作中会用到的工具以及固定材料。

### 7.2 运营者的责任

- 遵守国家和地区法规！
- 遵守本地现行的同业工伤事故保险联合会的事事故防范规定和安全规定。
- 提供防护装备并保证工作人员佩戴防护装备。
- 遵守与处理重物有关的所有法律法规。

### 7.3 安全



## 危险

缺失防护装置导致生命危险！

如果缺失接线盒的防护装置或者联轴器/电机区域内缺失防护装置，则电击或者接触正在旋转的部件都可能导致致命伤害。

- 开始试运行之前，必须将接线盒盖等之前拆下的防护装置重新安装好！



## 危险

### 零件掉落导致生命危险！

水泵本身以及水泵的零件可能具有很大的自重。零件掉落会造成割伤、挤伤、挫伤或者可能发生致人死亡的撞击。

- 始终使用适当的提升设备，并固定住零件防止其掉落。
- 严禁在悬吊的吊重下逗留。
- 存放和运输时，以及开始所有安装和装配工作之前，确保水泵位置稳定或者固定良好。



## 警告

### 高温表面！

整个水泵的温度可能极高。有烫伤危险！

- 执行任何工作前都应先使水泵冷却！



## 警告

### 烫伤危险！

如果流体温度和系统压力高，应先将水泵冷却并使系统进入无压状态。

## 小心

### 过热会损坏水泵！

不允许在没有流量的情况下运行水泵超过 1 分钟。能量堆积会产生热量，可能损坏轴、叶轮和机械密封。

- 确保不低于最小体积流量  $Q_{\min}$ 。

$Q_{\min}$  的近似计算：

$$Q_{\min} = 10 \% \times Q_{\max\text{水泵}} \times \text{实际转速/最大转速}$$

## 7.4 水泵法兰处允许的力和扭矩

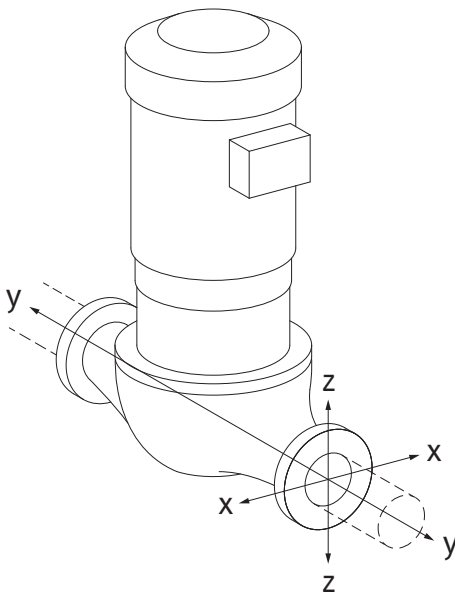


Fig. 6: 荷载条件16A, EN ISO 5199, 附录B

悬挂在管路中的水泵，荷载条件16A

DN	力 F [N]				扭矩 M [Nm]			
	$F_x$	$F_y$	$F_z$	$\Sigma$ 力 F	$M_x$	$M_y$	$M_z$	$\Sigma$ 扭矩 M
压力和吸入法兰								
32	450	525	425	825	550	375	425	800
40	550	625	500	975	650	450	525	950
50	750	825	675	1300	700	500	575	1025
65	925	1050	850	1650	750	550	600	1100
80	1125	1250	1025	1975	800	575	650	1175
100	1500	1675	1350	2625	875	625	725	1300

数值符合 ISO/DIN 5199-II 级 (2002) 附录 B

表 4: 垂直管路中的水泵法兰处允许的力和扭矩

## 固定在水泵支脚上的立式水泵，荷载条件17A

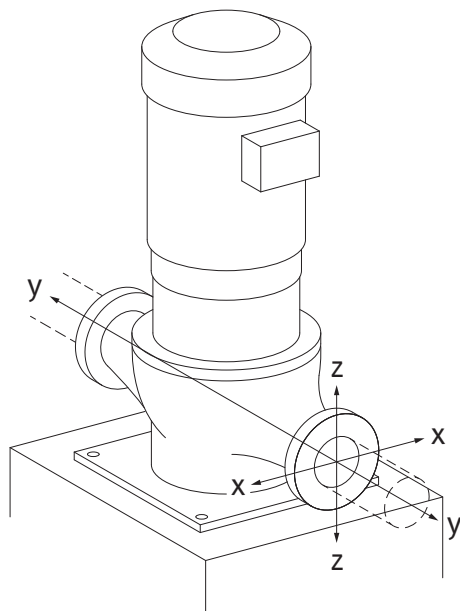


Fig. 7: 荷载条件17A, EN ISO 5199, 附录B

DN	力 F [N]				扭矩 M [Nm]			
	F <sub>x</sub>	F <sub>y</sub>	F <sub>z</sub>	Σ 力 F	M <sub>x</sub>	M <sub>y</sub>	M <sub>z</sub>	Σ 扭矩 M
32	338	394	319	619	300	125	175	550
40	413	469	375	731	400	200	275	700
50	563	619	506	975	450	250	325	775
65	694	788	638	1238	500	300	350	850
80	844	938	769	1481	550	325	400	925
100	1125	1256	1013	1969	625	375	475	1050

数值符合ISO/DIN 5199-II级 (2002) 附录B

表 5: 水平管路中的水泵法兰处允许的力和扭矩

如果并非所有起作用的负荷均达到了允许的最大值，则这些负荷中可有一个在遵守相应前提的情况下超出常规极限值。前提是指确保能够满足以下附加条件：

- 所有组件的力或扭矩最高可达允许的最大值的 1.4 倍。
- 作用于每个法兰上的力和扭矩满足补偿方程式的条件。

$$\left( \frac{\sum |F|_{\text{effective}}}{\sum |F|_{\text{max. permitted}}} \right)^2 + \left( \frac{\sum |M|_{\text{effective}}}{\sum |M|_{\text{max. permitted}}} \right)^2 \leq 2$$

Fig. 8: 补偿方程式

$\Sigma F_{\text{有效值}}$  和  $\Sigma M_{\text{有效值}}$  是两个水泵法兰（入口和出口）有效值的算术总和。 $\Sigma F_{\text{max. permitted}}$  和  $\Sigma M_{\text{max. permitted}}$  是两个水泵法兰（入口和出口）最大允许值的算术总和。补偿方程式中不考虑  $\Sigma F$  和  $\Sigma M$  的代数符号。

## 材料和温度的影响

允许的最大力和扭矩适用于基本材料灰口铸铁和初始温度为 20 °C 的情况。如果温度更高，必须根据其弹性模量的比率对数值进行如下修正：

$$E_{t,GG} / E_{20,GG}$$

$E_{t,GG}$  = 所选温度下灰口铸铁的弹性模量

$E_{20,GG}$  = 20 °C 时灰口铸铁的弹性模量

## 7.5 准备安装

检查水泵是否与交货通知上的说明一致；如果零件有损坏或者缺失，必须立即通知 Wilo 公司。检查木质板条箱/纸板箱/包装纸中是否有与水泵可能包装在一起的备件或者附件。



## 警告

因不当操作会造成人身和物品损伤危险！

- 只有完成所有焊接和钎焊工作以及可能需要执行的管道系统冲洗之后，才能安装水泵。
  - 污物可能使水泵工作不正常。

## 安放位置

- 将水泵安装在不受气候影响、无雾、无尘、通风良好、隔振、没有爆炸危险的环境内。切勿露天放置水泵！注意遵守“规定用途”章节的说明！
- 将水泵安装在容易够到的位置。这会方便日后检查、维护（如更换机械密封）或更换。注意墙壁和电机风扇罩之间的轴向最小间距：自由拆卸尺寸为最小 200 mm + 风扇罩直径。
- 在水泵安放地点上方，安装一台用于放置升降装置的装置。水泵总重：见目录或数据表。

## 小心

### 地基不当或整泵安放错误！

地基不当或整泵未正确安放在地基上可能导致水泵损坏。

- 这类损坏不在保修范围内。
- 绝对不可将整泵放在未固定或不承重的平面上。

将水泵安装在弹性支撑的底座上可以改善建筑物的结构隔音。

休止状态下的水泵可以避免轴承因其他整泵振动而损坏（例如在有多个冗余泵的系统）中）。为此，请将水泵安装在独立的底座上。

如水泵安装在楼板上，强烈建议采用弹性支撑。

对于变速泵需要格外小心。

如有必要，建议委托有资质的建筑声学专家进行配置和布局，确保考虑到所有结构和声学方面的标准。

根据最低激励频率选择弹性元件。通常为转速。如转速可变，应从最低转速开始。

为至少达到60%的隔音度，最低激励频率必须至少是弹性支撑固有频率的两倍。因此，转速越低，弹性元件的弹簧刚度必须越低。

一般可以使用以下材料：

- 转速在3000 rpm及以上时，使用天然软木板
- 转速在1000 rpm和3000 rpm之间时，使用橡胶金属元件
- 转速在1000 rpm以下时，使用螺旋弹簧

设计底座时，避免灰浆、瓷砖或辅助结构形成声桥，否则会使隔音失效或大幅降低隔音效果。

对于管道连接，应考虑到弹性元件在水泵和底座重量作用下的变形。

设计人员/安装公司必须确保管道连接到水泵时完全无应力，水泵壳体不受任何质量或振动影响。为此，建议使用补偿器。



## 注意

针对个别水泵类型要进行隔振安装，此时需要用弹性隔垫（如软木塞或MAFUND®板）将地基板与建筑物同时分开。

### 地基螺纹连接示例

- 将水泵安放到地基上时，用水准仪（在轴/出水口上）校准成套整泵。
- 将垫板(B)始终安装在底座(E)和地基(D)之间的固定材料（例如地脚螺栓(A)）左右两边。
- 均匀用力，拧紧固定材料。
- 如果距离 > 0.75 m，则在固定元件之间的中间位置为底座进行支撑。

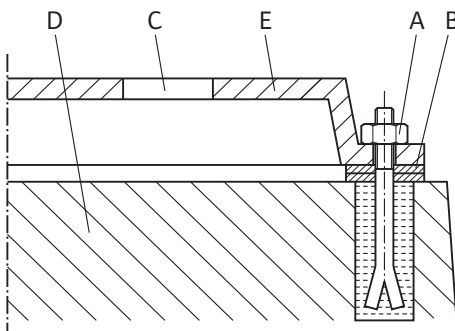


Fig. 9: 地基螺纹连接示例



## 警告

操作不当会造成人身伤害和物资损失！

如果承载重量过大，安装在电机外壳上的运输吊环会断裂。这可造成人员重伤，产品受损！

- 只能使用经过许可的吊具（比如滑轮组、吊车等）提升水泵。参见“运输和存放”章节。
- 电机外壳上安装的运输吊环只允许用于运输电机！

运输吊环并非始终位于电机上。参见“运输和存放”一章。



## 注意

简化日后对整泵的工作！

- 在水泵前后安装止回阀，这样就无需排空整个设备。

必要时应配备止回阀。



### 冷凝水排放

- 在空气调节或冷却系统中使用水泵：
  - 联接架内产生的冷凝水可以有针对性地通过一个现有的钻孔排出。也可以在这个孔上连接一根排水管，用于排放溢出的少量液体。
- 安装位置：
  - 除了“电机向下”之外，允许任何安装位置。
- 通气阀 (Fig. I/II, 位置2.1) 必须始终指向上方。

### IPL/DPL

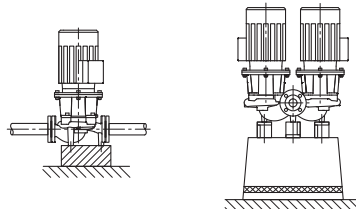


Fig. 10: IPL/DPL

吸入侧法兰和压力侧法兰上各有一个指示流向的箭头。流向必须与法兰上的方向箭头一致。



### 注意

电机接线盒不得指向下方。如有需要，可在松开内六角螺钉后旋转电机叶轮组。注意旋转时不要损坏壳体 O 型圈密封件。



### 注意

从开放式蓄水罐（比如冷却塔等）输送流体时，注意保证液位始终充分超过水泵的进水口。这样可以避免水泵干转运行。必须遵守最小进流压力。



### 注意

对于采取绝缘措施的设备，只允许将水泵壳体绝缘。切勿将联接架和电机绝缘。

每台电机上都有冷凝水排出孔，孔在出厂时（为保证符合防护等级IP55）由塞子密封住。如出现冷凝水（例如在空调或制冷系统中使用水泵），此塞子必须朝下拆出，以便冷凝水排出。

### 连接管路

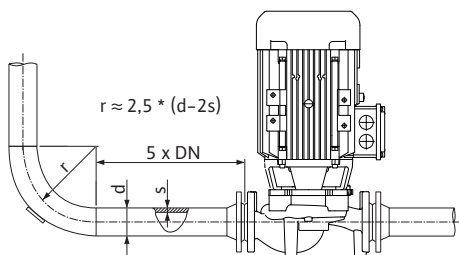


Fig. 11: 水泵前面、后面的稳定管段

### 小心

操作不当可能导致损坏！

切勿将水泵用作管路的固定点。

- 整套设备现有的汽蚀余量必须始终超过水泵所需的汽蚀余量。
- 由管路系统施加在水泵法兰上的力和力矩（例如由于扭曲、热膨胀）不得超过允许的力和力矩。
- 在没有机械应力的情况下安装管路和水泵。
- 在固定管路时应注意不要使水泵承受管道的重量。
- 吸入管路要尽可能短。吸入管路在通向水泵时应始终向上敷设，在进水口处则向下敷设。避免进入空气。
- 如果在吸入管路中需要一个挡泥板，则其自由截面必须相当于管路截面的 3-4 倍。
- 对于短管路，公称直径必须至少相当于水泵接口的公称直径。对于长管路，则选择最为经济的公称直径。
- 为了避免出现压力损失较高的情况，较大公称直径的转接器应设计为具有大约 8° 的扩展角。





## 注意

### 避免空穴现象！

- 在水泵的前、后均安装直管路作为稳定管段。稳定管段的长度必须大于 5 倍泵法兰公称直径。

终检

在安装管路之前，拆下水泵吸水和压力连接上的法兰盖。  
再次根据“安装”章节所述，检查整泵的对中情况。

- 如果有必要，补充拧紧地脚螺栓。
- 检查所有接口是否正确及功能是否正常。

## 8 电气连接



### 危险

#### 触电导致生命危险！

#### 建议使用热过载保护装置！

执行电气作业时不按规定操作，会发生电击致死事故！

- 电气连接工作须由具备资质的专业电工按照现行法规执行！
- 注意遵守事故防范法规！
- 在产品上作业之前先确认水泵和驱动装置均已断电。
- 确认作业结束之前无人能重新接通电源。
- 电气设备必须接地。接地方式必须适合驱动装置，并符合现行的标准和规定。接地端和固定件的尺寸必须合适。
- 注意附件的安装及操作说明书！



### 危险

#### 触电造成生命危险！

触摸通电部件会导致死亡或重伤！

即便断开连接，由于电容器未放电，接线盒内仍会出现较高的接触电压。因此必须先等待 5 分钟，之后才能开始在接线盒模块上作业！

- 全极切断电源电压，采取安全措施防止重新接通！
- 检查所有接口（以及无电势触点）有无电压！
- 切勿将钉子、螺丝刀、电线等物体插入接线盒开孔中！
- 重新安装之前拆下的保护装置（例如接线盒盖等）！

### 小心

电气连接不当会导致物资损失！

电源规格不足会由于电源过载而导致系统失灵和电缆火灾事故！

- 在进行与所用电缆横截面和保险丝有关的电网设计时，必须考虑到在多泵运行模式下可能出现所有水泵短暂同时运行的情况。

准备工作/提示

- 使用一根固定的接线电缆建立电气连接，该接线电缆应配有一个插接装置或者接触窗口开口宽度至少达到 3 mm 的全极开关（VDE 0730/第 1 部分）。
- 为了杜绝由于渗漏水造成损失，同时消除电缆螺纹接头的应力，应使用外径足够大的接线电缆并牢牢拧紧。
- 在螺纹连接附近弯折电缆，使其形成一个排水回路，排出形成的水滴。  
定位电缆螺纹接头并相应敷设电缆，以此确保没有水滴进入接线盒内。必须用生产商规定的塞子封住没有占用的电缆接头。
- 敷设接线电缆，确保既不会接触管路，也不会接触水泵。
- 如果介质温度高于 90 °C，需要使用耐热的接线电缆。
- 电源连接的电流类型和电压必须与型号铭牌上的说明一致。
- 电源侧保险丝：取决于电机标称电流。
- 连接外部变频器时，注意安装及操作说明书的相关说明！如果放电电流较高，必要时进行辅助接地。

- 必须安装电机保护开关或 PTC 热敏电阻跳闸单元（附件）防止电机过载。

#### 标准泵连接外部变频器

如果将标准泵连接在外部变频器上使用，注意下面几项涉及绝缘系统和绝缘轴承的说明：

#### 400 V 电网

Wilo 使用的干转子泵电机适合连接外部变频器运行。

强烈建议按照 IEC TS 60034-25:2014 标准安装和运行。由于变频器领域的发展快速，WILO SE 不保证电机连接第三方变频器能无故障运行。

#### 500 V/690 V 电网

Wilo 标配的干转子泵电机在 500 V/690 V 电网中不适合连接第三方变频器运行。

在 500 V 或 690 V 电网中使用时，需要使用装备相应线圈和增强型绝缘系统的电机。订购时必须详细说明。必须按照 IEC TS 60034-25:2014 标准执行整个安装过程。

#### 绝缘轴承

由于变频器的切换过程越来越快，因此即便是小功率电机，也可能通过电机轴承导致电压降。如果由于轴承电流导致过早断电，则使用电流绝缘轴承！

将变频器连接在电机上时，必须注意下列事项：

- 注意变频器生产商提供的安装指南。
- 注意变频器安装及操作说明书给出的不同电缆长度的上升时间和峰值电压。
- 使用截面足够大的合适电缆（最大 5% 电压损失）。
- 根据变频器生产商建议，连接正确的屏蔽。
- 与主电缆隔离铺设数据线（比如 PTC 评估）。
- 必要时与变频器生产商协议，使用正弦波滤波器 (LC)。



### 注意

电气连接的接线图张贴在接线盒盖内。

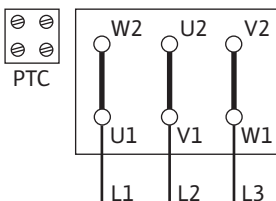


Fig. 12: 三角形电路

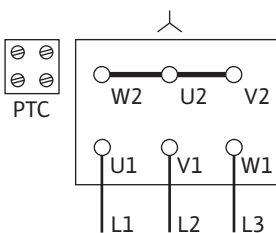


Fig. 13: 星形电路

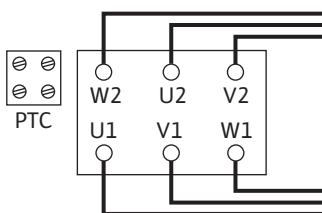


Fig. 14: 星三角形电路

#### 设置电机保护开关：

- 根据电机铭牌上标注的参数设置电机标称电流。  
星三角启动：如果电机保护开关切换到星三角接触器组合的馈电线，则设置和直接启动时一样。如果电机保护开关切换到电机馈电线的一条支线（U1/V1/W1 或 U2/V2/W2），则需将电机保护开关设置为  $0.58 \times$  电机标称电流的值。
- 如电机配有 PTC 热敏电阻传感器（特殊版本），将 PTC 热敏电阻传感器连接至 PTC 热敏电阻跳闸单元（由安装方负责）。

### 小心

#### 物资损失危险！

在 PTC 热敏电阻传感器端子上，最大只允许施加 7.5 V 的直流电压。更高的电压会破坏 PTC 热敏电阻传感器。

- 电源连接取决于电机功率  $P_2$ 、供电电压和启动方式。接线盒中连接桥所需的电路参见下表以及 Fig. 12、13 和 14。
- 在连接自动工作的开关设备时，注意相应的安装及操作说明书。

启动方式	电机功率		电机功率
	$P_2 \leq 3 \text{ kW}$	供电电压 3~230 V	供电电压 3~400 V
直接启动	三角形电路 (Fig. 12)	星形电路 (Fig. 13)	$P_2 \geq 4 \text{ kW}$ 供电电压 3~400 V 三角形电路 (Fig. 12 顶部)

启动方式	电机功率 $P_2 \leq 3 \text{ kW}$		电机功率 $P_2 \geq 4 \text{ kW}$
	供电电压 3~230 V	供电电压 3~400 V	供电电压 3~400 V
星三角启动	移除连接桥。 (Fig. 14)	不可行	移除连接桥。 (Fig. 14)

表 6: 端子布局

**注意**

建议使用软启动器，以限制启动电流，避免触发过电流保护装置。

端子	拧紧扭矩 单位Nm	螺钉
L1/L2/L3	$1.8 \pm 0.2$	M4
L1/L2/L3	$2.2 \pm 0.2$	M5
L1/L2/L3	$3.8 \pm 0.3$	M6

表 7: 接线端子板的拧紧扭矩

**8.1 停机加热装置**

针对由于气候条件而存在冷凝危险的电机，建议配备停机加热装置。具体涉及比如潮湿环境中处于停机状态的电机、承受剧烈温度波动的电机等。出厂时配备停机加热装置的电机，可作为特殊版本订购。停机加热装置用于保护电机绕组，避免电机由于冷凝水进入内部而受到损坏。

- 将停机加热装置连接到接线盒的 HE/HE 端子上（连接电压：1~230 V/50 Hz）。

**小心**

操作不当可能导致损坏！

电机运行期间不得接通停机加热装置。

**9 试运行**

- 电气作业：电气作业必须由专业电工执行。
- 安装/拆卸工作：必须由专业人员执行，而且要求该人员接受过相关培训，了解工作中会用到的工具以及固定材料。
- 操作人员必须了解整台设备的工作原理。

**危险**

缺失防护装置导致生命危险！

如接线盒缺少防护装置，电击可能会造成致命伤害。

- 开始试运行之前，必须将接线盒盖等之前拆下的防护装置重新安装好！
- 开始试运行之前，必须先由获得授权的专业人员对水泵和电机上的安全装置进行功能检查！

**警告**

喷射出的流体和松动的部件可能导致人员受伤！

水泵/设备安装不当，可能在试运行阶段导致人员重伤！

- 必须谨慎执行所有作业！
- 在试运行过程中保持距离！
- 执行所有作业时，都要穿戴防护服、佩戴防护手套和护目镜。

**注意**

建议由 Wilo 公司客户服务人员将水泵投入运行。

## 准备工作

在试运行之前，水泵的环境温度必须适当。

## 9.1 填充和排气

## 小心

干转运行会损坏机械密封！可能导致泄漏。

- 禁止水泵空运行。



## 警告

接触水泵/设备有烫伤或因低温而粘住的危险。

视水泵和设备的运行状态而定（流体温度），整个水泵可能温度很高或温度很低。

- 在运行过程中保持距离！
- 使设备和水泵冷却至室温！
- 执行所有作业时，都要穿戴防护服、佩戴防护手套和护目镜。



## 危险

特别热或者冷的受压液体会造成人身及物品损伤危险！

根据流体温度的不同，完全打开排气装置时可能有液态或者气态的、温度超高或温度超低的流体溢出。根据系统压力的不同，流体可能在高压下喷出。

- 打开排气装置时必须小心谨慎。

请正确灌注设备并排气。

1. 为此，松开通气阀并为水泵排气。
2. 排气结束后重新拧紧通气阀，使水不再流出。



## 注意

- 务必遵守最小进水口压力！

- 为了避免产生气蚀噪音和造成损坏，必须保证水泵的吸水口达到最小进水口压力。最小进水口压力取决于水泵的运行状况和工况点。必须相应地规定最小进水口压力。
  - 用于规定最小进水口压力的主要参数包括水泵在其工况点时的NPSH值以及介质的蒸汽压力。NPSH 值参见不同型号水泵的技术文档。
1. 通过短暂通电，检查旋转方向是否与风扇罩或联接架上的箭头一致。若旋转方向错误，则进行如下操作：
    - 如果是直接启动：交换电机接线端子板上的两个相（例如 L1 与 L2 互换）。
    - 如果是星三角启动：在双绕组电机的接线端子板上，交换绕组各自的始端和末端（例如 V1 与 V2 互换、W1 与 W2 互换）。
  - 只有在出口侧断流装置关闭时才能开启整泵！达到满载转速后，再慢慢打开断流装置，并将其调节到工况点。

## 9.2 开启

整泵的运行必须平稳、无振动。

在水泵磨合期和正常运行期间，一般会出现微量泄漏和滴漏。需要不时目检。如果出现明显泄漏，则应更换密封。



## 危险

缺失防护装置导致生命危险！

如果缺失接线盒的防护装置或者联轴器/电机区域内缺失防护装置，则电击或者接触正在旋转的部件都可能导致致命伤害。

- 在结束所有工作之后，必须重新安装和启用所有规定的安全和防护装置！

## 9.3 关闭

- 关闭压力管中的断流装置。

**注意**

如果压力管中安装了止回阀而且存在背压，断流装置就可以保持打开状态。

**小心****操作不当可能导致损坏！**

在关闭水泵时，吸入管路中的断流装置不得处于关闭状态。

- 关闭电机，让其完全惯性运行。注意惯性运行要平稳。
- 如果较长时间停机，则关闭吸入管路中的断流装置。
- 如果较长时间停机和/或有冻结危险，将水泵排空，然后采取措施防止冻结。
- 将拆卸的水泵保存在干燥且无尘的环境中。

## 9.4 运行

**注意**

水泵必须始终平稳、无振动地运行，不应在与产品目录 / 数据表中所述不一样的条件下运行。

**危险****缺失防护装置导致生命危险！**

如接线盒缺少防护装置，电击可能会造成致命伤害。

- 在结束所有工作之后，必须重新安装和启用所有规定的安全和防护装置！

**警告****接触水泵/设备有烫伤或因低温而粘住的危险。**

视水泵和设备的运行状态而定（流体温度），整个水泵可能温度很高或温度很低。

- 在运行过程中保持距离！
- 使设备和水泵冷却至室温！
- 执行所有作业时，都要穿戴防护服、佩戴防护手套和护目镜。

可以使用不同的方式和方法开启和关闭水泵。具体取决于运行条件和安装的自动化程度。为此注意下列事项：

**停止过程：**

- 避免水泵内的流体回流。
- 请勿以过小的体积流量工作较长时间。

**开始过程：**

- 确保水泵内已经充满流体。
- 请勿以过小的体积流量工作较长时间。
- 为了能够正常运行，较大的水泵需要达到最低流量。
- 在断流装置关闭时运行，可能导致蜗壳中过热或者轴封损坏。
- 用足够大的汽蚀余量保证水泵的进流持续不断。
- 避免由于背压太小导致电机过载。
- 为了避免电机内部温度急剧升高以及水泵、联轴器、电机、密封和轴承超负荷，每小时开启次数最多不可超过 10 次。

**双头泵运行**

为了确保备用水泵的运行就绪状态，必须每 24 个小时，或者至少每周一次，将其投入运行。

## 10 保养

- 保养工作：必须由熟悉所使用工作介质及其废弃处置的专业人员执行。
- 电气作业：电气作业必须由专业电工执行。
- 安装/拆卸工作：必须由专业人员执行，而且要求该人员接受过相关培训，了解工作中会用到的工具以及固定材料。

建议由 Wilo 公司客户服务部门保养和检查水泵。

**危险****触电导致生命危险！**

执行电气作业时不按规定操作，会发生电击致死事故！

- 对电气装置进行的工作只能由专业电工执行。
- 进行任何工作之前，将整泵断电并防止重新接通。
- 只能让专业电工排除水泵接线电缆的损坏。
- 注意水泵、液位调节装置和其他附件的安装及操作说明书。
- 切勿凿击电机上的开孔或在开孔中插入物体。
- 工作结束后，重新安装先前拆卸的防护装置，例如接线盒盖或联轴器罩壳等。

**危险****零件掉落导致生命危险！**

水泵本身以及水泵的零件可能具有很大的自重。零件掉落会造成割伤、挤伤、挫伤或者可能发生致人死亡的撞击。

- 始终使用适当的提升设备，并固定住零件防止其掉落。
- 严禁在悬吊的吊重下逗留。
- 存放和运输时，以及开始所有安装和装配工作之前，确保水泵位置稳定或者固定良好。

**危险****工具被甩出造成生命危险！**

维护电机轴所使用的工具可能在接触旋转部件时被甩出。进而导致人员受伤甚至死亡！

- 在水泵试运行之前，必须取出在维护工作时所使用的工具！

**警告****接触水泵/设备有烫伤或因低温而粘住的危险。**

视水泵和设备的运行状态而定（流体温度），整个水泵可能温度很高或温度很低。

- 在运行过程中保持距离！
- 使设备和水泵冷却至室温！
- 执行所有作业时，都要穿戴防护服、佩戴防护手套和护目镜。

## 10.1 供风装置

应定期检查电机外罩上的供风装置。污染影响电机冷却。如有必要，清理污染，恢复顺畅的空气供应。

## 10.2 维护工作

**危险****零件掉落造成生命危险！**

水泵或者某些部件掉落可能导致致命伤害！

- 安装时使用适当的吊具固定水泵部件，防止掉落。

**危险****触电会导致生命危险！**

检查是否无电压，盖住或者拦住旁边带电的零件。

### 10.2.1 保养中

进行保养工作时应更换所有拆下的密封。

### 10.2.2 更换机械密封

在磨合阶段，可能会出现少量滴漏。在水泵正常运行期间个别位置出现少量泄漏也是常见现象。

此外还应定期目检。如有明显泄漏，则要更换密封件。

Wilo 提供的修理套件中包括更换所需的零件。

拆卸：



#### 警告

#### 烫伤危险！

如果流体温度和系统压力高，应先将水泵冷却并使系统进入无压状态。

1. 将整套设备断电，采取措施防止意外重新接通。
2. 检查是否无电压。
3. 将工作区域接地和短路。
4. 关闭水泵前面、后面的断流装置。
5. 打开通气阀 (Fig. I/II, 位置2.1)，使水泵置于无压力状态。



#### 注意

执行下列所有作业时，注意为不同螺纹类型规定的拧紧扭矩（参见“拧紧扭矩”表）！

6. 如果用于拆卸驱动装置的电缆过短，则断开电机和电源连接线。
7. 松开联接架固定螺钉 (Fig. I/II, 位置4)，将带机械密封和叶轮的电机叶轮组从水泵壳体上拆下。
8. 将一把开口扳手（开口宽度27 mm）插入联接架窗口，并将轴固定在扳手表面。松开叶轮固定螺母 (Fig. I/II, 位置1.11)。取出下方垫圈 (Fig. I/II, 位置1.12、1.15)，并将叶轮 (Fig. I/II, 位置1.13) 从泵轴上拔下。
9. 拆下填隙片 (Fig. I/II, 位置1.16)，必要时也拆下平键 (Fig. I/II, 位置2.2)。
10. 从轴上拔下机械密封 (Fig. I/II, 位置1.21)。
11. 小心地清洁轴的配合面和支承面。
12. 将机械密封的静止环连同轴环一起从联接架法兰中取出，也取下O形圈 (Fig. I/II, 位置1.14)。清洁密封底座。

#### 安装

1. 将机械密封的新的密封静环连同密封盘一起压入联接架法兰的密封底座。用“去除张力的水”（如水和洗涤剂的混合物）更容易安装弹性体（O形圈、机械密封波纹管）。
2. 将新O形圈装入联接架的O形圈底座槽。
3. 将新的机械密封套在轴上。用“去除张力的水”（如水和洗涤剂的混合物）更容易安装弹性体（O形圈、机械密封波纹管）。必要时，重新装入平键和填隙片。
4. 使用垫圈和螺母安装叶轮，在叶轮外径上锁紧或用扳手固定住轴。避免由于歪斜而损坏机械密封。
5. 小心地将电机叶轮组装入水泵壳体并拧紧。
6. 连接电机和电源连接线。

### 10.2.3 更换电机

如果轴承噪音增大、有不正常的振动，说明轴承已磨损。必须更换轴承或电机。驱动装置的更换必须由 Wilo 客户服务人员执行！



拆卸：



### 警告

#### 烫伤危险！

如果流体温度和系统压力高，应先将水泵冷却并使系统进入无压状态。



### 警告

#### 人身伤害！

不当拆卸电机可能造成人身伤害。

- 在拆卸电机之前，确保重心不在支撑点上方。
- 在运输过程中采取措施防止电机倾翻。
- 始终使用适当的提升设备，并固定住零件防止其掉落。
- 严禁在悬吊的吊重下逗留。

1. 将整套设备断电，采取措施防止意外重新接通。
2. 检查是否无电压。
3. 将工作区域接地和短路。
4. 关闭水泵前面、后面的断流装置。
5. 打开通气阀 (Fig. I/II, 位置2.1)，使水泵置于无压力状态。



### 注意

执行下列所有作业时，注意为不同螺纹类型规定的拧紧扭矩（参见“拧紧扭矩”表）！

6. 取下电机连接线路。
7. 松开联接架固定螺钉 (Fig. I/II, 位置4)，并用适当的提升设备将驱动从水泵上抬起。
8. 使用合适的提升设备，将新电机（包括叶轮和轴封）小心地装入水泵壳体并拧紧。
9. 连接电机或电源连接线。

始终交叉拧紧螺栓。

螺栓连接				拧紧扭矩
位置	轴规格	尺寸/强度等级		Nm ± 10%
叶轮 - 轴 <sup>1)</sup>	D28	M14	A2-70	70
水泵壳体 - 联接架		M16	8.8	100

安装提示：

- 1) 使用 Molykote® P37 或类似产品润滑螺纹。

表 8: 拧紧扭矩

端子	拧紧扭矩 单位Nm	螺钉
L1/L2/L3	1.8 ± 0.2	M4
L1/L2/L3	2.2 ± 0.2	M5
L1/L2/L3	3.8 ± 0.3	M6

表 9: 接线端子板的拧紧扭矩



## 11 故障、原因、排除方法

**警告**

只能让有资质的专业人员进行故障排除！注意遵守所有安全说明！

如果无法排除运行故障，请联系专业维修厂或附近的 **Wilo** 客户服务部门或者代理处。

故障	原因	排除方法
水泵不启动或停止。	水泵堵塞。	切断电机电源。排除堵塞原因。如果电机堵塞：检修/更换电机/电机叶轮组。
	电缆端子松动。	检查所有电缆连接。
	电气保险丝损坏。	检查保险丝，更换损坏的保险丝。
	电机损坏。	联系 Wilo 客户服务部门或专业公司检查电机，必要时进行维修。
	电机保护开关触发。	将水泵出口侧调至额定体积流量（见铭牌）。
	电机保护开关错误设置	将电机保护开关设置为正确的额定电流（见铭牌）。
	电机保护开关受到环境温度过高的影响	更换电机保护开关或者用隔热层保护。
水泵低功率运行。	PTC 热敏电阻跳闸单元触发。	检查电机和风扇罩是否脏污，必要时清洁。 检查环境温度，必要时通过强制通风将环境温度设为 $\leq 40\text{ }^{\circ}\text{C}$ 。
	旋转方向错误。	检查旋转方向，必要时更改。
	出口侧截止阀节流。	慢慢打开截止阀。
	速度过低	端子跨接错误（用星形代替三角形）。
水泵发出噪音。	吸入管路中有空气	排除法兰泄漏。为水泵排气。如果泄漏明显，则更换机械密封。
	吸入压力不足形成气蚀。	增大吸入压力。遵守吸水口的最小进水口压力。检查吸入侧的滑阀和过滤器，必要时进行清洁。
	电机轴承损坏。	联系 Wilo 客户服务部门或专业公司检查水泵，必要时进行维修。
	叶轮发生摩擦。	检查联接架和水泵壳体之间的平面和定心，必要时进行清洁。

表 10: 故障、原因和排除方法

## 12 备件

只通过专业经销商或 Wilo 客户服务部门购买原装备件。为了避免核实询问和订错货物，每次订购时都请提供水泵和驱动装置铭牌上的所有数据。

## 小心

### 物资损失危险！

只有使用原装备件，才能保证水泵的功能。

只能使用 Wilo 原装备件！

订购备件时的必要说明：备件编号、备件名称以及水泵和驱动装置铭牌上的所有数据。这样可以避免再次询问或错误订购。

组件的分配参见Fig. I/II。

编号	零件	详情	编号	零件	详情
1	更换套件（整套）		2	电机	
1.1	叶轮（套件），带有：		2.1	排气阀	
1.11		螺母	2.2	平键	
1.12		张紧盘	4	用于联接架/泵壳的紧固螺钉	
1.13		叶轮	3	泵壳（套件），带有：	
1.14		O形圈	1.14		O形圈
1.15		垫圈	3.1		水泵壳体
1.16		填隙片	3.2		测压接口的塞子
1.2	机械密封（套件），带有：		3.3		转换阀DN 100 (Fig. III b)
1.11		螺母	3.4		阀芯≤ DN 80 (Fig. III a)
1.12		张紧盘	3.5		排放孔的螺旋塞
1.14		O形圈	4	用于联接架/泵壳的紧固螺钉	
1.15		垫圈			
1.21		机械密封			

表 11: 备件表

## 13 废弃处置

### 13.1 油和润滑剂

工作介质必须被收集到一个适当的容器中，并根据当地现行的指令废弃处置。一旦有介质滴落，立刻进行收集！

### 13.2 关于收集损耗的电气产品和电子产品的的相关信息

按规定废弃处置和正确回收这些产品，能避免环境污染、保护人身健康。



### 注意

禁止作为生活垃圾废弃处置！

在欧盟地区，该标志张贴在产品、包装或随附的资料中。它的意思是，相关的电气和电子产品不得作为生活垃圾废弃处置。

在按规定处理、回收和废弃处置相关旧产品时，要注意以下几点：

- 这些产品只能交给专门为此设立且获得认证的垃圾处理场。
- 注意当地现行的规定！

有关按规定废弃处置的信息，请咨询当地社区、最近的垃圾处理场或您购买产品的经销商。关于回收的详细信息请访问[www.wilo-recycling.com](http://www.wilo-recycling.com)。

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