

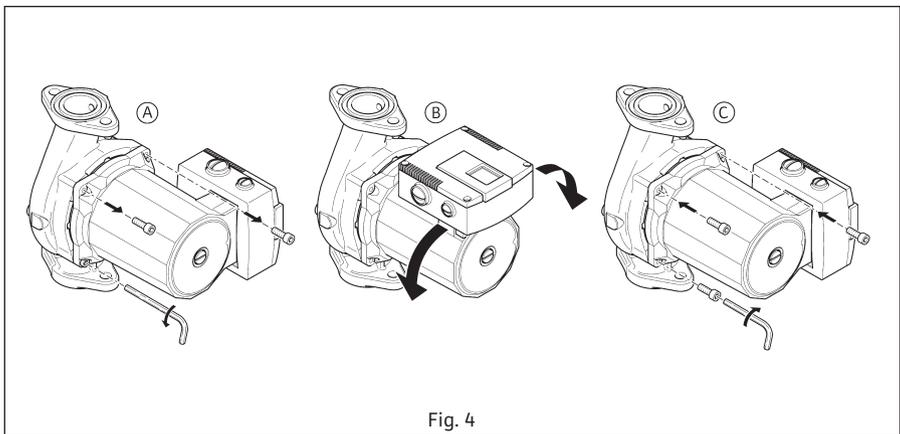
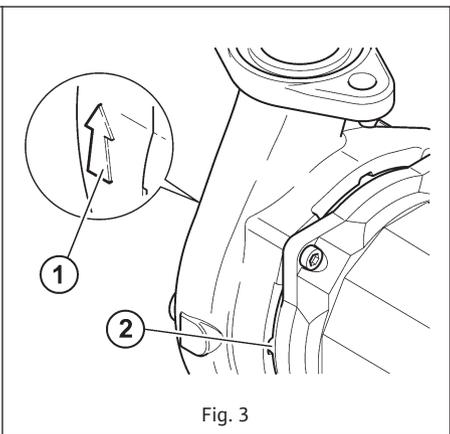
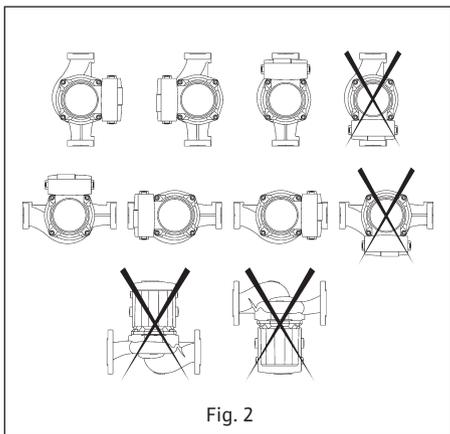
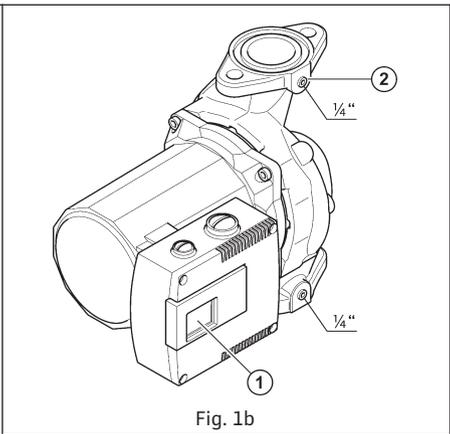
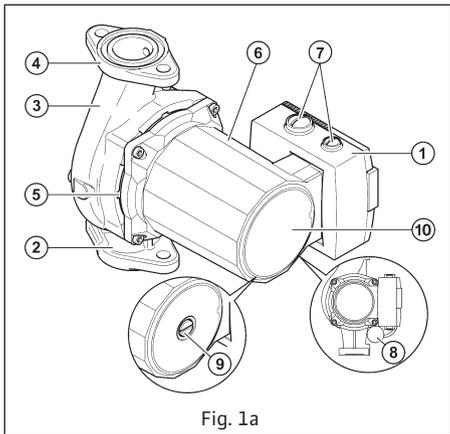


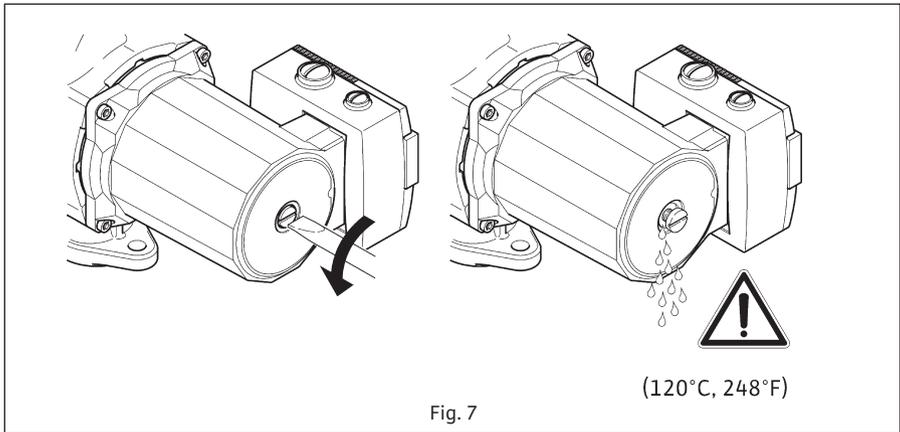
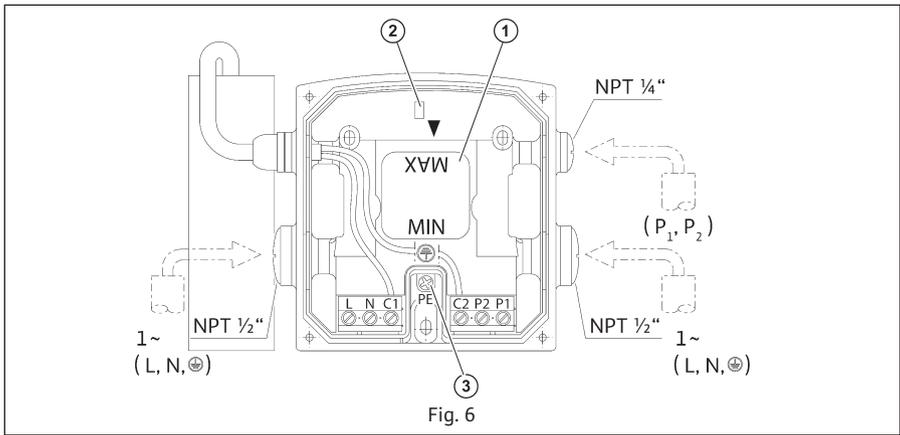
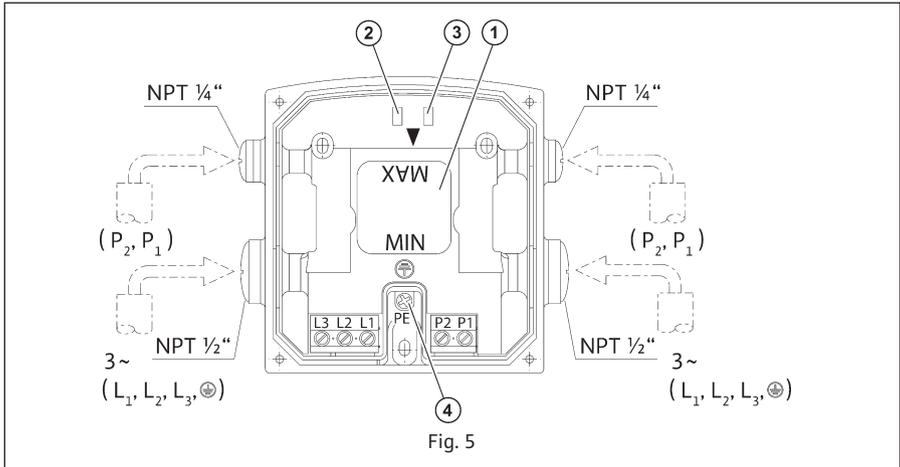
## Wilo TOP-S, TOP-Z

**Installation and operating instructions**

**Notice de montage et de mise en service**

**Instrucciones de instalación y funcionamiento**





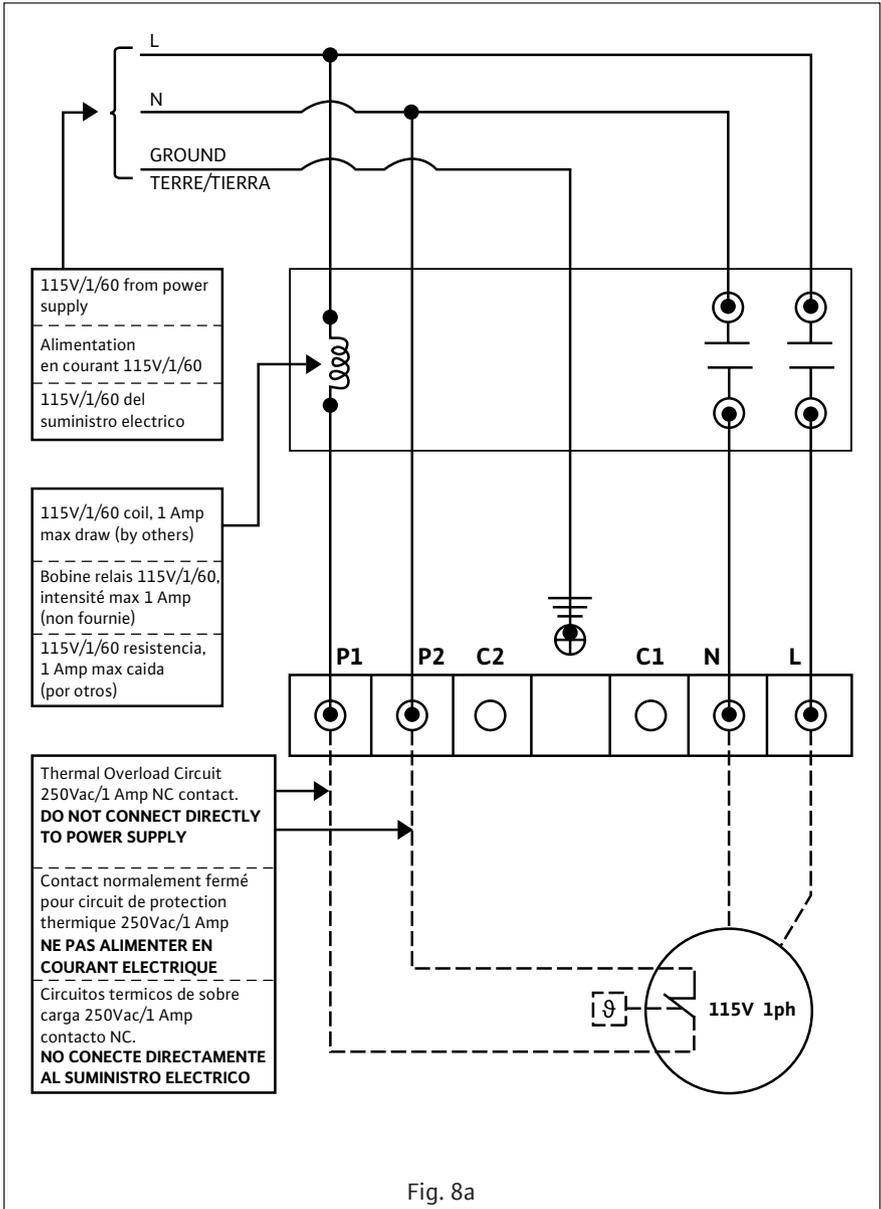


Fig. 8a

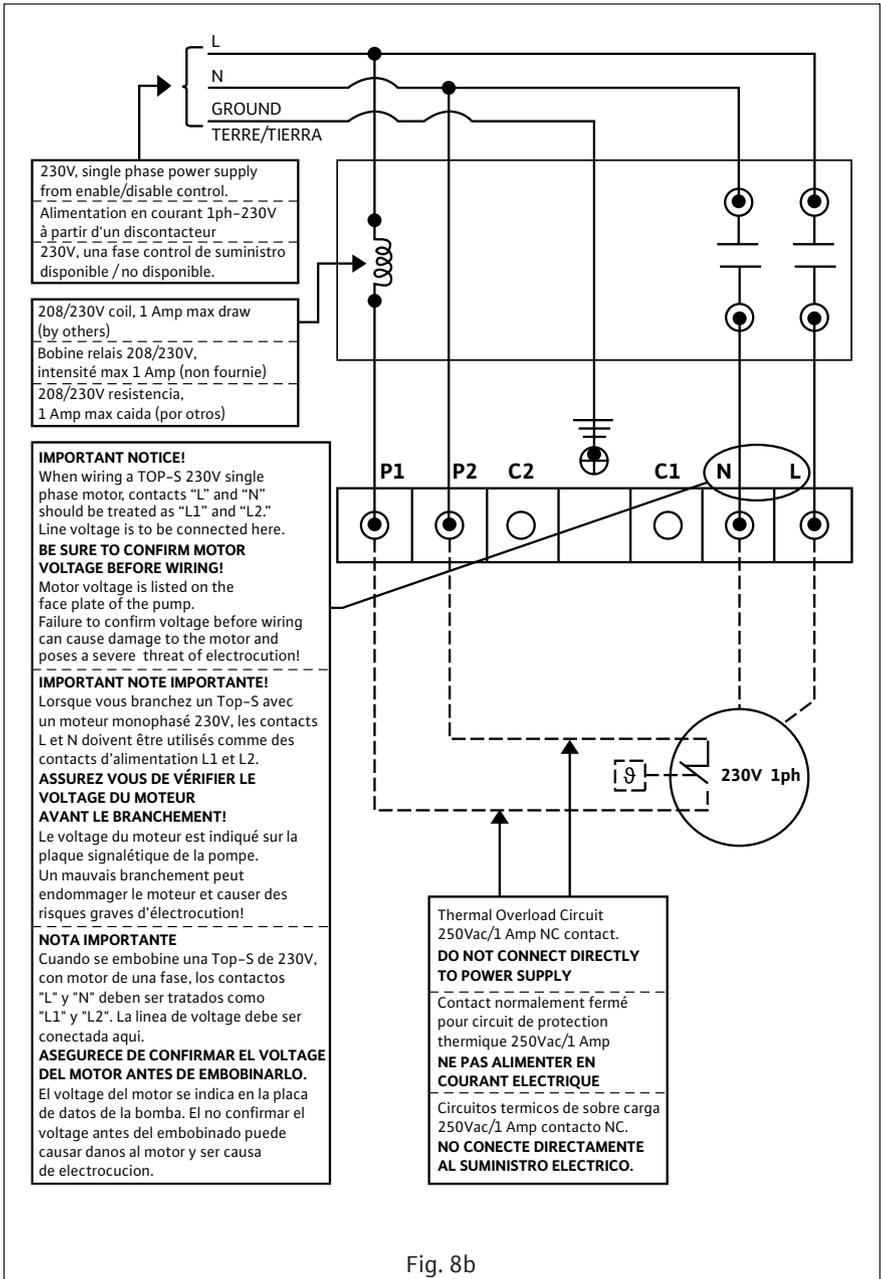


Fig. 8b

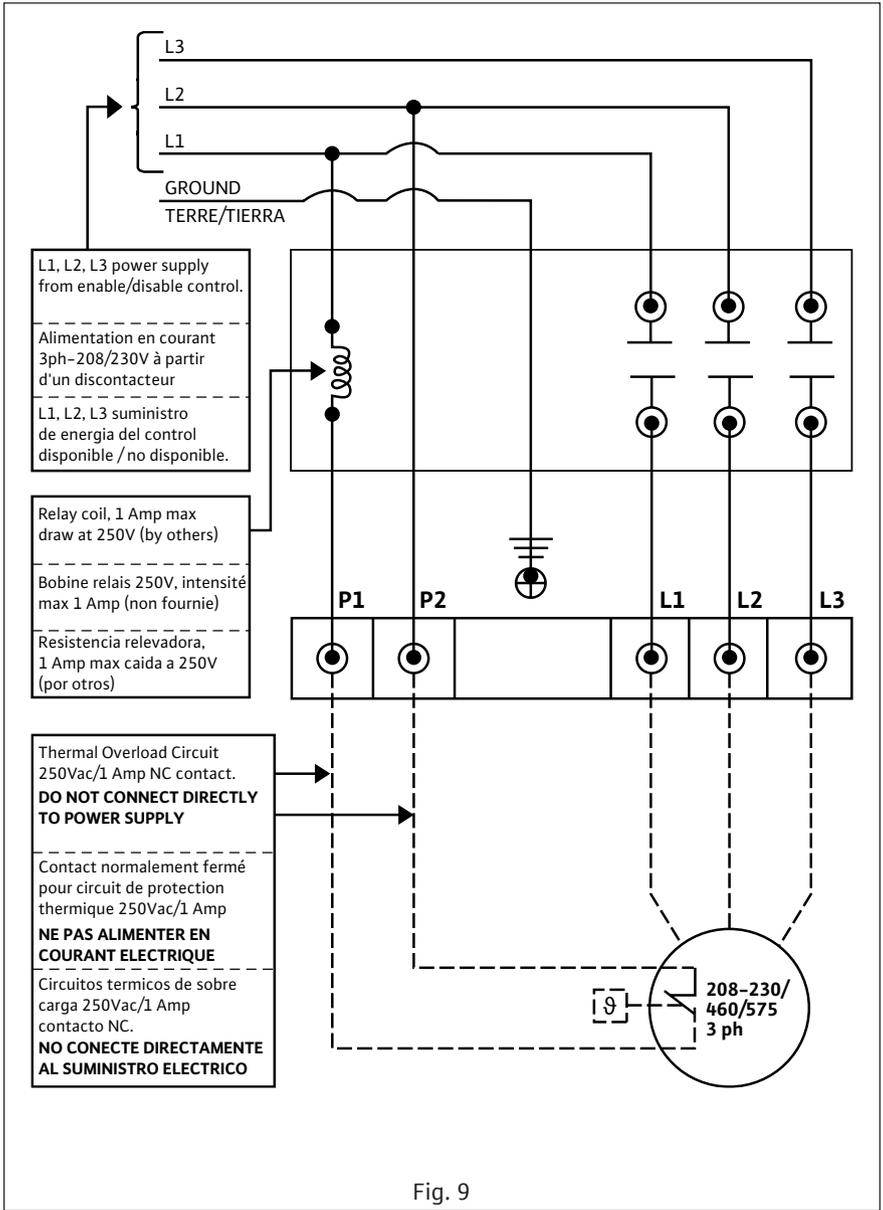


Fig. 9

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## 1 General

### 1.1 About this document

These Installation and Operating Instructions form an integral part of the product. They must be kept close to the product and in readiness whenever required. Precise observance of these instructions is a pre-condition for use of the product for the intended purpose and for its correct operation.

These Installation and Operating Instructions conform to the relevant version of the equipment and the underlying safety standards valid at the time of going to press.

## 2 Safety

These instructions contain important information which must be followed when installing and operating the pump. It is therefore imperative that they are read by both the installer and the operator before the circulator is installed or started up.

Both the general safety instructions in the 'Safety precautions' section and those in subsequent sections indicated by danger symbols should be carefully observed.

### 2.1 Symbols and signal words used in these operating instructions

#### Symbols:



General Safety symbol



Hazards from electrical causes

#### Signal words:

<b>DANGER!</b>	Imminently hazardous situation. Will result in death or serious injury if not avoided.
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<b>WARNING!</b>	The user can be exposed to (severe) injury. 'Warning' refers to the risk of harm to the user when the user is neglecting the procedure.
-----------------	---

<b>CAUTION!</b>	The product is at risk of damage. 'Caution' refers to the product when the user is neglecting the procedures.
-----------------	---

<b>NOTE!</b>	A notice with useful information for the user in relation to the product. It attends the user to possible problems.
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### 2.2 Qualified Personnel

The personnel installing the pump must have the appropriate qualifications for this work.

### 2.3 Risks incurred by failure to comply with the safety precautions

Failure to comply with the safety precautions could result in personal injury or damage to the pump or installation. Failure to comply with the safety precautions could invalidate warranty and/or damage claims.

In particular, failure to comply with these safety precautions could increase the possibility of the following risks:

- the failure of important parts of the pump or installation,
- personal injury due to electrical and mechanical causes,
- material damage.

## 2.4 Safety precautions for the operator

Existing regulations for the prevention of accidents must be observed. National Electrical Codes, local codes and regulations must be followed.

## 2.5 Safety precautions for inspection and installation

The operator must ensure that all inspection and installation work is carried out by authorized and qualified specialists who have carefully reviewed these instructions.

Work on the pump/unit must be carried out only with the pump disconnected from the power supply and at complete standstill.

## 2.6 Unauthorized alterations and manufacture of spare parts

Alterations to the pump or installation may only be carried out with the manufacturer's consent. The use of original spare parts and accessories authorized by the manufacturer will ensure safety. The use of any other parts may invalidate claims relieving the liability of the manufacturer for any consequences.

## 2.7 Improper use

The operational safety of the pump or installation supplied can only be guaranteed if it is used in accordance with paragraph 4 of the operating instructions. The limits given in the catalogue or data sheet must under no circumstances be exceeded.

## 3 Transport and interim storage

When receiving the material, check that there has been no damage during the transport. If shipping damage has occurred, take all necessary steps with the carrier within the allowed time.



### **CAUTION! Outside influences may cause damages!**

If the delivered material is to be installed later on, store it in a dry place and protect it from impacts and any outside influences ( humidity, frost etc.).

Handle the pump carefully so as not to damage the unit prior to installation.

## 4 Intended use (Application)



### **CAUTION!**

This pump has been approved for use with water only.

The circulating pumps are used to circulate liquids in

- Warm and hot water heating systems,
- Cooling and cold water circuits,
- Closed circulation systems,
- Open circulation systems (only TOP-Z),
- Circulation systems for domestic hot (drinking) water (only TOP-Z).



### **WARNING! Health hazard!**

The materials of the TOP-S circulators are not designed for drinking water supply. The pumps in the TOP-S range must not be used for drinking water.

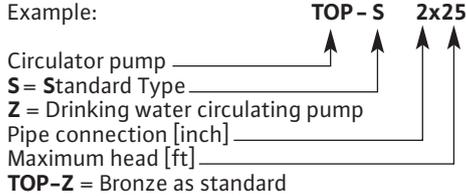
### **Permissible liquids and requirements:**

- Heating water according to the requirements of accepted standards of water quality in heating systems.
- Water and water/glycol mixtures in a maximum ratio up to 1:1. High glycol concentration and low temperature systems may require a reassessment of the hydraulic data to compensate for the increased viscosity (please contact your WILO representatives for more information). Use of additives (corrosion inhibitors, oxygen scavengers etc.) must be in compliance with the manufacturer instructions.
- Domestic hot (drinking) water (only TOP-Z).
- If other fluids or additives are used, please contact WILO for proper authorization.

## 5 Technical data

### 5.1 Type key

Example:



### 5.2 Data table

Voltages	1~115 V, 1~230 V, 3~208-230 V, 3~460 V, 3~575 V (see rating plate)
Frequency	60 Hz
Power consumption	See rating plate
Speed setting	2-speed
Liquid temperatures for TOP-S closed system:	14°F (-10 °C) up to 248°F (120°C)
Liquid temperatures for TOP-Z closed system:	14°F (-10 °C) up to 176°F (80°C)
open system:	< 140°F (60°C)
Domestic hot water system:	32°F (0 °C) up to 176°F (80°C)
Max. permitted degree of hardness in domestic hot water circulation systems:	18,8 gr/gal (US)
Max. ambient temperature	104°F (40°C)
Max. working pressure	145 psi
Protection class	Enclosure 2

Min. pump inlet pressure [psi] at suction side during operation by Wilo-TOP-S model				
At these liquid temps	nominal flange diameter [inch]			
	1.25	1.5	2	3
140°F (60°C)	1.8 (psi)		6.3 (psi)	
194°F (90°C)	7.3 (psi)		15.4 (psi)	
248°F (120°C)	29.9 (psi)		38.9 (psi)	

Min. pump inlet pressure [psi] at suction side during operation by Wilo-TOP-Z model				
At these liquid temps	nominal flange diameter [inch]			
	1.5		2	3
104°F (40°C)	7.1 (psi)		11.4 (psi)	
176°F (80°C)	11.4 (psi)		14.2 (psi)	

### 5.3 Scope of supply

- Complete pump
- Installation and operating instructions
- 2 flange gaskets (only for 1.25, 1.5 and 2 inch flange pumps)

### 5.4 Accessories

Accessories such as companion flanges must be ordered separately.

- Companion flanges (included bolts, nuts and seals).

## 6 Description and function

### 6.1 Product description (see Fig. 1a)

- |                     |   |
|---------------------|---|
| 1 Terminal box      | 6 Motor housing                           |
| 2 Suction side      | 7 Cable entry                             |
| 3 Pump housing      | 8 Capacitor (only for single phase pumps) |
| 4 Discharge side    | 9 Venting plug (only on some types)       |
| 5 Condensate outlet | 10 Rating plate                           |

### 6.2 Design of pump and motor

This wet rotor pump is designed to have all rotating parts surrounded by the liquid being pumped and is suitable for single or three phase operation (see pump rating plate). A shaft seal, which would be subject to wear and maintenance is not required. Depending on the design of the pump, the system fluid lubricates the sleeve bearings and cools both bearings and motor. The pump is maintenance-free and requires no further maintenance after the air bleeding procedure during the initial start-up (no after start-up maintenance).

The Wilo model TOP-Z is specially designed for use in conjunction with drinking water circulation systems. Thanks to its design and materials used in its construction the pump is resistant to corrosion from elements in domestic hot water (drinking water). All materials coming in contact with the delivery medium are NSF/ANSI 61 certified.

### 6.3 Functions

#### Speed setting of TOP-S.../TOP-Z... pumps (Fig. 5 and Fig.6)

The required speed of the pump can be adjusted manually in 2 positions (Max. and Min.) by moving the switch connector to the relevant socket. Procedure see Chapter "8.2 speed setting". Ensure power is turned off prior to changing speeds!

## 7 Installation and electrical connection

Installation and electrical work in compliance with any local codes and by qualified personnel only!



#### **WARNING! Bodily injury!**

Existing regulations for the prevention of accidents must be observed.



#### **WARNING! Electrical shock hazard!**

Dangers caused by electrical energy must be excluded. National Electrical Codes, local codes and regulations must be followed.

### 7.1 Installation

- The pump must be installed in a dry, well ventilated and frost-free place.



#### **CAUTION! Possible damage of the pump!**

Foreign materials such as dirt and solder can effect the pump operation.

- It is recommended that any welding and soldering work be done before installing the pump.
- Thoroughly flush the system prior to installing and operating the pump.
- Foreign material in the system resulting from construction may damage the pump and is not warrantable.

- The pump must be installed in an easily accessible position to facilitate inspection or replacement.
- The pump should never be located at the lowest point of the piping system, where dirt and sediment collect. Nor should it be located at the highest point of the piping system, where air accumulates. Please ensure at least a minimum of three pipe diameters of straight on the suction side of the pump.

- It is recommended that isolation valves be installed on the suction and discharge side of the pump.  
This will save having to drain and refill the system if the pump needs replacing. The valves are to be installed so that any water that escapes cannot drip onto the pump motor or terminal box.
- An arrow on the pump housing indicates the direction of water flow (Fig. 3, Pos. 1).
- Pump must be installed with the shaft in the horizontal position in such a way that it is not stressed by the pipework (Installation positions in Fig. 2).
- It is recommended that pressure gages be installed in the suction and discharge volute flanges (Fig.1b, Pos.2) to check pump and system performance.
- In order to obtain the correct terminal box position the motor housing can be turned after removing the four allen screws (Fig. 4).



**WARNING!**

If the pump is already installed in the system, the system must be drained or the isolating valves on both sides of the pump must be closed before the allen screws are removed as the pumped liquid may be scalding hot and/or under pressure.  
Do not start the pump until the system has been filled with liquid and vented.

- Permitted terminal box positions see Fig. 2



**CAUTION! Possible damage of the pump!**

When rotating the motor housing, ensure the O-ring between the cartridge and pump housing (volute) does not become damaged.

- Carefully lift the pump head and rotate it so that the terminal box is in the desired position. Replace the pump head onto the pump housing and tighten the allen screws evenly in a diagonal method.  
Torque to: M6 ..... 7 ft lb  
M10 ..... 22 ft lb  
M12 ..... 45 ft lb
- After replacing, check that the rotor shaft still rotates freely.  
TOP-S and TOP-Z pumps which are equipped with vent screws can be checked as follows (Fig. 1a, Pos.9): Remove the plug (located in the middle of the rating plate), insert a flat head screwdriver into the slot end of the shaft and turn to ensure free rotation.  
TOP-S and TOP-Z pumps without vent screws and not installed can be checked as follows: Insert a long screwdriver in the discharge port of the pump body (Fig.1, Pos.4) until you can feel the impeller and rotate it with the tool. If the impeller does not turn easily, repeat the dis-assembly / reassembly process.
- Between the stator housing and pump volute, there are three drain holes to allow condensed water to escape (Fig. 3, Pos. 2).



**CAUTION! Possible damage of the pump!**

The motor and condensate holes must remain free.  
For units which are to be insulated, only the pump volute may be insulated.

**7.2 Electrical connection**



**WARNING! Electrical shock hazard!**

Dangers caused by electrical energy must be excluded.

- Electrical work by a qualified electrician only!
- National Electrical Codes, local codes and regulations must be strictly followed.
- All electrical connections must be performed after the electrical supply has been switched off and secured against unauthorized switching.
- For safe installation and operation a proper grounding of the pump to the power supply's grounding terminals is required.

- Suitable fused overload protection is required to protect the motor per local electrical codes.

- The operating voltage and frequency are marked on the rating plate.
- The pump must be connected with a power supply conductor equipped with a grounded plug-connection and a main power switch (Fig.8 or Fig.9).
- A minimum cable size of 14 AWG should be used (refer to the local code for wiring restrictions).

**NOTE!** All conductors must be suitable for at least 194°F (90 °C).

- The electrical cable must be installed so that it never touches the pipework and/or the pump and motor housing.
- The connecting cable can be fed through the cable entry either above or below the terminal box. It is advisable to install the screwed cable glands with the entrance of the conduit pointing downwards. The cable entry which is not used must be closed by a blind plug (Fig.5 and Fig.6).
- Watertight screwed cable glands and conduit connections must be used to prevent any entrance of water to the terminal box.
- Connect power as shown in Fig.5 and Fig.6.
  - Loosen the four terminal box screws and remove the screws and cover.
  - Feed the appropriate power supply conductor to the cable conduit on the side of the terminal box (Fig.5 or Fig.6).
  - Connect the leads of the cable according to the **L** and **N (for 1 ~)** or **L<sub>1</sub>, L<sub>2</sub>, and L<sub>3</sub> (for 3 ~)** cable entry respectively and the ground lead to the  $\perp$  ground screw (Fig.6, Pos.3 for 1 ~) or (Fig.5 Pos.4 for 3 ~). If the power supply is connected the LED inside the terminal box will show green (Fig.5/6, Pos.2).
  - Replace the terminal box cover and tighten all four screws.
- The pump/installation should be grounded in compliance with local regulations. A ground fault interrupter can be used as extra protection.
- A fused plug or circuit breaker in the power line is required.
- The pump must be connected to the electrical supply via an external contactor to provide thermal overload protection. The contactor must be connected to the built-in thermal overload switch terminals P1 and P2 (potential-free normally closed contact, contact load 250 VAC/1A) to protect the pump against thermal overloading at all speeds.

**Or:** If the pump is protected by means of a motor starter, the starter must be set to the current consumption of the pump at the selected speed. The motor starter setting must be changed every time the pump speed is changed. The current consumption at the individual speeds is stated on the pump rating plate.

## 8 Start up

### 8.1 System filling - Venting

- Properly fill and pressurize the system with liquid.



**CAUTION! Possible damage of the pump!**

Never operate the pump dry.

The system must be filled before starting the pump. Ensure that all isolation valves are open.

- The pump is normally vented automatically after a short operational period. The TOP-S and TOP-Z pumps which are equipped with a vent screw can be manually vented (Fig. 7). Please observe the following procedure:
  - Turn the power to the pump off.



**WARNING! Risk of burning if the pump is touched!**

Depending on the operating condition of the pump and/or installation (fluid temperature) the pump/motor can become very hot.

- Close the valve on the discharge side.

**WARNING! Risk of scalding!**

Depending on the fluid temperature and the system pressure, if the vent screw is completely loosened hot liquid or vapour can escape or even shoot out at high pressure.

- Place a container under the back of the pump to catch any water that may run out.
- Protect all electrical parts against the leaking water.
- Carefully loosen the vent plug with a suitable screwdriver, continue until water appears, but do not remove.
- After 30 sec. re-tighten the plug.
- Re-open isolating valve.
- Turn the power back on.

**CAUTION! Possible damage of the pump!**

- Due to the internal pressure imbalance caused during the manual venting process it is possible that the pump becomes somewhat noisy. This noise should disappear once the air vent screw has been retightened and the internal pressure re-balances.
- The required inlet pressure must be obtained at the pump suction side.

## 8.2 Setting

**WARNING! Electrical shock hazard!**

Never make any connections in the pump terminal box unless the electrical supply has been disconnected.

**• Rotation check for 3~ pump (Fig. 5):**

The right direction of rotation will be indicated by a LED in the terminal box (Fig. 5, Pos. 3). This LED is not lit when the direction of rotation is correct. If the direction of rotation is incorrect, the LED will show red. To check the direction of rotation briefly connect the pump. In case the direction of rotation is incorrect, proceed as follows:

- Disconnect the power supply.
- Interchange two phases (L1,L2 or L2,L3 or L1,L3) inside the terminal box.
- Restart the pump.

**• Speed setting for 3~ pump (Fig.5 ) and 1~ pump (Fig. 6)**

Loosen the four terminal box screws and remove the screws and cover. Ensure the power is disconnected before removing the connector (Fig. 5/6, Pos. 1). Replace the speed selection connector by removing - rotating 180 degrees - plugging to the desired speed MAX or MIN.

The speed setting can be read (MAX or MIN) through a window when the terminal box cover is closed (Fig.1b, Pos.1).

## 9 Maintenance / Service

**All servicing should be performed by an authorized service representative!**

**WARNING! Electrical shock hazard!**

Dangers caused by electrical energy must be excluded.

All electrical work must be performed after the electrical supply has been disconnected and secured against unauthorized switching.

**WARNING! Risk of scalding!**

At high water temperatures and system pressure close isolating valves before and after the pump.

First allow pump to cool down.

These pumps are maintenance-free, self-lubricated by the system fluid and have no seals to leak or couplings to break.

## 10 Faults, causes and remedies



**WARNING! Electrical shock hazard!**

Dangers caused by electrical energy must be excluded.

All electrical work must be performed after the electrical supply has been disconnected and secured against unauthorized switching.



**WARNING! Risk of scalding!**

At high water temperatures and system pressure close isolating valves before and after the pump.

First allow pump to cool down.

Problem	Causes	Remedy
Pump is connected but fails to run. The green indicator light is off. (Fig.5/6, Pos.2)	Electrical defect / fuse is blown.	Check / replace the fuse. Should the fuse blow several times in a row: • Check the pump for electrical faults. • Check the pump mains cable and electrical connection.
	Ground fault interrupter has triggered.	Switch ground fault interrupter back on. Should the circuit-breaker trip several times in a row: • Check the pump for electrical faults. • Check the pump mains cable and electrical connection.
	Faulty terminal box.	Call Customer Services.
Pump is connected but fails to run. The green indicator light is on. (Fig.5/6, Pos.2)	Undervoltage.	Check the voltage at the pump (observe rating plate data).
	Winding damage.	Call Customer Services.
	Capacitor defect. ( only 1~)	Replace capacitor (observe rating plate data).
	Speed selection connector not installed.	Install speed selection connector.

Problem	Causes	Remedy
Pump is connected but fails to run. The green indicator light is on. (Fig.5/6, Pos.2)	Motor is blocked, e.g. by deposits from the system fluid.	Check and if necessary verify that the rotor shaft still rotates freely.
		Pump with equipped vent plug: • Remove the vent plug, • insert a flat head screwdriver into the slot end of the shaft and turn to ensure free rotation, • replace the vent plug.
		Pump without equipped vent plug: • Disassemble the motor head and check; unblock by turning the impeller if necessary.
		If the blockage cannot be removed, contact Customer Services.
Pump output too low. The green indicator light is on. (Fig.5/6, Pos.2)	There is foreign material inside the pump housing or impeller.	Disassemble the pump head and remove foreign material.
	Wrong pumping direction.	Exchange the pump suction and discharge sides. Observe the arrow indicating direction of flow on the pump housing.
	Shut-off valves are not fully open.	Open the shut-off valves fully.
	Three-phase pumps only: Wrong direction of rotation. The red LED is on. (Fig.5, Pos.3)	Correct the electrical connection in the terminal box: • Interchange two phases on the mains terminal.
Noise in the system. The green indicator light is on. (Fig.5/6, Pos.2)	Air in the system.	Vent the system.
	The pump flow is too high.	Decrease the pump output by switching to a lower speed.
	The pump head is too high.	Check speed setting, if necessary switch to a lower speed.
Noise in the pump. The green indicator light is on. (Fig.5/6, Pos.2)	Air in the pump.	Vent the pump / unit (see chapter 8.1)
	Cavitation due to insufficient inlet pressure.	Increase system pressure within the permissible range.
	There is foreign material inside the pump housing or impeller.	Disassemble the pump head and remove the foreign material.
	Shut-off valves are not fully open.	Open the shut-off valves fully.

**If the fault cannot be remedied, please contact your local heating specialist, or manufacturer's representative or WILO customer services.**

## **11 Spare parts**

All spare parts must be ordered through your local specialist and/or Wilo Customer Services. In order to avoid returns and incorrect orders, please specify the rating plate data for all orders.