Pioneering for You

Wilo-Economy CO-1...
Wilo-Economy CO/T-1...

en Installation and operating instructions

2554893 • Ed.01/2023-11

Economy CO-1...-EC
https://qr.wilo.com/637

Economy CO/T-1...-EC
https://qr.wilo.com/606

Fig. 1a

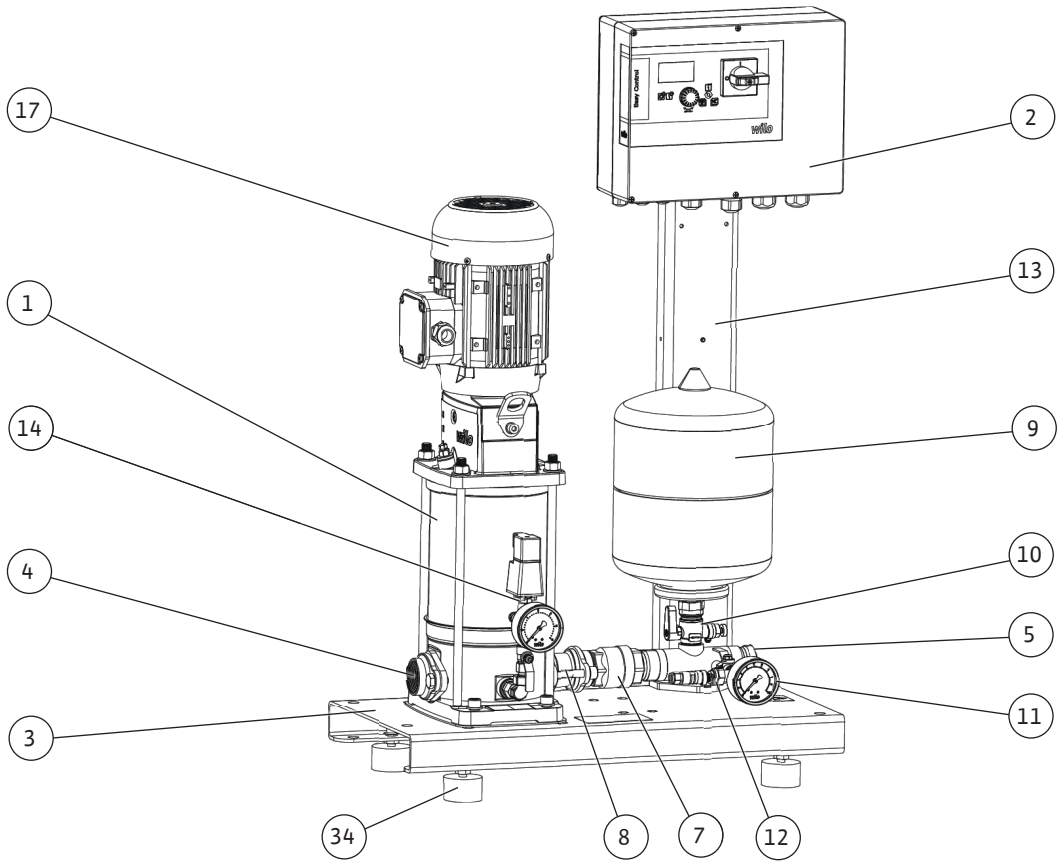
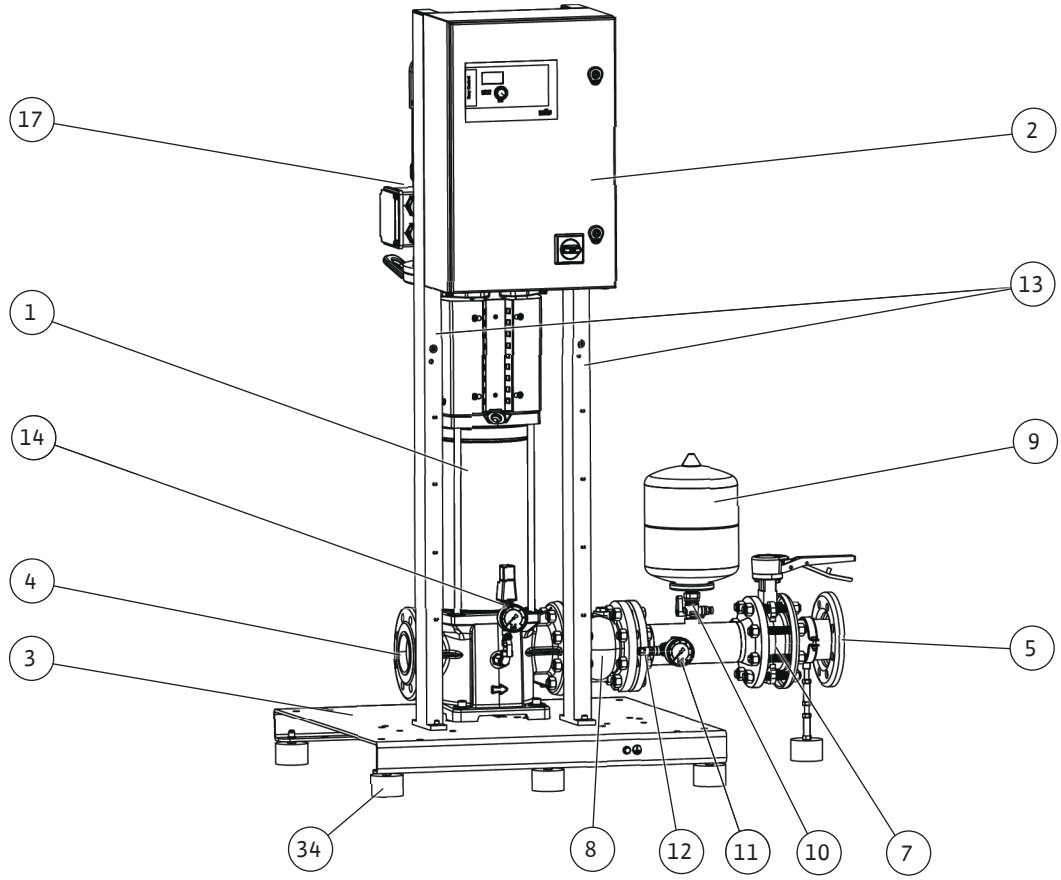


Fig. 1b



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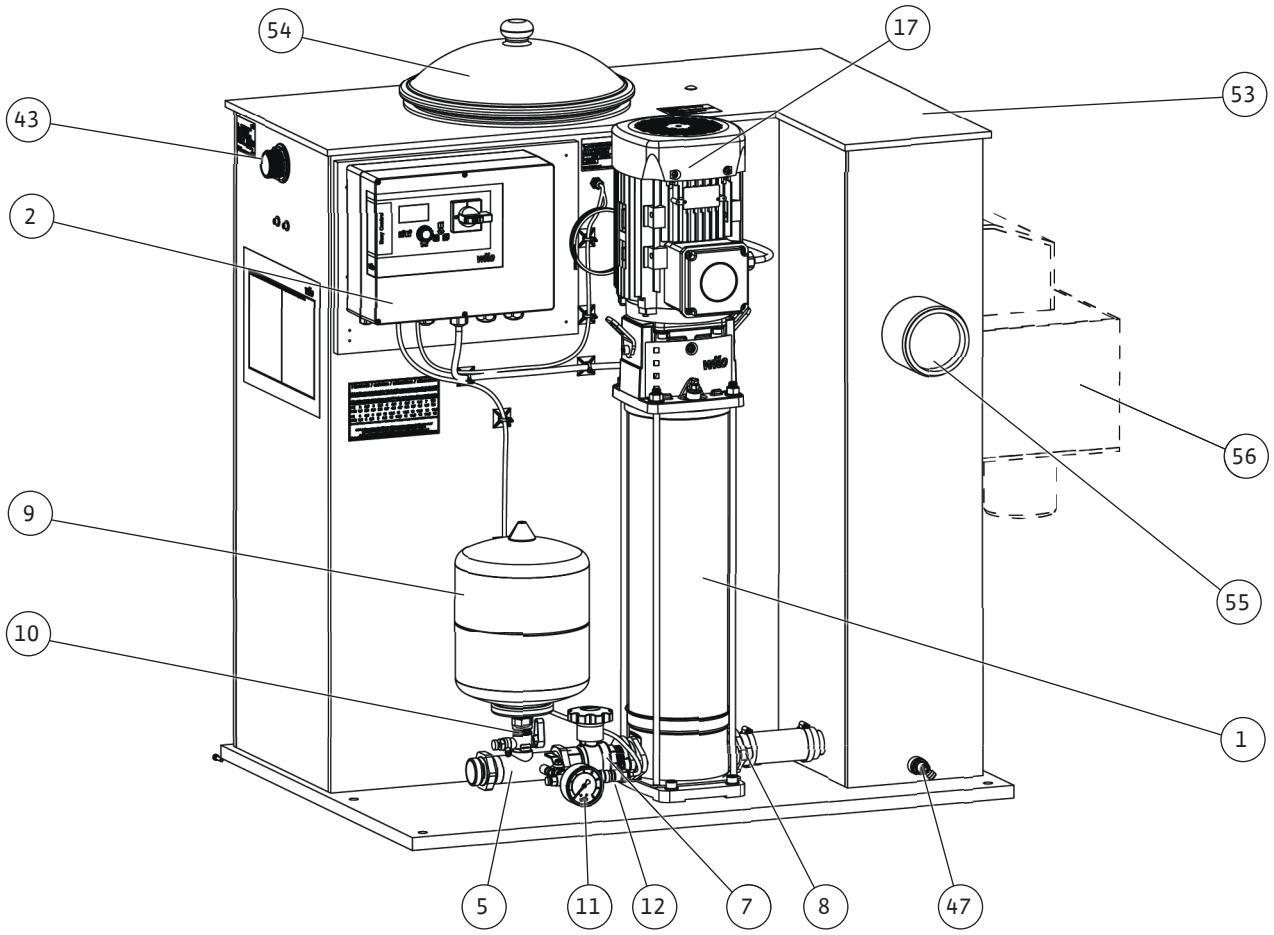
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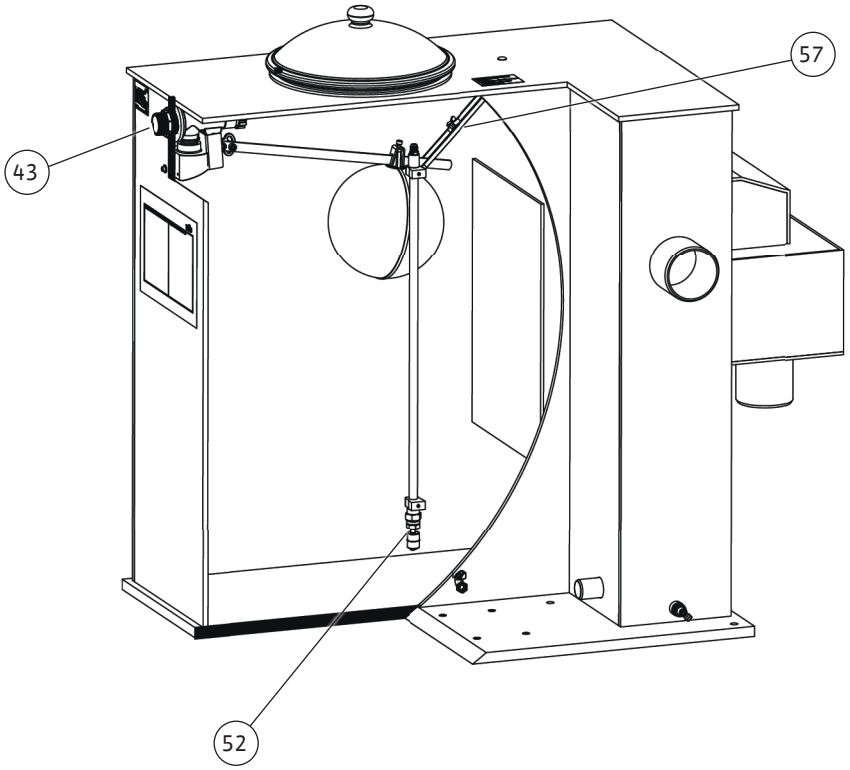
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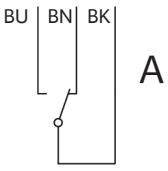
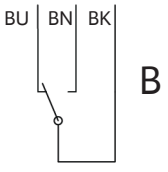
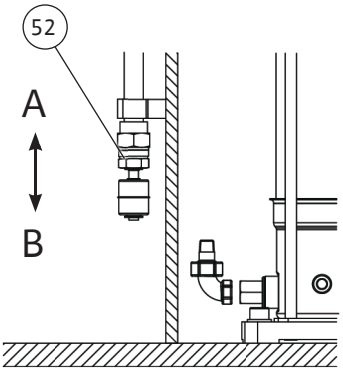

BU
BN
BK
A


BU
BN
BK
B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A
B

Fig. 2

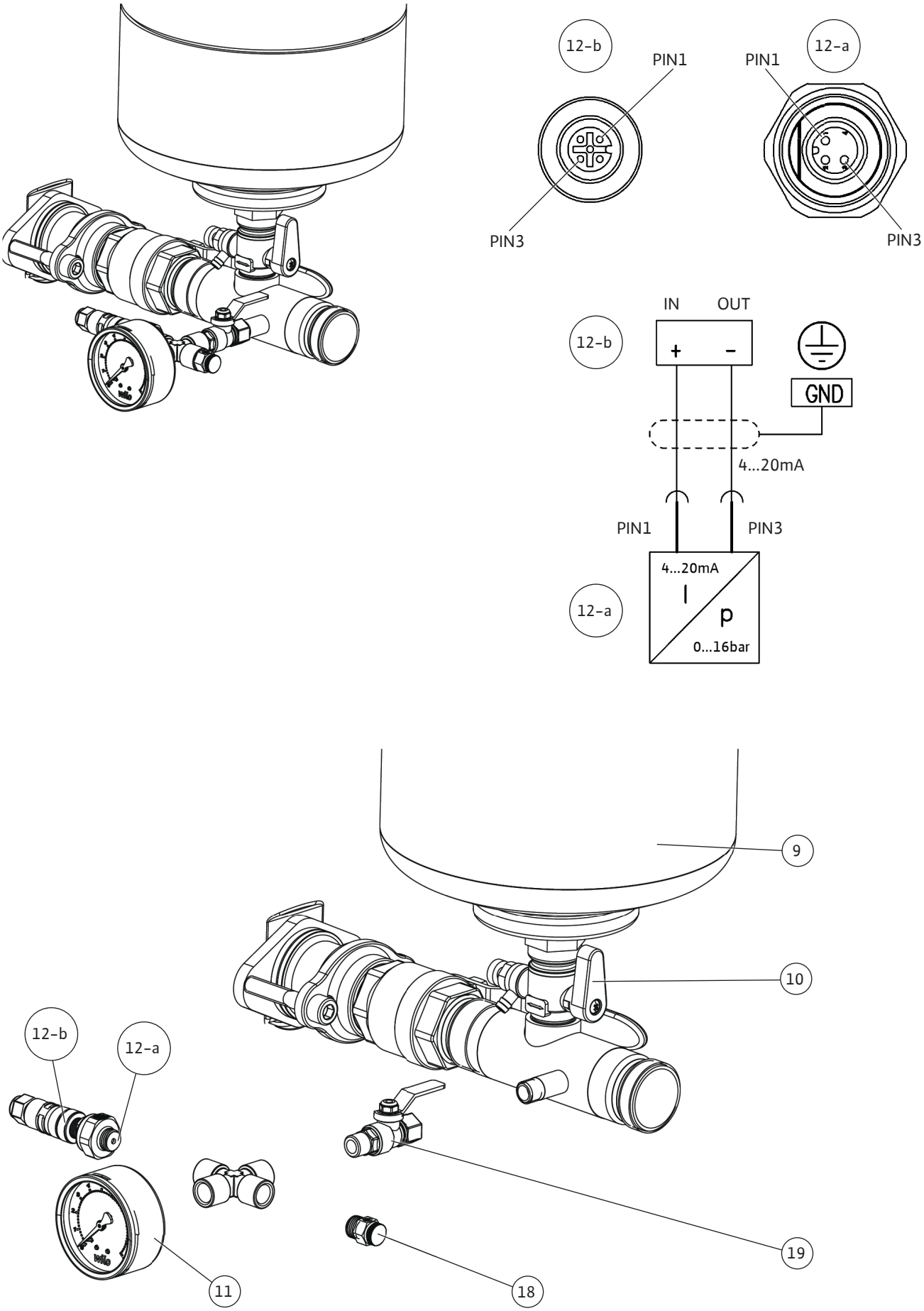
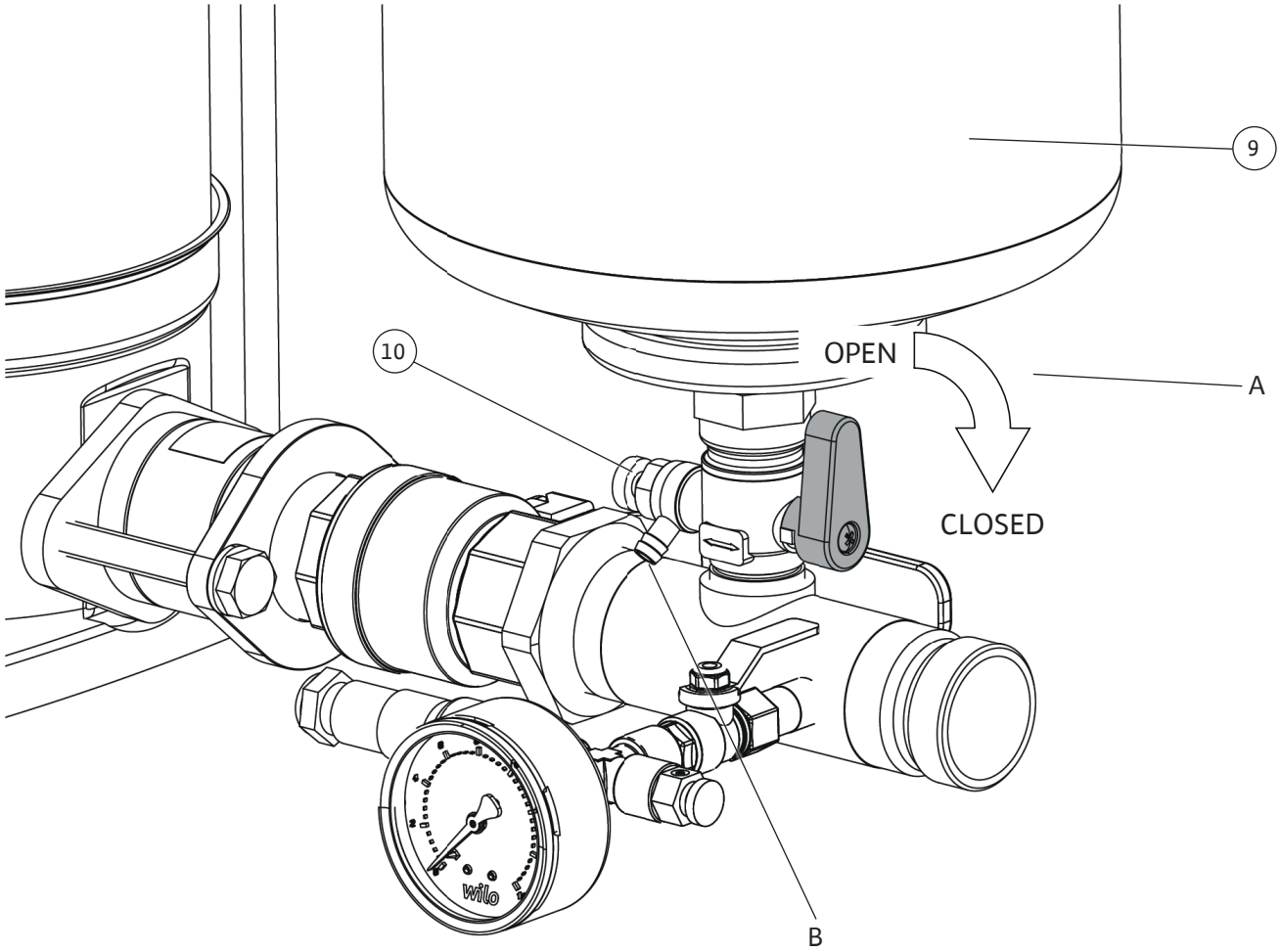
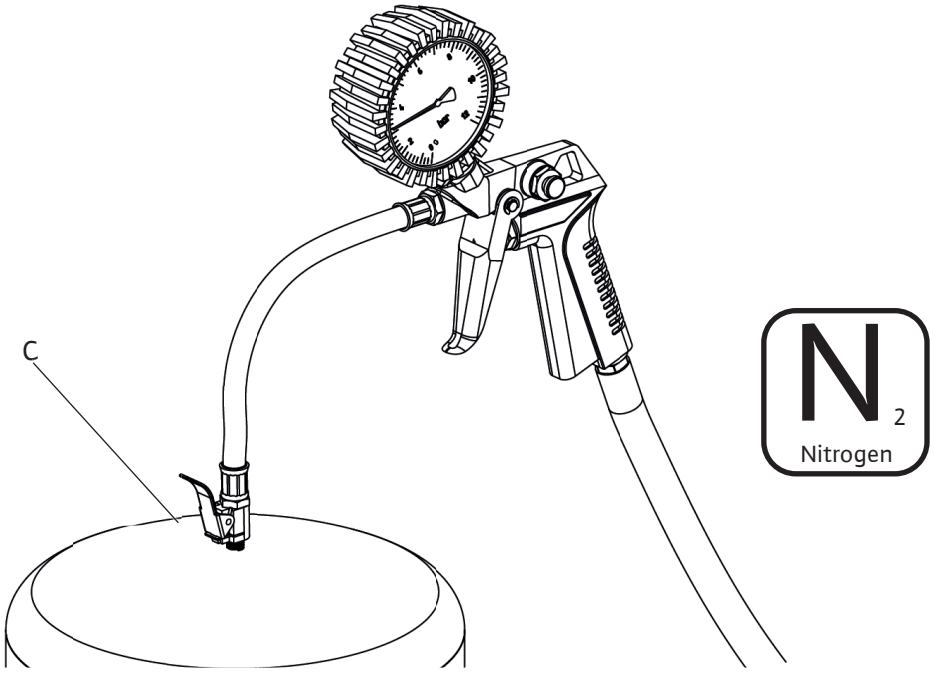

12-b
PIN1
PIN3
12-a
PIN1
PIN3
IN
OUT
12-b
+
-
GND
4...20mA
PIN1
PIN3
4...20mA
I
p
0...16bar
12-a
9
10
12-b
12-a
19
11
18

Fig. 3





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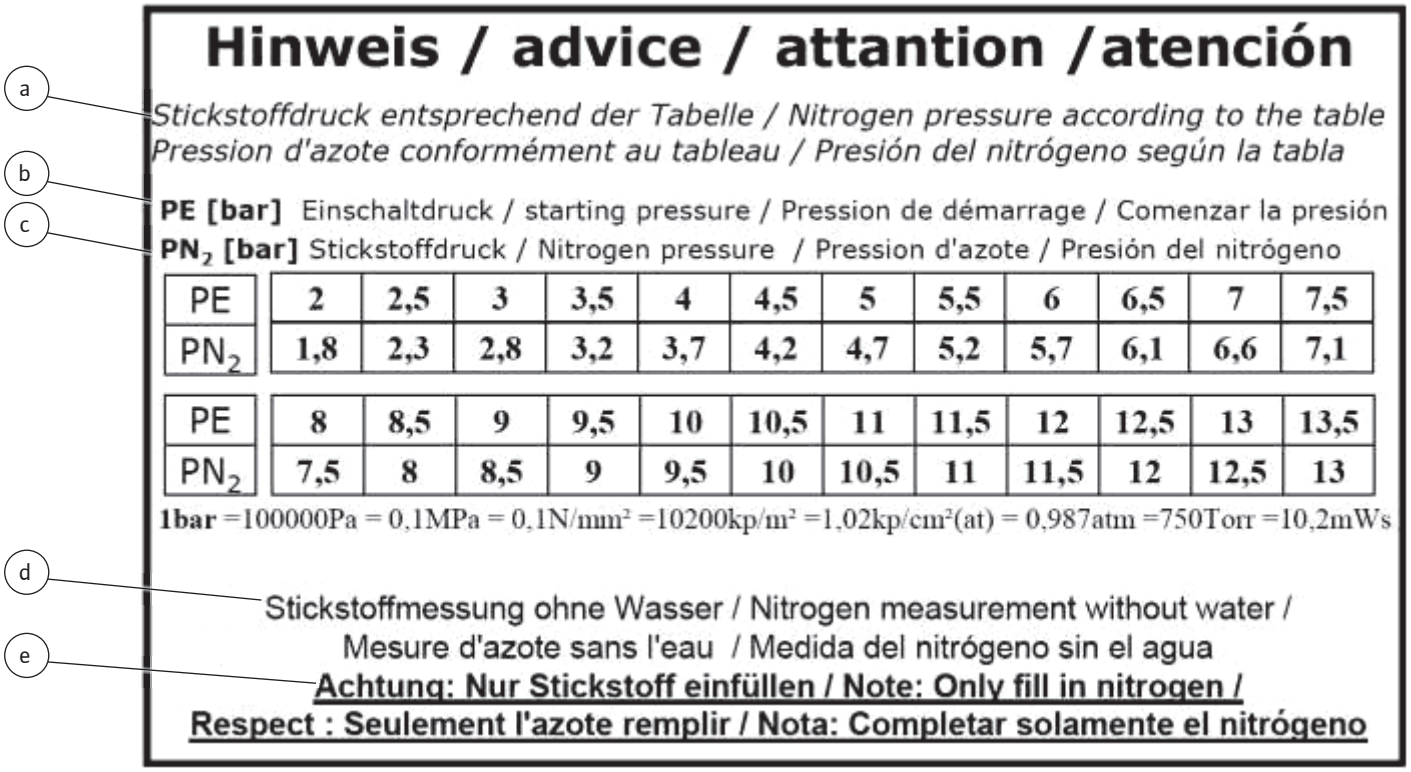
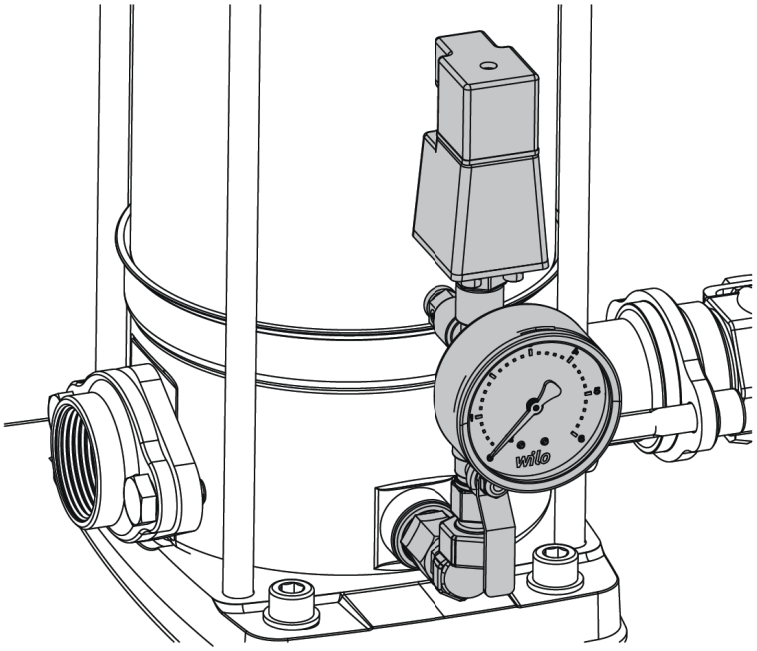

Hinweis / advice / attantion /atención
a
Stickstoffdruck entsprechend der Tabelle / Nitrogen pressure according to the table
Pression d'azote conformément au tableau / Presión del nitrógeno según la tabla
b
PE [bar] Einschaltdruck / starting pressure / Pression de démarrage / Comenzar la presión
c
PN2 [bar] Stickstoffdruck / Nitrogen pressure / Pression d'azote / Presión del nitrógeno
PE 2 2,5 3 3,5 4 4,5 5 5,5 6 6,5 7 7,5
PN2 1,8 2,3 2,8 3,2 3,7 4,2 4,7 5,2 5,7 6,1 6,6 7,1
PE 8 8,5 9 9,5 10 10,5 11 11,5 12 12,5 13 13,5
PN2 7,5 8 8,5 9 9,5 10 10,5 11 11,5 12 12,5 13
1bar =100000Pa = 0,1MPa = 0,1N/mm² =10200kp/m² =1,02kp/cm²(at) = 0,987atm =750Torr =10,2mWs
d
Stickstoffmessung ohne Wasser / Nitrogen measurement without water /
Mesure d'azote sans l'eau / Medida del nitrógeno sin el agua
e
Achtung: Nur Stickstoff einfüllen / Note: Only fill in nitrogen /
Respect : Seulement l'azote remplir / Nota: Completar solamente el nitrógeno

Fig. 5a



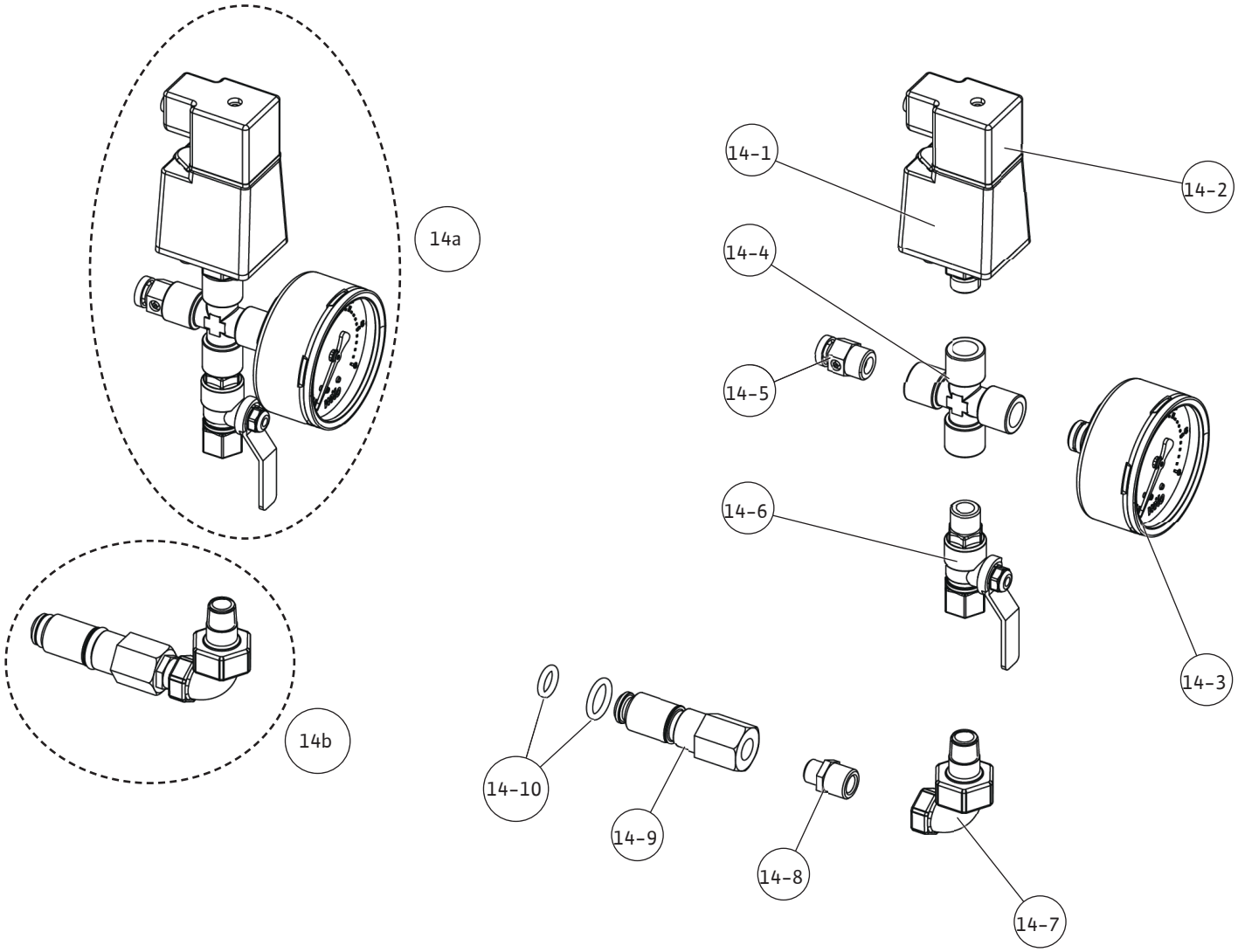
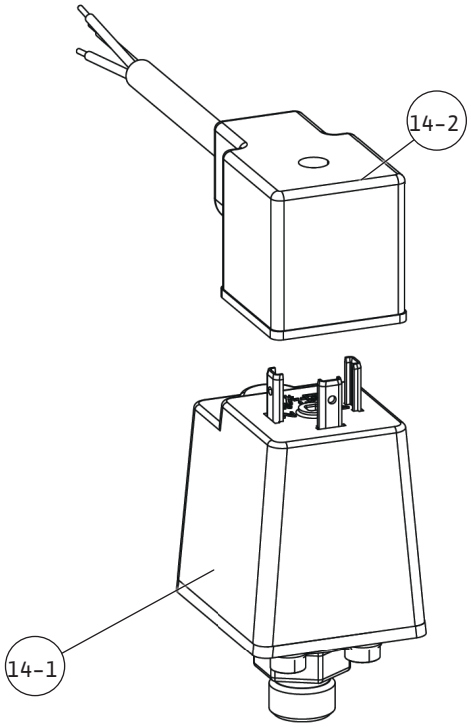


Fig. 5b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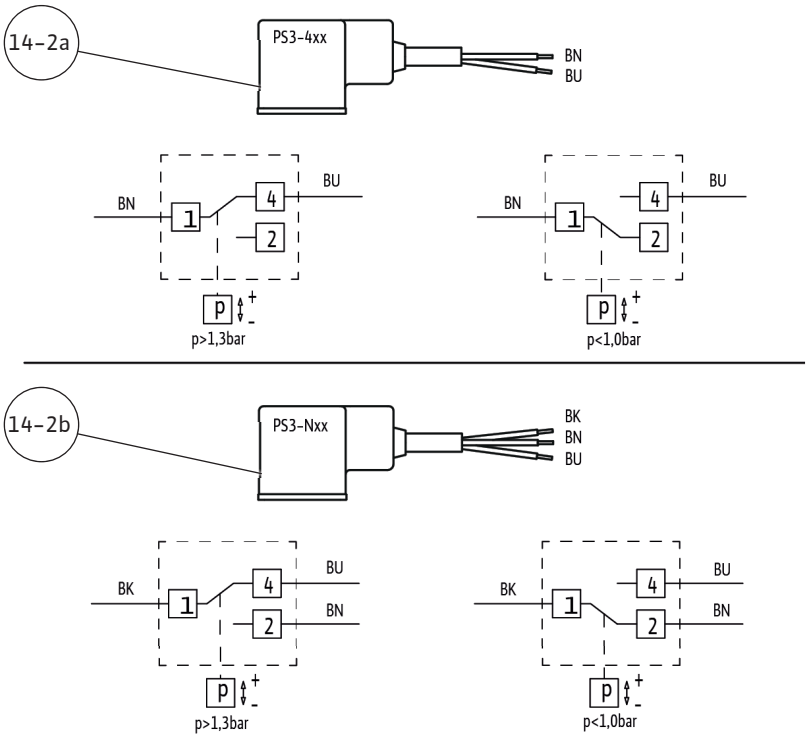
14-1


14-2a
PS3-4xx
BN
BU
BN
1
4
2
BU
p
+
-
p>1,3bar
BN
1
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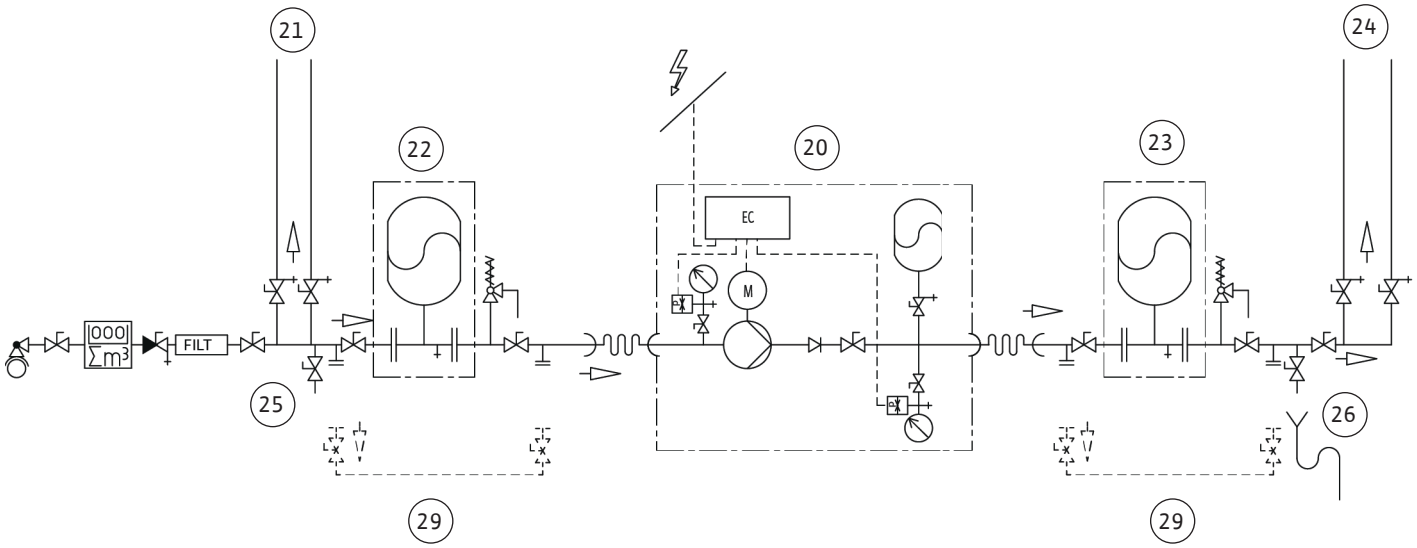
2
BU
p
+
-
p<1,0bar
14-2b
PS3-Nxx
BK
BN
BU
BK
1
4
2
BU
BN
p
+
-
p>1,3bar
BK
1
4
2
BU
BN
p
+
-
p<1,0bar

Fig. 6a


21
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23
EC
M
FILT
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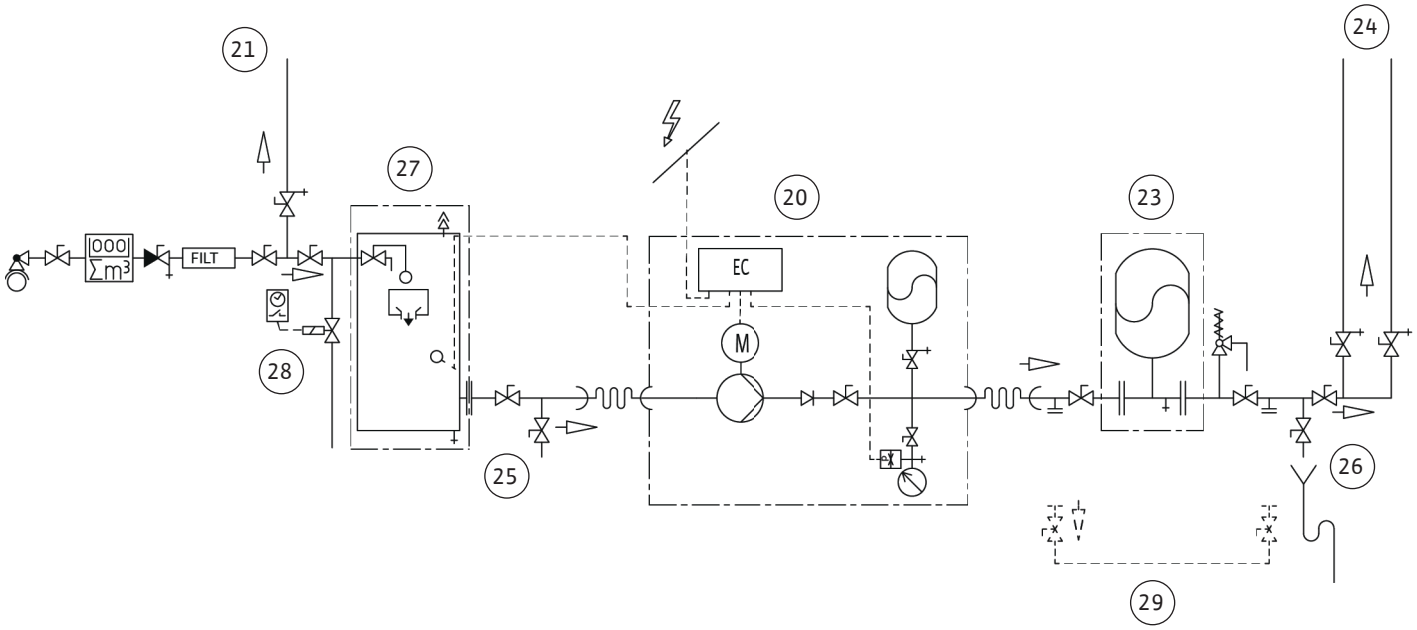
Fig. 6b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FILT
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Fig. 7

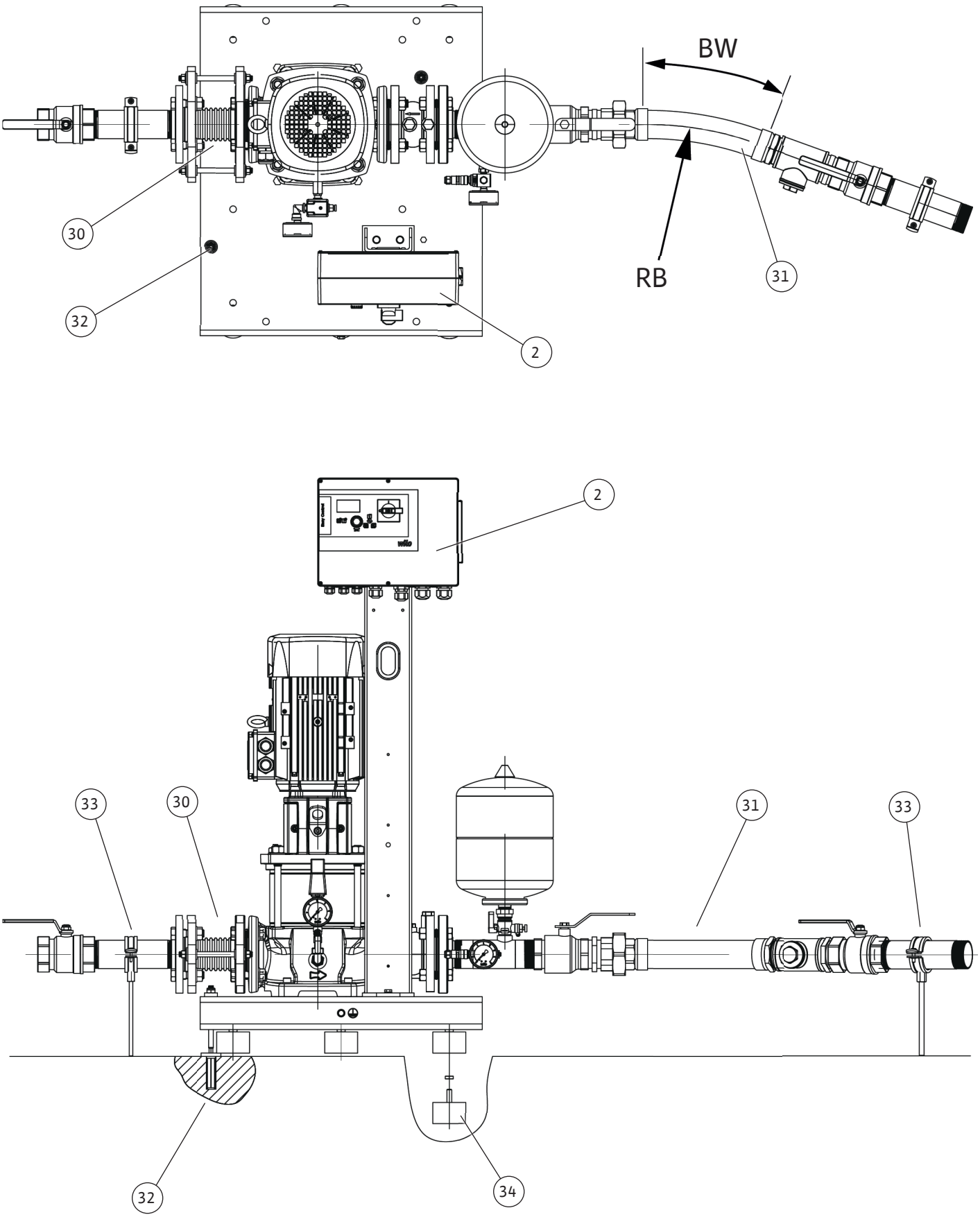
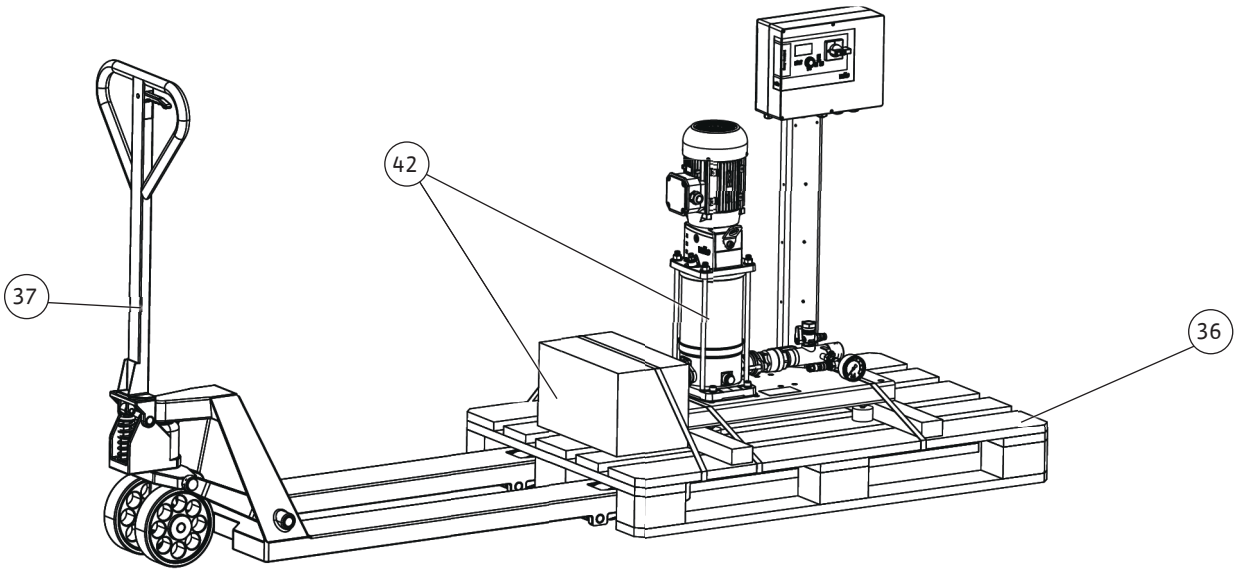
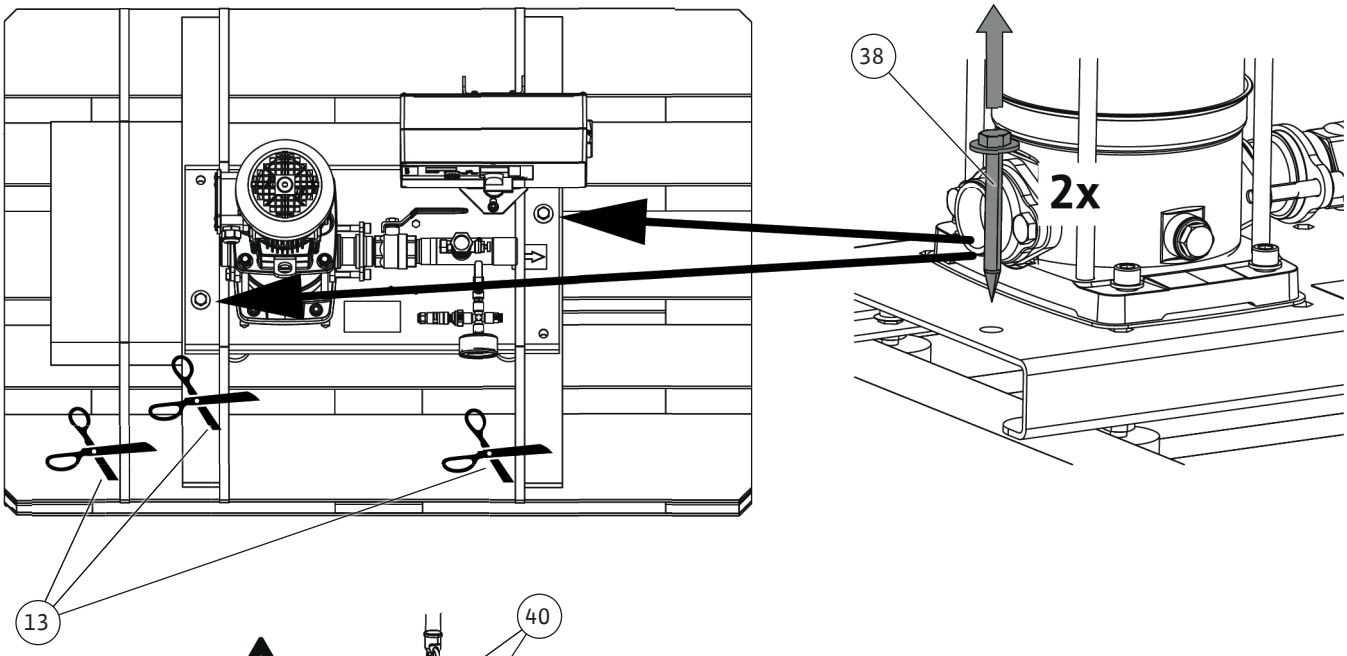
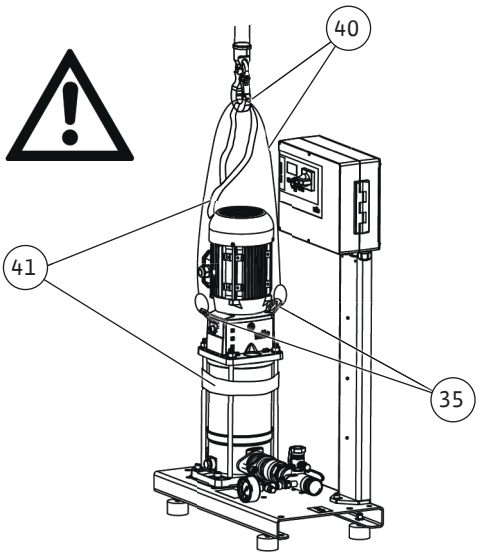


Fig. 8a







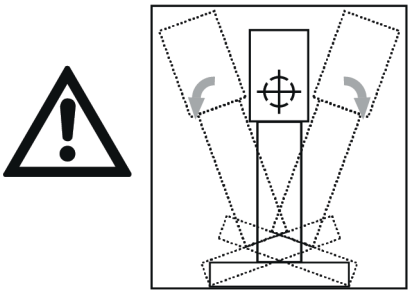
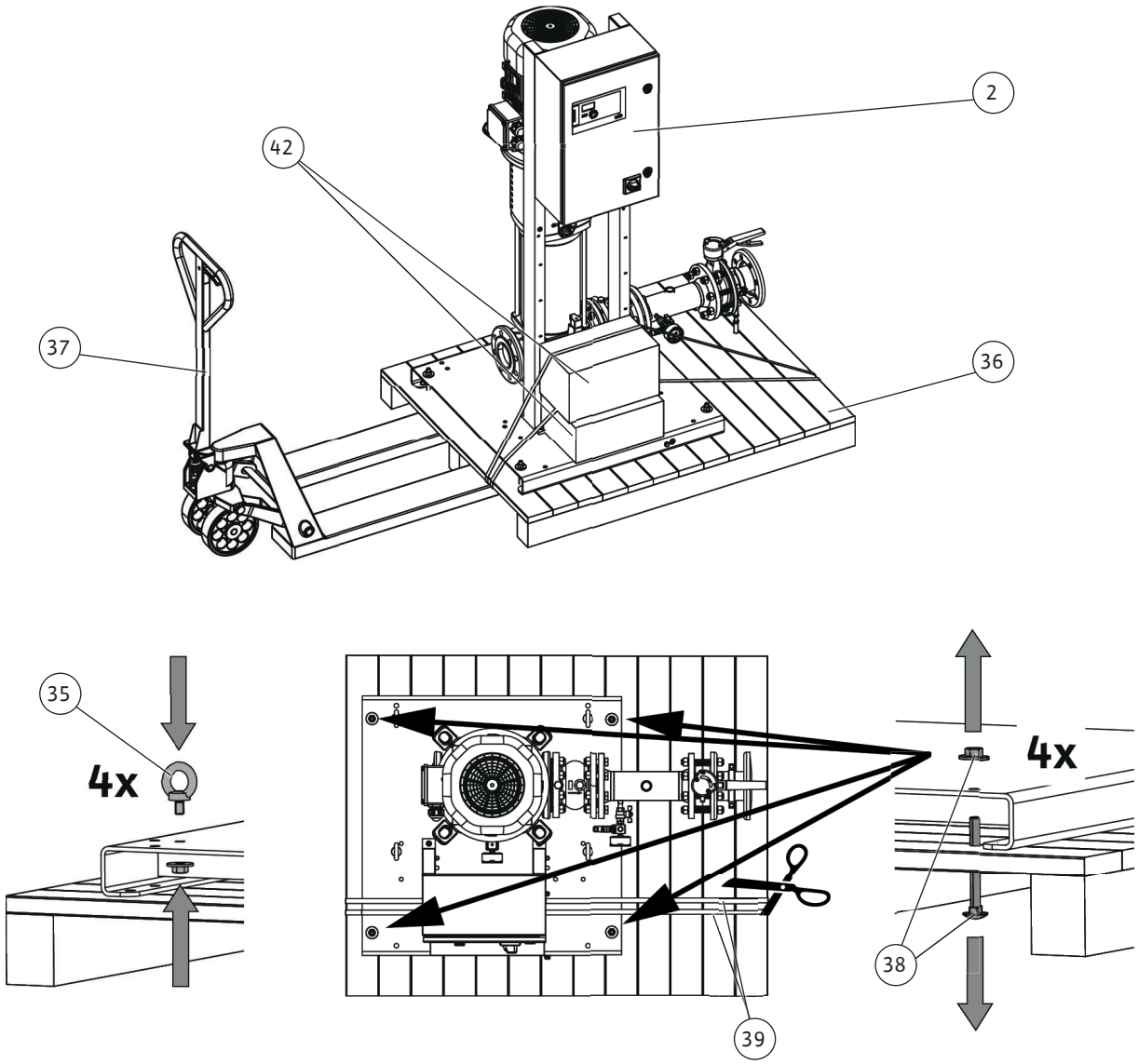


Fig. 8b



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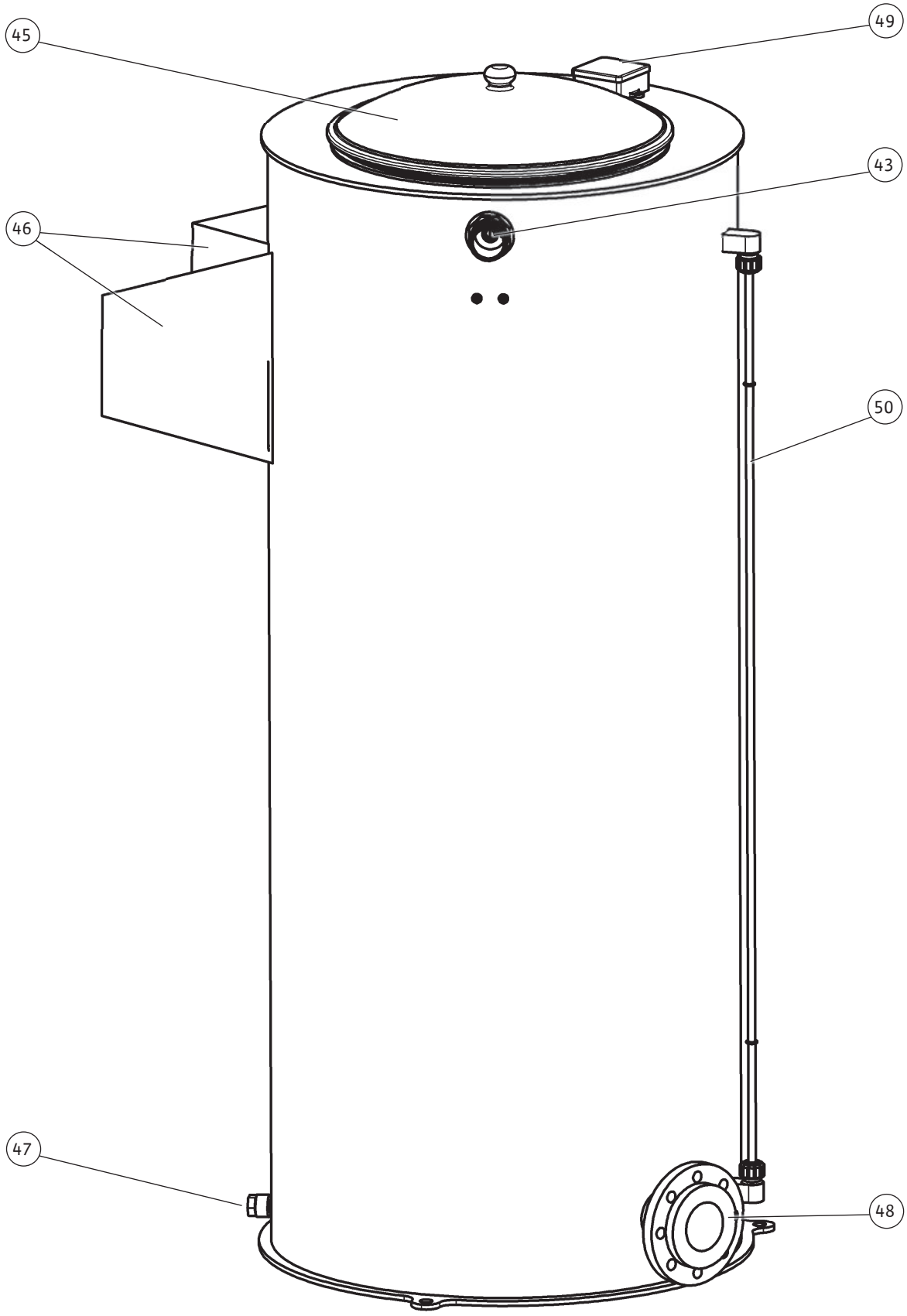


Fig. 9b

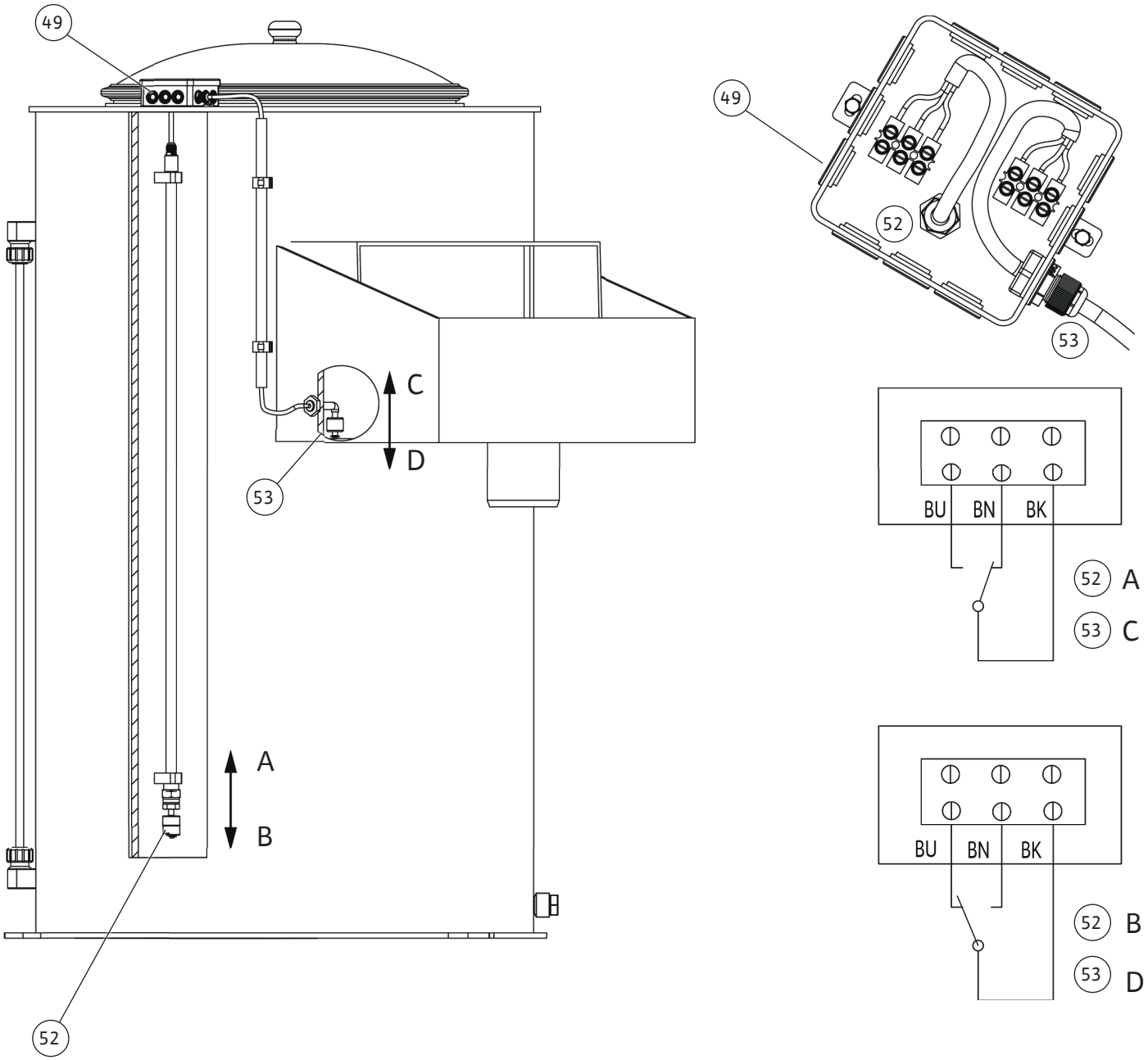


Fig. 10a

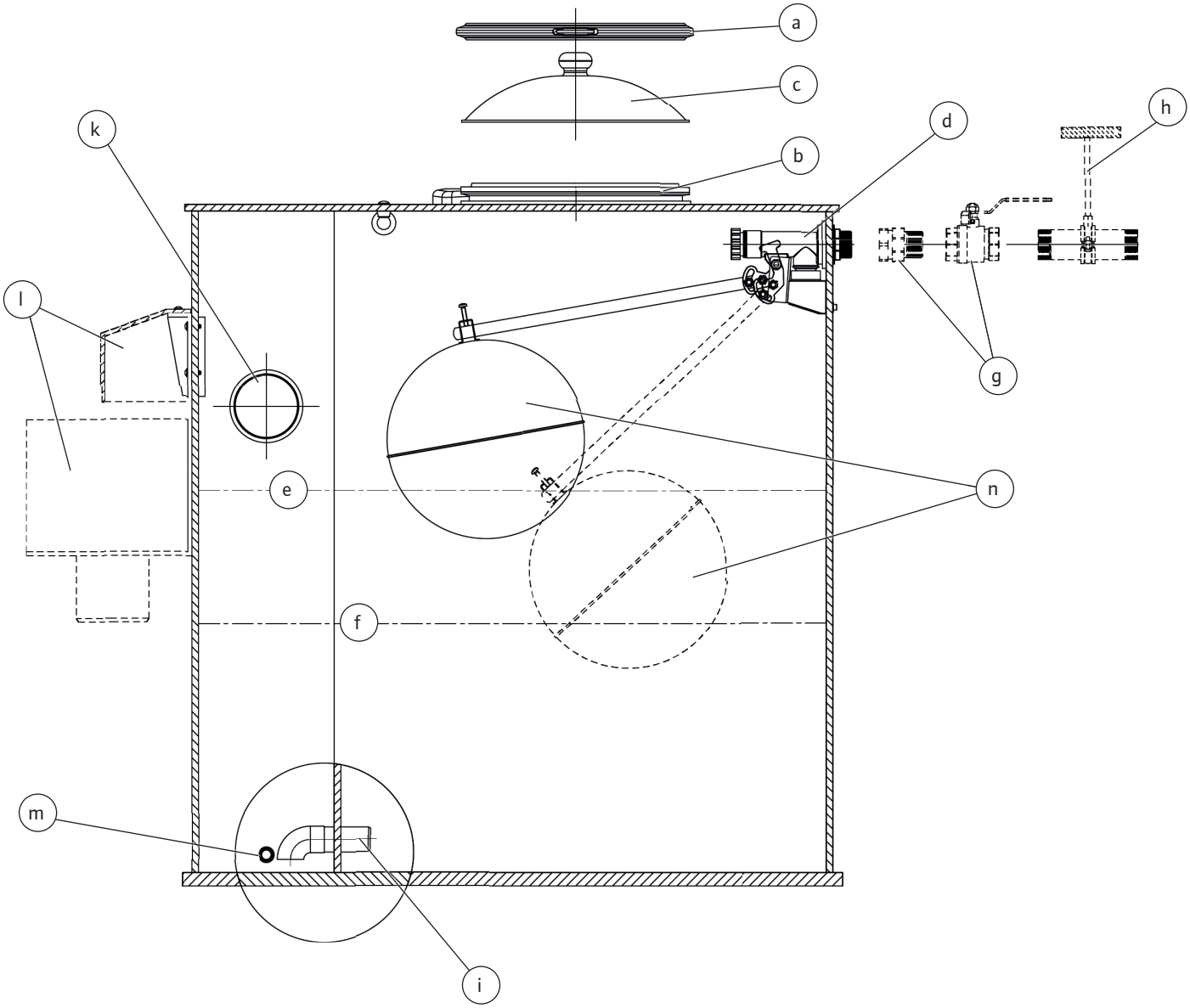
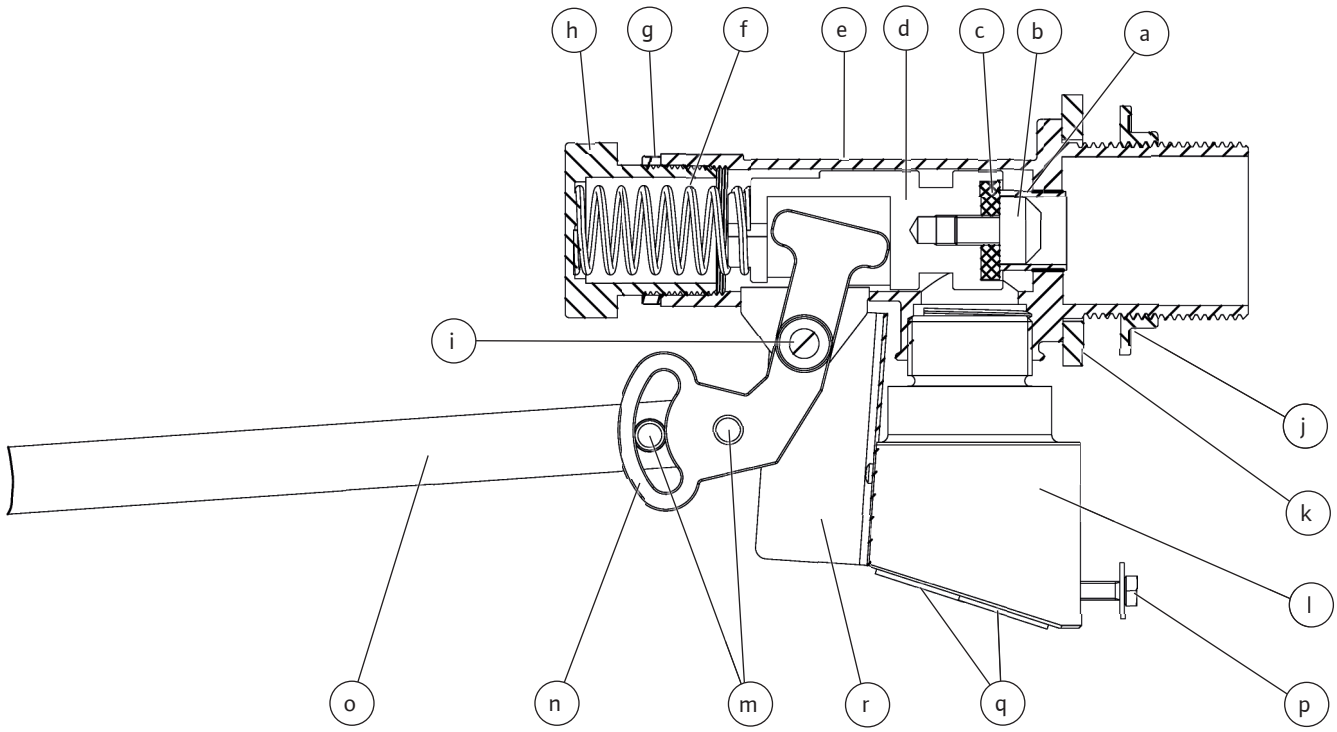


Fig. 10b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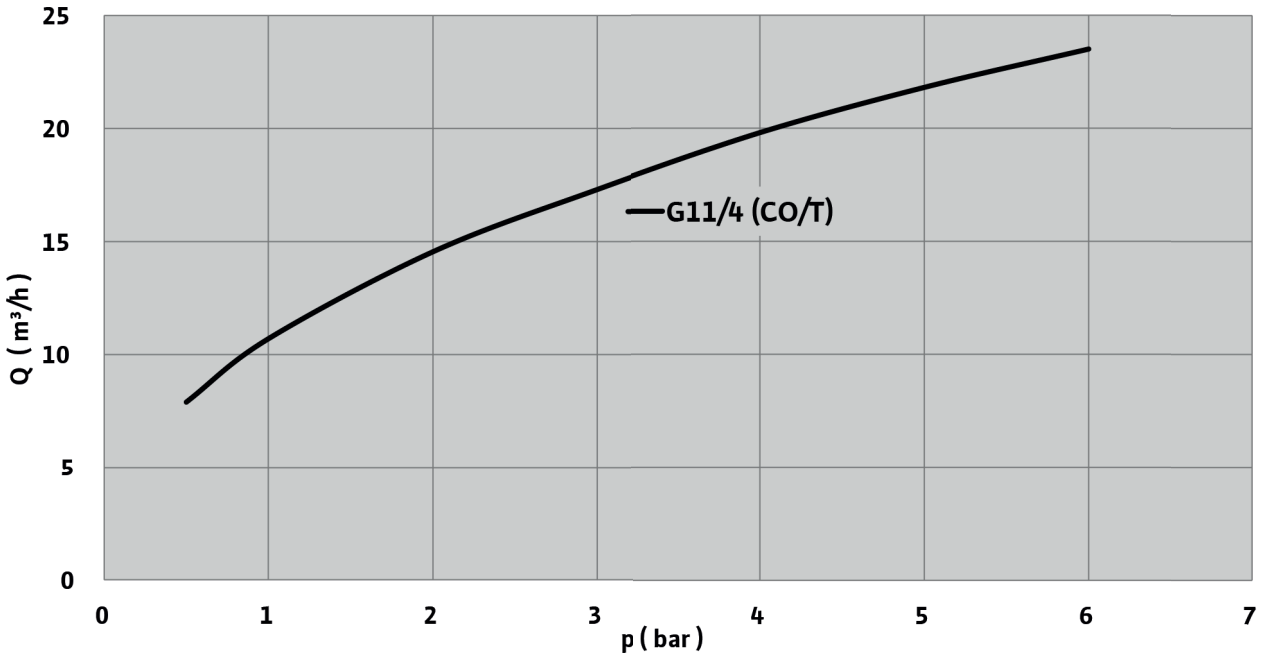
25
20
15
10
5
0
Q (m³/h)
0
1
2
3
4
5
6
7
p (bar)
G11/4 (CO/T)

Table of Contents

1 General

1.1 About these instructions

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

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

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

1.2 Copyright

1.3 Subject to change

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

1.4 Exclusion from warranty and liability

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

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

2 Safety

This chapter contains basic information for the individual phases of the life cycle. Failure to observe this information carries the following risks:

- Injury to persons from electrical, mechanical and bacteriological factors as well as electromagnetic fields
- Environmental damage from discharge of hazardous substances
- Property damage
- Failure of important functions of the product

Failure to observe the information contained herein will result in the loss of claims for damages.

The instructions and safety instructions in the other chapters 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. These safety instructions are shown differently:

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

DANGER

Type and source of the danger!

Consequences of danger and instructions for avoidance.

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

CAUTION

Type and source of the danger!

Consequences or information.

Signal words

- **DANGER!**
  Failure to follow the instructions will result in serious injuries or death!
- **WARNING!**
  Failure to follow the instructions can lead to (serious) injury!
- **CAUTION!**
  Failure to follow the instructions can lead to potentially irreparable property damage as well as to total loss.
- **NOTICE!**
  Useful information on handling the product

Markups

✓ Prerequisite

1. Work step/list

   ⇒ Notice/instructions

   ► Result

Symbols

These instructions use the following symbols:

General danger symbol

Danger caused by electric voltage

General warning symbol

Warning – suspended loads

Personal protective equipment: wear a safety helmet

Personal protective equipment: wear hearing protection

Personal protective equipment: wear safety footwear

Personal protective equipment: Wear protective gloves

Useful information

2.2 Personnel qualifications

- Personnel have been instructed on locally applicable regulations governing accident prevention.
- Personnel have read and understood the installation and operating instructions.
- Electrical work: qualified electrician
  Person with appropriate technical training (according to EN 50110-1), knowledge and experience who can identify and prevent electrical hazards.
- Lifting work: trained specialist for the operation of lifting devices
  Lifting equipment, lifting gear, attachment points
- Installation/dismantling must be carried out by a qualified technician who is trained in the use of the necessary tools and fixation materials.
- Operation/control: Operating personnel, instructed in the functioning of the complete system

2.3 Electrical work

- Observe applicable local regulations when connecting to the mains power supply.
- Comply with the requirements of the local energy supply company.
- Have electrical work carried out by a qualified electrician.
- Earth the device.
- Carry out the electrical connection according to the instructions of the switchgear and control device.
- Train personnel on how to make electrical connections.
- Train personnel on the options for switching off the device.
- Disconnect device from the mains and secure it against being switched on again without authorisation.
- Replace defective connection cables. Contact customer service.

2.4 Monitoring devices

The following monitoring devices must be provided by the customer if the system's scope of delivery does not include a switch cabinet:

Circuit breaker

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

- Observe local regulations.

Motor protection switch

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

Residual-current device (RCD)

- Install a residual-current device (RCD) in accordance with the regulations of the local energy supply company.
- If people can come into contact with the device and conductive fluids, install a residual-current device (RCD).
- For systems/pumps with frequency converters, use a universal-current-sensitive residual-current device (type B RCD).

2.5 Transport

- Wear the following protective equipment:
  - Safety footwear
  - Safety helmet (when using lifting equipment)
- Locally applicable laws and regulations on work safety and accident prevention must be complied with.
- Only use legally prescribed and approved lifting and hoisting gear.
- Select the lifting gear based on the prevailing conditions (weather, attachment point, load, etc.).
- Always attach the lifting gear to the attachment points.
- Ensure that the lifting gear is securely attached.
- Ensure that the hoisting gear is stable.
- Ensure a second person is present to coordinate the procedure if required (e.g. if the operator's field of vision is blocked).
- Standing under suspended loads is not permitted. Do **not** move suspended loads over workplaces where people are present.

2.6 Installing/dismantling

- Wear the following protective equipment:
  - Safety footwear
  - Safety gloves for protection against cuts
- Locally applicable laws and regulations on work safety and accident prevention must be complied with.
- Disconnect device from the mains and secure it against being switched on again without authorisation.
- All rotating parts must stop.
- Clean the device thoroughly.

2.7 During operation

- Wear protective equipment according to work regulations.
- Demarcate and cordon off the working area.

- No persons are allowed in the working area during operation.
- Depending on the process, the product is activated and deactivated using separate controls. Product may automatically activate following power cuts.
- Superior must be informed immediately of any faults or irregularities.
- Operator must switch product off immediately if faults occur.
- Open all gate valves in the inlet and pressure pipe.
- Ensure protection against dry running.

2.8 Maintenance tasks

- Wear the following protective equipment:
  - Safety footwear
  - Safety gloves for protection against cuts
- Disconnect device from the mains and secure it against being switched on again without authorisation.
- Ensure cleanliness, dryness and good lighting in the work area.
- Only carry out maintenance tasks described in these installation and operating instructions.
- Only original parts of the manufacturer may be used. The use of any non-original parts releases the manufacturer from any liability.
- Collect any leakage of fluid and operating fluid immediately and dispose of it according to the locally applicable guidelines.
- Clean the device thoroughly.

2.9 Operator responsibilities

- Provide installation and operating instructions in a language which the personnel can understand.
- Make sure that the personnel have received the required training for the specified work.
- Provide protective equipment. Ensure that the protective equipment is worn by personnel.
- Ensure that safety and information signs mounted on the device are always legible.
- Train the personnel on how the system operates.
- Eliminate any risk from electrical current.
- Demarcate and cordon off the working area.
- Define a personnel work plan for safe workflow.
- Carry out a sound pressure measurement. From a sound-pressure level of 85 dB(A) upward, wear hearing protection. Include a note in the work regulations!

Observe the following points when handling the device:

- Use is not permitted for persons under the age of 16.
- Persons under the age of 18 must be supervised by a technician!
- Use is not permitted for persons with limited physical, sensory or mental capacities!

3 Application/use

3.1 Intended use

Function and application

The automatic single pump pressure-boosting system is used in commercial and domestic areas where higher pressures than the usual mains pressure are required and no standby pump is needed.

The system is used in:

- domestic water supply and cooling systems
- industrial water supply and cooling systems
- fire water supply systems for self-help without any normative specifications
- irrigation and sprinkling installations

Design and installation are based on the following standards and directives:

- DIN 1988 (for Germany)
- DIN 2000 (for Germany)
- EU Directive 98/83/EC
- Drinking Water Ordinance – TrinkwV2001 (for Germany)
- DVGW directives (for Germany)

Make sure that the fluid to be pumped will not corrode the materials used in the system either chemically or mechanically and that it does not contain any abrasive or long-fibre constituents.

The CO-1.. pressure-boosting system type (Fig. 1a, Fig. 1b) can be connected directly or indirectly to the public water network using a break tank from the Wilo range or a break tank to be provided by the customer.

The CO/T... pressure-boosting system type (Fig. 1c) is supplied with an integrated break tank and is therefore already prepared for indirect connection to the public water supply network.

Current design, installation and application instructions for Wilo pressure-boosting systems can be found in the Wilo manual “Tips and tricks Booster” and other Wilo manuals and brochures on pump and system technology, see: https://wilo.com.

For your safety

- Completely reading and following all instructions in these Installation and operating instructions.
- Observing the statutory accident prevention and environmental regulations.
- Complying with inspection and maintenance regulations.
- Complying with in-house regulations and instructions.

The pressure-boosting system is built according to the manufacturer’s specifications as well as the state of the art and the recognised safety regulations. However, in the event of incorrect operation or misuse, danger to life and limb of the operator or third parties or damage to the system itself and other material assets may occur.

The safety devices on the pressure-boosting system are designed in such a way that there is no risk to the operating personnel when the system is used as intended.

The pressure-boosting system may only be used in technically fault-free condition and in accordance with its intended use, in a safety-conscious and hazard-conscious manner and in compliance with these installation and operating instructions. Faults that may affect safety must be rectified immediately by qualified personnel.

3.2 Improper use

Possible misuse

The pressure-boosting system is not designed for applications that are not explicitly intended for it by the manufacturer. This includes, in particular:

- Pumping fluids that chemically or mechanically attack the materials used in the system
- Pumping fluids that contain abrasive or long-fibre components
- Pumping fluids that are not intended for this purpose by the manufacturer

Persons under the influence of intoxicating substances (e.g. alcohol, drugs, narcotics) are not authorised to operate, maintain or modify the pressure-boosting system in any way.

Improper use

Improper use occurs when parts other than those specified in the intended use are processed in the pressure-boosting system. Modification of the components of the pressure-boosting system also leads to improper use.

All spare parts must comply with the technical requirements specified by the manufacturer. There is no guarantee that third-party parts are designed and manufactured in accordance with appropriate safety and operational requirements. This is always guaranteed when using original spare parts.

Modifications to the pressure-boosting system (mechanical or electrical changes to the function sequence) invalidate any liability on the part of the manufacturer for any resulting damage. This also applies to the installation and adjustment of safety devices and valves as well as the modification of load-bearing parts.

4 Product description

4.1 Type key

Example	Wilo-Economy CO-1 HELIX V605/EC
Wilo	Brand name
Economy	Product family: pressure-boosting systems
CO	Series designation
1	Number of pumps
HELIX	Pump series designation (see attached pump documentation)
V	Pump design, vertical
6	Rated volume flow of pump Q [m^3/h]
05	Number of pump stages
EC	Control device (Economy Control)

Example	Wilo-Economy CO-1 HELIX V2208/EC
Wilo	Brand name
Economy	Product family: pressure-boosting systems
CO	Series designation
1	Number of pumps
HELIX	Pump series designation (see attached pump documentation)
V	Pump design, vertical
22	Rated volume flow of pump Q [m^3/h]
08	Number of pump stages
EC	Control device (Economy Control)

Example	Wilo-Economy CO/T-1 HELIX V204/EC
Wilo	Brand name
Economy	Product family: pressure-boosting systems
CO	Series designation
/T	With integrated break tank for system separation
1	Number of pumps
HELIX	Pump series designation (see attached pump documentation)
V	Pump design, vertical
2	Rated volume flow of pump Q [m^3/h]
04	Number of pump stages
EC	Control device (Economy Control)

Additional designations for additional options pre-installed at the factory	
WMS	Including WMS kit (low-water cut-out switchgear for operation with supply pressure)

4.2 Technical data

Max. volume flow	see catalogue/data sheet
Max. delivery head	see catalogue/data sheet
Speed	2800 – 2900 rpm (constant speed)

Mains voltage	• 3~ 230 V ±10 % V (L1, L2, L3, PE) • 3~ 400 V ±10 % V (L1, L2, L3, PE)								
Rated current	See rating plate of pump/motor								
Frequency	50 Hz								
Electrical connection	(See installation and operating instructions and circuit diagram of the control device)								
Insulation class	F								
Protection class	IP54								
Power consumption P_1	See rating plate of pump/motor								
Power consumption P_2	See rating plate of pump/motor								
Sound-pressure level	Rated power (kW)								
Pumps with glanded motors	0.37	0.55	0.75	1.1	1.5	2.2	3	4	5.5
	56	57	58	59	60	63	66	68	70
dB(A) tolerance +3dB(A)									
Sound-pressure level	Rated power (kW)								
Pumps with glanded motors	7.5	9	11	15	18.5	22	30	37	
	70	70	71	71	72	74	75	80	
dB(A) tolerance +3dB(A)								LWA= 91 dB(A)	
	Values for 50 Hz (fixed speed) with tolerance of +3 dB(A) Lpa = workplace-related emission level in dB(A) LWA = Sound-pressure level in dB(A) indicated from Lpa = 80 dB(A)								
Nominal diameters Inlet connection/discharge port CO-1	G11/4(I) / G11/4(A)					(..1HELIX V 4) (..1HELIX V 6)			
	G11/2(I) / G11/2(A)					(..1HELIX V 10)			
	G2(I) / G11/2(A)					(..1HELIX V 16)			
	G2(I) / G2(I)					(..1HELIX V 22)			
	$G2^1/_2$(I) / $G2^1/_2$(I)					(..1HELIX V 36)			
	DN 80 / DN 80					(..1HELIX V 52)			
Nominal diameters Inlet connection/discharge port CO/T-1	G11/4(A) / G11/4(A)					(..1HELIX V4) (..1HELIX V6)			
	DN... : Flange connection according to EN 1092 (PN 16) G...(A): Male thread according to EN 228-1 G...(I): Female thread according to EN 228-1								
(Subject to change without prior notice/see also the installation plan provided)									
Permitted ambient temperature	5 °C to 40 °C								
Permissible fluids	Pure water without settling sediments								
Permissible fluid temperature	• 3 °C to 50 °C (CO-1) • 3 °C to 40 °C (CO/T-1)								
Max. permissible operating pressure	6/10/16 bar (HELIX V) on the discharge side (see rating plate)								
Max. permissible inlet pressure	Indirect connection (but max. 6 bar)								
Diaphragm expansion tank	8 l								

4.3 Scope of delivery

The pressure-boosting system is supplied ready for connection.

The pressure-boosting system (compact unit with integrated control) contains a non-self-priming, vertical high-pressure multistage centrifugal pump.

The pump is installed on a base frame (CO-1) or a baseplate (CO/T-1) with all pipework.

Measures required on-site:

- Make the connections for the inlet and discharge pipes.
- Establish the electrical mains connection.
- Install the supplied accessories ordered separately.

4.3.1 Standard version scope of delivery

- Pressure-boosting system
- Installation and operating instructions for the pressure-boosting system
- Installation and operating instructions for the pump
- Factory test protocol
- Box with accessories/accessories kit/add-on parts (Fig. 8a, 8b – Item 42), if applicable

4.3.2 Special version scope of delivery

- Installation and operating instructions for the control device, if applicable
- Installation plan, if applicable
- Electrical circuit diagram, if applicable
- Installation and operating instructions for the frequency converter, if applicable
- Supplementary sheet with the factory settings for the frequency converter, if applicable
- Installation and operating instructions for the signal transmitter, if applicable
- Spare parts list, if applicable

4.4 Accessories

Accessories must be ordered separately as required. The accessories from the Wilo range include the following:

- Open break tank (Fig. 9a, 9b)
- Larger diaphragm pressure vessel (on the inlet or discharge side)
- Safety valve
- Dry-running protection:
  - Low-water cut-out switchgear (WMS) (Fig. 5a, 5b); in inlet mode (min. 1.0 bar) is supplied fitted to the pressure-boosting system if part of the order.
  - The CO/T-1 pressure-boosting system is fitted as standard with a float switch in the break tank, which switches the pump off when there is a water shortage (Fig. 1c – Item 52) and switches the pump back on when the water level in the tank is sufficient.
  - Float switch
  - Low-water electrodes with a level relay
  - Electrodes for tank operation (special accessories on request)
- Flexible connection pipes (Fig. 7 – Item 31)
- Compensators (Fig. 7 – Item 30)
- Threaded flanges

4.5 Components of the system

NOTICE

These installation and operating instructions contain a general description of the complete system.

NOTICE

For detailed information about the pump in this pressure-boosting system, see the enclosed installation and operating instructions for the pump.

4.5.1 Connection

The CO-1 pressure-boosting system can be connected to the public water supply network in two ways:

- Direct connection (Fig. 6a).
- Indirect connection (Fig. 6b).

When supplied with a self-priming pump (special version), this may be connected to the public water supply network only indirectly (system separation by a non-pressurised break tank).

The CO/T-1 pressure-boosting system is intended for indirect connection to the public water supply network via the integrated break tank with level-dependent topping-up and system separation (similar to Fig. 6b).

4.5.2 Components of the pressure-boosting system

The complete system is made up of various main components.

NOTICE

Observe the respective installation and operating instructions for the individual component.

Mechanical and hydraulic components CO-1 (Fig. 1a, 1b):

The pressure-boosting system is installed on a base frame (Item 3) with vibration absorbers (Item 34). The pressure-boosting system consists of a high-pressure multistage centrifugal pump (Item 1) with three-phase current motor (Item 17). A shut-off valve (Item 7) and a non-return valve (Item 8) are fitted on the discharge side. A lockable assembly with pressure sensor (Item 12) and pressure gauge (Item 11) is fitted. An 8-litre diaphragm expansion tank (Item 9) is included in the scope of delivery. A lockable throughflow fitting (Item 10) is pre-assembled on the discharge line (for flow through in accordance with DIN 4807-Part 5).

A low-water cut-out switchgear (WMS) assembly (Item 14) can be optionally fitted or retrofitted to the drain connection of the pump (see also Fig. 5a, 5b).

The control device (Item 2) is fitted on the base frame using an upright support bracket (Item 13). The electrical components of the system are connected to the control device.

Mechanical and hydraulic system components CO/T-1 (Fig. 1c):

The system components are mounted on a plastic baseplate belonging to the integrated break tank (Item 53). The pressure-boosting system consists of a high-pressure multistage centrifugal pump (Item 1) with three-phase current motor (Item 17) with a shut-off valve (Item 7) and a connection pipe (Item 5) fitted on the discharge side. A lockable assembly with pressure sensor (Item 12) and pressure gauge (Item 11) is fitted on the discharge side. An 8-litre diaphragm expansion tank (Item 9) is included in the scope of delivery. A lockable throughflow fitting (Item 10) is pre-assembled on the discharge line (for flow through in accordance with DIN 4807-Part 5).

A non-return valve (Item 8) as well as the connection (hose) to the break tank are fitted on the inlet side. A float switch (Item 52) is installed in the break tank as a signal transmitter for protection against low water level. The water inlet (Item 43) from the supply mains is fed into the break tank via a level-dependent opening and closing float valve (Item 43 or Fig. 10a, 10b).

These installation and operating instructions describe the overall system in general, without going into a detailed description of the operation of a control device (see section ***Commissioning*** and the accompanying documentation for the control device).

High-pressure multistage centrifugal pump (Item 1) with three-phase current motor (Item 17):

Different types of high-pressure multistage centrifugal pumps are installed depending on the application and the performance parameters required.

NOTICE

Detailed instructions for the pump can be found in the attached installation and operating instructions for the pump.

Diaphragm expansion tank kit (Fig. 3)

Consisting of:

- Diaphragm expansion tank (Item 9) with lockable throughflow fitting (Item 10) and drain valve

Pressure sensor kit (Fig. 2)

Consisting of:

- Pressure gauge (Item 11)
- Pressure sensor (Item 12-a)

- Electrical connection, pressure transmitter (Item 12-b)
- Drain/venting (Item 18)
- Stop valve (Item 19)

Control device (Fig. 1a to 1c – Item 2)

A control device from the EC series is used for control and regulation.

NOTICE

Detailed instructions for the type of control device used in the pressure-boosting system can be found in the attached installation and operating instructions and the associated wiring circuit diagram.

4.6 Function

WARNING

Risk of damage to your health!

Risk of damage to your health due to contaminated drinking water.

- Use only materials that ensure the required water quality for drinking water installations.
- To reduce any impairment of the drinking water quality, flush the pipes and system.
- If commissioning the system after a longer period of downtime, replace the water.

CAUTION

Risk of damage to property!

Dry running can lead to the pump developing leakages and to motor overload.

- Ensure that the pump does not run dry to protect the mechanical seal and the plain bearings.

4.6.1 Description

The pressure-boosting system with non-self-priming, vertically installed, multistage high-pressure multistage centrifugal pump (Helix V) is supplied as a compact unit, fully piped and ready for connection.

The pressure-boosting system of the CO- 1... series (examples Fig. 1a, 1b) is fitted on a zinc-coated steel base frame (Item 3) with vibration absorbers (Item 34).

The pressure-boosting system of the CO/T-1 series (Fig. 1c) is fitted on a plastic baseplate together with a plastic break tank.

- The connections for the inlet and discharge pipe and the electrical mains connection must be installed.
- The supplied accessories ordered separately must be installed.
- Observe the relevant, applicable regulations and standards when using the system for drinking water supply and/or fire extinguishing supply.
- The pressure-boosting systems must be operated and maintained in accordance with the relevant provisions (in Germany according to DIN 1988 (DVGW)) so that the operational reliability of the water supply is permanently guaranteed and neither the public water supply nor other consumption installations are detrimentally affected.
- The applicable standards and directives (see Application/use [▶ 25]) on the connection and connection type to public water supply networks must be observed. They may be supplemented by regulations of the water supply companies (WVU) or the responsible fire protection authority.
- The local conditions (e.g. a supply pressure that is too high or fluctuating considerably and which might require the installation of a pressure reducer) must also be observed.

Pressure-boosting systems in the CO-1 and CO/T-1 series are fitted as standard with a non-self-priming horizontal or vertical high-pressure multistage centrifugal pump (Item 1) with three-phase current motor (Item 17). The pump is supplied with water via the inlet connection (Item 4). For suction mode (CO-1) from lower-lying tanks, a separate, vacuum-

proof and pressure-resistant suction line with a foot valve should be installed. It must be positioned at a constant upward inclination from the tank to the pump connection.

The pump increases the pressure and pumps the water to the consumer through the discharge line (Item 5). To do this, the pump is switched on and off according to the pressure. A pressure sensor (Item 12) is used for pressure monitoring (see also Fig. 2). The pressure sensor continuously measures the actual pressure value, converts it into an analogue current signal and transmits it to the control device. The control device switches the pump on or off, depending on requirements and control mode, until the set control parameters are reached. For a more precise description of the control mode, control process and setting options, please see the installation and operating instructions for the control device.

The diaphragm expansion tank included in the scope of delivery (Item 9) (total capacity of approx. 8 litres) exercises a buffer effect on the pressure sensor and prevents oscillation of the control when switching the pump on and off. It guarantees low water extraction (e.g. due to smallest leakages) from the available storage volume without switching on the pump. The switching frequency is reduced and the operating state of the system is stabilised.

For direct connection to the public water supply, a low-water cut-out switchgear (WMS) is offered as an accessory (Item 14) (Fig. 5a and 5b), which monitors the existing supply pressure and whose switching signal is processed by the control device. The WMS kit is installed on the pump's drainage opening (required for this: WMS connection set (Fig. 5a – Item 14b) from the accessories range) or at an installation point to be provided in the inlet pipe.

In the case of an indirect connection (system separation by non-pressurised break tank), provide a level-dependent signal transmitter installed in the break tank as a dry-running protection device. When using a Wilo break tank, a float switch (Fig. 9b – Item 52) is already included in the scope of delivery.

CO/T-1 series pressure-boosting systems that are fitted with an unpressurised break tank (Fig. 10a) for system separation have a float switch (Fig. 1c – Item 52), which is already installed as a low-water signal transmitter in the tank.

For tanks provided by the customer, there are various signal transmitters for subsequent installation in the Wilo range (e.g. WA65 float switch or low-water electrodes with level relay).

4.6.2 Noise characteristics

WARNING

Risk of injury from a lack of protective equipment!

In case of sound-pressure levels above 80 dB(A), there is a risk of hearing impairments.

- Wear suitable hearing protection during operation.

Depending on the power requirements, the pressure-boosting system is supplied with a wide variety of pumps which vary in terms of their noise and oscillation characteristics. For the relevant data, see Technical data [▶ 26] in the installation and operating instructions for the pump and in the catalogue specifications for the pump.

5 Transport and storage

WARNING

Risk of injury from a lack of protective equipment!

Danger of (serious) injuries during work.

- Wear protective gloves to protect against cuts.
- Wear safety shoes.
- If lifting accessories are used, wear a safety helmet.

WARNING

Risk of injury from falling parts!

Never allow anyone to stand under suspended loads!

- Do not move the load over workplaces where persons are present.

CAUTION

Risk of damage to property!

Unsuitable lifting gear can cause the system to slip out or fall down.

- Only use suitable and approved lifting gear.
- Never attach the lifting gear to the piping. Use the existing stop lugs (examples Fig. 8b) or the base frame for fixation.
- Ensure stability of the load since, with the vertical pump design, the centre of gravity is shifted to the top range (top-heavy, Fig. 8a, 8b).

CAUTION

Risk of damage to property due to incorrect loading!

Subjecting the pipes and valves to loads while in transit can result in leakages.

CAUTION

Risk of damage to property due to environmental influences!

The system can be damaged by environmental influences.

- Take suitable measures to protect the system from moisture, frost and heat as well as mechanical damage.

NOTICE

- After removing the packaging, store or assemble the system in accordance with the installation conditions described (see Installation and electrical connection [▶ 33]).

5.1 Delivery

The pressure-boosting system is fixed onto a pallet (Fig. 8a, 8b), delivered on transport boards or in a transport box. The pressure-boosting system is foil-wrapped to protect it against moisture and dust.

- Observe transport and storage instructions attached to the packaging.
- The transport dimensions, weights, necessary passageways and transport areas of the system can be found on the supplied installation plan or documentation.
- On delivery and before removing the packaging, check the packaging for damage.

If damage is detected due to a fall or similar:

- Check the pressure-boosting system and accessories for possible damage.
- Notify the delivery company (forwarding agent) or customer service, even if you do not find any obvious damage to the pressure-boosting system or its accessories.

5.2 Transport

The pressure-boosting system is packed in plastic wrap to protect it against moisture and dirt.

- If the outer packaging is damaged or no longer present, apply suitable protection from humidity and dirt.
- Do not remove the outer packaging until you are at the installation site.
- If the system is transported again at a later date, fit new suitable protection against moisture and contamination.
- Demarcate and cordon off the working area.
- Keep unauthorised persons away from the working area.
- Use approved lifting slings: Sling chains or polyester webbing slings.
- Attach lifting slings to base frame:
  - Transport with forklift
  - Transport with lifting gear.
  - Fixation lugs on base frame: Sling chain with sling hook with safety latch.
  - Screw in the loosely supplied ring eyelets: Sling chain or polyester webbing sling with shackle.

- Permissible angle specification for the lifting sling
  - Fixation with sling hook: ±24°
  - Fixation with shackle: ±8°
  - If the angle specifications cannot be complied with, use a spreader beam.

5.3 Storage

- Place the system on a firm and even surface.
- Ambient conditions: 10 °C to 40 °C, max. humidity: 50 %.
- Dry hydraulics and pipework before packing.
- Protect the system from humidity and dirt.
- Protect the system from direct exposure to sunlight.

6 Installation and electrical connection

WARNING

Risk of damage to your health!

Risk of damage to your health due to contaminated drinking water.

- No materials that have adverse effects on the quality of the water may be used for drinking water installations.
- Flushing the pipes and system reduces any impairment of the drinking water quality.
- If the system is not used for a longer period of time, replace the water.

6.1 Installation location

Requirements for the installation location:

- Dry, well ventilated and frost-resistant.
- Separate and lockable (e.g. requirement of DIN 1988 standard).
- Sufficiently sized floor drainage (with sewer connection). Floor drainage is mandatory for the CO/T-1 series and when using a separate break tank.
- Free of harmful gases and secured against gas ingress.
- Maximum ambient temperature of +0 °C to 40 °C at a relative humidity of 50 %.
- Horizontal and level installation surface.
- Slight height adjustment for stabilisation possible with the vibration absorbers in the base frame (Fig. 7 – Item 34):

1. Loosen the counter nut.
2. Turn the appropriate vibration absorber out or in.
3. Fix the counter nut again.

Also note:

- Ensure adequate space for maintenance work. The main dimensions can be found in the supplied installation plan. The system should be freely accessible from at least two sides.
- Wilo advises against installation and operation near living rooms and bedrooms.
- To avoid the transmission of structure-borne noise and to ensure a stress-free connection to upstream and downstream pipes, compensators (Fig. 7 – Item 30) with extension limiters or flexible connection pipes (Fig. 7 – Item 31) must be used.

6.2 Installation

DANGER

Danger of death due to electrical current!

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

- Only have electrical connection established by an electrician approved by the local energy supply company.
- Observe applicable local regulations.
- Before swapping the phases, switch off the main switch of the system and secure it against unauthorised restarting.

6.2.1 Foundation/bearing surface

The pressure-boosting system is designed for installation on a flat concrete floor. The base frame is mounted on height-adjustable vibration absorbers as means of insulation against structure-borne noise.

NOTICE

For transport reasons, the vibration absorbers may not be installed upon delivery. Before installing the pressure-boosting system, check that all the vibration absorbers are fitted and locked by the threaded nut (Fig. 7, 8a – Item 34).

If the customer also wants to fasten the installation to the floor (Fig. 7 – Item 32), suitable measures must be taken to avoid structure-borne noise transmission.

6.2.2 Hydraulic connection and pipes

CAUTION

Property damage caused by dust caps or plugs that have not been removed!

Dust caps or plugs that have not been removed can cause clogging and damage the pump.

- Check all connections and remove any remaining leftover packaging, dust caps and plugs.

For connections to the public drinking water supply network, the requirements of the responsible local water supply company must be met.

Prerequisites:

- Completion of all welding and soldering work
- Carrying out required rinsing
- If necessary, disinfect the pipeline system and the delivered pressure-boosting system (hygiene according to local regulations (in Germany, according to TrinkwV 2001))

Installation notes:

- On-site piping installation must be completed voltage-free.
- To avoid distortion of the pipe adaptors, use compensators with length limitation or flexible connection pipes. This minimises the transmission of system oscillations to the building installation.
- In order to prevent the transmission of structure-borne noise to the building, do not fix the pipe clamps to the pressure-boosting system pipework (Fig. 7 - Item 33).

Flow resistance

Keep the flow resistance of the inlet and suction line as low as possible:

- Short piping
- Horizontal piping if possible
- Pressure and vacuum-proof pipes
- Suitable nominal diameter (at least same size as system connection)
- Minimal bends
- Sufficiently large shut-off valves
- Avoid automatic extractors

Otherwise, the protection against low water level may be activated due to severe pressure losses in the event of high volume flows:

- Observe the NPSH of the pump
- Avoid pressure losses
- Avoid cavitation

Hygiene

Installations in the drinking water supply are subject to special hygiene requirements.

- Observe all locally applicable regulations and measures for drinking water hygiene.

This description follows the German Drinking Water Ordinance (TwVO) in its applicable version.

The supplied pressure-boosting system meets the standards of current technology (in particular DIN 1988) and was checked at the factory to make sure it functions correctly. When used in drinking water applications, the complete drinking water installation has to be handed over to the operator in a perfect state of hygiene.

The following applies here:

- DIN 1988, part 400 and the commentaries on the standard.
- TwVO § 5. Paragraph 4 microbiological requirements: Flushing or disinfecting the system.

The limit values to be observed can be taken from TwVO § 5.

NOTICE

The manufacturer recommends flushing the system for cleaning.

Preparing system flushing

1. Install a T-connector on the end discharge side of the pressure-boosting system (if there is a diaphragm expansion tank on the discharge side, immediately downstream of it) upstream of the next shut-off valve (compare diagram Fig. 6a, 6b – Item 26).
2. Fit the branch with a shut-off valve for draining the flushing fluid into the waste water system during flushing.
3. Nominal diameter of the branch must be adapted according to the maximum volume flow of the pressure-boosting system.
4. If it is not possible to achieve free drainage, such as when connecting a hose, the requirements of DIN 1988-200 must be observed.

6.2.3 Install accessories

Fitting dry-running protection

In the event of a direct connection to the public water supply network:

- For CO-1 pressure-boosting systems, fit the low-water cut-out switchgear (WMS) to a connection port to be provided for this purpose in the suction line (for retrofitting) or to the drain connection port on the pump (HELIX V) and seal it (Fig. 5a). Additionally use the WMS connection kit for CO-1 for this purpose.
- Establish the electrical connection in accordance with the installation and operating instructions for the pump and in accordance with the installation and operating instructions and circuit diagram for the control device.
- In CO/T-1 pressure-boosting systems, a float switch is installed in the tank as a low-water signal transmitter and wired to the control device. No additional accessories are necessary.

In the event of indirect connection:

- If a Wilo break tank is used, a float switch for level monitoring is provided as standard as a means of protection against low water level. Establish the electrical connection to the control device of the system in accordance with the installation and operating instructions and circuit diagram for the control device. Observe the installation and operating instructions of the break tank.
- In the event of operation with tanks provided by the customer: Install the float switch in the tank so that the “low water” switching signal is transmitted if the water level drops to approximately 100 mm above the draw-off connection. Establish the electrical connection in accordance with the installation and operating instructions for the pump and in accordance with the installation and operating instructions or circuit diagram for the control device.
- Alternatively: Install a level controller and 3 submersible electrodes in the break tank:

1. Position the first electrode (earth electrode) just above the base of the tank. The electrode must always be below the water surface for the lower switching level (water shortage).
2. Position the second electrode for the lower switching level (low water) approx. 100 mm above the draw-off connection.
3. Position the third electrode for the upper switching level (no longer low water) at least 150 mm above the lower electrode.
4. Establish the electrical connection between the level control device and the frequency converter of the pump or control device and the pump or control device (see installation and operating instructions and the circuit diagram of the level control device).

NOTICE

Observe the respective manufacturer's documentation for the component.

Install diaphragm pressure vessel

NOTICE

Diaphragm pressure vessels require regular testing according to Directive 2014/68/EU (in Germany, also take into account the Ordinance on Industrial Safety and Health §§ 15(5) and 17 as well as Annex 5).

The diaphragm expansion tank (8 litre) – which is part of the scope of delivery – is delivered unmounted as an accessories kit for transportation and hygienic reasons (box (Fig. 8a, 8b – Item 42)).

- Install the diaphragm expansion tank (Item 9) on the throughflow fitting (Item 10) prior to commissioning (Fig. 3).
- Do not twist the throughflow fitting. The drain valve (see also Fig. 3, B) or the flow direction arrows printed on it must be parallel to the collecting pipe.

NOTICE

Observe the respective manufacturer's documentation for the component.

Installing an additional diaphragm pressure vessel

- Install a throughflow diaphragm pressure vessel according to DIN 4807 in drinking water installations.
- Make sure there is enough room for maintenance or replacement work.
- For maintenance work, install connections for a bypass upstream and downstream of the diaphragm pressure vessel to prevent system downtimes.
- At the end of the work, the bypass (diagram Fig. 6a, 6b – Item 29) must be completely removed to avoid stagnation of the water.

NOTICE

Observe the respective manufacturer's documentation for the component.

- The respective system conditions and the system pumping data must be taken into account when selecting the dimensioning of an additional diaphragm pressure vessel. When doing so, ensure there is sufficient flow through the diaphragm pressure vessel. The maximum volume flow of the pressure-boosting system must not exceed the maximum permissible volume flow of the diaphragm expansion tank connection (see table or the specifications on the rating plate and the installation and operating instructions for the tank).

Nominal diameter	DN 20	DN 25	DN 32	DN 50	DN 65	DN 80	DN 100
Connection	(Rp 3/4")	(Rp 1")	(Rp 11/4")	Flange	Flange	Flange	Flange
Max. volume flow (m^3/h)	2.5	4.2	7.2	15	27	36	56

Install safety valve

Installing a safety valve on the end pressure side is necessary if the operating pressure of an installed system component exceeds the maximum permissible value. This is the case if the sum of the maximum possible supply pressure and the maximum delivery pressure of the pressure-boosting system exceeds the permissible operating pressure. The safety valve must be designed so that it will drain off the volume flow occurring in the pressure-boosting system when the positive operating pressure is 1.1 times the admissible level.

NOTICE

Refer to the data sheets and characteristic curves of the pressure-boosting system for the design of the data.

- Securely drain off the outflowing water flow.

NOTICE

Observe the respective manufacturer's documentation for the component.

Install the non-pressurised break tank

WARNING

Risk of injury

Walking on or subjecting areas to load that are not intended for this purpose can lead to accidents and damage

- Walking on plastic containers/the cover is prohibited.

CAUTION

Risk of damage to property

Changes to non-pressurised break tanks can lead to impairment of the statics and to inadmissible deformations or damage to the tank.

- Note that non-pressurised break tanks are statically designed for the nominal capacity.

CAUTION

Risk of property damage due to incorrect handling.

PE tanks from the Wilo range are only designed to collect clean water.

- Clean and flush the break tank before filling it.
- Comply with the maximum water temperature of 40 °C.
- Observe the documentation of the tank.

To connect the pressure-boosting system indirectly to the public drinking water supply network, install the system together with a non-pressurised break tank according to DIN 1988 (Fig. 9a). The rules for the pressure-boosting system apply to the installation of the break tank as well (see installation location page [▶ 33]).

1. The entire base of the tank must be in contact with a solid bearing surface.
2. The maximum volume of the tank concerned must be considered when designing the bearing capacity of the bearing surface.
3. Ensure there is sufficient space for inspection work (at least 600 mm above the tank and 1000 mm on the connection sides).
4. The tank must not slant when full, because an uneven load may cause damage.

The non-pressurised (i.e. under atmospheric pressure), closed PE tank (accessory) must be installed according to the transport and installation instructions supplied:

1. Connect the tank without mechanical tension before commissioning. Make the connection with flexible components such as compensators or hoses.
2. The tank overflow must be connected according to the applicable regulations (in Germany, DIN 1988/T3 and 1988-300).
3. Take suitable measures to prevent heat transmission through the connection pipes.

4. The electrical wiring (float switch for protection against low water level) to the frequency converter of the pump or the control device of the system must be connected before the pressure-boosting system is commissioned.

NOTICE

Observe the respective manufacturer's documentation for the component.

Install the compensators

NOTICE

Compensators are subject to wear. It is necessary to regularly check for cracks or blisters, exposed fabric or other defects (see recommendations in DIN 1988).

For stress-free installation of the pressure-boosting system, connect the pipes using compensators (Fig. 7 – Item 30). The compensators must be equipped with a structure-borne noise-insulating extension limiter to absorb the reaction forces that occur.

1. Install the compensators stress-free in the pipes. No alignment errors or pipe displacement must be compensated for with compensators.
2. Tighten screws evenly and diagonally. The ends of the screws must not project beyond the flange.
3. If welding work is done near the compensators, they must be covered for protection (sparks, radiated heat). Do not paint rubber component of compensators and protect against oil.
4. Compensators must be accessible for inspection at any time and must not be covered by the pipe insulation.

NOTICE

Observe the respective manufacturer's documentation for the component.

Install the flexible connection pipes

NOTICE

Flexible connection pipes are subject to wear in operation. Regular checks for leakages or other defects are necessary (see recommendations of DIN 1988).

The flexible connection pipes in the Wilo range consist of a high-quality stainless steel corrugated hose with stainless steel braiding. In the case of pipes with threaded connections, use for stress-free installation of the pressure-boosting system and in the event of slight pipe displacement (Fig. 7 – Item 31).

1. Fit the flat-sealing stainless steel screwed connection with female thread to the pressure-boosting system.
2. Install the male pipe thread on the onward pipework.

Observe the following during installation:

- Depending on the respective size, observe the maximum permissible deformations (bend radius RB and bend angle RW) according to table 2 (Fig. 7).
- A suitable tool must be used to avoid kinking or twisting during installation.
- In the event of angular displacement of the pipes, fix the pressure-boosting system to the floor, taking into account suitable measures for reducing the structure-borne noise.
- Flexible connection pipes must be accessible for inspection at any time and must not be covered by the pipe insulation.

Nominal diameter Connection	Thread of screwed connection	Tapered male thread	Max. bend radius RB in mm	Max. bend angle BW in °
DN 32	Rp $1^1/_4$"	Rp $1^1/_4$"	250	60
DN 40	Rp $1^1/_2$"	Rp $1^1/_2$"	260	60
DN 50	Rp 2"	Rp 2"	300	50
DN 65	Rp $2^1/_2$"	Rp $2^1/_2$"	370	40

Install the pressure reducer

The use of a pressure reducer becomes necessary:

- In case of pressure fluctuations in the inlet pipe > 1 bar.
- In the event of a pre-pressure fluctuation that is so great that the pressure-boosting system must be shut down.
- If the total pressure (supply pressure and pump delivery head at zero flow point) exceeds the rated pressure.

NOTICE

Refer to the data sheets and characteristic curves of the pressure-boosting system for the design of the data.

The pressure reducer requires a minimum pressure drop of approx. 5 m or 0.5 bar. The pressure downstream of the pressure reducer (back-pressure) is the basis for the total delivery head calculation of the pressure-boosting system. When installing a pressure reducer, there must be an installation section of approximately 600 mm on the supply pressure side.

NOTICE

Observe the respective manufacturer's documentation for the component.

6.3 Electrical connection

DANGER

Danger of death due to electrical current!

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

- Only have electrical connection established by an electrician approved by the local energy supply company.
- Observe applicable local regulations.
- Before swapping the phases, switch off the main switch of the system and secure it against unauthorised restarting.

NOTICE

- For the electrical connection, observe the relevant installation and operating instructions.
- Observe the enclosed electrical circuit diagrams and connection diagrams.

Points to be taken into account:

- Technical electrical current type, voltage and frequency of the power supply network must match the details on the rating plate of the control device.
- Electrical connection cables must be adequately dimensioned for the total power of the pressure-boosting system (see rating plate, installation and operating instructions and attached electrical wiring diagrams).
- External fuse protection of the connection cable for the pressure-boosting system must be provided in accordance with the applicable local regulations (e.g. VDE0100, part 430) in compliance with the details in the installation and operating instructions.

- As a protective measure, the pressure-boosting system must be earthed according to regulations (i.e. according to the local regulations and circumstances). Connections intended for this purpose must be identified.

Additional protection against dangerous contact voltages

- For a pressure-boosting system fitted with a frequency converter, a residual-current device Type B (RCD-B) with a trigger current of 300 mA should be installed.
- The protection class of the pressure-boosting system and of the individual components can be taken from the rating plates and/or data sheets.

NOTICE

Observe the corresponding installation and operating instructions and the attached electrical wiring diagrams.

7 Commissioning

DANGER

Danger of death due to electrical current!

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

- Only have electrical connection established by an electrician approved by the local energy supply company.
- Observe applicable local regulations.
- Before swapping the phases, switch off the main switch of the system and secure it against unauthorised restarting.

DANGER

Danger of death as supply pressure is too high!

Excessive supply pressure (nitrogen) in the diaphragm pressure vessel can lead to damage or destruction of the vessel and thus to personal injury.

- Observe the safety measures for handling pressurised vessels and technical gases.
- The pressures in these installation and operating instructions (Fig. 4) are given in **bar**. If other units of pressure measurement are used, convert the figures correctly.

WARNING

Risk of injury from a lack of protective equipment!

Danger of (serious) injuries during work.

- Wear safety shoes.

CAUTION

Risk of damage to property!

Dry running can lead to the pump developing leakages and to motor overload.

- Ensure that the pump does not run dry to protect the mechanical seal and the plain bearings.

NOTICE

We recommend that the initial commissioning of the system is performed by the Wilo customer service department.

- Contact your dealer, your nearest Wilo representative or the Wilo customer service department.

NOTICE

Automatic activation after power cut

Depending on the process, the product is activated and deactivated using separate controls. The product may automatically be activated following power cuts.

7.1 Preparations and control measures

- Check that all on-site wiring has been performed correctly, in particular the earthing, prior to initial activation.
- Check that the pipe adaptors are not under stress.
- Fill the system and carry out a visual inspection for leakages.
- Open the shut-off valve at the pump and in the suction and discharge line.
- Open the pump venting screw and fill the pump slowly with water to allow the air to escape completely. Close the venting screw once the pump has been fully vented.
- In suction mode (i.e. negative level difference between break tank and pump), the pump and the suction line must be filled via the opening in the venting screw (use a funnel).
- When a diaphragm pressure vessel (optional or accessory) is installed, check that it is set to the correct supply pressure (Fig. 3, 4). To do so:

1. Depressurise the diaphragm pressure vessel on the water side:
   ⇒ Close the flow-through fixture (Fig. 3 - Item A).
   ⇒ Allow the residual water to escape via the drain (Fig. 3 - Item B).
2. Remove the top dust cap.
3. Check the gas pressure at the air valve of the diaphragm pressure vessel with an air pressure gauge (Fig. 3 - Item C):
   ⇒ If the pressure is too low (PN 2 = pump switch-on pressure p_{min} minus 0.2 – 0.5 bar or value given in the table on the tank (Fig. 4)), correct by filling with nitrogen by the Wilo customer service.
   ⇒ If the pressure is too high: Release nitrogen from the valve until the required value is reached.
4. Reinstall the dust cap.
5. Close the drain valve on the flow-through fixture.
6. Open the flow-through fixture.

- For system pressures > PN 16, the manufacturer's filling instructions should be observed for the diaphragm pressure vessel, see installation and operating instructions for the diaphragm pressure vessel.
- In the case of an indirect connection, check that the water level in the break tank is adequate, or with a direct connection, that the inlet pressure is adequate (minimum inlet pressure 1 bar).
- Check correct installation of the right dry-running protection (see protection against low water level page [▶ 42]).
- Position the float switch and electrodes for the protection against low water level in the break tank so that the pressure-boosting system is switched off at the minimum water level (see Protection against low water level page [▶ 42]).

Settings on the control device:

- Check the motor protection switch in the control device to make sure that the correct rated current is set according to the specifications on the motor rating plate.
- Check and set the operating parameters required on the control device in accordance with the attached installation and operating instructions.

NOTICE

Observe the respective installation and operating instructions for the individual component.

7.2 Protection against low water level (WMS)

7.2.1 Operation with supply pressure

The pressure switch for the optional low-water cut-out switchgear (WMS) kit (Fig. 5a, 5b) for monitoring the supply pressure is permanently set in the factory. It is not possible to change this setting!

- 1 bar: Deactivation in case of undershoot
- Approx. 1.3 bar: Reactivation in case of overshoot

When using another pressure switch as the low-water signal transmitter, observe the accompanying description about its configuration options.

NOTICE

Observe the respective manufacturer's documentation for the component.

7.2.2 Operation with separate break tank (inlet mode)

With Wilo break tanks, the level-dependent low-water monitoring is performed via a float switch (see example Fig. 9a, 9b).

- Connect the float switch before commissioning in the control device.

NOTICE

Observe the respective installation and operating instructions for the individual component.

7.2.3 Operation with integrated break tank (CO/T)

CO/T series pressure-boosting systems are shut down due to low water when the water level falls below the lower switching point of the low-water signal transmitter (Fig. 1c, 52 level B). The system is restarted once the water level reaches the upper switching point of the low-water signal transmitter (Fig. 1c, 52 level A). These settings are not intended to be changed.

7.3 Commissioning the system

WARNING

Risk of damage to your health!

Risk of damage to your health due to contaminated drinking water.

- Ensure that pipe and system flushing has been carried out.
- If the system is not used for a longer period of time, replace the water.

Once all preparations and control measures have been carried out according to "General preparations and control measures" section:

1. Activate the main switch on the control device.
2. Set the control to automatic mode.

The pressure control system switches on the pump until the consumer piping is filled with water and the set pressure has built up. If the pressure no longer changes (no consumer requirement within a preset time), the control system switches off the pump.

- Refer to the installation and operating instructions for the pump and control device for a precise description.
- See also: Preparations and control measures page [▶ 41]

8 Shutdown/dismantling

In case of maintenance or repair, take the pressure-boosting system out of operation as follows:

1. Switch off the voltage supply and secure it against unauthorised reactivation.
2. Close the shut-off valve upstream and downstream of the pressure-boosting system.

3. Shut off the diaphragm expansion tank at the throughflow fitting and drain it.
4. Drain the system completely if necessary.

9 Maintenance

9.1 Checking the pressure-boosting system

To guarantee maximum operational reliability at the lowest possible operating costs, we recommend regular inspection and maintenance of the pressure-boosting system (see DIN 1988). It is advisable to enter into a maintenance contract with a specialist company or with the Wilo customer service department.

The following checks must be carried out on a regular basis:

- Inspection of the pressure-boosting system's readiness for operation.
- Inspection of the mechanical seal of the pump The mechanical seal needs water for lubrication. Water may leak out of the gasket slightly. In case of a larger water leak, replace the mechanical seal.
- Check the diaphragm pressure vessel (a 3-month cycle is recommended) for correct supply pressure setting and impermeability (Fig. 3 and 4).

9.2 Checking the supply pressure

CAUTION

Risk of damage to property through incorrect supply pressure!

Incorrect supply pressure influences the functionality of the diaphragm pressure vessel and can lead to increased wear of the diaphragm and to system malfunctions. Excessive supply pressure will damage the diaphragm pressure vessel.

- Check supply pressure.

- Depressurise the diaphragm expansion tank on the water side (close the flow-through fixture (Fig. 3 – Item A)). Allow the residual water to escape via the drain (Fig. 3 - Item B).
- Check the gas pressure at the diaphragm pressure vessel valve (top, remove dust cap) with an air pressure gauge (Fig. 3 - Item C).
- If necessary, correct the pressure by filling with nitrogen. (PN 2 = pump switch-on pressure p_{min} minus 0.2 – 0.5 bar or value given in the table on the tank (Fig. 4) – Wilo customer service). If the pressure is too high, release nitrogen from the valve.

If the system experiences downtime for a prolonged period, see Decommissioning/Removal [▶ 42] and drain the pump by opening the drain plug at the pump support foot.

10 Faults, causes and remedies

NOTICE

- Have faults, particularly those affecting the pump or the control unit, remedied exclusively by the Wilo customer service or a specialist company.

NOTICE

- The general safety instructions must be observed during any maintenance or repair work.
- The installation and operating instructions of the pump and the control device must be observed.

The faults specified here are general faults.

- If errors are shown on the display of the control device, observe the installation and operating instructions for the control device.

Fault	Cause	Remedy
Display on the control device incorrect		Observe the installation and operating instructions for the control device and the pump.

Fault	Cause	Remedy
Pump does not start	No mains voltage	Check the fuses, cables and connections.
	Main switch “OFF”	Switch on the main switch.
	Water level in the break tank too low, i.e. low-water level reached	Check the inlet valve/supply line of the break tank.
	Low-water level switch has triggered	Check inlet pressure.
	Low-water level switch on the inlet side defective	Check and replace the low water switch if necessary.
	Electrodes connected incorrectly or supply pressure switch set incorrectly	Check the installation and setting and correct as required.
	Inlet pressure is above start-up pressure	Check the default values, correct if necessary.
	Shut-off device closed at pressure sensor/ pressure switch	Check shut-off valve, if necessary, open the shut-off valve
	Start-up pressure set too high	Check the setting, correct if necessary.
	Fuse defective	Check the fuse protection and replace it if necessary.
	Motor protection has triggered	Check the default values against the pump and motor data, measure the current values and correct the setting if necessary. Check the motor for defects, and replace if necessary.
	Power contactor defective	Check and replace it if necessary.
	Turn-to-turn fault in the motor	Check, if necessary, replace motor or have it repaired.
Pump does not shut down	Major fluctuations of the inlet pressure	Check the inlet pressure and take measures to stabilise the supply pressure if necessary (e.g. pressure reducers).
	Inlet pipe clogged or shut off	Check the inlet pipe and, if necessary, remove the clogging or open the shut-off valve.
	Nominal diameter of the inlet pipe too small	Check the inlet pipe and increase the cross-section of the inlet pipe if necessary.
	Inlet pipe installed incorrectly	Check the inlet pipe and change the pipe routing if necessary.
	Air in the inlet	Check and, if necessary, seal the piping and vent the pump.
	Impellers clogged	Check pump and replace or have it repaired if necessary.
	Non-return valve leaking	Check and replace the seal or non-return valve if necessary.
	Non-return valve clogged	Check and remove the clogging or replace the non-return valve if necessary.
	Shut-off valve in the system closed or not sufficiently open	Check shut-off valve, open fully if necessary.
	Volume flow too high	Check the pump data and default values, correct if necessary.
	Shut-off valve closed at pressure sensor	Check shut-off valve, open if necessary.
	Switch-off pressure set too high	Check the setting, correct if necessary.
	Incorrect direction of rotation of the motors	Check the direction of rotation and correct it by changing over phases if necessary.
Switching frequency too high or fluttering	Major fluctuations of the inlet pressure	Check the inlet pressure and take measures to stabilise the supply pressure if necessary (e.g. pressure reducers).
	Inlet pipe clogged or shut off	Check the inlet pipe and, if necessary, remove the clogging or open the shut-off valve.
	Nominal diameter of the inlet pipe too small	Check the inlet pipe and increase the cross-section of the inlet pipe if necessary.

Fault	Cause	Remedy
	Inlet pipe installed incorrectly	Check the inlet pipe and change the pipe routing if necessary.
	Shut-off valve closed at pressure sensor	Check shut-off valve, open if necessary.
	Incorrect supply pressure at diaphragm expansion tank	Check the supply pressure, correct if necessary.
	Shut-off valve at diaphragm expansion tank closed	Check shut-off valve, open if necessary.
	Switching difference set too low	Check the setting, correct if necessary.
Pump is not stable and/or making unusual noises	Major fluctuations of the inlet pressure	Check the inlet pressure and take measures to stabilise the supply pressure if necessary (e.g. pressure reducers).
	Inlet pipe clogged or shut off	Check the inlet pipe and, if necessary, remove the clogging or open the shut-off valve.
	Nominal diameter of the inlet pipe too small	Check the inlet pipe and increase the cross-section of the inlet pipe if necessary.
	Inlet pipe installed incorrectly	Check the inlet pipe and change the pipe routing if necessary.
	Air in the inlet	Check and, if necessary, seal the piping and vent the pump.
	Air in the pump	Vent the pump, check the impermeability of the suction line and seal it if necessary.
	Impellers clogged	Check pump and replace or have it repaired if necessary.
	Volume flow too high	Check the pump data and default values, correct if necessary.
	Incorrect direction of rotation of the motor	Check the direction of rotation and correct it by changing over phases if necessary.
Pump is not stable and/or making unusual noises	Mains voltage: a phase is missing	Check the fuses, cables and connections.
	Pump not adequately fixed to base frame	Check the fixation and re-tighten the fastening screws if necessary.
	Bearing damage	Check the pump/motor and replace it or have it repaired if necessary.
Motor or pump getting too hot	Air in the inlet	Check and, if necessary, seal the piping and vent the pump.
	Shut-off valve in the system closed or not sufficiently open	Check shut-off valve, open fully if necessary.
	Impellers clogged	Check pump and replace or have it repaired if necessary.
	Non-return valve clogged	Check and remove the clogging or replace the non-return valve if necessary.
	Shut-off valve closed at pressure sensor	Check and if necessary, open shut-off valve.
	Deactivation point set too high	Check the setting, correct if necessary.
	Bearing damage	Check the pump/motor and replace it or have it repaired if necessary.
	Turn-to-turn fault in the motor	Check, if necessary, replace motor or have it repaired.
	Mains voltage: A phase is missing	Check the fuses, cables and connections.
Current consumption too high	Non-return valve leaking	Check and replace the seal or non-return valve if necessary.
	Volume flow too high	Check the pump data and default values, correct if necessary.
	Turn-to-turn fault in the motor	Check, if necessary, replace motor or have it repaired.
	Mains voltage: A phase is missing	Check the fuses, cables and connections.

Fault	Cause	Remedy
Motor protection switch triggers	Non-return valve defective	Check and replace the non-return valve if necessary.
	Volume flow too high	Check the pump data and default values, correct if necessary.
	Power contactor defective	Check and replace it if necessary.
	Turn-to-turn fault in the motor	Check, if necessary, replace motor or have it repaired.
	Mains voltage: A phase is missing	Check the fuses, cables and connections.
Pump generates no or insufficient power	Major fluctuations of the inlet pressure	Check the inlet pressure and take measures to stabilise the supply pressure if necessary (e.g. pressure reducers).
	Inlet pipe clogged or shut off	Check the inlet pipe and, if necessary, remove the clogging or open the shut-off valve.
	Nominal diameter of the inlet pipe too small	Check the inlet pipe and increase the cross-section of the inlet pipe if necessary.
	Inlet pipe installed incorrectly	Check the inlet pipe and change the pipe routing if necessary.
	Air in the inlet	Check and, if necessary, seal the piping and vent the pumps.
	Impellers clogged	Check the pump and replace it or have it repaired if necessary.
	Non-return valve leaking	Check and replace the seal or non-return valve if necessary.
	Non-return valve clogged	Check and remove the clogging or replace the non-return valve if necessary.
	Shut-off valve in the system closed or not sufficiently open	Check and if necessary, fully open the shut-off valve.
	Low-water level switch has triggered	Check inlet pressure.
	Incorrect direction of rotation of the motors	Check the direction of rotation and correct it by changing over phases if necessary.
	Turn-to-turn fault in the motor	Check, if necessary, replace motor or have it repaired.
Dry-running protection switches off although water is present	Major fluctuations of the inlet pressure	Check the inlet pressure and take measures to stabilise the supply pressure if necessary (e.g. pressure reducers).
	Nominal diameter of the inlet pipe too small	Check the inlet pipe and increase the cross-section of the inlet pipe if necessary.
	Inlet pipe installed incorrectly	Check the inlet pipe and change the pipe routing if necessary.
	Volume flow too high	Check the pump data and default values, correct if necessary.
	Low-water electrodes connected incorrectly or supply pressure switch set incorrectly	Check the installation and setting and correct as required.
	Low-water level switch or pressure sensor on the inlet side defective	Check and replace the low water switch or pressure sensor if necessary.
Dry-running protection does not switch off, although water low	Low-water electrodes connected incorrectly or pressure for low water cut-out switch set incorrectly	Check the installation and setting and correct as required.
	Low-water level switch on the inlet side defective	Check and replace the low water switch if necessary.

You can find information on faults to the pump or the control device not dealt with here in the attached installation and operating instructions for the components concerned.

- If a fault cannot be repaired, contact an installer or Wilo factory customer service.

11 Spare parts

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

12 Disposal

12.1 Oils and lubricants

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

12.2 Water-glycol mixture

The operating fluid complies with Water Hazard Class 1 of the German Administrative Regulation of Substances Hazardous to Water (VwVwS). When disposing of it, the locally applicable guidelines (e.g. DIN 52900 on propanediol and propylene glycol) must be observed.

12.3 Protective clothing

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

12.4 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.

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

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

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

12.5 Batteries/rechargeable batteries

Batteries and rechargeable batteries must not be disposed of with domestic waste and they must be removed before product disposal. End consumers are legally obliged to return all used batteries and rechargeable batteries. For this purpose, you can return used batteries and rechargeable batteries free of charge at municipal collection points or specialist retailers.

NOTICE

Disposal in domestic waste is prohibited!

Batteries and rechargeable batteries affected are marked with this symbol. The identifier for the heavy metal they contain is displayed beneath the graphic:

- **Hg** (mercury)
- **Pb** (lead)
- **Cd** (cadmium)

13 Appendix

13.1 Captions

Fig. 1a Example of CO-1HELIX V6... /EC pressure-boosting system Fig. 1b Example of CO-1HELIX V52... /EC pressure-boosting system Fig. 1c Example of CO/T-1HELIX V6... /EC pressure-boosting system	
1	Pump
2	Control device
3	Base frame
4	Inlet connection
5	Discharge pipe
6	Shut-off valve on the inlet side (optionally for some types)
7	Shut-off valve on the discharge side
8	Non-return valve
9	Diaphragm pressure vessel
10	Throughflow fitting
11	Pressure gauge (on the discharge side)
12	Pressure sensor (on the discharge side)
13	Mounting bracket for fixation of the control device
14	Low-water cut-out switchgear (WMS) (optional)
17	Motor
34	Oscillation absorber
43	Float valve (inlet)
47	Drain
52	Low-water signal transmitter/float switch
A	Tank full, contact closed (water not low)
B	Tank empty, contact open (low water)
	Core colours
BN	BROWN
BU	BLUE
BK	BLACK
53	Break tank (CO/T)
54	Inspection opening/cover
55	Operational overflow (pipe socket)
56	Overflow box (optional)
57	Float valve securing mechanism (to be removed before commissioning)

Fig. 2 Pressure sensor (on the discharge side) and diaphragm expansion tank kit	
9	Diaphragm pressure vessel
10	Throughflow fitting
11	Pressure gauge
12-a	Pressure sensor
12-b	Electrical connection, pressure sensor
18	Drain/venting
19	Shut-off valve

Fig. 3 Throughflow fitting operation/pressure testing of the diaphragm pressure vessel	
9	Diaphragm pressure vessel
10	Throughflow fitting
A	Open/close
B	Drain

Fig. 3 Throughflow fitting operation/pressure testing of the diaphragm pressure vessel	
C	Check the supply pressure (nitrogen – N_2)

Fig. 4 Reference table nitrogen pressure diaphragm pressure vessel (example)	
a	Nitrogen pressure according to the table
b	Start-up pressure base-load pump PE (bar)
c	Nitrogen pressure PN 2 (bar)
d	Notice: Nitrogen measurement without water
e	Notice: Caution! Fill with nitrogen only.

Fig. 5a Low-water cut-out switchgear (WMS) kit mounted on drain connection Fig. 5b Electrical connection options/WMS switching logic	
14-a	WMS kit
14-1	PS3 pressure switch
14-2	Plug (PS3-Nxx or PS3-4xx versions)
14-2a	PS3-4xx two-core connection cable, normally-closed function (opens when pressure drops)
14-2b	PS3-Nxx three-core connection cable, changeover contact function
14-3	Pressure gauge
14-4	Distributor/fitting
14-5	Air vent valve
14-6	Stop valve
14-b	WMS connection kit
14-7	Screwed connection
14-8	Fitting
14-9	Pump drainage screw
14-10	O-ring seals
BN	BROWN
BU	BLUE
BK	BLACK
	Connection in control device (see supplied terminal diagram)

Fig. 6a Example of a direct connection (hydraulic diagram) Fig. 6b Example of an indirect connection (hydraulic diagram)	
20	CO-1... system
21	Consumer connections upstream of the pressure-boosting system
22	Diaphragm pressure vessel (accessory) on the inlet side with bypass
23	Diaphragm pressure vessel (accessory) on the discharge side with bypass
24	Consumer connections downstream of the pressure-boosting system
25	Infeed connection for flushing the system
26	Drainage connection for flushing the system
27	Non-pressurised break tank (accessory) on the inlet side
28	Flushing apparatus for inlet connection of the break tank
29	Bypass for inspection/maintenance only (not permanently installed)

Fig. 7 Installation example	
2	Control device
30	Compensator with extension limiters (accessory)
31	Flexible connection pipe (accessory)
32	Floor fixation with structure-borne noise insulation (provided by the customer)

Fig. 7 Installation example	
33	Fixation of pipes, e.g. with pipe clamp (provided by the customer)
34	Screw the vibration absorber (included in the scope of delivery) into the threaded inserts provided and secure with a counter nut
RW	Bend angle for flexible connection pipe
RB	Bend radius for flexible connection pipe

Fig. 8a Transport information example for CO-1HELIX V6.../EC Fig. 8b Transport information example for CO-1HELIX V52.../EC	
2	Control device
34	Screw the vibration absorber (included in the scope of delivery) into the threaded inserts provided and secure with a counter nut
35	Eye bolts/transport lugs for the attachment of lifting slings
36	Transport pallet/transport frame (example)
37	Transport equipment (example: pallet truck)
38	Transport securing (screws)
39	Transport securing (strap)
40	Lifting equipment (example – crane gear (Fig. 9a), load bar (Fig. 9b)
41	Protective wrapper (example – lifting strap)
42	Box/bag with accessories/accessories kit (e.g. diaphragm pressure vessel, counter flanges, oscillation absorbers etc.)

Fig. 9a Break tank (accessory example)	
43	Inlet (with float valve (accessory))
45	Inspection opening
46	Overflow Ensure adequate drainage. Provide siphon or valve to prevent ingress of insects. No direct connection to the sewer system (free drainage according to EN 1717)
47	Drain
48	Extraction (connection for pressure-boosting system)
49	Terminal box for low-water signal transmitter and/or overflow signal transmitter
50	Level display

Fig. 9b Low-water signal transmitter (float switch) with connection diagram	
49	Terminal box for low-water signal transmitter and/or overflow signal transmitter
52	Low-water signal transmitter/float switch
A	Floater top, tank full, contact closed (water not low)
B	Floater bottom, tank empty, contact open (low water)
53	Overflow signal transmitter/float switch
C	Floater top, overflow alarm
D	Floater bottom, no overflow alarm
	Core colours
BN	BROWN
BU	BLUE
BK	BLACK

Fig. 10a Break tank and float valve CO/T	
a	Clamp for cover locking device
b	Inspection opening
c	Cover
d	Float valve (filling valve)
e	Maximum water level

Fig. 10a Break tank and float valve CO/T	
f	Minimum water level
g	Shut-off valve with screwed connection (provided by the customer)
h	Fixation of pipes, e.g. with pipe clamp (provided by the customer)
i	Drain connection for pump
k	Overflow connection (operational overflow)
l	Overflow box (emergency overflow) with cover
m	Drain
n	Floater ball of the filling valve

Fig. 10b Float valve CO/T A – Setup	
a	Valve seat
b	Screw
c	Gasket
d	Valve body
e	Housing
f	Spring
g	Threaded ring
h	Plug
i	Pin
j	Support nut
k	Sealing washer (internal)
l	Slow flow outlet adapter
m	Screw
n	Lever
o	Lever bar
p	Screws for fastening
q	Jet regulator
r	Metal sheet

Fig. 10b Float valve CO/T B – Float valve CO/T (11/4) characteristic curve	
Q (m^3/h)	Flow rate
P (bar)	Inlet pressure

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