Pioneering for You

Wilo-TOP-S/-SD/-RL/-I





de Einbau- und Betriebsanleitung
en Installation and operating instructions
fr Notice de montage et de mise en service
es Instrucciones de instalación y funcionamiento

2 165 760-Ed.04/ 2026-03-Wilo

Fig. 1:

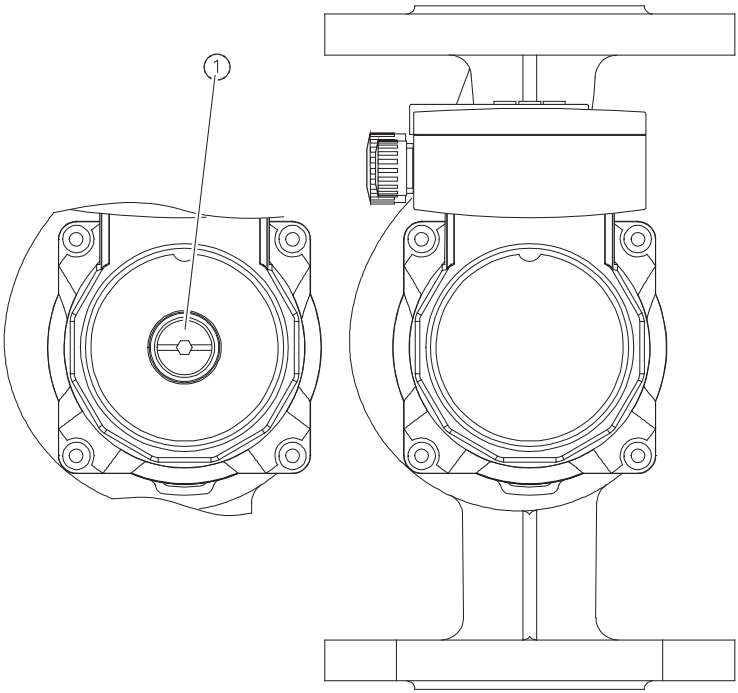


Fig. 2:

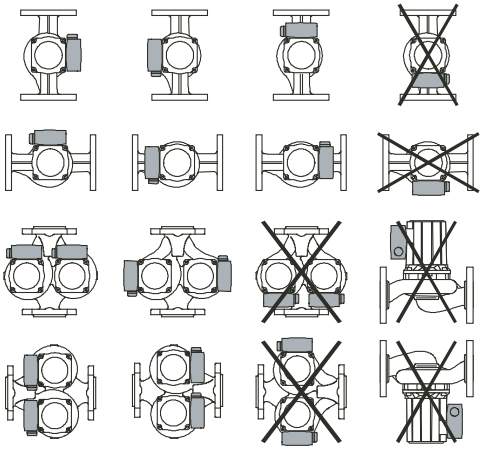


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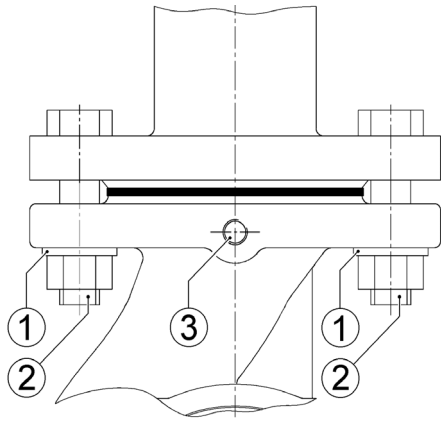
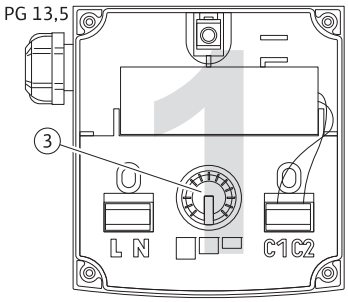
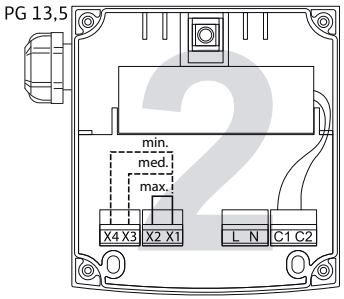
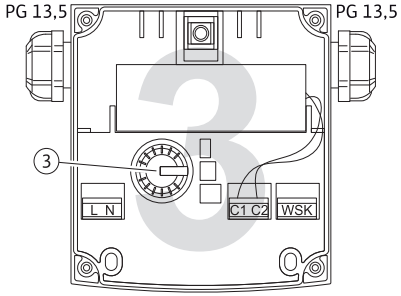
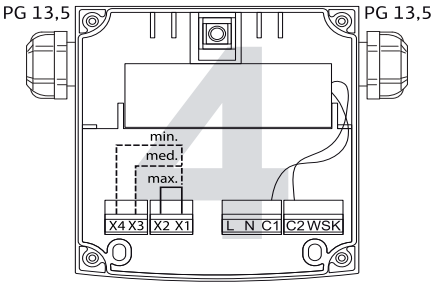


Fig. 4: 1~


PG 13,5
1
3
L N
C1 C2


PG 13,5
2
min.
med.
max.
X4 X3
X2 X1
L N
C1 C2


PG 13,5
PG 13,5
3
3
L N
C1 C2
WSK


PG 13,5
PG 13,5
4
min.
med.
max.
X4 X3
X2 X1
L N C1
C2 WSK

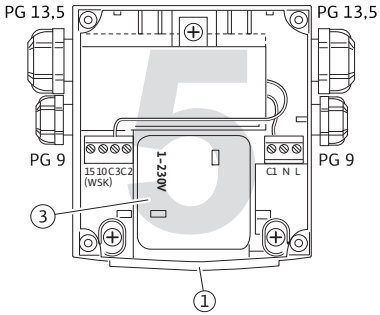
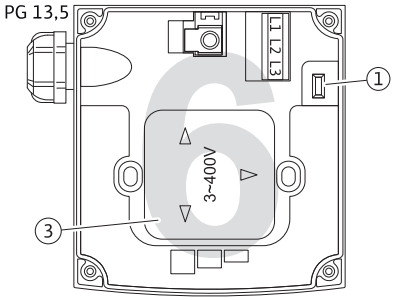

PG 13,5
PG 13,5
5
PG 9
PG 9
15 10 C3 C2
(WSK)
1~230V
C1 N L
3
1

Fig. 4: 3~


PG 13,5
L1 L2 L3
6
1
3~400V
3

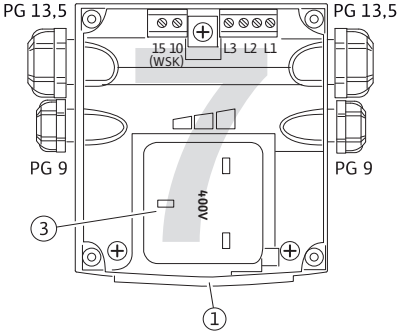

PG 13,5
PG 13,5
15 10
(WSK)
L3 L2 L1
7
PG 9
PG 9
400V
3
1

Fig. 5:

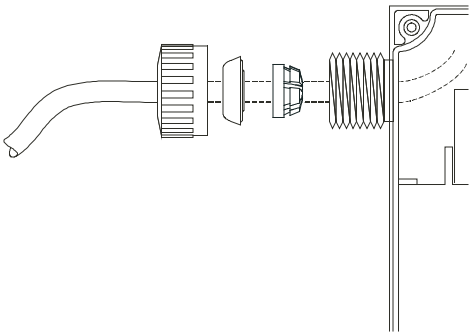


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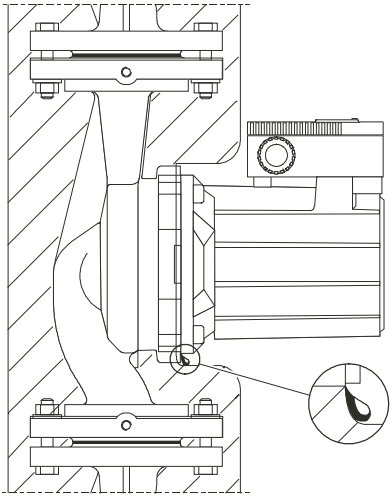


Fig. 7a:

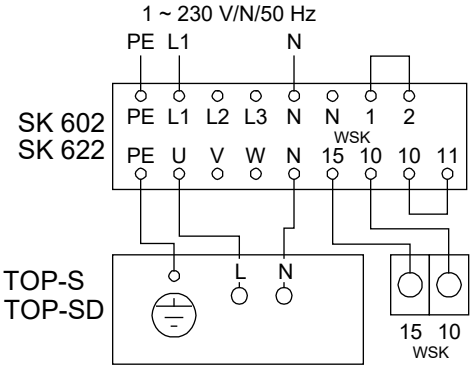
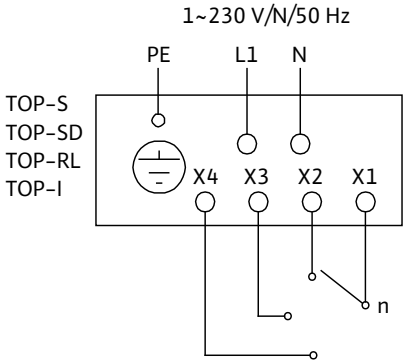


Fig. 7b:



1 General

About this document

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

These installation and operating instructions are an integral part of the product. They must be kept readily available at the place where the product is installed. Strict adherence to these instructions is a precondition for the proper use and correct operation of the product. These installation and operating instructions correspond to the relevant version of the product and the underlying safety standards valid at the time of going to print.

2 Safety

These operating instructions contain basic information which must be adhered to during installation, operation and maintenance. For this reason, these operating instructions must, without fail, be read by the service technician and the responsible specialist/operator before installation and commissioning.

It is not only the general safety instructions listed under the main point "safety" that must be adhered to but also the special safety instructions with danger symbols included under the following main points.

2.1 Indication of instructions in the operating instructions

Symbols:



General danger symbol



Danger due to electrical voltage



NOTE:

Signal words:

DANGER!
Acutely dangerous situation.
Non-observance results in death or the most serious of injuries.

WARNING!
The user can suffer (serious) injuries. 'Warning' implies that (serious) injury to persons is probable if this information is disregarded.

CAUTION!
There is a risk of damaging the product/unit. 'Caution' implies that damage to the product is likely if this information is disregarded.

NOTE: Useful information on handling the product. It draws attention to possible problems.

Information that appears directly on the product, such as:
- Direction of rotation arrow, flow direction symbol
- Identification for connections
- Rating plate
- Warning sticker

Must be strictly complied with and kept in legible condition.

2.2 Personnel qualifications

The installation, operating and maintenance personnel must have the appropriate qualifications for this work. Area of responsibility, terms of reference and monitoring of the personnel are to be ensured by the operator. If the personnel are not in possession of the necessary knowledge, they are to be trained and instructed. This can be accomplished if necessary by the manufacturer of the product at the request of the operator.

2.3 Danger in the event of non-observance of the safety instructions

Non-observance of the safety instructions can result in risk of injury to persons and damage to the environment and the product/unit. Non-observance of the safety instructions results in the loss of any claims to damages.
In detail, non-observance can, for example, result in the following risks:
- Danger to persons from electrical, mechanical and bacteriological influences
- Damage to the environment due to leakage of hazardous materials
- Property damage
- Failure of important product/unit functions
- Failure of required maintenance and repair procedures

2.4 Safety consciousness on the job

The safety instructions included in these installation and operating instructions, the existing national regulations for accident prevention together with any internal working, operating and safety regulations of the operator are to be complied with.

2.5 Safety instructions for the operator

This device can be used by persons with limited physical, sensory or mental capabilities or lack of experience and knowledge provided they are supervised or have been instructed in the safe use of the device and understand the dangers that may arise. Children must not use or play with this device. Cleaning and user maintenance must not be carried out by children.
- If hot or cold components on the product/the unit lead to hazards, measures must be taken on site to guard them against touching.
- Guards protecting against touching moving components (such as the coupling) must not be removed whilst the product is in operation.
- Highly flammable materials are always to be kept at a safe distance from the product.

- Leakages of hazardous fluids (e.g. explosive, toxic or hot) must be removed so that no danger to persons or the environment arises. National statutory provisions are to be complied with.
- Danger from electrical current must be eliminated. Local directives or general directives and local energy supply companies must be adhered to.

2.6 Safety instructions for installation and maintenance work

The operator must ensure that all installation and maintenance work is carried out by authorised and qualified personnel, who are sufficiently informed from their own detailed study of the installation and operating instructions.
Work on the product/unit must only be carried out when at a standstill. It is mandatory that the procedure described in the installation and operating instructions for shutting down the product/unit are complied with.
Immediately on conclusion of the work, all safety and protective devices must be put back in position and/or recommissioned.

2.7 Unauthorised modification and manufacture of spare parts

Unauthorised modification and manufacture of spare parts will impair the safety of the product/personnel and will make void the manufacturer's declarations regarding safety.
Modifications to the product are only permissible after consultation with the manufacturer. Original spare parts and accessories authorised by the manufacturer ensure safety. The use of other parts will absolve us of liability for consequential events.

2.8 Improper use

The operating reliability of the supplied product is only guaranteed for conventional use in accordance with Section 4 and 5 of the installation and operating instructions. The limit values must on no account fall under or exceed those specified in the catalogue/data sheet.

3 Transport and interim storage

On arrival, immediately check the product and its packaging for damage caused during transit. If transport damage is found, the necessary procedures involving the forwarding agent must be taken within the specified period.



CAUTION! Risk of injuries to personnel and property damage!
Incorrect transport and interim storage can cause damage to the product and injury to personnel.

- **The pump and its packaging must be protected against moisture, frost and mechanical damage during transport and interim storage.**
- **Packaging that has become weakened due to moisture may allow the product to fall out, causing injury to personnel.**
- **The pump must only be carried by the motor/pump housing when transported, never by the module/terminal box, cable or external condenser.**

4 Intended use

Circulation pumps are used for pumping liquids in

- hot water heating systems
- cooling and cold water circuits
- closed-circuit industrial circulation systems.

WARNING! Health hazard!
Because of the materials used in their construction, pumps of the TOP-S/-SD/-RL/-I series are unsuitable for use in applications involving potable water or foodstuffs.

5 Product information

5.1 Type key

Example: TOP-S 25/5 EM	
TOP	Circulation pump, glandless
S	-S/-RL = Standard type -SD = Standard type , double pump -I = Industrial type
25	Screwed connection [mm]: 20 (Rp ¾), 25 (Rp 1), 30 (Rp 1¼) Flange connection: DN 32, 40, 50, 65, 80, 100 Combination flange (PN 6/10): DN 32, 40, 50, 65
/5	Maximum delivery head in [m] for Q = 0 m^3/h
EM	EM = Single-phase motor DM = Three-phase motor

5.2 Technical data

Max. flow rate	Depends on the pump type, see catalogue
Max. delivery head	Depends on the pump type, see catalogue
Speed	Depends on the pump type, see catalogue
Mains voltage	1~230 V in accordance with DIN IEC 60038 3~400 V in accordance with DIN IEC 60038 3~230 V* in accordance with DIN IEC 60038 (optionally with switching plug) ***Exception:** TOP-S/-SD 80/15 and 80/20 For other voltages see rating plate
Rated current	See rating plate
Frequency	See rating plate (50 or 60 Hz)
Insulation class	See rating plate
Protection class	See rating plate
Power consumption P_1	See rating plate
Nominal diameters	See type key
Connection flanges	See type key

5.2 Technical data	
Pump weight	Depends on the pump type, see catalogue
Permissible Ambient temperature	–20 °C to +40 °C
Max. rel. humidity	≤ 95%
Permissible fluids TOP–S/–SD/–RL/–I	Heating water (as per VDI 2035) Water/glycol mixtures, max. mixing ratio of 1:1 (If glycol is added, the delivery data of the pump must be corrected according to the higher viscosity, depending on the mixing ratio percentage.) Only use brand–name goods with corrosion protection inhibitors; comply with the manufacturer's specifications and safety data sheets. The pump manufacturer's approval must be obtained for use of other fluids. Special versions with fluids–resistant materials (e.g. versions for use with oil) available on request.
Permissible fluid temperature	Heating water: TOP–S/–SD/–RL: –20 °C to +130 °C (for a short time (2h): +140 °C) **Exception:** TOP–S 25/13; TOP–S/–SD 80/15 and 80/20: –20 °C to +110 °C TOP–I: –20 °C to +110 °C TOP–S/–SD/–RL: If used with Wilo–Protect module C: –20 °C to +110 °C
Max. permissible operating pressure	See rating plate
Emission sound–pressure level	< 50 dB(A) (depending on the pump type)
Emitted interference	EN 61000–6–3
Interference resistance	EN 61000–6–2



CAUTION! Risk of injuries to personnel and property damage!
Non–approved fluids can damage the pump and also cause injury. Comply strictly with the relevant safety data sheets and manufacturer's data!

Minimum inlet pressure (above atmospheric pressure) at the pump suction port in order to avoid cavitation noises (at fluids temperature T_{Med}):

TOP-S/-SD/-RL			TOP-I
T_{Med}	Rp 1, Rp 1¼, DN 32/40	DN 50, DN 65, DN 80, DN 100	Rp ¾, Rp 1
+50 °C	0.05 bar	0.3 bar	0.5 bar
+80 °C	–	–	0.8 bar
+95 °C	0.5 bar	1.0 bar	–
+110 °C	1.1 bar	1.6 bar	2.0 bar
+130 °C	2.4 bar(*)	2.9 bar(*)	–

(*) not applicable to TOP-S 25/13, TOP-S/-SD 80/15, TOP-S/-SD 80/20

The values apply up to 300 m above sea level; allowance for higher altitudes: 0.01 bar/100 m increase in height.

5.3 Scope of delivery

- Pump, complete
  - Two gaskets for threaded connection
  - Two-part thermal insulation shell (single pump only); not on TOP-RL and TOP-I
  - 8 x M12 washers (for M12 flange screws on combination flange version DN 32-DN 65)
  - 8 x M16 washers (for M16 flange screws on combination flange version DN 32-DN 65)
  - Installation and operating instructions

5.4 Accessories

Accessories must be ordered separately:

- Wilo-Protect Module C
- Switching plug for 3~230 V

See catalogue for detailed list.

6 Description and function

6.1 Description of the pump

The pump is fitted with a glandless motor (single-phase (1~) or three-phase (3~), **for mains connection voltage and mains frequency see the rating plate**, in which all the rotating parts are in contact with the fluid. The design relies on the fluid to provide lubrication for the plain bearings of the rotor shaft.
The motor is multi-speed. Speed switching is executed in different ways depending on the terminal box. This is performed either by a speed selection switch, by plugging in the switching plug differently or by internally or externally jumpering the contacts (See Commissioning/Switching Over the Speed).
A suitable switching plug is available as an accessory for 3 ~230 V.

The assignment of terminal boxes to the individual pump types is described in the section "Terminal boxes" (chapter 6.2).

TOP-SD:
For a double pump the two motor impeller units are fitted identically and accommodated in a common pump housing.

6.2 Terminal boxes

There are nine terminal boxes (fig. 4) covering all the pump types. Table 1 lists the assignment of terminal boxes to pump types:

Mains connection	Max. power consumption P_1 (see rating plate data)	Terminal box type	
		TOP-RL, TOP-I	TOP-S, TOP-SD
1~	95 W ≤ P_1max ≤ 265 W	1	1/2
	320 W ≤ P_1max ≤ 400 W	–	3/4/5
	650 W ≤ P_1max ≤ 960 W	–	5
3~	95 W ≤ P_1max ≤ 270 W	6	6
	305 W ≤ P_1max ≤ 3125 W	–	7

Table 1: Assignment of terminal box types to pump types (see also fig. 4)

The fittings for the terminal boxes can be found in Table 2:

Terminal box type	Direction-of-rotation control lamp (fig. 4, item 1)	Variable speed control (fig. 4, item 3)
1	–	Speed selection switch, 3-step
2	–	Internal/external, jumpering of contacts "x1-x2" or "x1-x3" or "x1-x4"
3	–	Speed selection switch, 3-step
4	–	Internal/external, Jumpering of contacts "x1-x2" or "x1-x3" or "x1-x4"
5	– [2]	Switching plug, 2-step
6	X (internal)	Switching plug, 3-step
7	X [1]	Switching plug, 3-step

Table 2: Fitting of terminal boxes

1) The light indicator signals are carried by a common fibre optic cable to the cover, so that the signals are visible from outside.

2) When mains voltage is present, the lamp lights up green

- The direction of rotation indicator light lights up green when mains voltage is present and the direction of rotation is correct; if the direction of rotation is incorrect, the control lamp goes out (see the chapter "Commissioning").
- The fault signal light lights up red if the integral motor protection has tripped.

7 Installation and electrical connection

DANGER! Risk of fatal injury!
Improper installation and electrical connection can result in fatal injury.
Danger from electrical current must be eliminated.

- **Installation and electrical connection may only be carried out by qualified personnel and in accordance with the applicable regulations.**
- **Accident prevention regulations must be observed!**
- **Comply with the regulations of the local energy supply company!**
  Pumps with pre-assembled cable:
- **Never pull on the pump cable**
- **Do not kink the cable.**
- **Do not place any objects on the cable**

7.1 Installation

WARNING! Danger of bodily injury!
Incorrect installation can result in injuries.

- **There is a crushing hazard**
- **There is a risk of injury due to sharp edges/burrs. Wear appropriate protective clothing (e.g. safety gloves)!**
- **There is a risk of injury hazard due to the pump/motor falling. Use suitable lifting gear to secure the pump/motor against falling.**

CAUTION! Risk of damage to property!
Incorrect installation can result in damage to property.

- **Only have installation work performed by qualified personnel.**
- **Observe national and regional regulations.**
- **When the pump needs to be transported, it may be carried only by the motor/pump housing. Not by the module/terminal box!**

- Installation within a building:
  - Install the pump in a dry, well-ventilated room. Ambient temperatures below -20 °C are not permitted.
- Installation outside a building (outdoor installation):
  - Install the pump in a sump (e.g. light sump, ring sump) with cover or in a cupboard/housing as weather protection. Ambient temperatures below -20 °C are not permitted.
  - Avoid exposure of the pump to direct sunlight.
  - The pump requires protection so that the condensate drain grooves are not contaminated. (fig. 6).
  - Protect the pump against rain. Dripping water from above is permitted provided that the electrical connection has been established in accordance with the installation and operating instructions and properly sealed.

CAUTION! Risk of damage to property!
Ensure sufficient ventilation/heating if the ambient temperature exceeds/ falls below the permitted limit values.

- Carry out all welding and soldering work prior to the installation of the pump.

CAUTION! Risk of damage to property!
Contamination from the pipe system can destroy the pump during operation. Before installing the pump, flush the pipe system.

- Provide check valves upstream and downstream of the pump.
- Attach piping to the floor, ceiling or wall using appropriate fittings so that the pump does not bear the weight of the piping.
- When installing in the feed of open systems, the safety supply must branch off upstream of the pump (DIN EN 12828).
- If necessary remove the two half shells of the thermal insulation before installing the single pump.
- Install the pump at an easily accessible location to allow it to be easily checked or replaced at a later time.
- Precautions during installation:
  - Assemble such that the pump shafts are horizontal and not under strain (see the installation positions shown in fig. 2). The motor terminal box must not point downwards. If necessary, slacken the socket-head screws and rotate the motor housing (see chapter 9).
  - The direction of flow of the fluid must correspond to the flow direction symbol on the pump housing or the pump flange.

7.1.1 Installation of a threaded pipe union pump

- Install appropriate threaded pipe unions before installing the pump.
- Use the supplied flat gaskets between the suction/pressure ports and threaded pipe unions when installing the pump.
- Screw union nuts onto the threads of the suction/pressure ports and tighten them using a suitable open-end wrench or pipe wrench.

CAUTION! Risk of damage to property!
When tightening the pipe unions, keep the pump in position by gripping the motor. Not the module/terminal box!

- Check the threaded pipe unions for leaks.
- Single pump:
  Fit the two half-shells of the thermal insulation before commissioning and push them together so that the guide pins engage in the opposite holes.

7.1.2 Installation of a flange-end pump

Assembly of pumps with a combination flange PN6/10
(Flange-end pumps DN 32 to DN 65 inclusive)

WARNING! Risk of injury and damage to property!
The flange connection can be damaged and develop leaks if the pump is not installed correctly. There is a risk of injury and damage to property due to hot fluid escaping.

- **Never connect two combination flanges to each other!**
- **Pumps with combination flanges are not suitable for operating pressures PN16.**
- **The use of securing elements (e.g. spring rings) can result in leaks at the flange connection. They are therefore not permitted. The washers supplied (fig. 3, item 1) must be inserted between screw heads / nuts and the combination flange.**
- **The permissible tightening torques listed in the table below must not be exceeded, even if screws of higher strength (≥4.6) are used, since otherwise splintering can occur at the edges of the long holes. This causes the screws to lose their preload and the flange connection can become leaky.**
- **Use screws of sufficient length. The screw thread must protrude at least one thread turn beyond the nut (fig. 3, item 2).**

DN 32, 40, 50, 65	Rated pressure PN 6	Rated pressure PN 10/16
Screw diameter	M12	M16
Strength class	≥ 4.6	≥ 4.6
Permitted tightening torque	40 Nm	95 Nm
Min. screw length for		
• DN 32/DN 40	55 mm	60 mm
• DN 50/DN 65	60 mm	65 mm

DN 80, 100	Rated pressure PN 6	Rated pressure PN 10/16
Screw diameter	M16	M16
Strength class	≥ 4.6	≥ 4.6
Permitted tightening torque	95 Nm	95 Nm
Min. screw length for		
• DN 80	65 mm	65 mm
• DN 100	70 mm	70 mm

- Install appropriate flat gaskets between pump and counter flanges.
- Tighten the flange bolts crosswise in two steps to the prescribed tightening torque (see Table 7.1.2).
  - Step 1: 0.5 x permissible tightening torque
  - Step 2: 1.0 x permissible tightening torque
- Check the flange connections for leaks.
- Single pump:
  Fit the two half-shells of the thermal insulation before commissioning and push them together so that the guide pins engage in the opposite holes.

7.1.3 Insulation of the pump in cooling/air-conditioning systems

- The series TOP-S/-SD/-RL/-I are suitable for use in refrigeration and air-conditioning systems with fluid temperatures down to -20 °C.
- The thermal insulation shells included in the scope of delivery of single pumps may however only be used in heating systems at fluid temperatures of +20 °C or higher, since these thermal insulation shells do not enclose the pump housing in a diffusion-proof manner.
- For applications in refrigeration and air-conditioning systems commercially-available diffusion-proof thermal insulation materials must be used.

CAUTION! Risk of damage to property!
If the diffusion-proof insulation is applied by the customer, the pump housing may be insulated only up to the motor separation joint, so that the condensate drain openings remain open and allow the condensate accumulating in the motor to flow out without obstruction (fig. 6). Otherwise condensate can accumulate in the motor, eventually causing an electrical defect.

7.2 Electrical connection

DANGER! Risk of fatal injury!
Improper electrical connections pose a risk of fatal injury due to electric shock.

- **Only allow the electrical connection and all associated activities to be made by an electrician approved by the local power supply company and in accordance with the local regulations in force.**
- **Before working on the pump, all poles of the power supply must be disconnected. Because voltages hazardous to persons persist for some time (in condensers), no work may be commenced on the module until 5 minutes have elapsed (applies only to 1~ systems). Check to ensure that all connections (including potential-free contacts) are voltage-free.**
- **Do not operate the pump if the module/terminal box is damaged.**
- **If the setting and operating elements on the module/terminal box are inadmissibly removed, there is a danger of electric shock by touching the electrical components located inside.**

CAUTION! Risk of damage to property!
An incorrect electrical connection can cause damage to property.
If the wrong voltage is applied, the motor can be damaged!

- The current type and voltage of the mains connection must correspond to the specifications on the rating plate.
- The electrical connection must be established via a fixed connection line equipped with a connector device or an all-pole switch with a contact opening width of at least 3 mm.
- Mains-side fuse protection: 10 A, slow.

- Double pumps: provide a separate mains connection cable and a separate fuse on the mains side for both motors of the double pump.
- The pumps can also be used without restriction in existing installations with and without residual-current-operated protection switch switches. When dimensioning the residual-current-operated protection switch, consider the number of pumps connected and their motor currents.
- When pumps are used in systems with water temperatures above 90 °C, a suitable heat-resistant supply cable must be used.
- All connection cables must be installed so that they do not touch the pipe and/or the pumps or motor housing.
- To ensure protection against dripping water and to provide the threaded cable connection with strain relief, (PG 13.5), a connection cable with an outside diameter of 10 – 12 mm should be used, and fitted as shown in fig. 5. In addition, the cable near the screwed connection should be bent into the form of a drip loop, from which any accumulated drips will fall. Unused threaded cable connections should be blanked off with the sealing plates provided, and screwed tight.
- Commission pumps only if they are fitted with the correct modular cover. Check that the cover seal is correctly seated.
- Earth the pump/installation in accordance with the regulations.

7.2.1 Motor protection



DANGER! Risk of fatal injury!
Improper electrical connections pose a risk of fatal injury due to electric shock.
If the mains leads and WSK lead are brought together in a 5-core cable, the WSK-lead must not be monitored using a protective low voltage.



CAUTION! Risk of damage to property!
If the thermal winding contact (WSK, terminal 10 and 15)) of the pump is not connected to a motor protection system, the motor can be damaged due to thermal overload!

Pump with terminal box type		Tripping	Fault acknowledgement
TOP-S TOP-SD TOP-RL TOP-I 1~230 V	1 (P_1max ≤ 265 W)	Internal switching off of motor voltage	Automatically, after the motor has cooled down
	2 (P_1max ≤ 265 W)	Internal switching off of motor voltage	Automatically, after the motor has cooled down
	3 (320 W ≤ P_1max ≤ 400 W)	Thermal winding contact and external tripping unit (SK602 (N)/ SK622 (N) or other switch gear/control device)	Manually at the tripping unit, after the motor on the SK602/SK622 has cooled down on the SK602N/ SK622N: automatically
	4 (320 W ≤ P_1max ≤ 400 W)	Thermal winding contact and external tripping unit (SK602 (N)/ SK622 (N) or other switchgear/control device)	Manually at the tripping unit, after the motor on the SK602/SK622 has cooled down on the SK602N/ SK622N: automatically
	5 (650 W ≤ P_1max ≤ 960 W)	Thermal winding contact and external tripping unit (SK602 (N)/ SK622 (N) or other switchgear/control device)	Manually at the tripping unit, after the motor on the SK602/SK622 has cooled down on the SK602N/ SK622N: automatically

Pump with terminal box type		Tripping	Fault acknowledgement
TOP-S TOP-SD TOP-I 3~400 V	6 (P_1max ≤ 270 W)	Internal switching off of a motor phase	• Switch off mains voltage • Allow motor to cool down • Switch on mains voltage
	7 (305 W ≤ P_1max ≤ 3125 W)	Thermal winding contact and external tripping unit (SK602 (N)/ SK622 (N) or other switchgear/control device)	Manually at the tripping unit, after the motor on the SK602/SK622 has cooled down on the SK602N/ SK622N: automatically

- The setting of any thermal tripping that is fitted must correspond to the maximum current (see rating plate) of the speed stage at which the pump is being operated.

Motor protection tripping devices
If Wilo tripping units SK 602 (N)/ SK 622 (N) are present in existing systems, pumps with full motor protection (WSK) can be connected to them. Perform the mains connection and also the tripping unit connection (refer to the rating plate data) in accordance with the circuit diagram fig. 7a:
1~230 V: 320 W ≤ P_1max ≤ 400 W, with thermal winding contact

7.2.2 Frequency converter operation

Three-phase motors of the series TOP-S/-SD/-I can be connected to a frequency converter. When operating with frequency converters, output filters should be used to reduce noise and to avoid damage due to voltage spikes.

For noise reduction, it is recommended that sine filters (LC filters) are used rather than du/dt filters (RC filters).
The following limit values should be complied with:

- Rate of voltage rise du/dt <500 V/µs
- Voltage spikes û < 650 V

The following limit values at the connection terminals of the pump must not be exceeded:

- U_{min} = 150 V
- f_{min} = 30 Hz

At low output frequencies from the frequency converter, the direction of rotation indicator light at the pump may go out.

8 Commissioning

WARNING! Risk of injury and damage to property!
Commissioning the pump without the sealing screw including the flat gasket is not permissible, since escaping fluid can cause damage!

Prior to commissioning the pump, check that it was installed and connected correctly.

8.1 Filling and venting

Prime and vent the unit correctly. Venting the pump rotor compartment is carried out automatically after a short operating period. Dry running for short periods will not harm the pump.

WARNING! Risk of injury and damage to property!
It is not permitted to remove the motor head, differential pressure screw (fig. 3 item 3) or the flange connection / threaded pipe union for the purpose of venting the system!

- **There is a risk of scalding!**
  Escaping fluid can lead to injuries to persons and damage to the product. When the venting screw is opened, hot fluid may escape at high pressure in liquid of vapour form.
- **Touching the pump can cause burns!**
  Depending on the operating status of the pump or unit (fluid temperature), the entire pump can become very hot.

Pumps with venting screws (visible on motor head; fig. 1, item 1) can be vented as follows if required:

- Switch off the pump.
- Close the check valve on the pressure side.
- Protect electrical parts from any escaping water.
- Carefully open the venting screw (fig. 1, item 1) using a suitable tool.

CAUTION! Risk of damage to property!
Depending on the operating pressure, the pump may jam when the venting screw is open.
The necessary inlet pressure must be present at the suction side of the pump!

- Carefully push back the motor shaft with a screwdriver several times.
- After 15 to 30 seconds, screw the venting screw back in.
- Switch on the pump.
- Open the check valve again.

NOTE! Incomplete venting will result in noises in the pump and unit. Repeat the procedure if necessary.

8.2 Rotation direction monitoring

- Direction of rotation check for 3~:
  Depending on the terminal box, the direction of rotation is indicated by a light on or in the terminal box (fig. 4, item 1). If the direction of rotation is correct, the light lights up green. If the direction of rotation is incorrect, the light remains dark. To check the direction of rotation, briefly switch the pump on. If the direction of rotation is incorrect, proceed as follows:
  - Electrically isolate the pump.
  - Interchange 2 phases in the terminal box.
  - Restart the pump.

  The direction of rotation of the motor must correspond to the direction of rotation arrow on the rating plate.

8.2.1 Variable speed control

DANGER! Risk of fatal injury!
When working on the open terminal box, there is a danger of electric shock from touching the live terminals.

- **Disconnect the system from the power supply and secure it against being switched on again.**
- **It is not permissible to perform a stage change-over whilst in operation.**
- **Only specialist personnel may perform a step change-over.**

For 1~ pumps with terminal box type 1, 3 (fig. 4):
Undo the terminal box cover screws, then remove the terminal box cover, switch the 3-step rotary switch within the box (fig. 4, item 3) to the symbol for the desired speed stage, then correctly refit the terminal box cover.
When the terminal box cover is closed, the speed stage setting can be viewed through the viewing window.

For 1~ pumps with terminal box type 2, 4 (fig. 4):

- Speed change-over in the terminal box:
  - Undo the terminal box cover screws, then remove the terminal box cover, select the desired speed stage for the terminal box type 2/4 by changing over the cable jumpers, then correctly refit the terminal box cover.
- External speed change-over outside the terminal box (pump with cable version):
  - For an external change-over of the speed stage, a cable can be connected as shown in the circuit diagram fig. 7b. Undo the terminal box cover screws then remove the terminal box cover, remove the cable jumpers, feed in the cable through the PG cable gland and connect it, then correctly refit the terminal box cover. The cable end should be connected to an external 3-step switch.

NOTE! If the cable jumpers are not connected or incorrectly connected, the pump will not start. Make the connections for terminal box type 2 / 4 and circuit diagram fig. 7b.

For 1~ and 3~ pumps with terminal box type 5, 6, 7 (fig. 4):
The switching plug in the terminal box can be set to one of a maximum of two or three steps (depending on the terminal box type).
Undo the terminal box cover screws then remove the terminal box cover, pull off the switching plug (fig. 4, item 3) only with the pump switched off, then replace it so that the symbol for the desired speed stage in the terminal box is indicated by the respective marking of the switching plug.
When the terminal box cover is closed, the speed stage setting can be viewed through the viewing window.

NOTE! If on a double pump both the individual pumps are in operation at the same time, the selected speeds must be identical for both pumps.

8.3 Decommissioning

The pump must be decommissioned before conducting maintenance, repair or dismantling work.

DANGER! Risk of fatal injury!
Deadly electric shock may occur when working on electrical equipment.

- **Have work on the electrical part of the pump carried out only by a qualified electrician as a basic principle.**
- **Before starting any maintenance and repair work, disconnect the pump from the power supply, and make sure it cannot be switched back on by unauthorised persons.**

WARNING! Risk of burns!
Depending on the operating status of the pump or unit (fluid temperature), the entire pump can become very hot. Touching the pump can cause burns. Allow the system and pump to cool down to room temperature.

9 Maintenance

Before carrying out maintenance, cleaning and repair work, read the chapters "Dismantling/installation of the motor" and "Decommissioning". The safety instructions in chapters 2.6, 7 and 8 must be complied with.
After successful maintenance and repair work, install and connect the pump according to the "Installation and electrical connection" chapter. Switch on the system as described in the "Commissioning" chapter.

9.1 Dismantling/installation of the motor



WARNING! Danger of bodily injury!

- **Touching the pump can cause burns!**
  Depending on the operating status of the pump or unit (fluid temperature), the entire pump can become very hot.
- **At high fluid temperatures and system pressures there is risk of scalding due to escaping hot fluid.**
  Before dismantling the motor, close the existing check valves on both sides of the pump, allow the pump to cool to room temperature, and drain the isolated branch of the system. If no check valves are fitted, drain the entire system.
- **Observe the manufacturer's information and safety data sheets on possible additives in the unit.**
- **Risk of injury due to the motor falling when the fastening screws have been undone. Comply with national regulations for accident prevention and also with the operator's internal works, company and safety regulations. If necessary, wear protective clothing and equipment!**
- **During installation/dismantling of the motor head, the rotor unit can fall out and injure personnel. Do not hold the motor head with the impeller facing downward.**

The motor does not have to be completely removed from the pump housing if only the terminal box is to be repositioned. The motor can be rotated to the desired position whilst still attached to the pump housing (see fig. 2 for the permissible installation positions).



CAUTION! Risk of damage to property!
If for maintenance or repair work the motor head is detached from the pump housing, the O-ring located between the motor head and pump housing must be replaced with a new one. When installing the motor head, check that the O-ring is correctly seated.

- To release the motor, undo four socket-head screws.



CAUTION! Risk of damage to property!
Do not damage the O-ring located between the motor head and the pump housing. The O-ring must lie in the angled end of he bearing plate that faces the impeller, and must not be twisted.

- After the installation tighten the four socket-head screws again crosswise.
- For the commissioning of the pump, see chapter 8.

10 Faults, causes and remedies

Have faults remedied by qualified personnel only! Observe the safety instructions in chapter 9!

Fault	Cause	Remedy
The system is noisy.	Air in the system.	Vent the system.
	The flow rate at the pump is too high.	Reduce the pump power by switching to a lower speed.
	The pump delivery head is too high.	Reduce the pump power by switching to a lower speed.
Pump is making noises.	Cavitation due to insufficient supply pressure.	Check pressure stability / supply pressure and if necessary increase them within the permissible range.
	Foreign bodies in the pump housing or impeller.	After dismantling the motor impeller unit, remove the foreign body.
	Air within the pump.	Vent the pump/system.
	The check valves in the system are not fully open.	Fully open the check valves.
The pump power is too low.	Foreign bodies in the pump housing or impeller.	After dismantling the motor impeller unit, remove the foreign body.
	Incorrect flow direction.	Interchange the pressure side and suction side of the pump. Refer to the direction symbol on the pump housing or pump flange.
	The check valves in the system are not fully open.	Fully open the check valves.
	Incorrect direction of rotation.	Correct the electrical connections in the terminal box: Refer to the direction of rotation arrow on the rating plate
	(only for 3~) terminal box type 6/7:	
	Indicator light off	Interchange two phases at the mains supply terminals.

Fault	Cause	Remedy
With the power switched on, the pump does not run.	Fuse protection tripped / defective.	Exchange / switch on the fuse protection. If the fuse protection trips again: • Check the pump for electrical defects. • Check the mains cable to the pump and check the electrical connections.
	Residual-current-operated protection switch has tripped.	Switch on the residual-current-operated protection switch. If the residual-current-operated protection switch trips again: • Check the pump for electrical defects. • Check the mains cable to the pump and check the electrical connections.
	Undervoltage	Check the voltage at the pump (refer to the rating plate).
	Damage to the windings	Contact customer service.
	Terminal box defective.	Contact customer service.
	Condenser defective (only for 1~). Terminal box type 1/2/3/4/5	Exchange the condenser.
	Cable jumper for speed change-over not fitted/ wrongly fitted. Terminal box type 2/4	Fit the cable jumper correctly, see fig. 4/7b
	Speed selection plug is not fitted. Terminal box type 5/6/7	Fit the speed selection plug.

<table>
<tr><th>Fault</th><th colspan="8">With the power switched on, the pump does not run.</th></tr>
<tr><td>Cause</td><td colspan="8">Motor protection has switched the pump off, because:</td></tr>
<tr><td></td><td colspan="2">a) Switch off because of hydraulic overloading of the pump.</td><td colspan="2">b) Switch off because of obstruction within the pump.</td><td colspan="2">c) Switch off because of excessive fluid temperature.</td><td>d) Switch off because of excessive ambient temperature.</td></tr>
<tr><td>Remedy</td><td colspan="2">a) Throttle the pump at the pressure side to a duty point on the pump curve.</td><td colspan="2">b) If necessary remove the venting screw (visible from outside) from the pump and check the free running of the pump rotor by turning the slotted shaft end, using a screwdriver; unblock if necessary.
Alternatively:
Dismantle the motor head and check; if necessary unblock by turning the impeller. If the obstruction cannot be cleared, contact customer service.</td><td colspan="2">c) Reduce the temperature of the fluid, see rating plate data.</td><td>d) Reduce the ambient temperature , e.g. by insulating the piping and fittings.</td></tr>
<tr><td>Display</td><td colspan="8">Displays of the lights in the terminal box type</td></tr>
<tr><td></td><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr>
<tr><td></td><td></td><td>–</td><td>–</td><td>–</td><td>–</td><td>green</td><td>green</td><td>green</td></tr>
<tr><td>Fault acknowledgement</td><td colspan="8">Terminal box type 1/2
Auto-reset; after the motor has cooled down, the pump restarts automatically.</td></tr>
<tr><td></td><td colspan="8">Terminal box type 3/4/5/7:
It the thermal winding contact was connected to an external switchgear SK602/SK622, this must be reset. With the switchgear SK602N/SK622N, acknowledgement is made automatically after the motor has cooled down.</td></tr>
<tr><td></td><td colspan="8">Terminal box type 6:
After the motor protection has tripped, switch off the mains voltage. Allow the pump to cool down approx. 8 to 10 min, then switch the power supply on again.</td></tr>
</table>

If the operating fault cannot be remedied, please consult an installer or the nearest Wilo customer service point or representative.

11 Spare parts

Spare parts may be ordered via local installers and/or Wilo customer service.
To avoid queries and incorrect orders, all data of the rating plate should be submitted for each order.

12 Disposal

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

1. Use public or private disposal organisations when disposing of the entire product or part of the product.
2. For more information on proper disposal, please contact your local council or waste disposal office or the supplier from whom you obtained the product.

NOTE!
The pump must not be disposed of along with household waste.
For further information on recycling, go to www.wilo-recycling.com

Subject to change without prior notice!