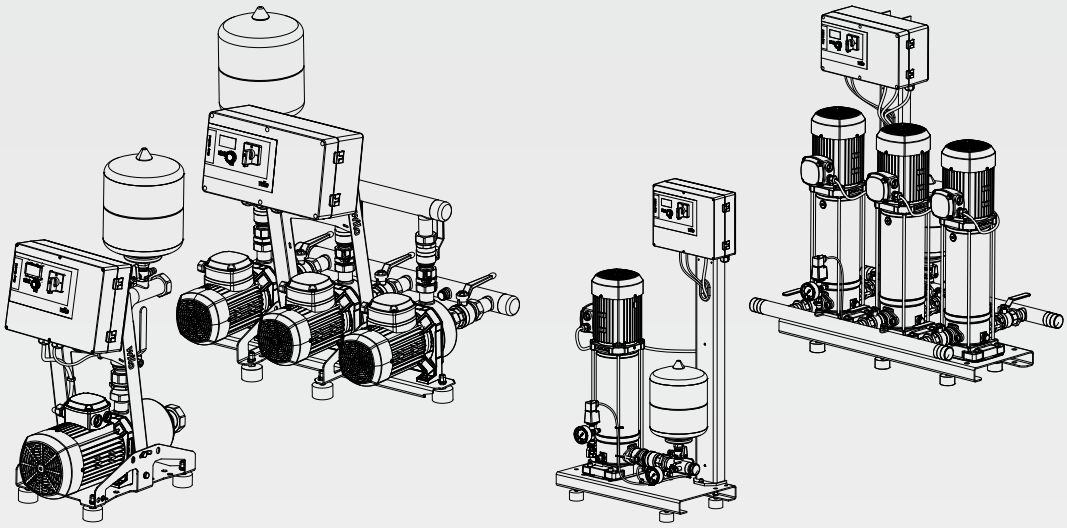
Pioneering for You

Wilo Isar-MODH1
Wilo Isar-MODV1



en Installation and operating instructions

2552079 • Ed.02/2021-04

Fig. 1a

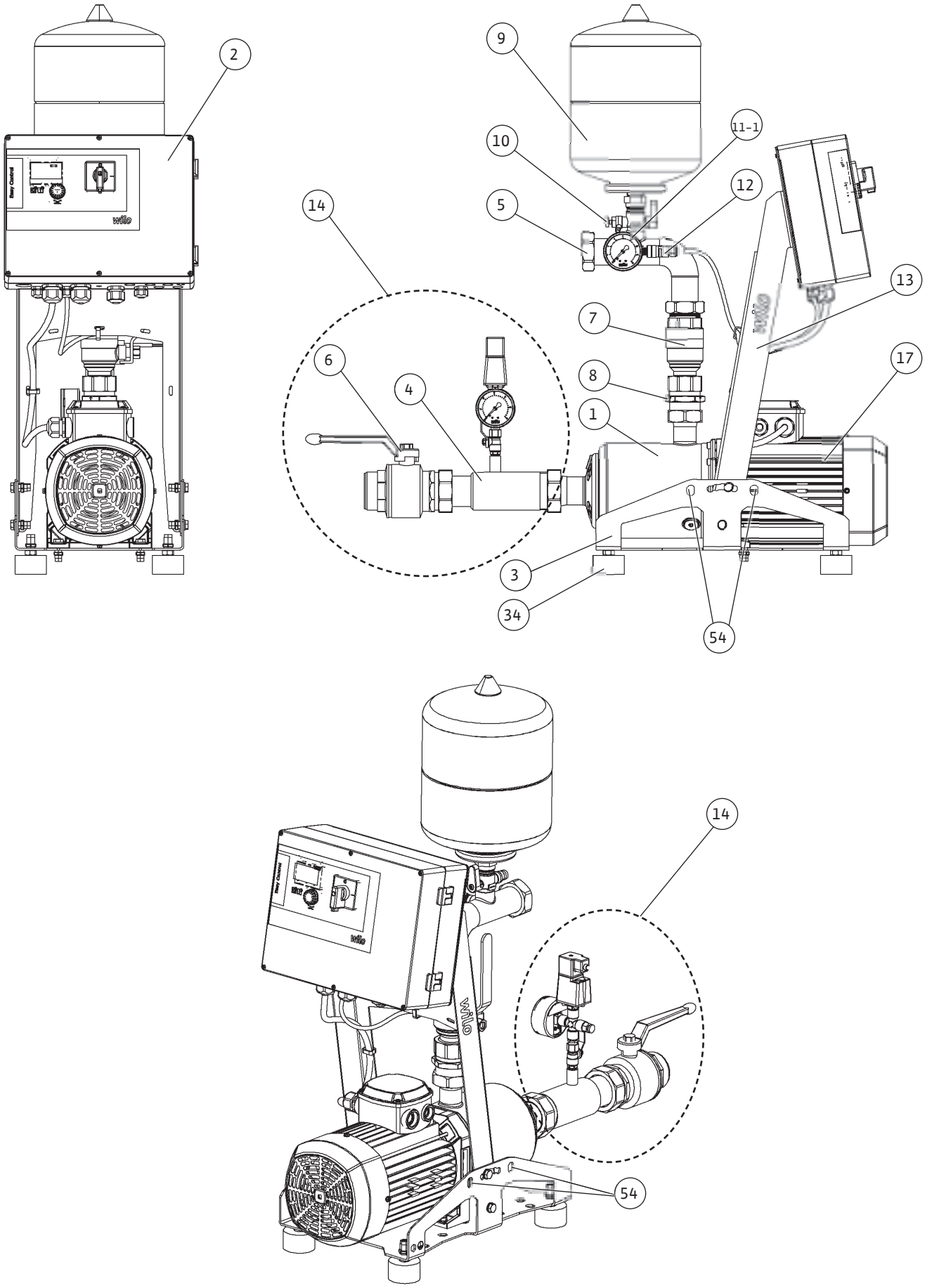


Fig. 1b

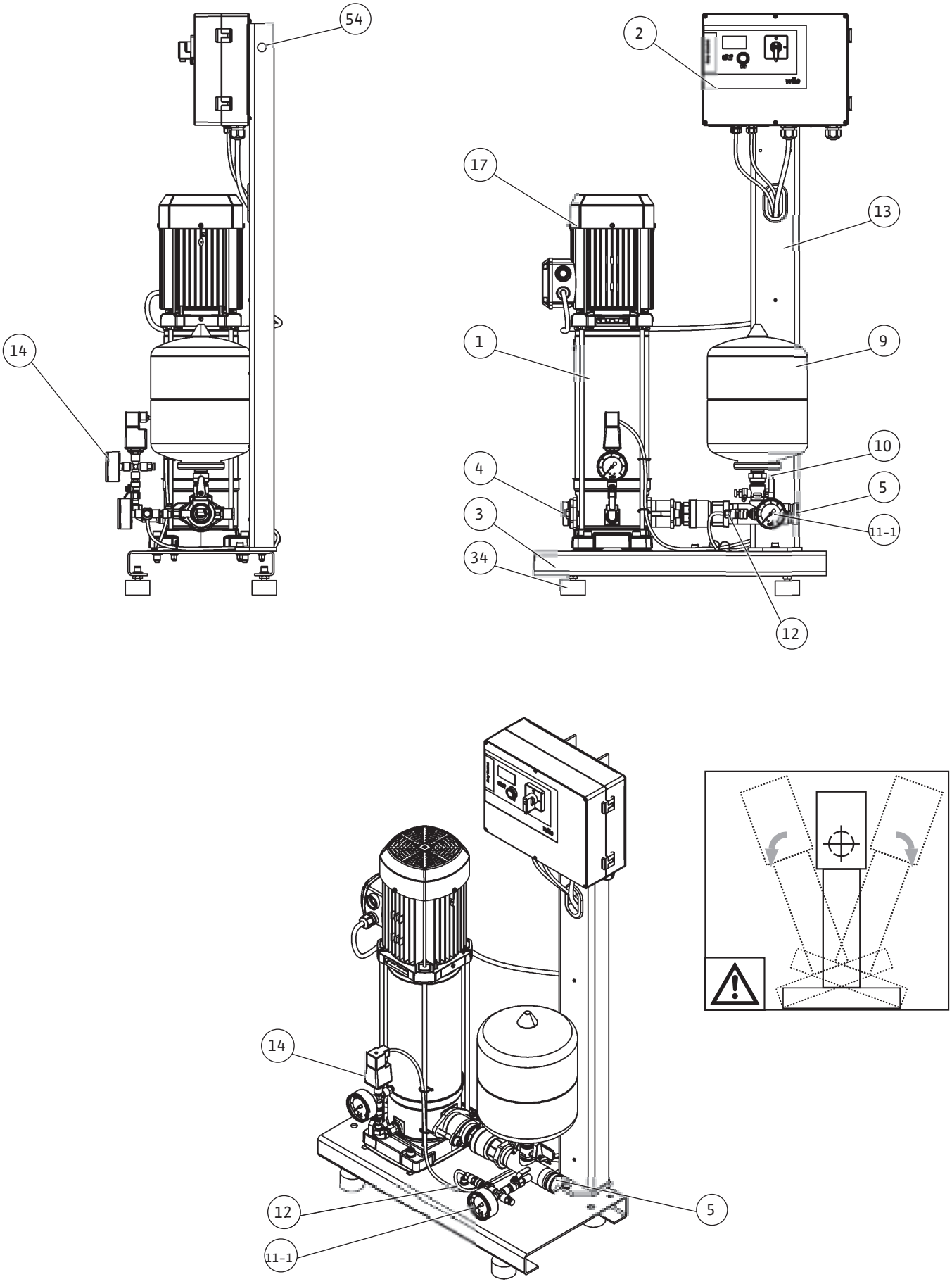


Fig. 2a

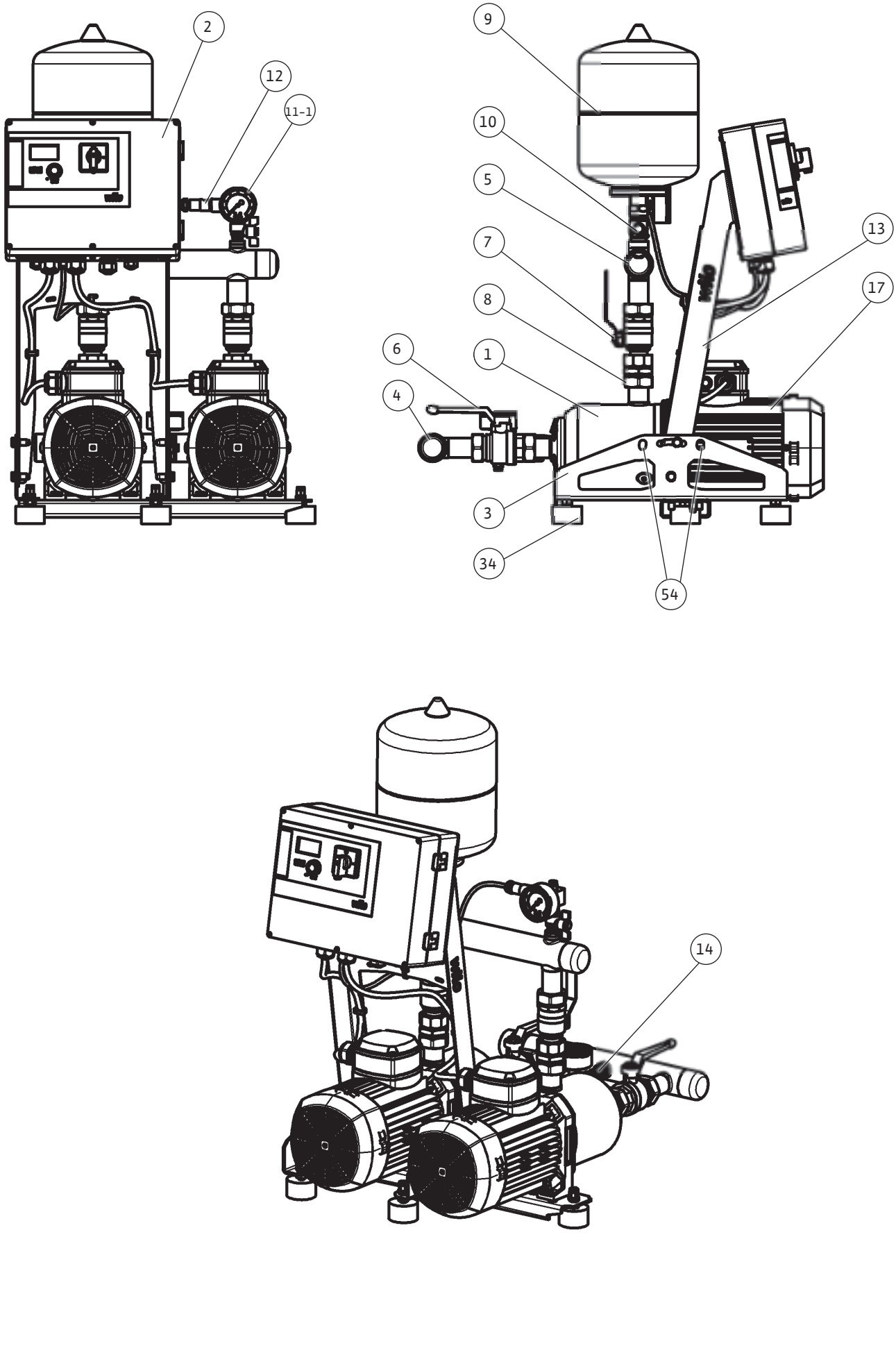


Fig. 2b

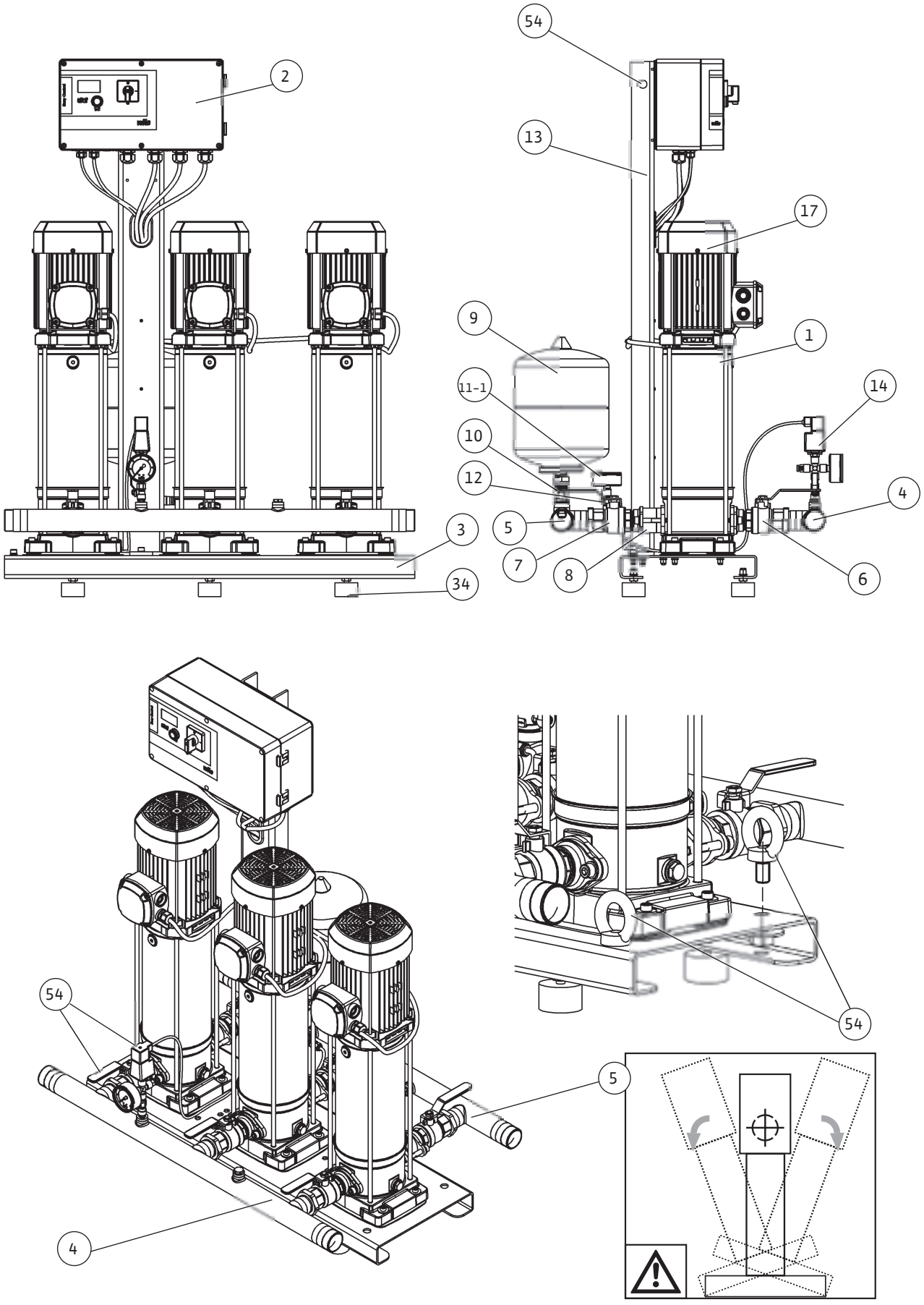


Fig. 3a

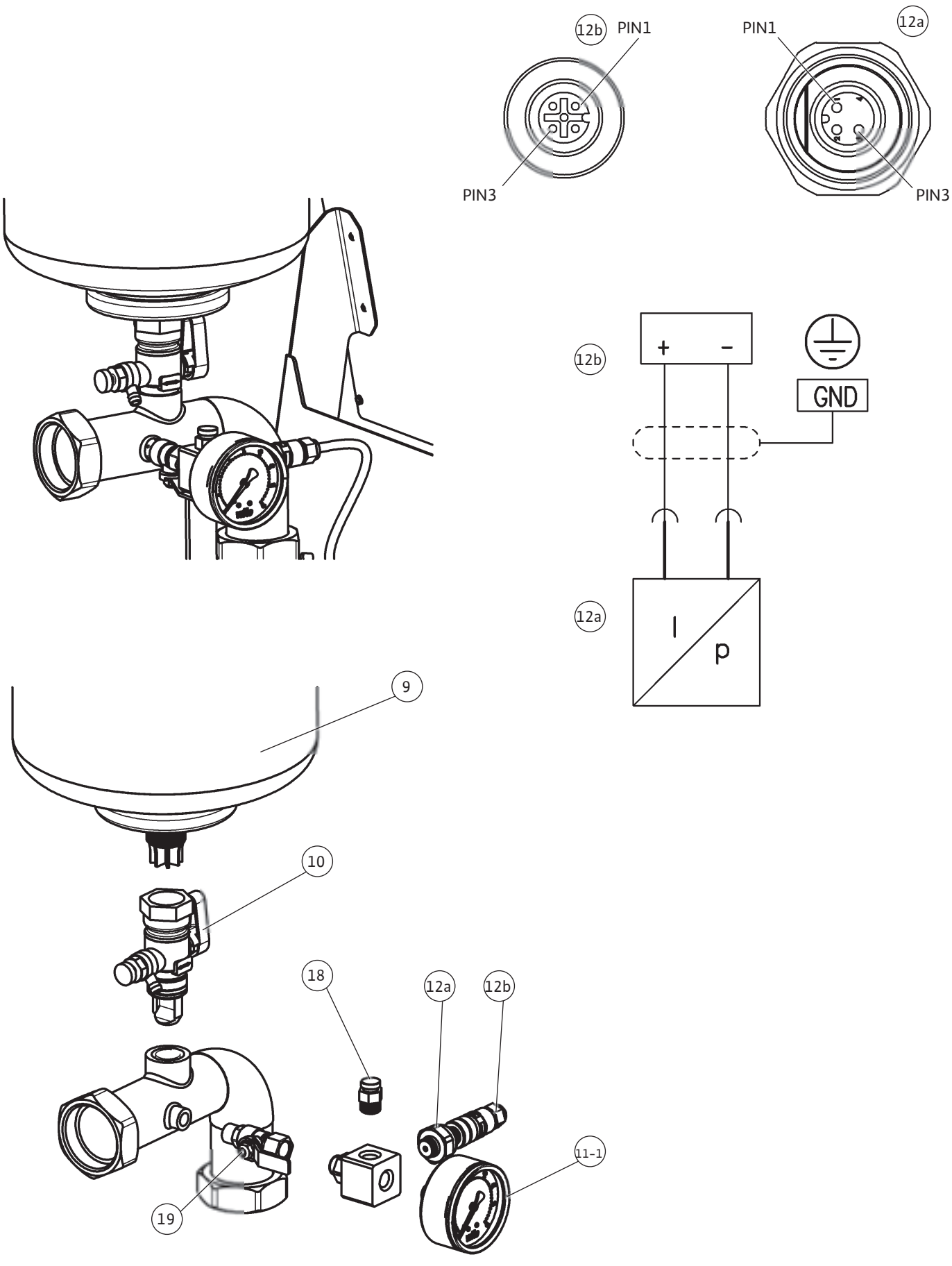


Fig. 3b

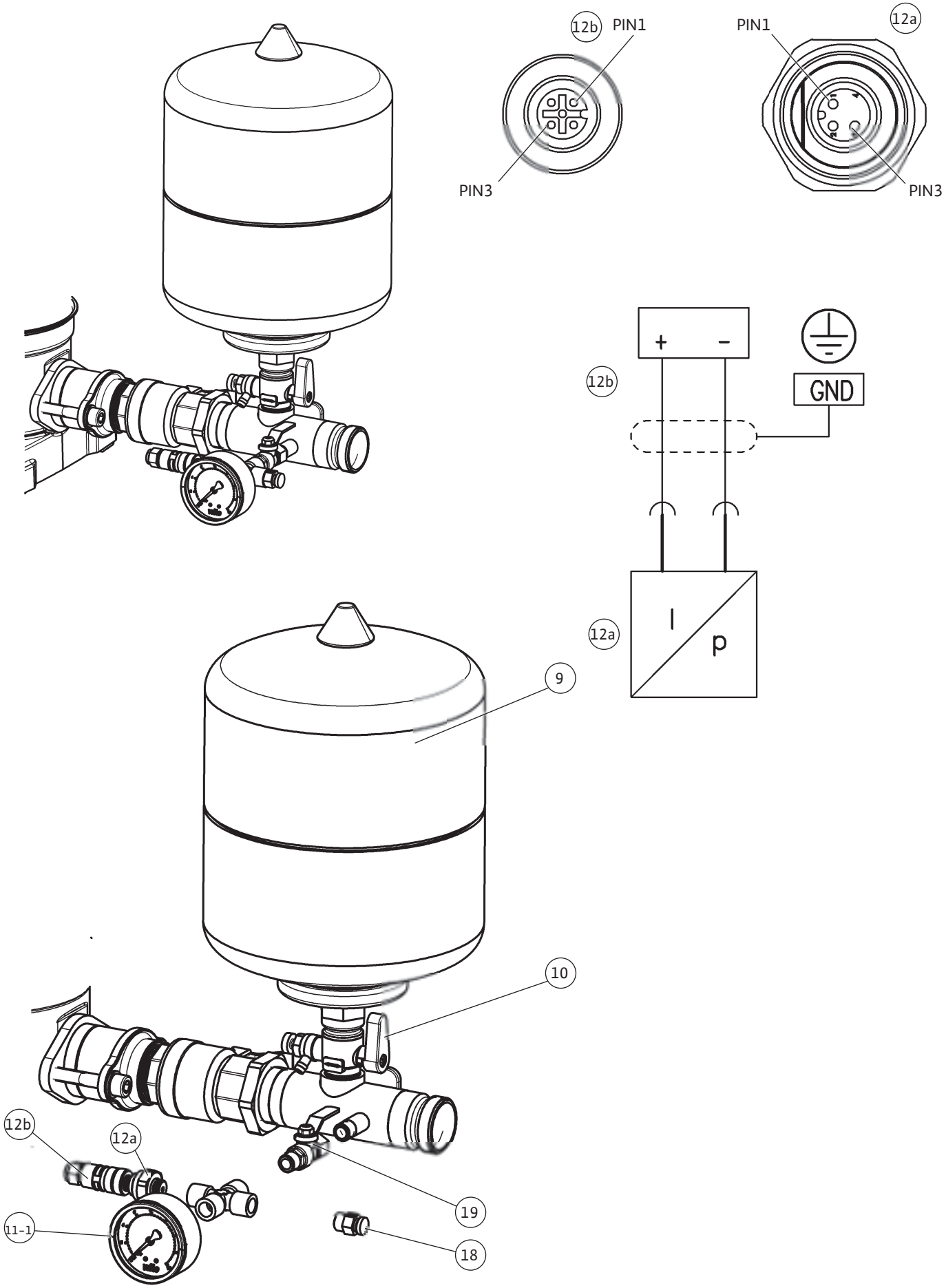


Fig. 3c

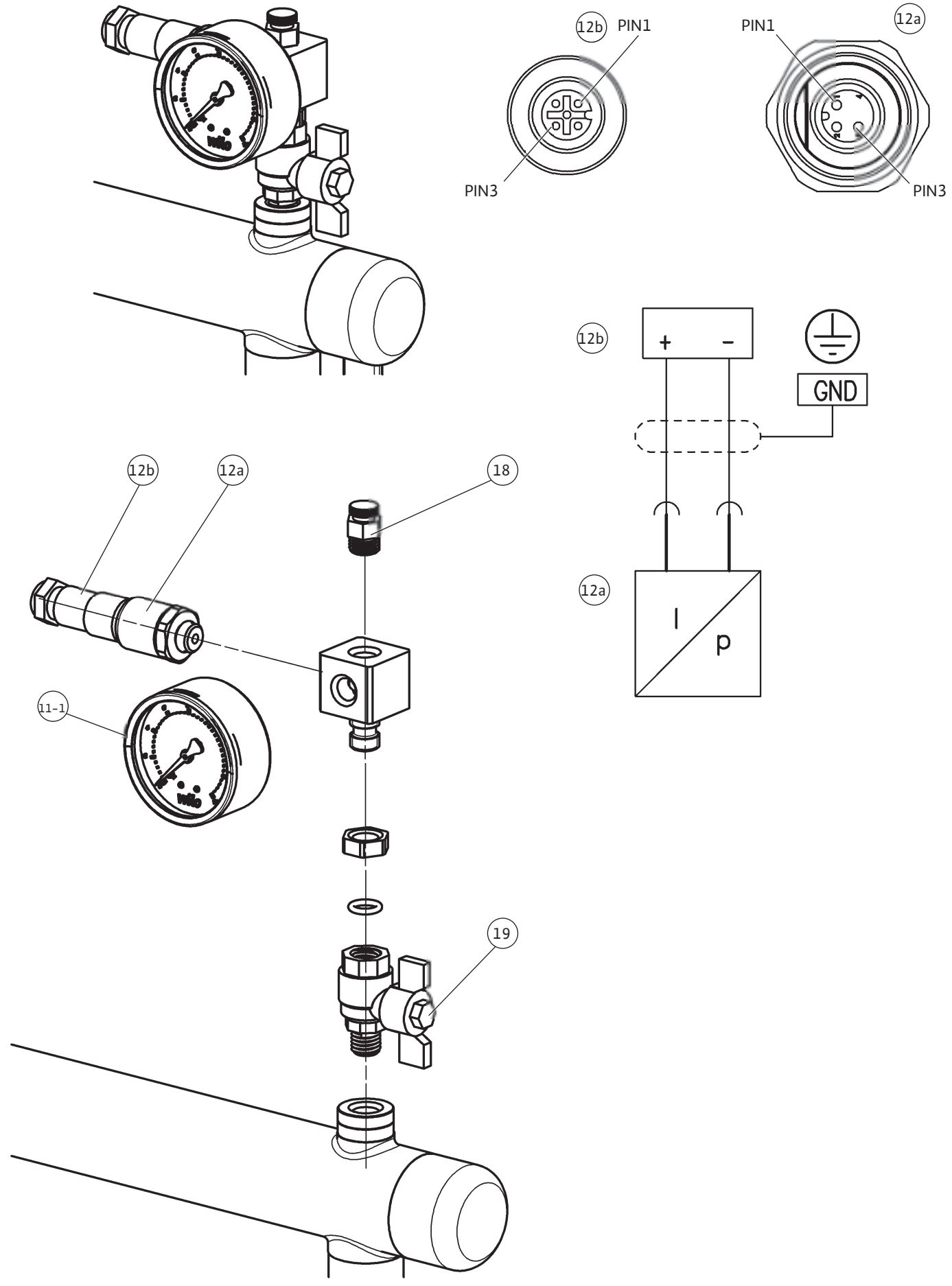


Fig. 3d

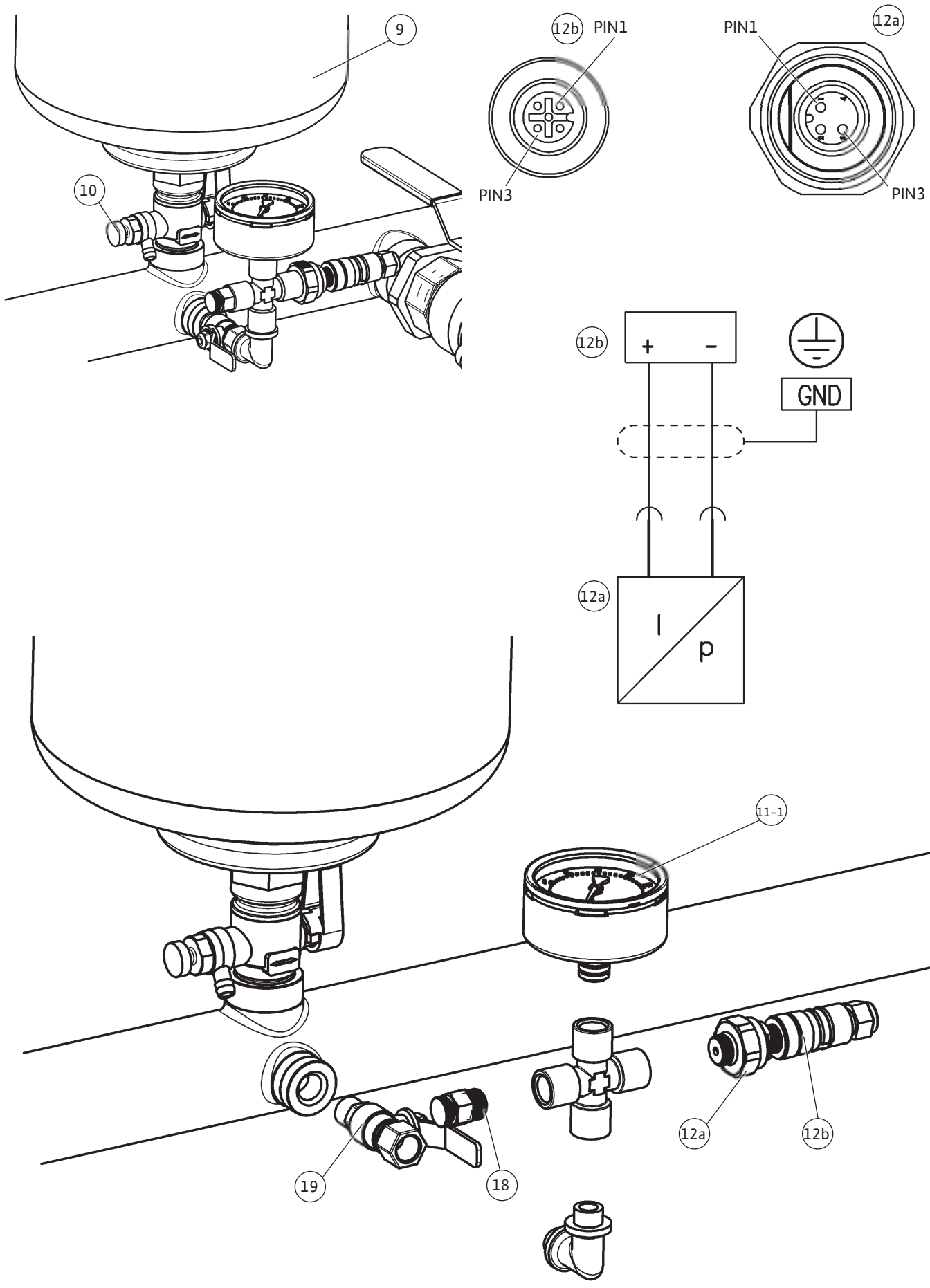


Fig. 4

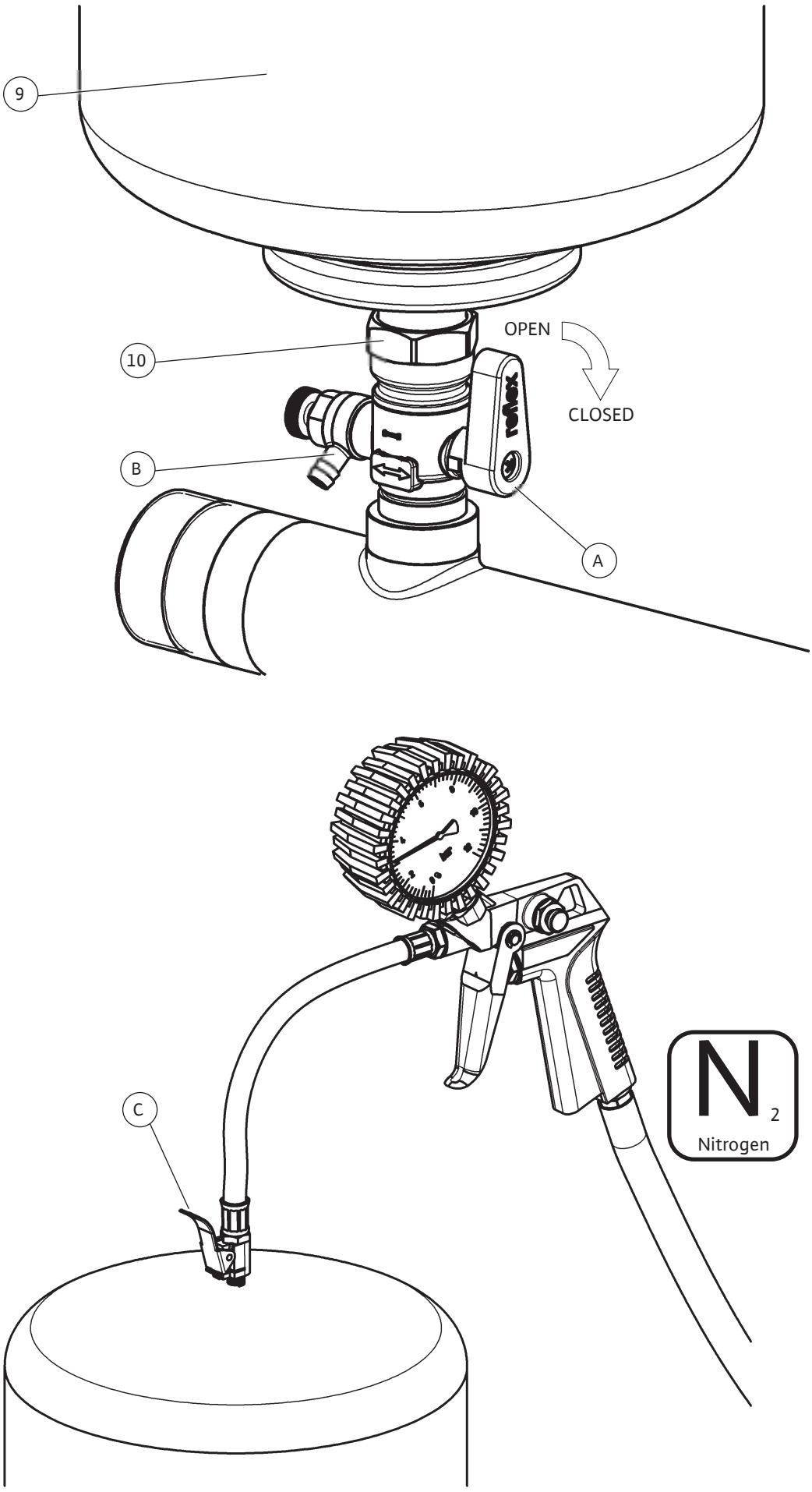


Fig. 5

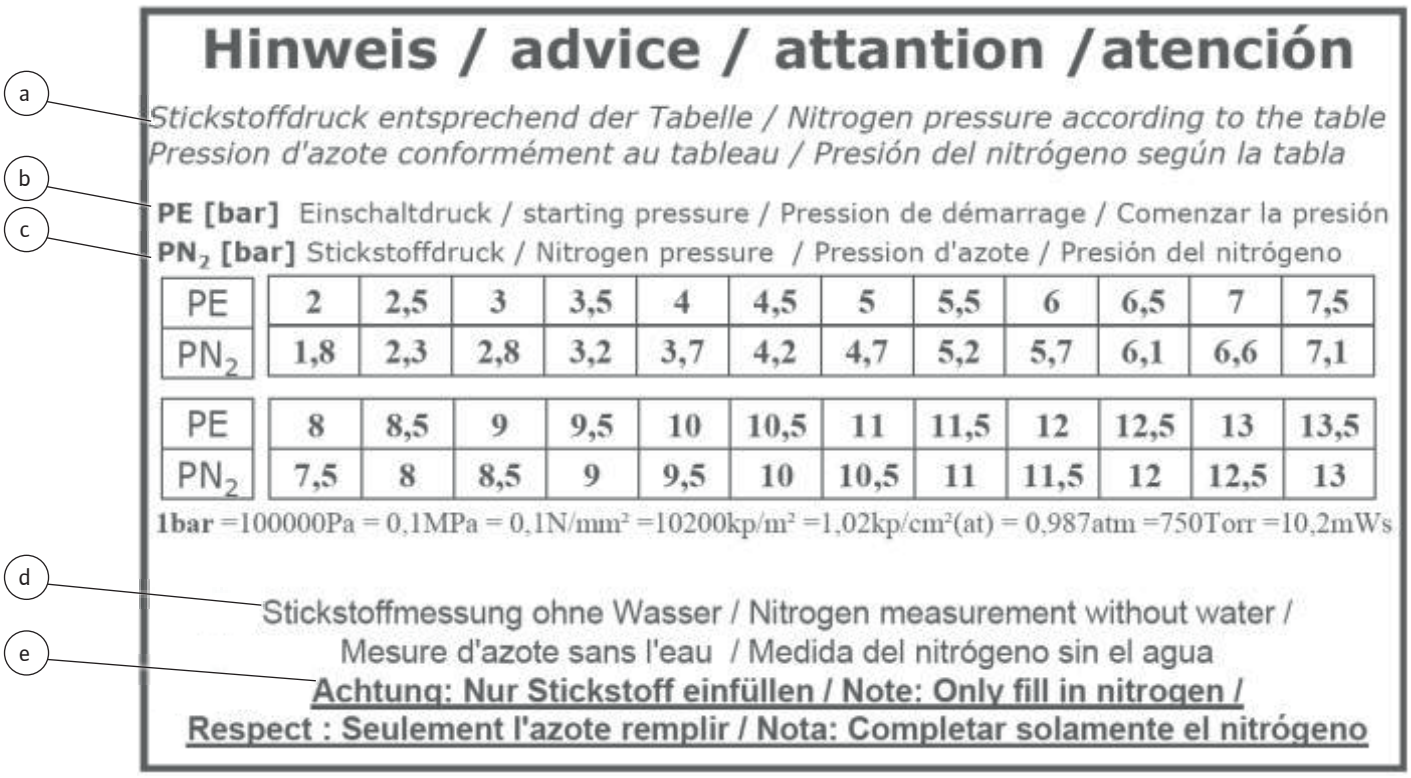

Hinweis / advice / attantion /atención
a
Stickstoffdruck entsprechend der Tabelle / Nitrogen pressure according to the table
Pression d'azote conformément au tableau / Presión del nitrógeno según la tabla
b
PE [bar] Einschaltdruck / starting pressure / Pression de démarrage / Comenzar la presión
c
PN2 [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. 6a

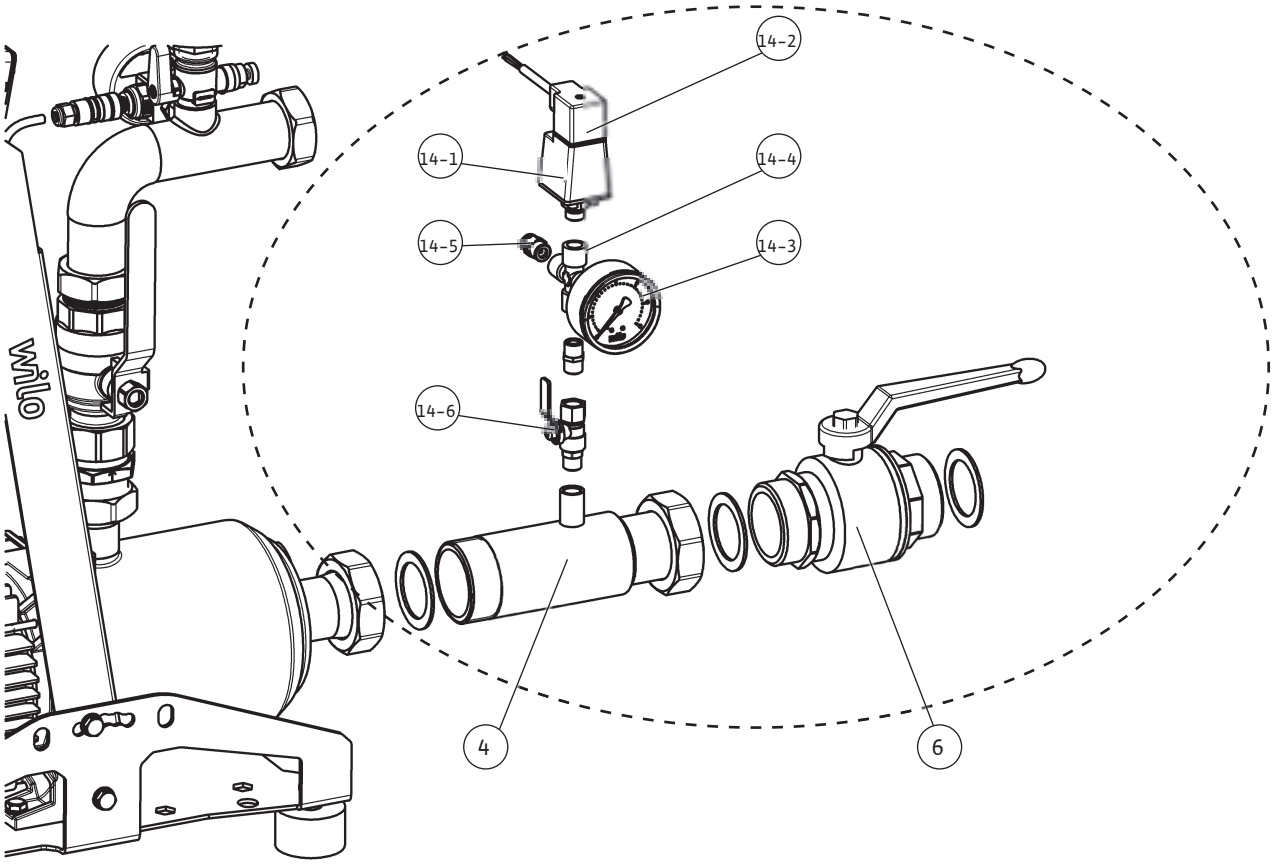


Fig. 6b

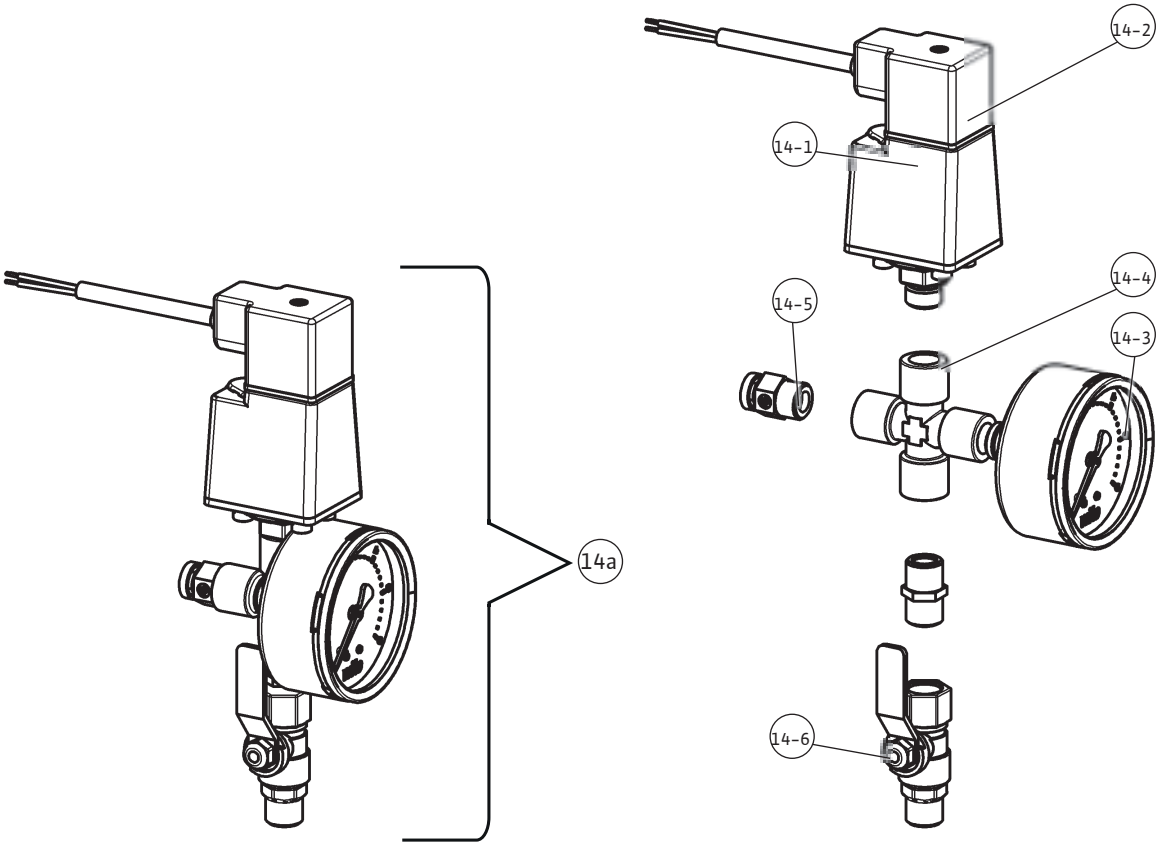


Fig.6c

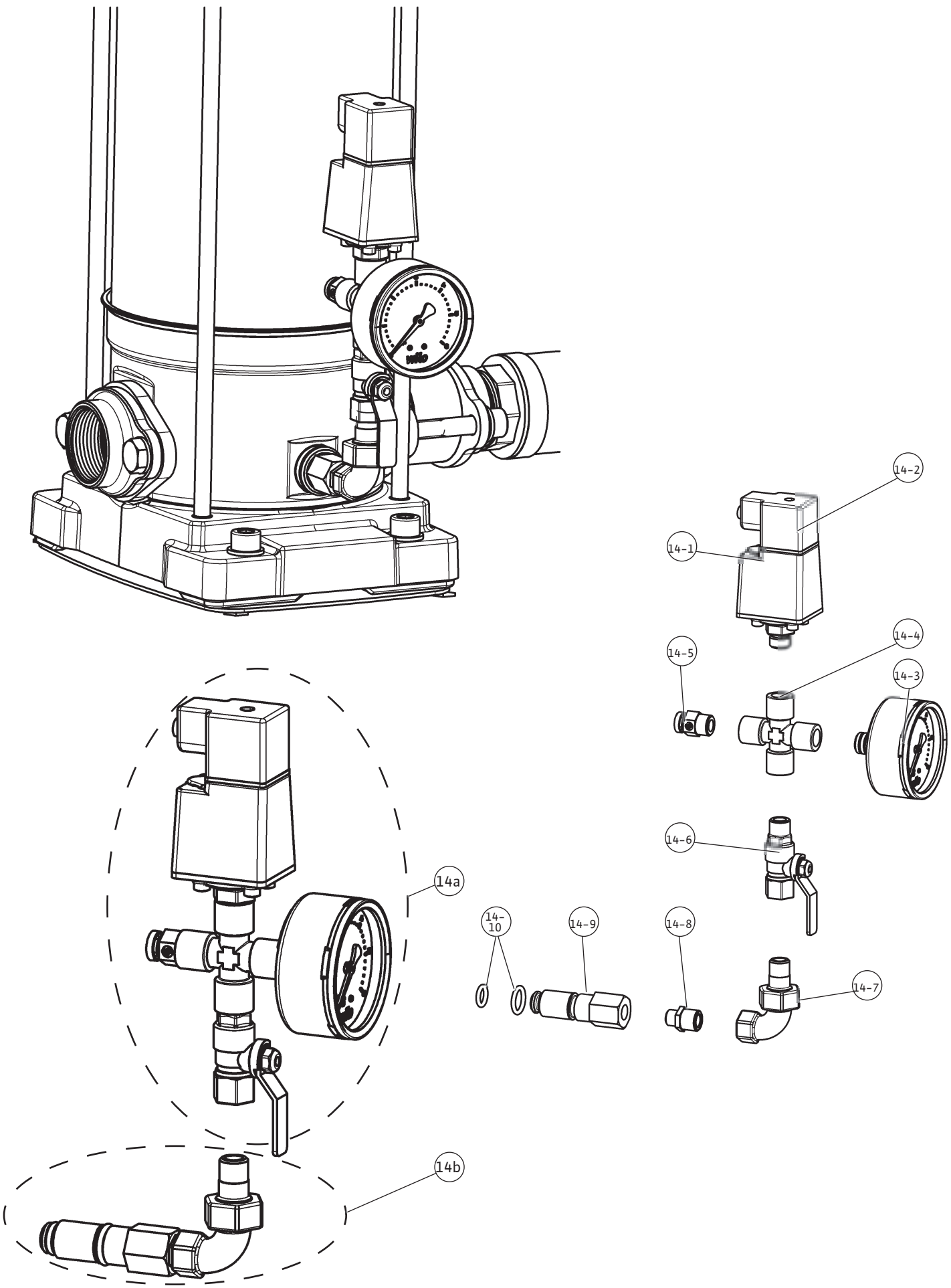
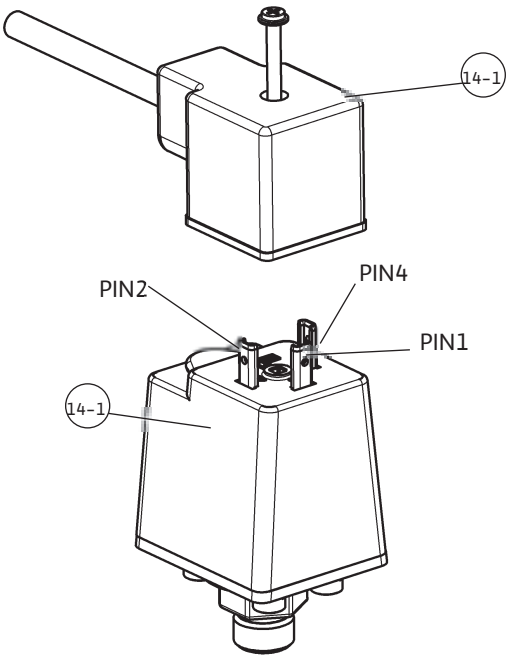
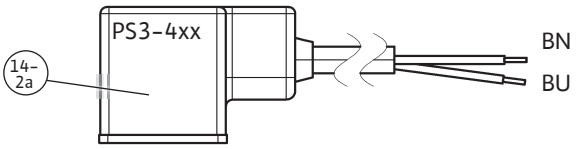
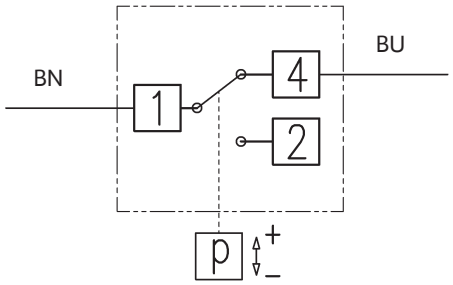


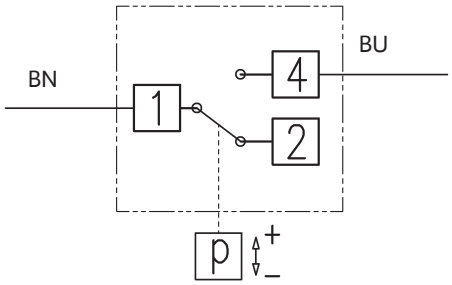
Fig. 6d



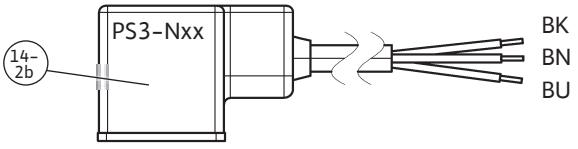


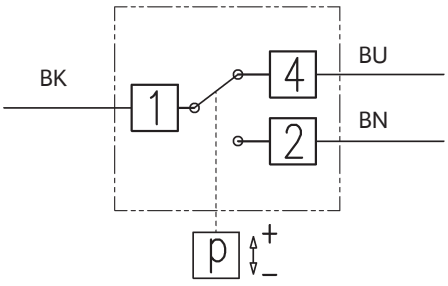


P>1,3 bar

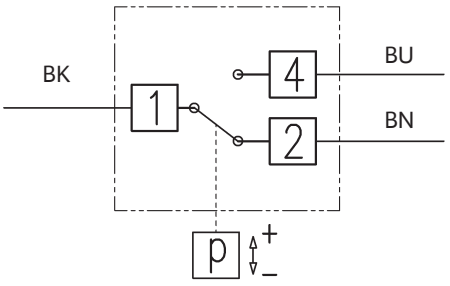


P>1,0 bar





P>1,3 bar



P>1,0 bar

Fig. 7a

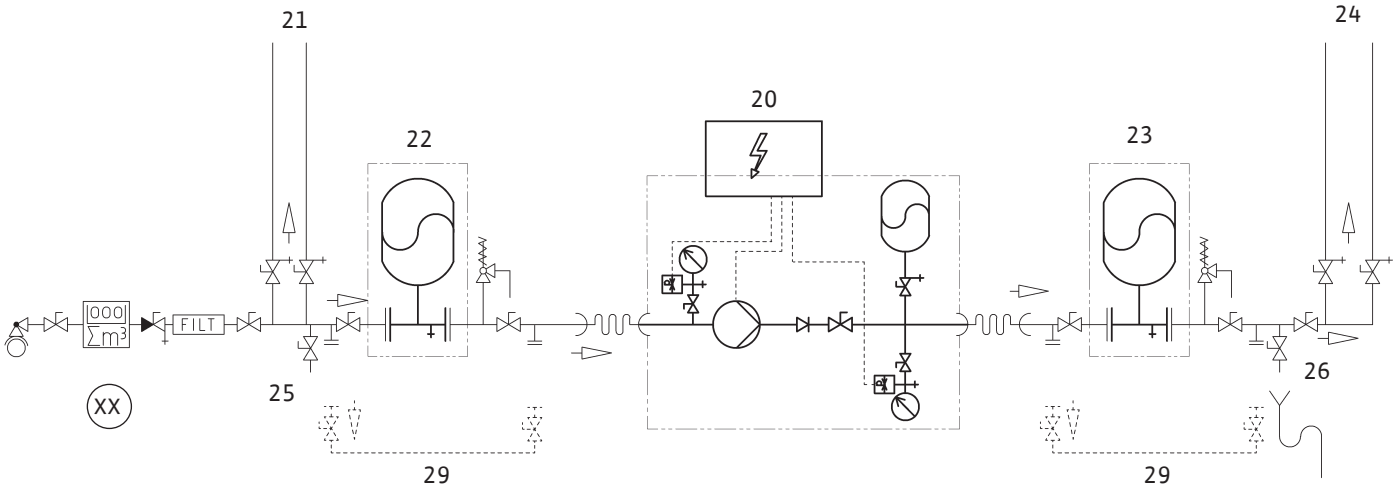


Fig. 7b

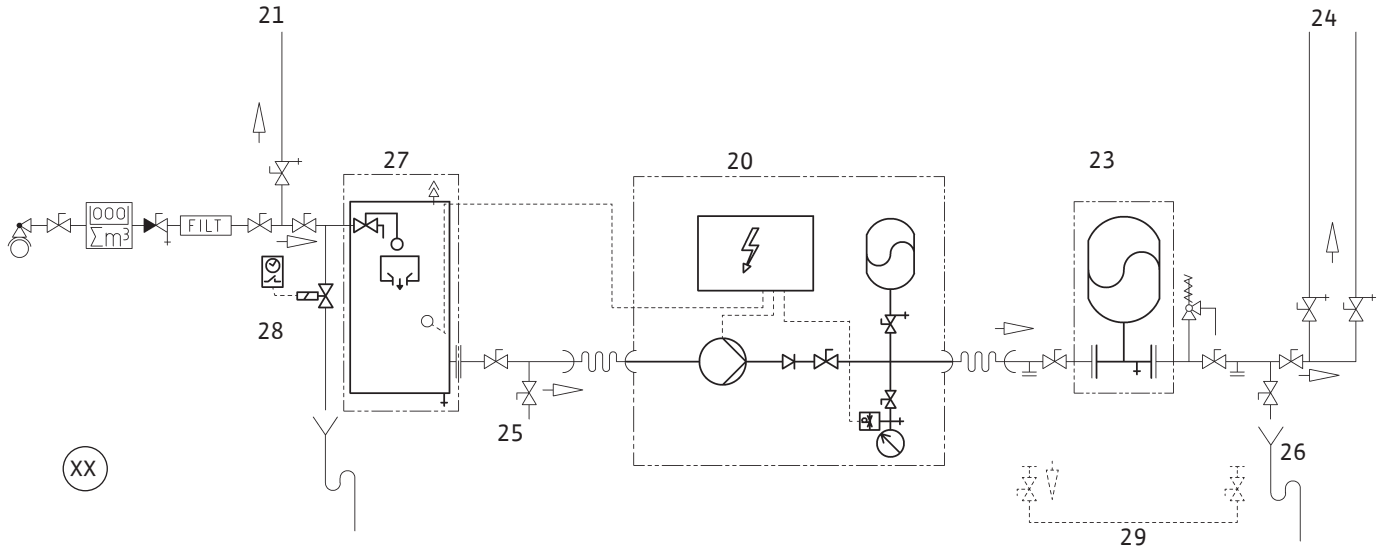


Fig. 8a

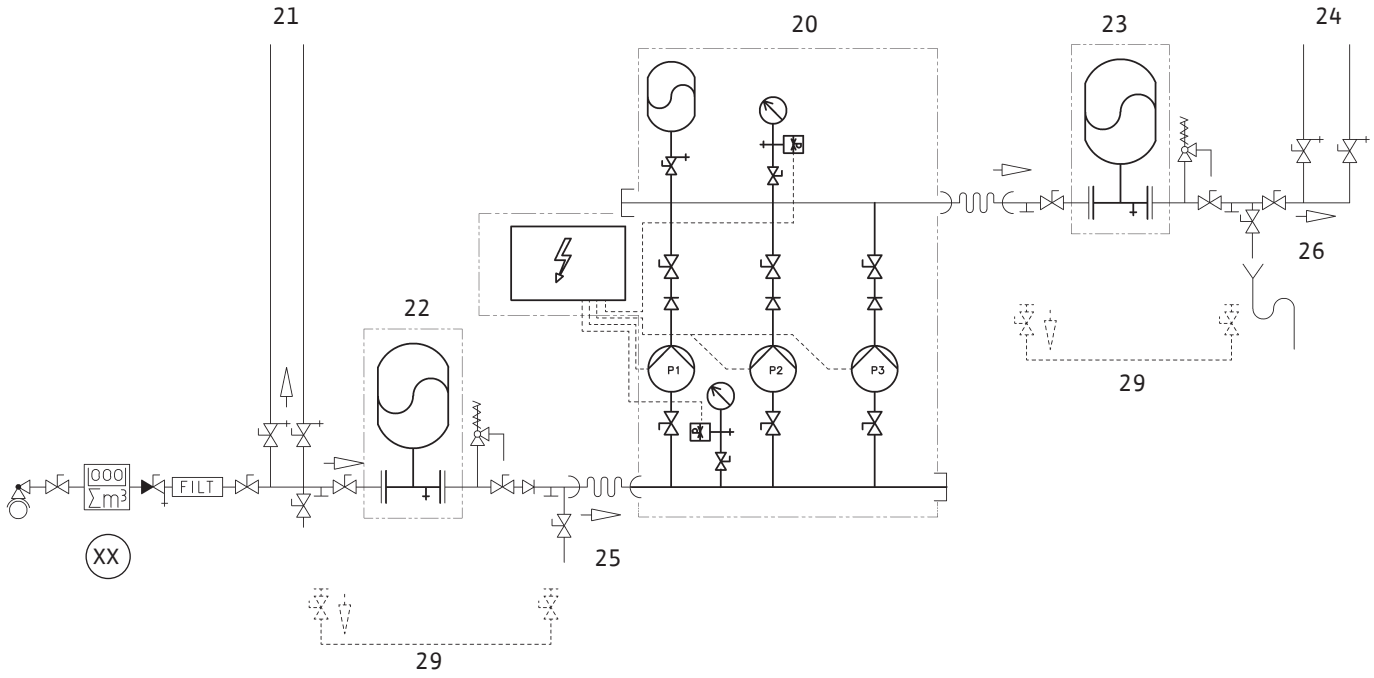

21
20
23
24
22
26
P1
P2
P3
29
FILT
XX
25
29

Fig. 8b

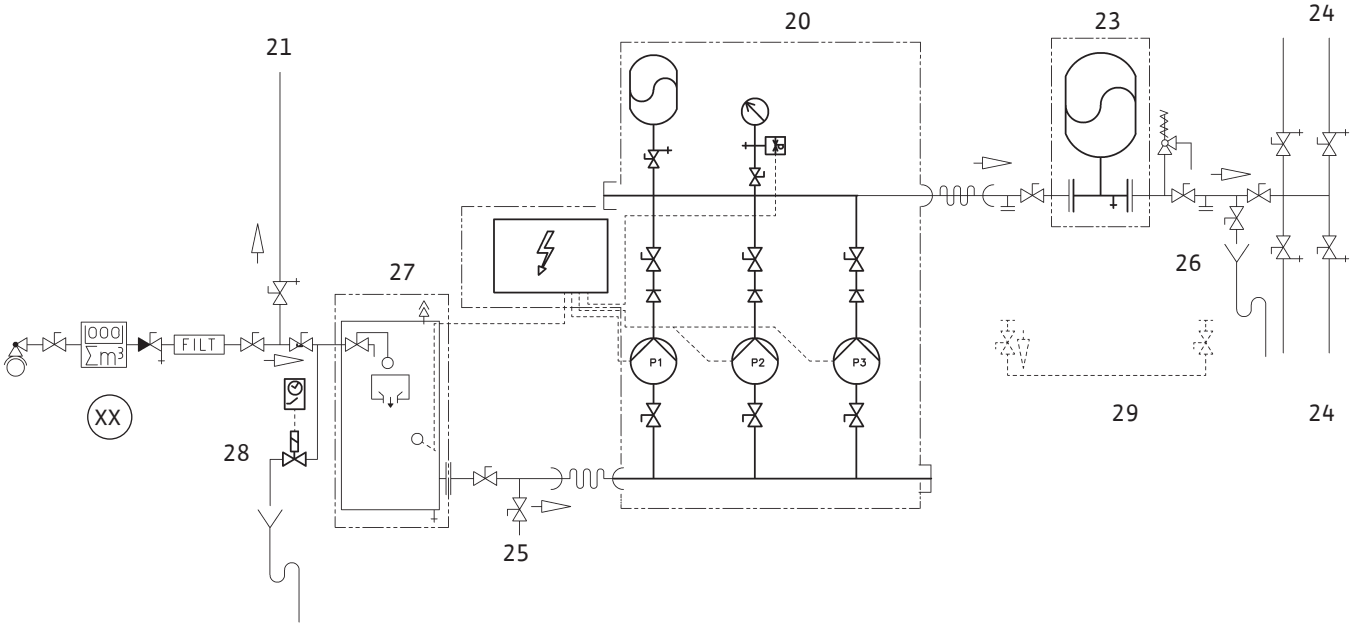

20
23
24
21
27
26
FILT
XX
28
P1
P2
P3
29
24
25

Fig. 9a

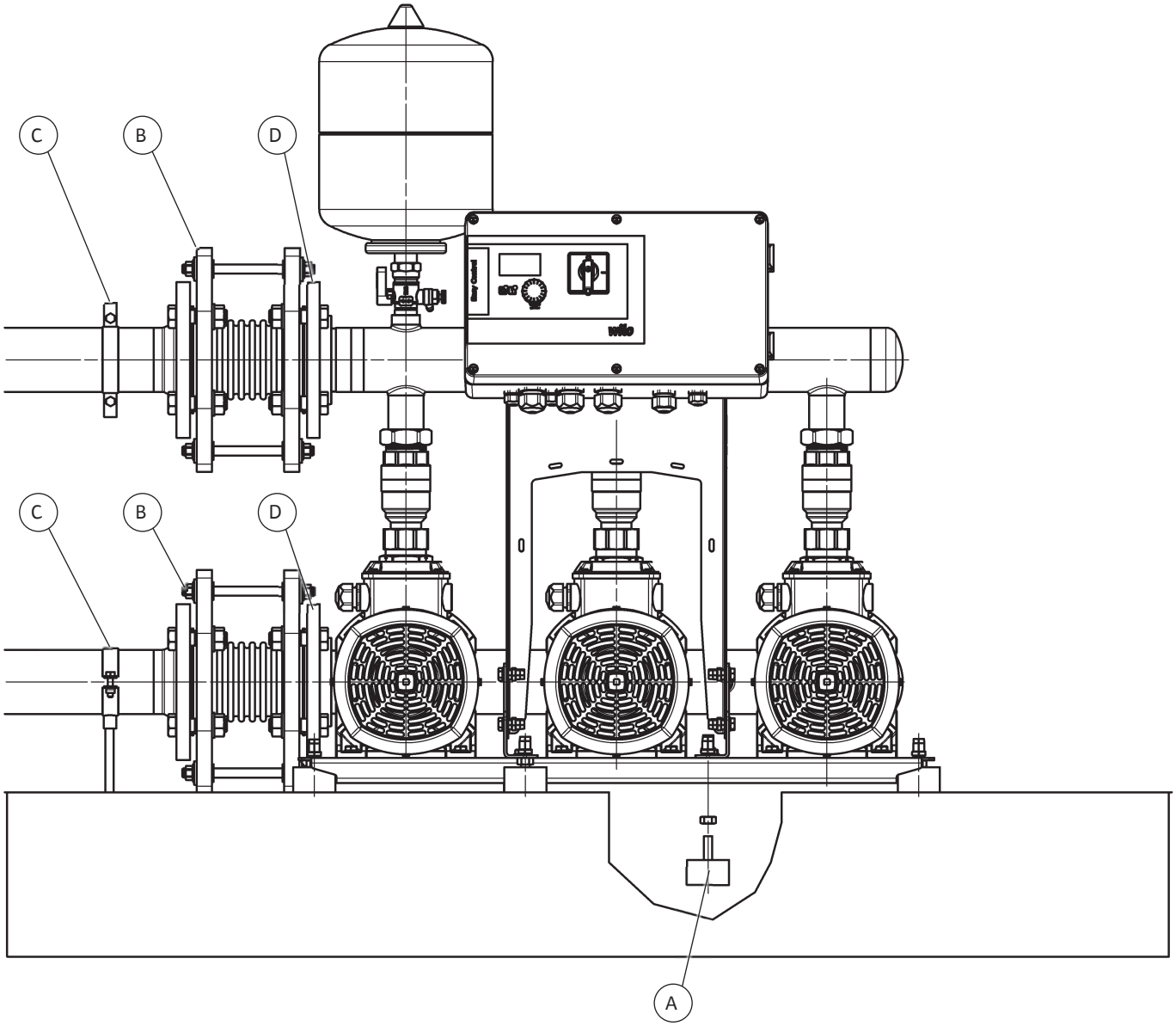
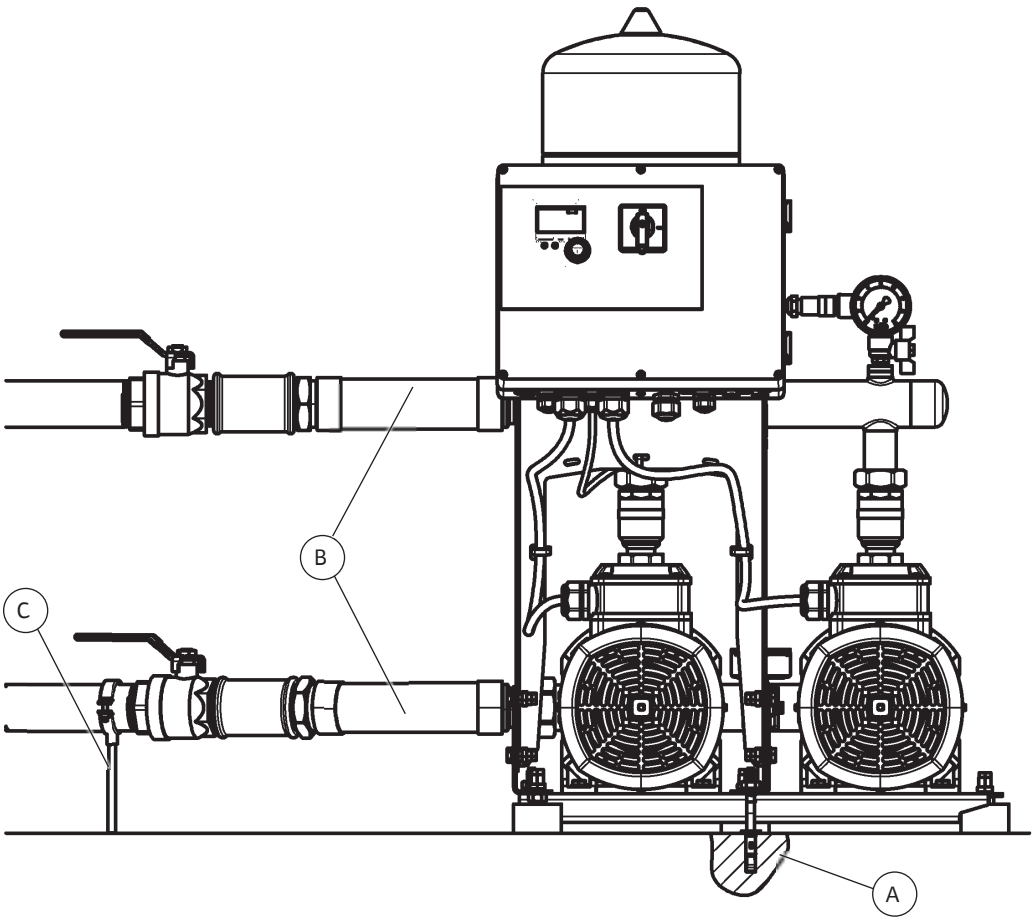


Fig. 9b



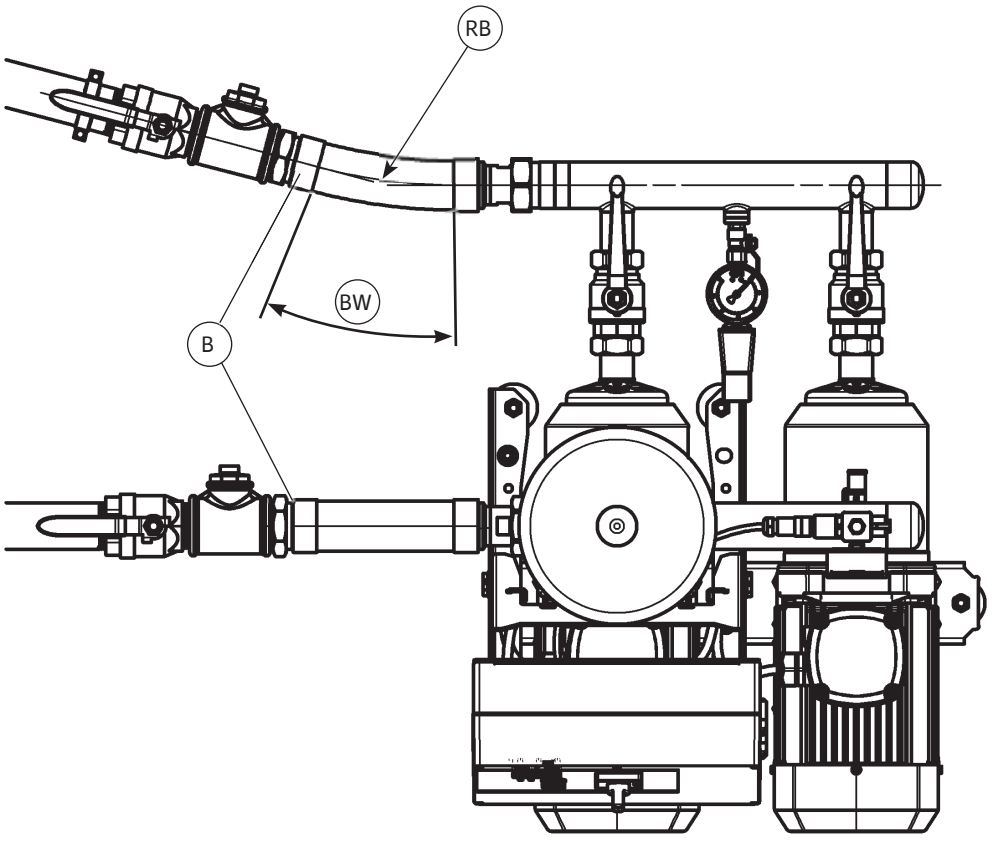


Fig. 9c

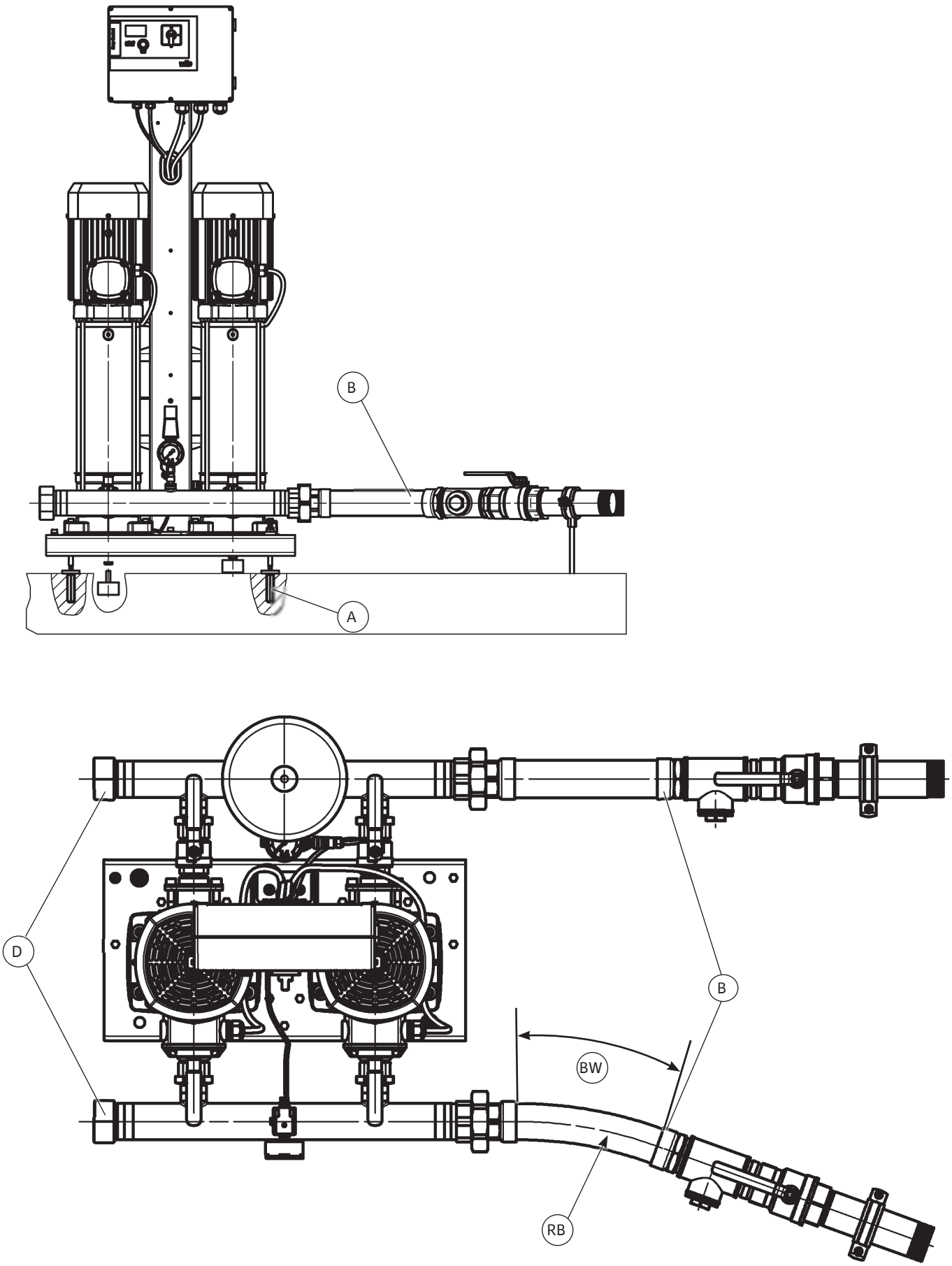
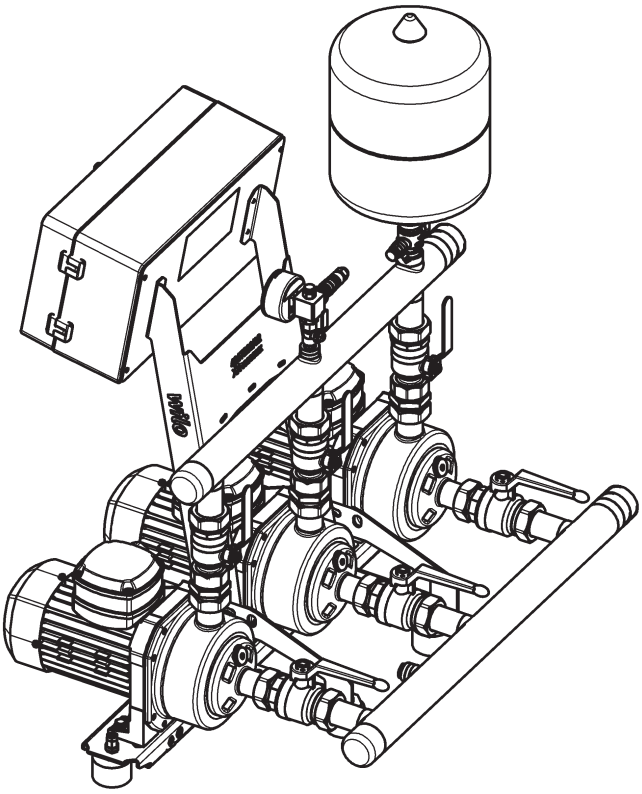


Fig. 10a



S - 1

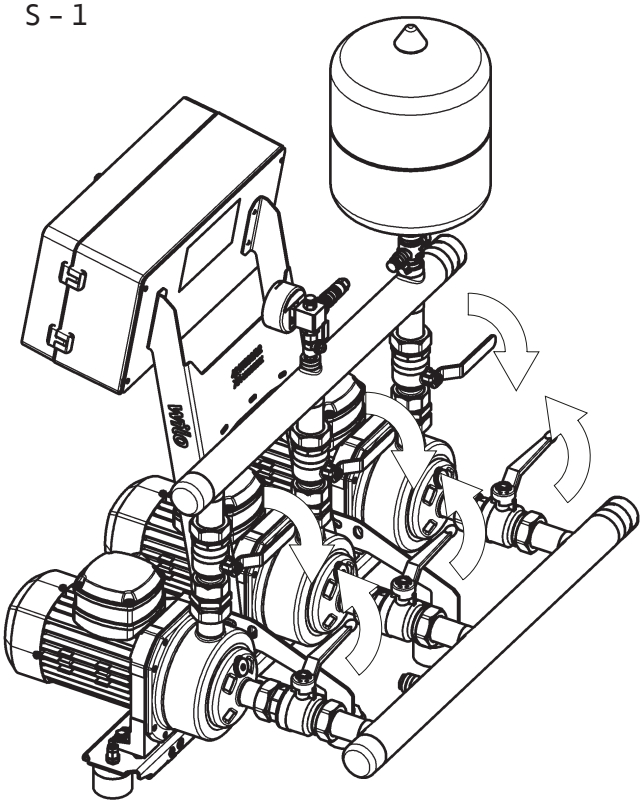
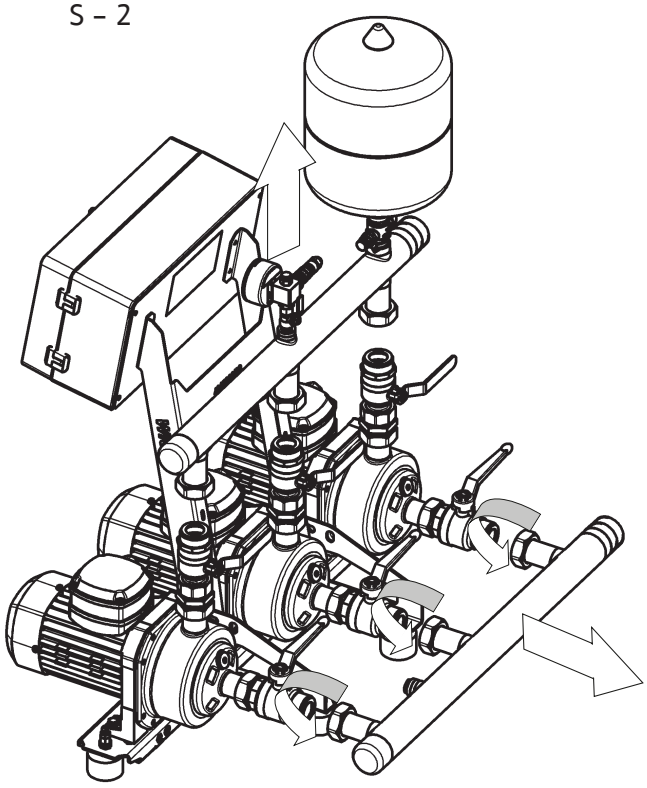


Fig. 10b

S – 2



S – 3

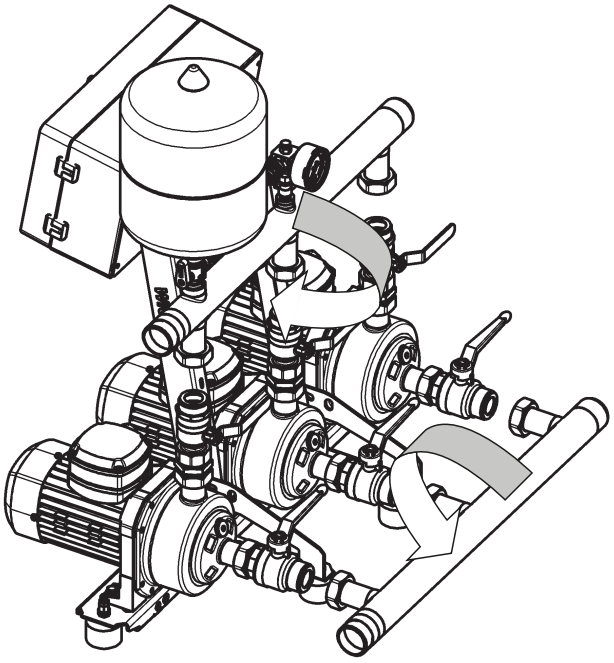
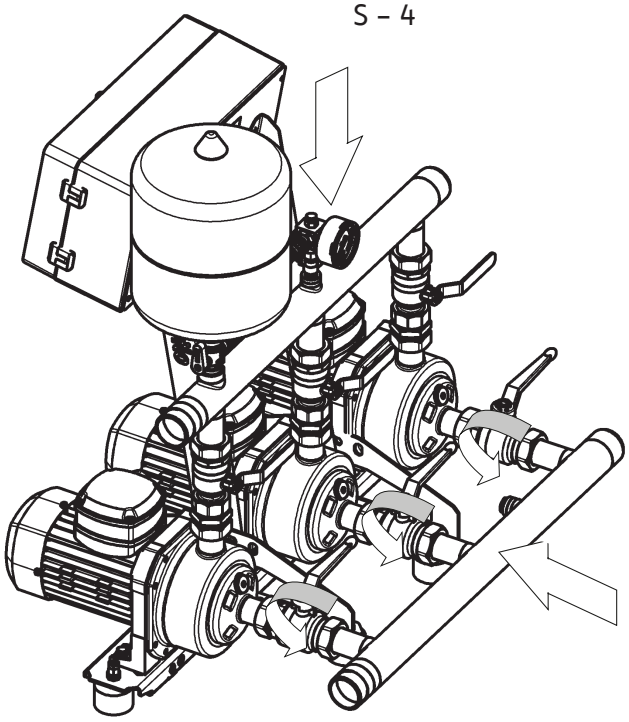


Fig. 10c

S – 4



S – 5

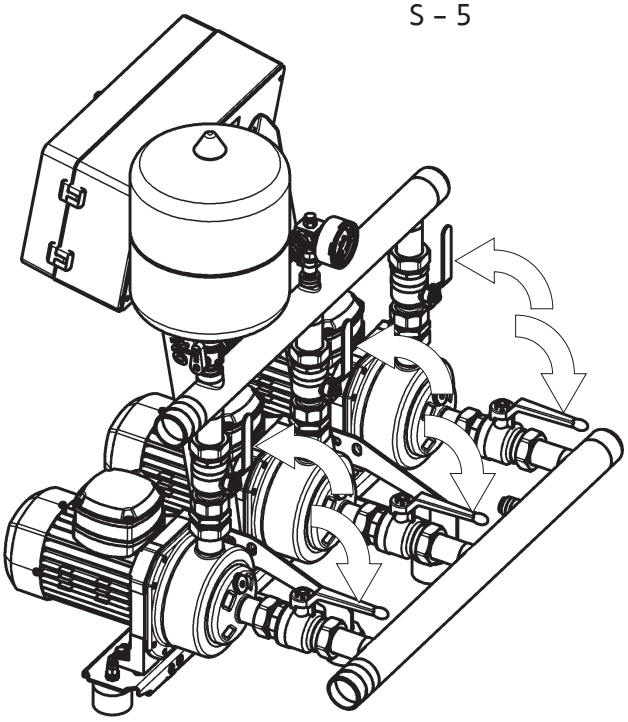
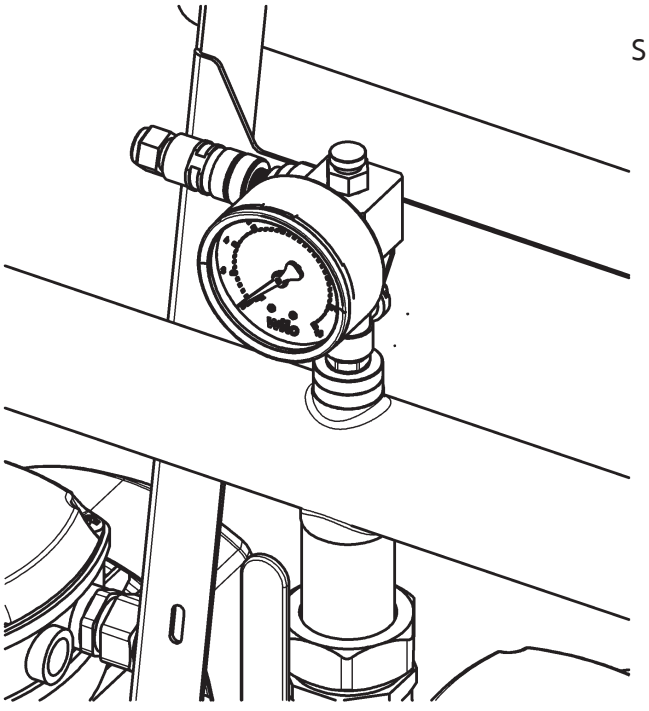


Fig. 10d

S – 6



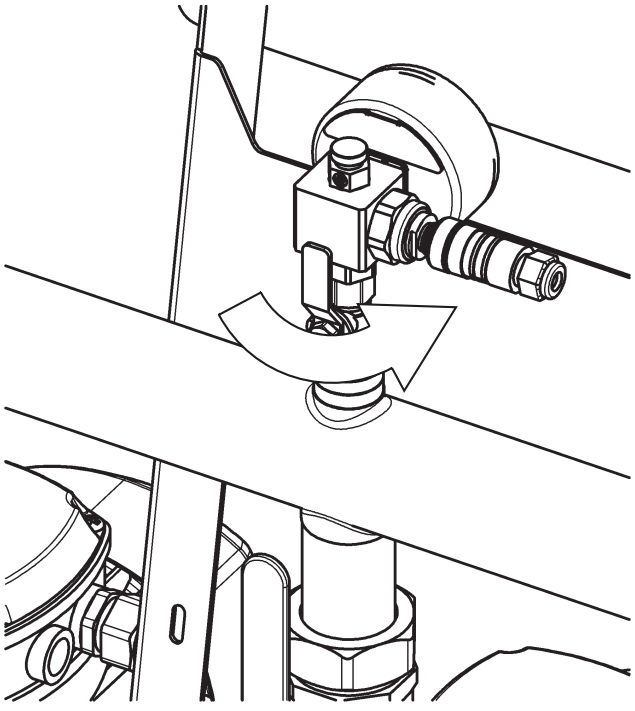


Fig. 11a

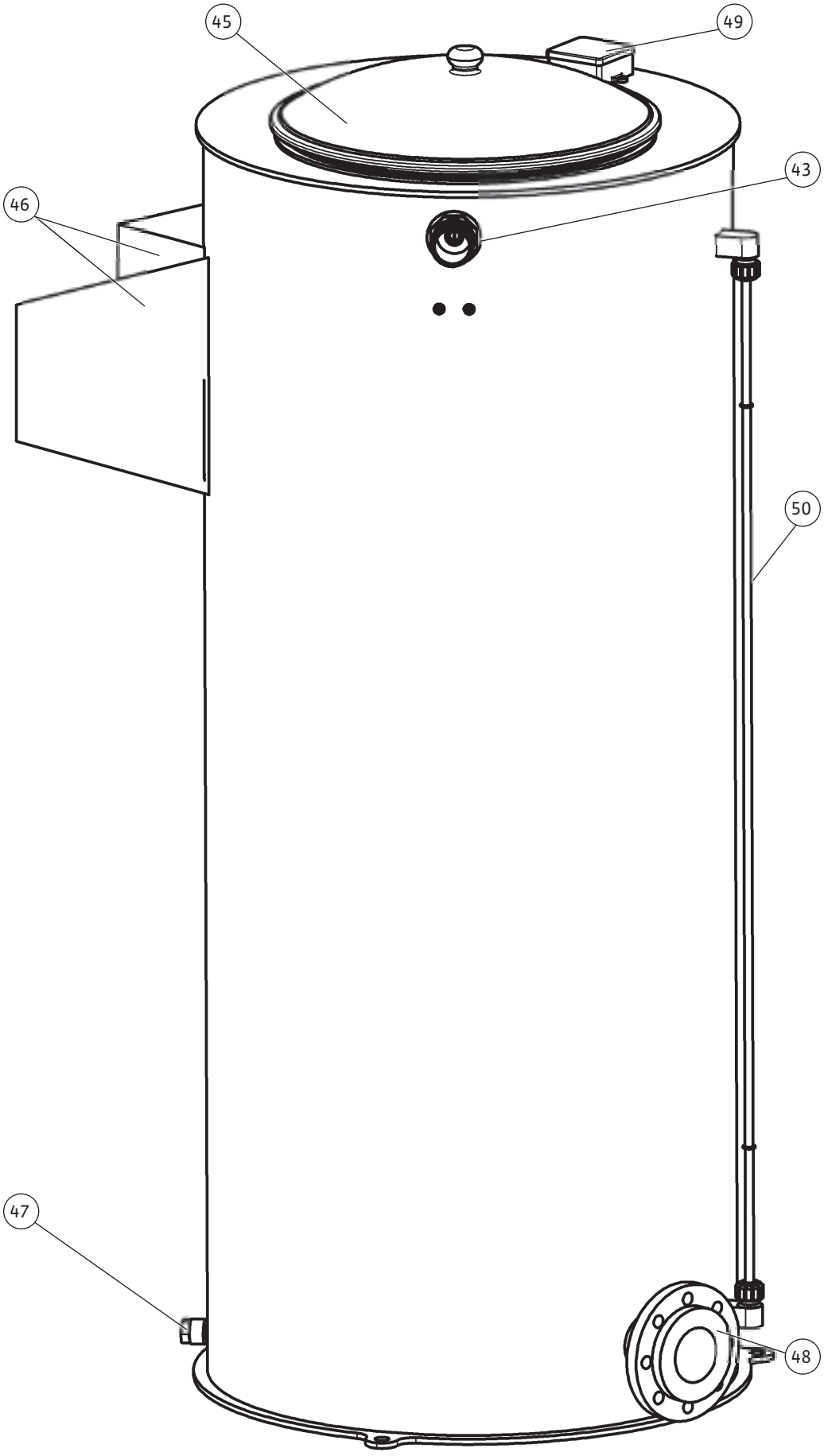


Fig. 11b

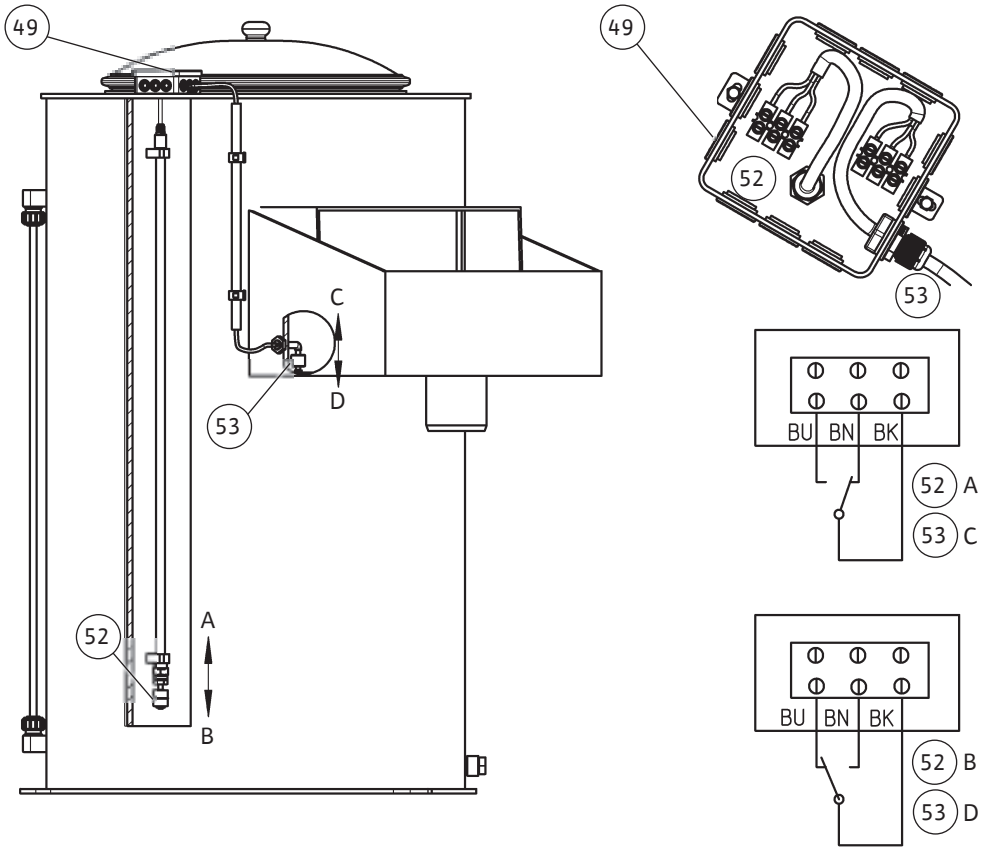


Fig. 12

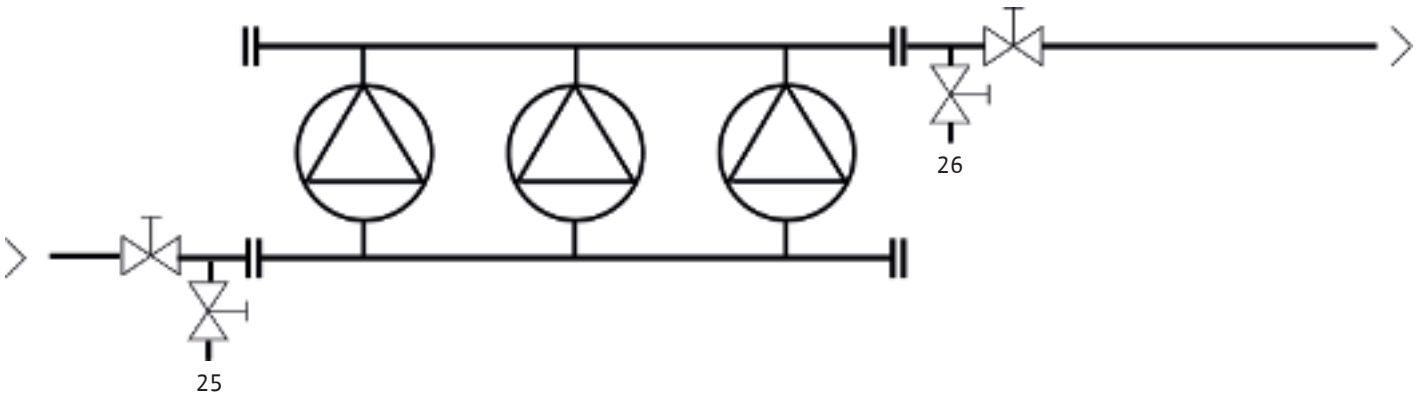
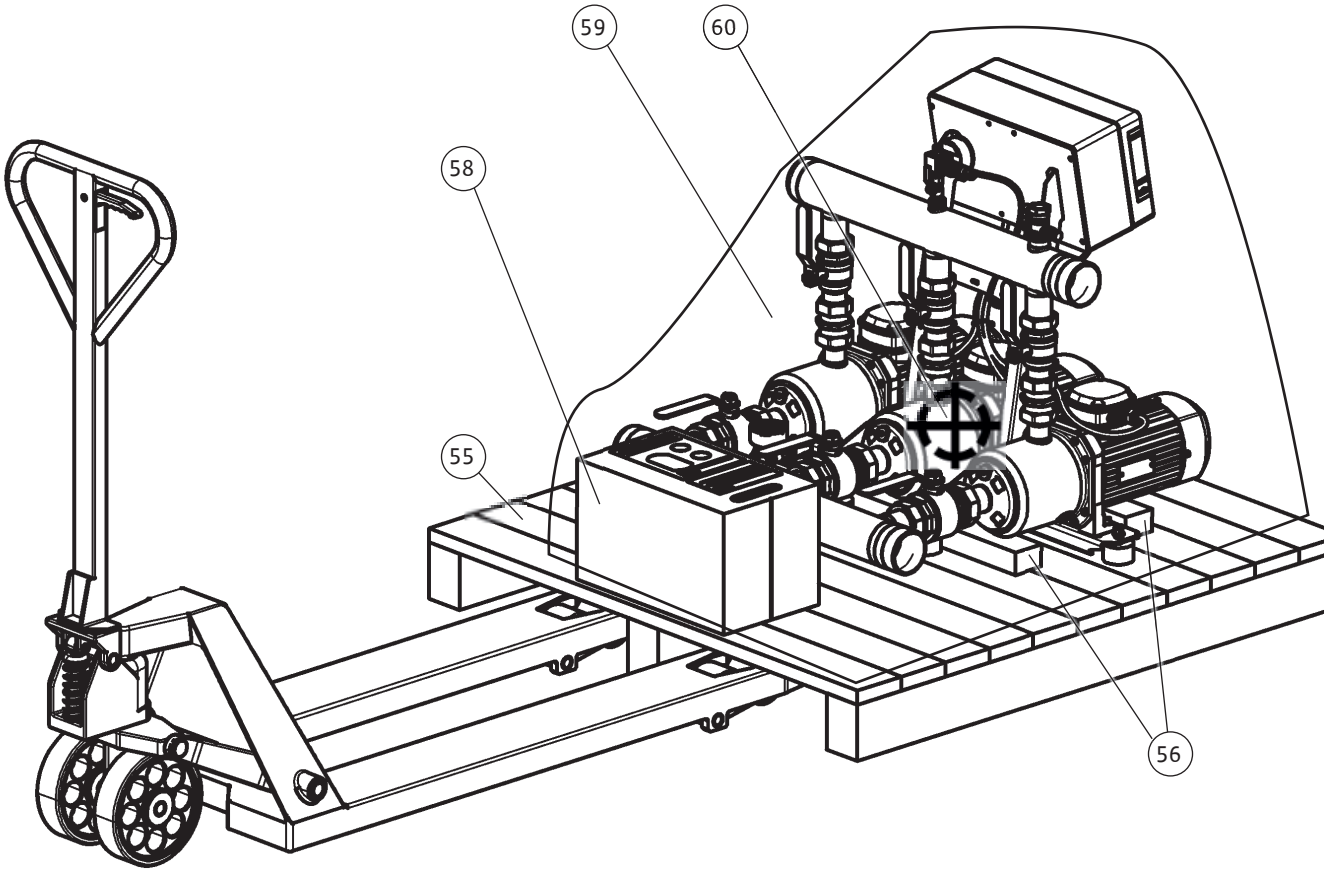


Fig. 13a



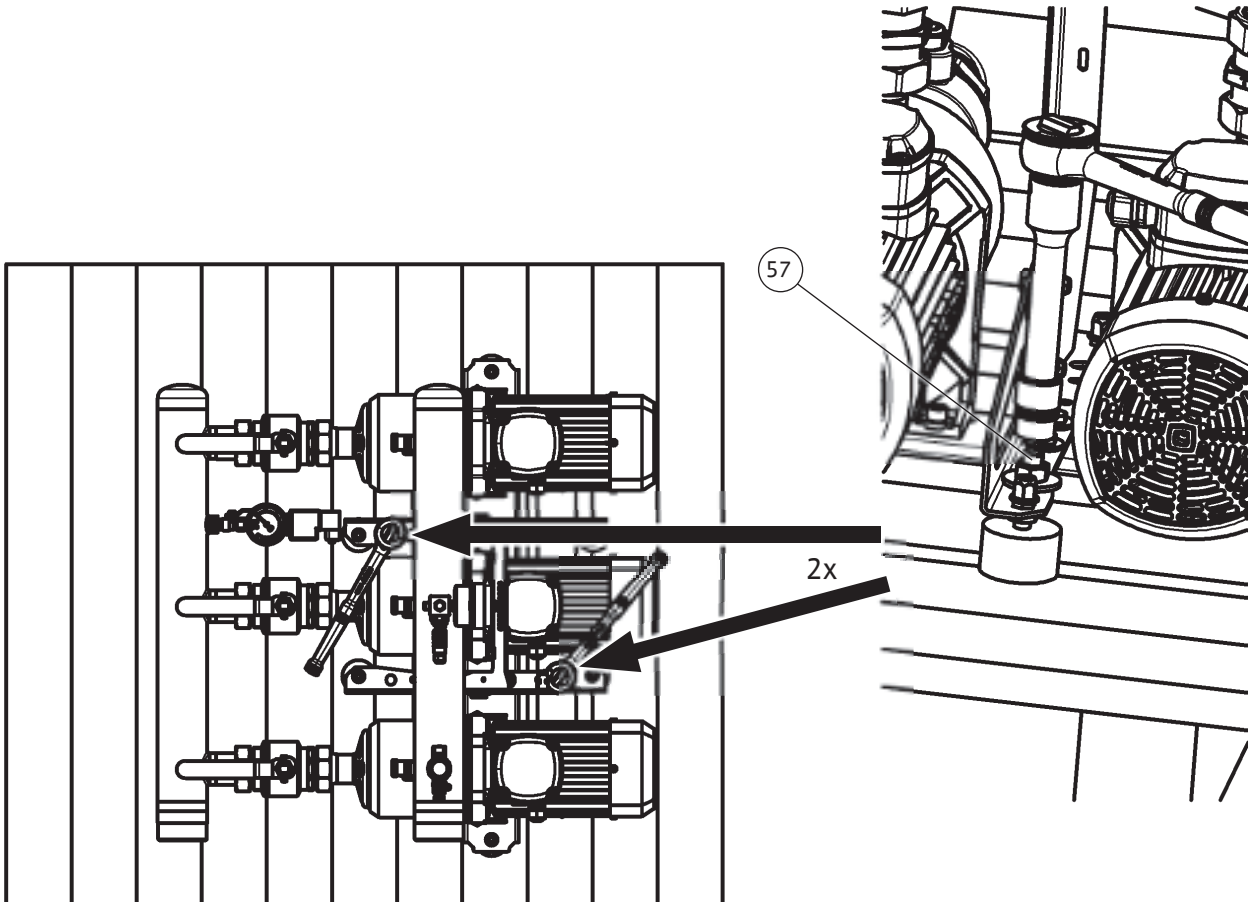


Fig. 13b

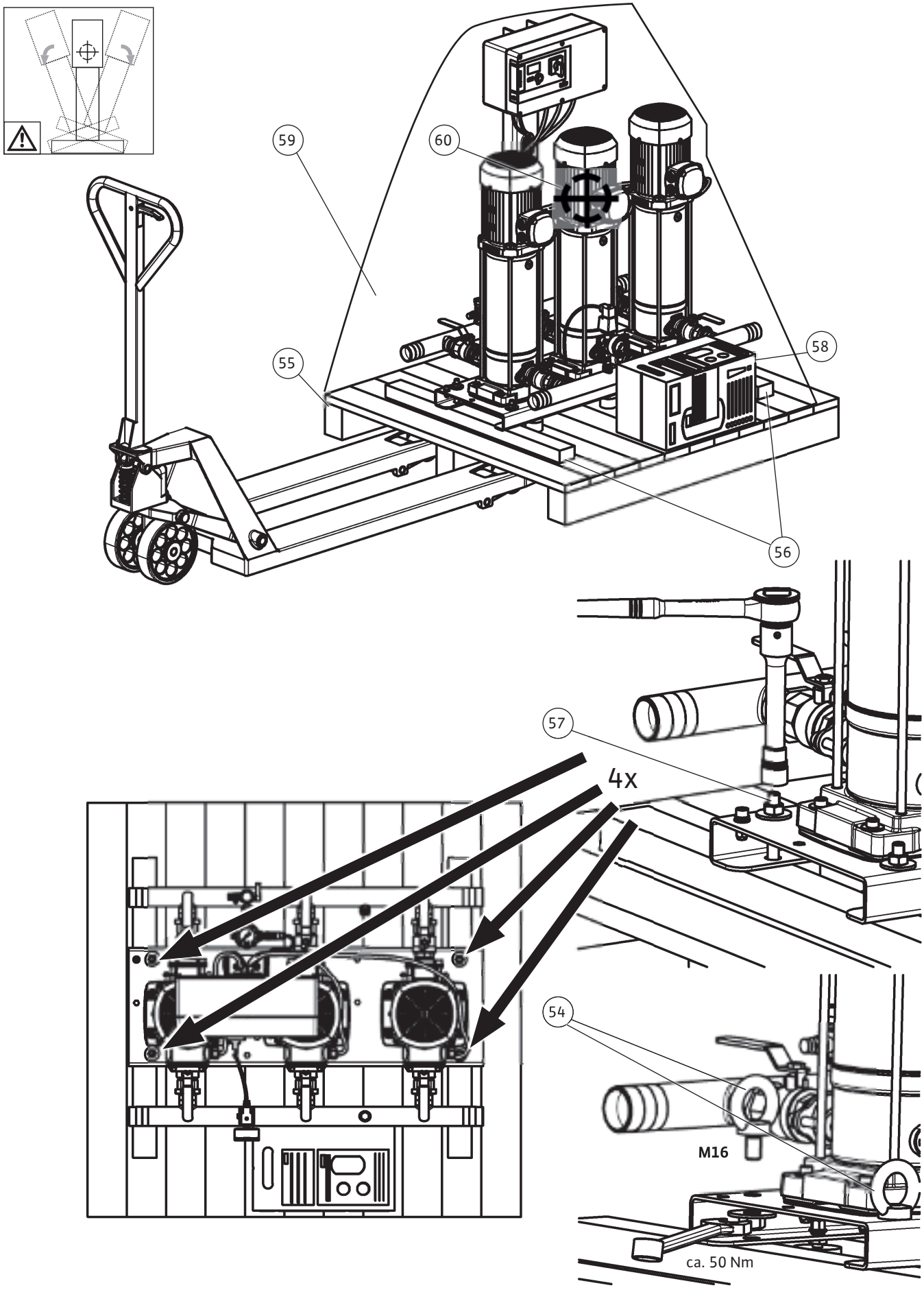


Table of Contents

1 General information

1.1 About these instructions

These instructions form part of the product. Adherence to these instructions is a requirement for the intended use and correct operation of the product:
- → Carefully read the instructions prior to any activities on and with the product.
- → Keep the instructions in an accessible place at all times.
- → Observe all product specifications and labels on the device.

The language of the original operating instructions is German. Versions of these instructions in any other language are translations of the original operating instructions.

1.2 Copyright

Wilo shall reserve the right to change the listed data without notice and shall not be liable for technical inaccuracies and/or omissions.

1.3 Subject to change

Wilo shall reserve the rights to make technical changes to the product and individual components. The illustrations used may differ from the original and are intended as a sample representation of the device.

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 the 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 observe the safety instructions will result in serious injuries or death!

→ **WARNING!**
Failure to follow the instructions can lead to (serious) injuries!

→ **CAUTION!**
Failure to follow the instructions can lead to property damage and a possible 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 – high voltage


General warning symbol


Warning – suspended loads


Access prohibited


Personal protective equipment: wear a safety helmet


Personal protective equipment: wear safety footwear


Personal protective equipment: Wear protective gloves


Useful information

2.2 Personnel qualifications

Personnel must:

→ Be instructed about locally applicable regulations governing accident prevention.

→ Have read and understood the installation and operating instructions.

The personnel must have the following qualifications:

→ Electrical work must be carried out by an authorised electrician (in accordance with EN 50110-1).

- → 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.
- → The product must be operated by persons who have been instructed on how the complete system functions.

Definition of "qualified electrician"

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

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.
- → Electrical work must be 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 equipment must be provided on-site:

Circuit breaker

The size and switching characteristics of the circuit breakers must conform to the rated current of the connected product. Observe local regulations.

Motor protection switch

Make provision for an on-site motor protection switch for devices without a plug! The minimum requirement is a thermal relay/motor protection switch with temperature compensation, differential triggering and anti-reactivation device in accordance with the local regulations. In case of sensitive mains, make provision for the installation on-site of other protective equipment (e.g. overvoltage, undervoltage or phase failure relay, 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).

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 Wilo pressure-boosting systems from the ISAR MODH1 and ISAR MODV1 series are designed for water supply systems for pressure boosting and pressure maintenance.
The system is used as:
→ Drinking water installation, primarily in high-rise apartments, hospitals, administrative and industrial buildings, the structure, function and requirements of which comply with the following standards, guidelines and directives:
  – DIN 1988 (for Germany)
  – DIN 2000 (for Germany)
  – EU Directive 98/83/EC
  – Drinking Water Ordinance in its valid version (for Germany)
  – DVGW directives (for Germany)
→ Industrial system for water supply and cooling systems
→ Fire water and supply system for local use
→ Irrigation and sprinkling installation

For your safety

Intended use includes:
- → 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- ISAR MODH1-1CH1-L-202/EC
Wilo	Brand name
ISAR	Product family: pressure-boosting systems
MODH	With horizontal pumps
1	Fixed-speed version
-1	Number of pumps
CH1-L	Pump series
2	Rated flow rate Q [m3/h] per pump (2-pole – 50 Hz version)
02	Number of pump stages (2-pole – 50 Hz version)

Example	Wilo- ISAR MODH1-1CH1-L-202/EC
/EC	Switchgear (here Easy Control)

Example	Wilo ISAR MODH1-3CH1-L-605/EC
Wilo	Brand name
ISAR	Product family: pressure-boosting systems
MODH	With horizontal pumps
1	Fixed-speed version
-3	Number of pumps
CH1-L	Pump series
6	Rated flow rate Q [m3/h] per pump (2-pole – 50 Hz version)
05	Number of pump stages
/EC	Switchgear (here Easy Control)

Example	Wilo ISAR MODV1-1CV1-L-209/EC
Wilo	Brand name
ISAR	Product family: pressure-boosting systems
MODV	with vertical pumps
1	Fixed-speed version
-1	Number of pumps
CV1-L	Pump series
2	Rated flow rate Q [m3/h] per pump (2-pole – 50 Hz version)
09	Number of pump stages
/EC	Switchgear (here Easy Control)

Example	Wilo ISAR MODV1-3CV1-L-1006/EC
Wilo	Brand name
ISAR	Product family: pressure-boosting systems
MODV	With horizontal pumps
1	Fixed-speed version
-3	Number of pumps
CV1-L	Pump series
10	Rated flow rate Q [m3/h] per pump (2-pole – 50 Hz version)
06	Number of pump stages
/EC	Switchgear (here Easy Control)

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 switchgear)	
Insulation class	F	
Protection class	IP54 (pump by itself IP55)	
Power consumption P_1	See rating plate of pump/motor	
Power consumption P_2	See rating plate of pump/motor	
Nominal diameters Connection Suction/pressure pipe	G1¼/G1¼	(ISAR MODH1-1CH1-L-2.../EC) (ISAR MODH1-1CH1-L-4.../EC) (ISAR MODV1-1CV1-L-2.../EC) (ISAR MODV1-1CV1-L-4.../EC) (ISAR MODV1-1CV1-L-6.../EC)
	G1½/G1¼	(ISAR MODH1-1CH1-L-6.../EC)
	G1½/G1½	(ISAR MODV1-1CV1-L-10.../EC)
	G2/G1½	(ISAR MODH1-1CH1-L-10.../EC) (ISAR MODV1-1CV1-L-16.../EC)
	G2/G2	(ISAR MODH1-1CH1-L-16.../EC)
	R1¼/R1¼	(ISAR MODH1-2CH1-L-2.../EC) (ISAR MODH1-2CH1-L-4.../EC) (ISAR MODH1-3CH1-L-2.../EC)
	R2½/R2½	(ISAR MODH1-2CH1-L-6.../EC) (ISAR MODV1-2CV1-L-2.../EC) (ISAR MODV1-2CV1-L-4.../EC) (ISAR MODH1-3CH1-L-4.../EC)
	R2/R2	(ISAR MODH1-2CV1-L-6.../EC) (ISAR MODH1-2CH1-L-10.../EC) (ISAR MODH1-3CH1-L-6.../EC)
	R2½/R2½	(ISAR MODV1-2CV1-L-10.../EC) (ISAR MODV1-2CV1-L-16.../EC) (ISAR MODH1-3CH1-L-10.../EC) (ISAR MODV1-3CV1-L-6.../EC) (ISAR MODV1-3CV1-L-10.../EC)
	R3/R3	(ISAR MODH1-2CH1-L-16.../EC) (ISAR MODV1-3CV1-L-16.../EC)
	DN 100/DN 100	(ISAR MODH1-3CH1-L-16.../EC)
	(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 60 °C (deviating values on request)	
Max. permissible operating pressure	MODH1 – on the pressure side 10 bar (see rating plate) MODV1 – on the pressure side 16 bar (see rating plate)	
Max. permissible inlet pressure	Indirect connection (but max. 6 bar)	
Additional data		
Diaphragm pressure vessel	8 l	

4.3 Scope of delivery

The automatically controlled Wilo pressure-boosting systems ISAR MODH1 and ISAR MODV1 are supplied ready for connection.

As a compact unit with integrated control, they contain 1 to 3 non-self-priming, multistage horizontal/vertical high-pressure multistage centrifugal pumps.

The pumps are mounted on a common base frame and completely piped together.

Measures required on-site:
- → Make the connections for the inlet and pressure pipes.
- → Establish the electrical mains connection.
- → Install the supplied accessories ordered separately.

4.3.1 Scope of delivery_standard version

- → Pressure-boosting system
- → Installation and operating instructions for the pressure-boosting system
- → Installation and operating instructions for the pumps
- → Installation and operating instructions for the switchgear
- → Factory test protocol

4.3.2 Scope of delivery_special version

- → 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. 11a)
- → Larger diaphragm pressure vessel (on the inlet or discharge side)
- → Safety valve
- → Dry-running protection:
  - For systems with supply pressure (inlet mode, supply pressure at least 1 bar), an additional kit is supplied ready-fitted as protection against low water level (WMS) (Fig. 6a to 6c) if this is included in the order scope.
  - Float switch
  - Low-water electrodes with a level relay
  - Electrodes for tank operation (special accessories on request)
- → Flexible connection pipes (Fig. 9b – It. B),
- → Compensators (Fig. 9b – It. B),
- → Threaded flanges (Fig. 9a – It. D)

4.5 Components of the system

4.5.1 Notes

NOTICE
The present installation and operating instructions contain only a general description of the complete system.

NOTICE
Detailed instructions for the pump type used in this pressure-boosting system can be found in the attached installation and operating instructions for the pump.

4.5.2 Connection

Using a non-self-priming high-pressure multistage centrifugal pump, it's possible to connect the pressure-boosting system to the public water supply network for drinking water in two ways:
- → Direct connection: without system separation (Fig. 7a, 8a).
- → Indirect connection: Connection is established with system separation through a break tank (Fig. 7b, 8b), which is closed and unpressurised, i.e. it is under atmospheric pressure.

4.5.3 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 (Fig. 1a and 2a – MODH1/Fig. 1b and 2b – MODV1)

The compact unit is installed on a base frame construction (Fig. 1a, 2a – It. 3) with vibration absorbers (Fig. 1a, 2a – It. 34). It consists of a group of one, two or three horizontal (MODH1) or vertical (MODV1) high-pressure multistage centrifugal pump(s) (Fig. 1a, 2a – It. 1) with a three-phase current motor (Fig. 1a, 2a – It. 17), which are combined by means of an inlet (Fig. 1a, 2a – It. 4) and pressure pipe (Fig. 1a, 2a – It. 5) (collection pipes in case of two or three pumps) to form a complete system. Each pump is fitted with a (Fig. 1a, 2a – It. 6) shut-off valve on the inlet side, a (Fig. 1a, 2a – It. 7) shut-off valve on the pressure side and a non-return valve (Fig. 1a, 2a – It. 8) on the pressure side.

Horizontal centrifugal pump(s) CH-L or vertical centrifugal pump(s) CV-L (Fig. 1a, 1b, 2a, 2b – It. 1)

Different types of multistage horizontal (CH-L) or vertical (CV-L) centrifugal pumps are installed in the pressure-boosting system depending on the application and the performance parameters required. Their number can vary from 1 to 3 pumps.

NOTICE
Detailed instructions for the pump type used in this pressure-boosting system can be found in the attached installation and operating instructions for the pump.

Switchgear (Fig. 1a to 2b – It. 2)

The EC series switchgear is used to control the pressure-boosting system. The size and components of the switchgear may vary depending on the design and performance parameters of the pumps.

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

The switchgear (Fig. 1b – It. 2) is mounted on the base frame construction (Fig. 1b – It. 3) by means of a mounting bracket (Fig. 1b – It. 13) (MODV1) or two mounting brackets (MODH1) and is fully wired to the electrical components of the system.

Diaphragm pressure vessel (Fig. 3a, 3b, 3c, 3d or Fig. 4 – It. 9)

The scope of delivery for all systems includes an 8-litre diaphragm pressure vessel (It. 9) with a lockable throughflow fitting (It. 10) (for flow-through in accordance with DIN 4807-Part 5). Screw the diaphragm pressure vessel into the pre-installed throughflow fitting (Fig. 3a, 3b, 3c, 3d and Fig. 4).

Protection against low water level (WMS, Fig. 6a to 6d)

Optionally, an assembly for protection against low water level (Fig. 6b, 6c – It. 14) can be fitted to the inlet pipe or retrofitted.

For horizontal single-pump systems, this assembly additionally consists of a connection pipe (Fig. 6a – It. 4) and a shut-off valve (Fig. 6a – It. 6).

In vertical single-pump systems, this assembly is installed at the pump's drain connection (Fig. 6c).

Pressure transmitter and pressure gauge (Fig. 3a to 3d)

Pressure transmitter kit (on the pressure side, Fig. 3a to 3d).
→ Pressure gauge (It. 11-1)
→ Pressure transmitter (It. 12a)

→ Electrical connection, pressure transmitter (It. 12b)
→ Drain/venting (It. 18)
→ Stop valve (It. 19)

4.6 Function

4.6.1 Safety_headline

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 systems.
- 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.

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.

4.6.2 Description

Standard and special versions

In the standard version, the Wilo pressure-boosting systems from the ISAR MODH1 series consist of non-self-priming multistage horizontal high-pressure multistage centrifugal pumps. The pressure-boosting systems from the ISAR MODV1 series consist of non-self-priming multistage vertical high-pressure centrifugal pumps without an integrated frequency converter. An inlet pipe supplies the system with water.

Where self-priming pumps are used for special versions, or in the case of suction mode from lower-lying tanks, a separate vacuum-proof and pressure-resistant suction line with a foot valve must be installed for each pump. The suction line must run steadily upwards from the tank to the system.

The pump(s) increase(s) the pressure and pump(s) the water to the consumer via the pressure pipe. To do this, they are switched on and off according to the pressure. The pressure sensor continuously measures the actual value of the pressure, which is converted into a current signal and transmitted to the switchgear.

Depending on the requirement and the control mode, the switchgear switches the pumps on, in or off. A more precise description of the control mode and the control process can be found in the installation and operating instructions for the switchgear.

Systems with several pumps

For systems with several pumps, the total delivery volume of the system is distributed across all operating pumps.

Advantages:
→ Precise adaptation of the system output to the actual demand.
→ Operation of the pumps in the most favourable performance range.
→ High efficiency level of the system and economical energy consumption.

The pump that starts first is the base-load pump of the system. The remaining pumps needed to reach the system operating point are called peak-load pump(s). If the system is configured to supply drinking water according to DIN 1988, one pump must be designated as a standby pump, i.e. at maximum extraction, one pump is always decommissioned or on standby. To ensure that all the pumps are used equally, the switchgear cycles the pumps, i.e. the order of activation and the allocation of the base load/peak load or standby pump functions change regularly.

Diaphragm pressure vessel

The assembled diaphragm pressure vessel has a total capacity of approx. 8 l.

Function:
→ Exerts some buffering effect on the pressure-side pressure transmitter.
→ Prevents oscillation of the control unit when switching the system on and off.
→ Guarantees low water extraction (e.g. for smallest leakages) from the storage volume at hand without switching on the base-load pump. This reduces the switching frequency of the pumps and stabilises the operating status of the pressure-boosting system.

Protection against low water level (WMS)

Various kits with an integrated pressure switch (Fig. 6a to 6d – It. 14-1) are provided as optional accessories for direct connection of the system to the public water supply network as protection against low water level (Fig. 6a to 6d – It. 14). This pressure switch monitors the supply pressure and if the pressure is low, it sends a switching signal to the switchgear.

This kit comes fully assembled and wired when ordering the system with optionally integrated WMS.

For retrofitting the WMS on **horizontal pump systems (MODH1-1CH-L...)**, order and install the corresponding kit including additional pipework with installation point and shut-off valve for the inlet side **(Fig. 6a)**.

For systems with **a vertical pump (MODV1-1CVL...)**, the WMS kit and an additional connection kit are to be ordered and installed **(Fig. 6c).**

For all multi-pump systems, an installation point for the WMS is provided as standard at the inlet pipe.

In the case of an indirect connection (system separation by non-pressurised break tank), provide a level-dependent signal transmitter and install it into the break tank as dry-running protection. When using a Wilo break tank (Fig. 11a), the scope of delivery includes a float switch (Fig. 11b – It. 52).

For existing on-site tanks, you will find various signal transmitters in the Wilo range that can be retrofitted (e.g. float switch WA65 or low-water electrodes with a level relay).

4.6.3 Noise characteristics

Pressure-boosting systems contain different pump types in varying numbers. No specific overall noise level can therefore be listed here for all variants of pressure-boosting systems.

In the following overview, pumps of the standard series are taken into account at a mains frequency of 50 Hz:

	Number of pumps	Rated power (kW)						
		0.37	0.55	0.75	1.1	1.5	1.85	2.5
Max. sound-pressure level (*) LpA in [dB(A)]	1	55	57	58	58	58	62	63
	2	58	60	61	61	61	65	66
	3	59.5	61.5	62.5	62.5	62.5	66.5	67.5

(*) Values for 50 Hz (constant speed) with a tolerance of +3 dB(A)

LpA = workplace-related emission level in dB(A);

For motor powers not listed here and/or other pump series, see the single pump noise value from the installation and operating instructions for the pumps or from the catalogue information on the pumps. With the following procedure, it is also possible to approximate the overall noise level of the complete system using the noise value for an individual pump of the type supplied:

Calculation		
Single pump	...	dB(A)
2 pumps, total	+3	dB(A) (tolerance +0.5)
3 pumps, total	+4.5	dB(A) (tolerance +0.5)
Overall noise level =	...	dB(A)

Example (pressure-boosting system with 3 pumps)		
Single pump	58	dB(A)
3 pumps, total	+4.5	dB(A) (tolerance +1)
Overall noise level =	62.5 ... 63.5	dB(A)

5 Transportation and storage

5.1 Safety

WARNING

Hand and foot injuries due to lack of protective equipment!

Danger of (serious) injuries during work. Wear the following protective equipment:

- Safety gloves for protection against cuts
- Safety shoes
- Safety helmet must be worn if lifting equipment are used!

WARNING

Standing under suspended loads!

Never allow anyone to stand under suspended loads! Danger of (serious) injuries caused by falling parts. Loads may not be carried over work places where people are present!

CAUTION

Risk of damage to property!

Unsuitable lifting gear can cause the vertical pump 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 (Fig. 1a to 2b – It. 54) or the base frame for fixation.
- Ensure the stability of the load since, with the vertical pump design, the centre of gravity is shifted to the top range (top-heavy, Fig. 13b – It. 60).

WARNING

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).

5.2 Delivery

The pressure-boosting system is fixed onto a pallet (Fig. 13a, 13b – It. 55, 56), delivered on transport boards or in a crate and is foil-wrapped (Fig. 13a, 13b – It. 59) to protect it against moisture and dust. Transport and storage instructions applied to the packaging must be observed.

For systems from the ISAR MODV series with 2 or 3 pumps, after removing the screws for the securing mechanism (Fig. 13b – It. 59), insert the eye bolts provided in the accessories kit into the drilled holes and fix them with the nuts provided (Fig. 2b, 13b – It. 54).

The transport dimensions, weights, necessary passageways and transport areas of the system can be found on the supplied installation plan or documentation.

When receiving and before unpacking the pressure-boosting system and the supplied accessories, first check the packaging for damage.

If damage is found which may have been caused by the system having fallen or similar impacts:
→ check the pressure-boosting system and accessories for possible damage, and
→ notify the delivery company (forwarding agent) or our customer service, even if you do not find any obvious damage to the system or its accessories.

5.3 Transport

→ The system is packed in plastic wrap to protect it from humidity 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 gear: Sling chains or transport straps.
→ Attach lifting gear to base frame:
  – Transport with forklift
  – Transport with lifting gear.
  – Fixation lugs on base frame: Sling chain with sling hook with safety latch.
  – Supplied ring eyelets must be screwed in: Sling chain or transport strap with shackle.
→ Permissible angle specifications for the lifting gear (Fig. 1a, 1b, 2a, 2b – It. 54)
  – Fixation with sling hook: ±24°
  – Fixation with shackle: ±8°
  – If the angle specifications cannot be complied with, use a spreader beam.

5.4 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

6.1 Safety

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 systems.
- 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.

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 using the threaded nut. (see also Fig. 9a to 9c, It. A)

6.2 Installation site

Requirements for the installation location:

- → Dry, well ventilated and frost-resistant.
- → Separate and lockable (e.g. requirement of DIN 1988 standard).
- → Free of harmful gases and secured against gas ingress.
- → Maximum ambient temperature of +0 °C to 40 °C at a relative humidity of 50 %.
- → Availability of adequately sized soil drainage (e.g. sewer connection).
- → Horizontal and level installation surface. Slight height adjustment for stabilisation possible with the vibration absorbers in the base frame:

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. 9a – It. B) with extension limiters or flexible connection pipes (Fig. 9b, 9c – It. B) must be used.

6.3 Installation

6.3.1 Safety

DANGER

Risk of fatal injury due to high voltage!

Observe the following instructions to avoid personal injury:

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

6.3.2 Foundation/bearing surface

The pressure-boosting system is designed for installation on a level 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. 9a – It. A).

If the customer also wants to fix the installation to the floor (Fig. 9b and Fig. 9c – It. A), suitable measures must be taken to avoid structure-borne noise transmission.

6.3.3 Hydraulic connection and pipes

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))

On-site piping is installed voltage-free. Compensators with extension limiters or flexible connection pipes are suitable to avoid tension of the pipe adaptors. This also minimises the transmission of system vibrations 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. 9a to 9c – It. C).

The connection is made either on the right or left side of the system, depending on the site conditions. It may be necessary to move blind flanges or threaded caps that are already fitted.

Horizontal pump system:

The factory setting for the system connection is to the front on the inlet and pressure sides (view on the switchgear – operator view).

The pipework is turned by approx. 90° to the left or right if the connection of the pressure pipe has to be made laterally due to spatial conditions:

1. Loosen the union nut on the pipework.
2. Turn the pipe in the required direction.
3. Position the flat gasket properly between the sealing surfaces to prevent leakage.
4. Screw on the union nut tightly.

Vertical pump system:

The system is set up at the factory setting so that the connection is made on the inlet side on the left and on the pressure side on the right (view of switchgear – operator view).

System with two or three horizontal pumps:

The factory setting for the system connection is to the left (view on the switchgear – operator view).

The manifolds are turned (Fig. 10a, 10b) if the connection needs to be made on the right side due to spatial conditions:

1. Close all shut-off valves within the system if the system is already filled with water.
2. Fully loosen the union nuts on the respective pipework.
3. Turn the manifold in the relevant direction for the connection.
4. Position flat gaskets properly between the sealing surfaces to prevent leakages.
5. Screw on the union nuts tightly.
6. Open all shut-off valves within the system again. If required, turn pressure transmitter/pressure gauge kit.

System with two or three vertical pumps

The system is set up at the factory setting so that the suction- and pressure-side connections can be made either on the left or right (view of switchgear – operator view). The unused connection side must be sealed pressure-tight with a threaded cap (Fig. 9a – It. D; accessories, nominal diameter see table).

Flow resistance

The flow resistance of the inlet and suction pipes must be kept as low as possible:
→ Short piping
→ Few elbows
→ Sufficiently large shut-off valves

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. In principle, all locally applicable regulations and measures for drinking water hygiene must be observed.
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.

1. Installation of a T-connector on the end pressure side of the pressure-boosting system (if there is a diaphragm pressure vessel on the discharge side, immediately downstream of it) upstream of the next shut-off device.
2. Provide the branch with a shut-off device for draining the sink into the wastewater system during flushing.
3. The branch must be adapted according to the maximum flow rate of a single pump (Fig. 7a – 8b – It. 25, 26 and 28).
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.

6.3.4 Install accessories

Horizontal pump system (Fig. 1a and Fig. 6a)

Connection kit with WMS:

1. Install the connection kit with WMS onto the union nut on the inlet side.
2. Ensure the flat gasket is seated properly.

Vertical pump system (Fig. 1b and Fig. 6c)

1. Screw in and seal the WMS kit by using the WMS connection kit for CO-1 on the drainage nozzle of the pump!

System with two or three horizontal pumps (Fig. 2a and Fig. 6b) or vertical pumps (Fig. 2b and Fig. 6b)

Protection against low water level (WMS) kit:

1. Screw the protection against low water level (WMS) kit into the connection port provided on the inlet side of the collecting pipe and (if retrofitting) seal it.

For retrofitting without the original Wilo accessories connection kit:

1. Screw the WMS kit into a connection port prepared on-site on the inlet side of the collecting pipe and seal it.
2. Establish the electrical connection in the switchgear according to the installation and operating instructions and circuit diagram of the switchgear (also Fig. 6d).

In the event of an indirect connection, i.e. for 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. (If break tanks from the Wilo range are used, a float switch is installed (Fig. 11a and 11b).
→ Alternatively: Install 3 submersible electrodes in the break tank:

1. Position the first electrode as an earth electrode just above the base of the tank. This must always be below the water surface for the lower switching level (low water).
2. Position the second electrode for the upper switching level (low water eliminated) approx. 100 mm above the draw-off connection.
3. Attach the third electrode at least 150 mm above the lower electrode. Connect the wiring to the switchgear.

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).

For transportation and hygienic reasons, the diaphragm pressure vessel (8 litre) – which is part of the scope of delivery – is delivered unmounted as an accessories kit. The diaphragm pressure vessel must be mounted on the throughflow fitting before commissioning (Fig. 3a to 3d and Fig. 4).

NOTICE
Observe the respective manufacturer's documentation for the component.

A throughflow diaphragm pressure vessel according to DIN 4807 must be used for drinking water installations. Make sure there is enough room for maintenance or replacement work.

For maintenance work, connections for a bypass are provided upstream and downstream of the diaphragm pressure vessel to prevent system downtimes. To avoid stagnation of the water, the bypass (as, for example, in the diagrams Fig. 7a, 7b, 8a and 8b – It. 29) must be completely removed at the end of the work.

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 size of the 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 pressure vessel connection (the following 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	(Rp3/4")	(Rp1")	(Rp11/4")	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

DANGER
Danger of injury!
Walking on or covering areas not intended for this purpose can lead to accidents and damage!

- Walking on plastic containers/the cover is generally 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.

NOTICE
Clean and flush the non-pressurised break tank before filling it.

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. The rules for the pressure-boosting system apply to the installation of the break tank as well (installation location).

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 dimensioning the bearing capacity of the bearing surface.
3. When installing, make sure 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 supplied as an accessory must be installed according to the transport and installation instructions supplied with the tank.

The following procedure applies:

1. Connect the tank without mechanical tension before commissioning. The connection must be made with flexible components, like 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.

NOTICE
PE tanks from the Wilo range are only designed to accommodate clean water. The maximum temperature of the water must not exceed 50 °C (including tank documentation!).

4. The electrical wiring (float switch for protection against low water level) to the switchgear of the system must also 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. 9a – It. B). 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. When installing, the screws must be tightened uniformly, working across diagonals. 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. The compensators must be accessible for inspection within the system at all times and must therefore not be covered by the pipe insulation.

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. 9b and 9c – It. B).

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 according to the following table (also Fig. 9b, 9c).
→ A suitable tool must be used to prevent kinking or twisting during installation.
→ In the event of angular displacement of the pipes, fix the system to the floor, taking into account suitable measures for reducing the structure-borne noise.
→ Do not include flexible connection pipes in pipe insulation so that they are accessible for inspection at all times.

Nominal diameter Connection	Thread of screwed connection	Tapered male thread	Max. bend radius RB in mm	Max. bend angle BW in °
DN 32	Rp11/4"	Rp11/4"	250	60
DN 40	Rp11/2"	Rp11/2"	260	60
DN 50	Rp2"	Rp2"	300	50
DN 65	Rp21/2"	Rp21/2"	370	40

Install the pressure reducer

The use of a pressure reducer becomes necessary:
→ In case of pressure fluctuations in the inlet pipe of more than 1 bar.

→ In the event of a pre-pressure fluctuation that is so great that the 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.

6.4 Electrical connection

Pressure-boosting systems in the ISAR MODH1 series are equipped with switchgears in the EC series.

NOTICE
To make the electrical connection, the corresponding installation and operating instructions and attached electrical wiring diagrams must be observed.

Points to be taken into account:
→ Technical current type, voltage and frequency of the power supply network must match the details on the rating plate of the switchgear.
→ The electrical connection cable must be adequately dimensioned for the total power of the pressure-boosting system (see rating plate).
→ 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), and the connections intended for this purpose must be identified.

Additional protection against dangerous contact voltages
→ For pressure-boosting systems without a frequency converter (EC), a residual-current device, type A (RCD) with a trigger current of 30 mA must be installed.
→ The protection class of the system and of the individual components can be taken from the rating plates and/or data sheets.

NOTICE
The corresponding installation and operating instructions and the attached electrical wiring diagrams must be observed.

7 Commissioning

WARNING
Foot injuries due to a lack of protective equipment!
Danger of (serious) injuries during work. Wear safety shoes!

NOTICE
Automatic activation after power cut
Depending on the process, the product is switched on and off using separate controls. The product may automatically switch on following power cuts.

7.1 Safety

DANGER

Risk of fatal injury due to high voltage!

Observe the following instructions to avoid personal injury:

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

DANGER

Risk of fatal injury 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 and 5) are given in **bar**. If other units of pressure measurement are used, convert the figures correctly.

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 directly to arrange this.

7.2 General 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 valves at the pumps and in the suction and pressure pipe.
→ Open the pump venting screws and fill the pumps slowly with water to allow the air to escape completely. Close the venting screws once the pumps have been fully vented.
→ In suction mode (i.e. negative level difference between break tank and pumps), 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. 4 and 5). To do so:

1. Depressurise the tank on the water side:
   ⇒ Connect flow-through fixture (Fig. 4 – It. A).
   ⇒ Allow the residual water to escape via the drain (Fig. 4 – It. B).
2. Check the gas pressure at the air valve (top, remove dust cap) of the diaphragm pressure vessel with an air pressure gauge (Fig. 4 – It. C):
   ⇒ If the pressure is too low (PN 2 = pump cut-in pressure p_{min} minus 0.2 – 0.5 bar or value given in the table on the tank (Fig. 5)), 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.

3. Put the dust cap back on.
4. Close the drain valve on the flow-through fixture
5. Open the flow-through fixture.

→ For system pressures > PN 16, the manufacturer's filling instructions should be observed for the diaphragm pressure vessel in accordance with the installation and operating instructions.
→ 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).
→ In the break tank, position the float switch and electrodes for the protection against low water level so that the pressure-boosting system is switched off at minimum water level (see protection against low water level).
→ Rotation control for pumps with a standard motor without integrated frequency converter:
  – Switch on briefly to check whether the direction of rotation of the pumps matches the arrow on the pump housing. Swap phases if the direction of rotation is incorrect.
→ Check the motor protection switch in the switchgear to make sure that the correct rated current is set according to the specifications on the motor rating plate. The pumps can only briefly build up pressure against the closed gate valve on the pressure side.
→ Check and set the operating parameters required on the switchgear according to the attached installation and operating instructions.

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

7.3 Protection against low water level (WMS)

7.3.1 For operation with supply pressure

Systems containing only uncontrolled pumps

The pressure switch for the optional protection against low water level (WMS) kit (Fig. 6a to 6c) for monitoring the supply pressure is permanently factory-set. 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.

7.3.2 For operation with break tank (inlet mode)

With Wilo break tanks, the level-dependent low-water monitoring is performed via a float switch. This must be electrically connected to the switchgear before commissioning.

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

7.4 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 chapter “General preparations and control measures”:

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

► The pressure sensor measures the pressure at hand and transmits a corresponding current signal to the switchgear. If the pressure is less than the set start-up pressure, depending on the parameter settings and the control mode, the switchgear first switches on the base-load pump and, if required, the peak-load pump(s) until the consumer pipes are filled with water and the set pressure has built up.

See also

General preparations and control measures [▶ 49]

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

9 Maintenance

9.1 Safety

CAUTION

Risk of damage to property

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

- Check the supply pressure.

9.2 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 operational readiness of the pressure-boosting system.
→ Inspection of the mechanical seals on the pumps. The mechanical seals need water for lubrication, which can leak out of the gasket slightly. If water leakage is noticeable, the mechanical seal must be replaced.
→ Optional: Check the diaphragm pressure vessel (a 3-month cycle is recommended) for correct supply pressure setting and impermeability (Fig. 6 and 7).

To check the supply pressure:

→ Depressurise the vessel on the water side (close the flow-through fixture (Fig. 4 – It. A) and allow the residual water to escape through the drain (Fig. 4 – It. B).
→ Check the gas pressure at the diaphragm pressure vessel valve (top, remove dust cap) with an air pressure gauge (Fig. 4 – It. C).
→ If necessary, correct the pressure by filling the system with nitrogen. (PN 2 = pump cut-in pressure p_{min} minus 0.2 – 0.5 bar or value given in the table on the tank

(Fig. 5) – Wilo customer service). If the pressure is too high, release nitrogen from the valve.

In the case of systems with a frequency converter, the inlet and outlet filters of the fan must be cleaned if they are very dirty.

If the system is at a standstill for a longer period of time due to decommissioning, proceed as described in and drain all pumps by opening the drain plugs on the pump support foot.

10 Faults, causes and remedies

10.1 Notes

NOTICE
Note that faults, particularly those affecting the pumps or the control unit, may only be remedied by the Wilo customer service or a specialist company.

NOTICE
The general safety instructions must be observed during any maintenance or repair work. Furthermore, the installation and operating instructions of the pumps and the switchgear must be observed.

10.2 Faults, causes and remedies

Fault	Cause	Remedy
Display on the switchgear incorrect		Observe the installation and operating instructions of the switchgear.
Pump(s) do(es) 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 indicated	Check the inlet pressure and the level in the break tank.
	Low water switch defective	Check and, if necessary, replace the low-water switch.
	Electrodes connected incorrectly or pressure for low water cut-out 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.
	Start-up pressure set too high	Check the setting and correct it 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 it if necessary.
	Contactor defective	Check it and replace it if necessary.
	Turn-to-turn fault in the motor	Check, if necessary, replace motor or have it repaired.
Pump(s) do not switch off	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.

Fault	Cause	Remedy
	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.
	Gate valve in the system closed or not sufficiently open	Check and open the shut-off valve completely if necessary.
	Flow rate too high	Check the pump data and default values and correct if necessary.
	Shut-off device closed at pressure transmitter	Check and open the shut-off valve if necessary.
	Switch-off pressure set too high	Check the setting and correct it 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).
Switching frequency too high or fluttering	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.
	Shut-off device closed at pressure transmitter	Check and open the shut-off valve if necessary.
	No diaphragm pressure vessel present (optional or accessory)	Retrofit a diaphragm pressure vessel.
	Supply pressure at existing diaphragm pressure vessel incorrect	Check the supply pressure and correct it if necessary.
	Valve on existing diaphragm pressure vessel closed	Check the valve and open it if necessary.
	Existing diaphragm pressure vessel defective	Check the diaphragm pressure vessel and replace it if necessary.
	Switching difference set too low	Check the setting and correct it if necessary.
Pump(s) not stable and/or make(s) 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 pumps.
	Air in the pump	Vent the pump, check the impermeability of the suction line and seal it if necessary.
	Impellers clogged	Check the pump and replace it or have it repaired if necessary.
	Flow rate too high	Check the pump data and default values and correct if necessary.
	Incorrect direction of rotation of the motors	Check the direction of rotation and correct it by changing over phases if necessary.

Fault	Cause	Remedy
Pump(s) not stable and/or make(s) 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 pumps.
	Gate valve in the system closed or not sufficiently open	Check and open the shut-off valve completely if necessary.
	Impellers clogged	Check the pump and replace it 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 device closed at pressure transmitter	Check and open the shut-off valve if necessary.
	Deactivation point set too high	Check the setting and correct it 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.
	Flow rate too high	Check the pump data and default values and 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.
Motor protection switch triggers	Non-return valve defective	Check and replace the non-return valve if necessary.
	Flow rate too high	Check the pump data and default values and correct if necessary.
	Contactor defective	Check it 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(s) produce(s) no or too little 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.
		Replace the non-return valve.
	Gate valve in the system closed or not sufficiently open	Check and open the shut-off valve completely if necessary.
	Low water level indicated	Check the inlet pressure and the level in the break tank.

Fault	Cause	Remedy
Pump(s) produce(s) no or too little power	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.
	Flow rate too high	Check the pump data and default values and correct if necessary.
	Electrodes connected incorrectly or supply pressure switch set incorrectly	Check the installation and setting and correct as required.
	Low water switch defective	Check and, if necessary, replace the low-water switch.
Dry-running protection does not switch off, although water low	Electrodes connected incorrectly or pressure for low water cut-out switch set incorrectly	Check the installation and setting and correct it as required.
	Low water switch defective	Check and, if necessary, replace the low-water switch.
Direction of rotation signal lamp on (not for all pump types)	Incorrect direction of rotation of the motors	Check the direction of rotation and correct it by changing over phases if necessary.

You can find information on the pumps or the switchgear faults not dealt with here in the attached installation and operating instructions for the components concerned.

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 fluid must be collected in suitable tanks 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 pressure-boosting system ISAR with one pump (ISAR MODH-1) Fig. 1b Example of pressure-boosting system ISAR with one pump (ISAR MODV-1) Fig. 2a Example of pressure-boosting system ISAR with two pumps (ISAR MODH-1) Fig. 2b Example of pressure-boosting system ISAR with three pumps (ISAR MODV-1)	
1	Pump(s)
2	Switchgear
3	Base frame
4	Inlet connection/Piping on the suction side
5	Pressure pipe
6	Shut-off valve on the inlet side (for ISAR MODH-1 single-pump systems with optional WMS(14))
7	Shut-off valve on the pressure side
8	Non-return valve
9	Diaphragm pressure vessel
10	Throughflow fitting
11-1	Pressure gauge
12	Pressure sensor
13	Mounting bracket for fixation of the switchgear
14	Low-water cut-out switchgear (WMS), optional
17	Motor
34	Vibration absorber
54	Drilled holes for lifting eyes (lifting device)

Fig. 3a Pressure transmitter and diaphragm pressure vessel kit (ISAR MODH-1 single-pump system) Fig. 3b Pressure transmitter and diaphragm pressure vessel kit (ISAR MODV-1 single-pump system) Fig. 3c Pressure sensor and diaphragm pressure vessel kit (ISAR MODH-1 multi-pump system) Fig. 3d Example of pressure-boosting system ISAR with three pumps (ISAR MODV-1)	
9	Diaphragm pressure vessel
10	Throughflow fitting
11-1	Pressure gauge
12a	Pressure sensor
12b	Pressure sensor (plug), electrical connection, PIN assignment
18	Drain/venting
19	Stop valve

Fig. 4 Throughflow fitting operation/pressure testing of the diaphragm pressure vessel	
9	Diaphragm pressure vessel
10	Throughflow fitting
A	Open/close
B	Drain
C	Check the supply pressure (nitrogen! – N_2) in acc. with Fig. 5

Fig. 5 Reference table nitrogen pressure diaphragm pressure vessel (example) (supplied as a sticker!)	
a	Nitrogen pressure according to the table
b	Start-up pressure base-load pump in PE (bar)
c	Nitrogen pressure in bar PN 2 (bar)
d	Notice: Nitrogen measurement without water
e	Notice: Caution! Fill with nitrogen only

Fig. 6a Protection against low water level (WMS) kit for ISAR MODH1 single-pump system (including connection pipe and valve) Fig. 6b Protection against low water level (WMS) kit for multi-pump systems (ISAR MODH1 and MODV1) Fig. 6c Protection against low water level (WMS) kit for ISAR MODV1 single-pump system Fig. 6d Protection against low water level (WMS) kit, PIN assignment and electrical connection	
14 a	WMS kit, complete
14-1	Pressure switch (type PS3..or MDR-P...)
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 (only ISAR MODV1 single-pump system)
14-7	Screwed connection
14-8	Fitting
14-9	Pump drainage screw
14-10	O-ring seals
Core colours	
BN	BROWN
BU	BLUE
BK	BLACK

Fig. 7a Example of a direct connection (hydraulic diagram) single-pump system Fig. 7b Example of an indirect connection (hydraulic diagram) single-pump system Fig. 8a Example of a direct connection (hydraulic diagram) multi-pump system Fig. 8b Example of an indirect connection (hydraulic diagram) multi-pump system	
20	Pressure-boosting system
21	Consumer connections upstream of the pressure-boosting system
22	Diaphragm pressure vessel on the inlet side
23	Diaphragm pressure vessel on the end pressure side
24	Consumer connections downstream of the pressure-boosting system
25	Infeed connection for system flushing (nominal diameter = pump connection)
26	Draining connection for system flushing (nominal diameter = pump connection)

Fig. 7a Example of a direct connection (hydraulic diagram) single-pump system Fig. 7b Example of an indirect connection (hydraulic diagram) single-pump system Fig. 8a Example of a direct connection (hydraulic diagram) multi-pump system Fig. 8b Example of an indirect connection (hydraulic diagram) multi-pump system	
27	Unpressurised break tank on the inlet side
28	Flushing apparatus for inlet connection of the break tank
29	Bypass for inspection/maintenance (not permanently installed)
XX	Building connection to the water supply mains

Fig. 9a Installation example: Vibration absorber and compensator (ISAR MODH1)	
A	Vibration absorber (screw it into the threaded inserts provided and secure with counter nuts)
B	Compensator with extension limiters (accessory)
C	Fixing the pipes downstream of the pressure-boosting system, e.g. with pipe clamps (provided by the customer)
D	Threaded flange

Fig. 9b Installation example: Flexible connection pipes and floor fixation (ISAR MODH1) Fig. 9c Installation example: Flexible connection pipes and floor fixation (ISAR MODV1)	
A	Floor fixation with structure-borne noise insulation (provided by the customer)
B	Flexible connection pipe (accessory)
BW	Bend angle
RB	Bend radius
C	Fixing the pipes downstream of the pressure-boosting system, e.g. with pipe clamps (provided by the customer)
D	Threaded caps (accessory)

Fig. 10a to 10d Conversion of the manifold(s), changeover of connection side(s) (only ISAR MODH1 with 2 and 3 pumps)	
S – 1	Close shut-off valves
S – 2	Loosen the union nuts at the manifold(s),
S – 3	Turn the manifold(s) including all components
S – 4	Attach manifold(s) (observe seal seat!), tighten union nuts
S – 5	Open shut-off valves
S – 6	Turn pressure transmitter/manometer kit (if required)

Fig. 11a Open break tank (accessory – example)	
43	Inlet (with float valve (accessory))
45	Inspection opening
46	Overflow: Ensure adequate drainage. Protect siphon or valve against ingress of insects. Free discharge in accordance with EN 1717
47	Drain
48	Extraction (connection for pressure-boosting system)
49	Terminal box (low-water signal transmitter and, if available, overflow signal transmitter)

Fig. 11a Open break tank (accessory – example)	
50	Level display

Fig. 11b Low-water signal transmitter in the break tank (float switch) with connection diagram	
49	Terminal box
52	Low-water signal transmitter/float switch
53	Overflow signal transmitter/float switch
A	Tank full, contact closed (water not low)
B	Tank empty, contact open (water low)
C	Tank overflowing, contact closed (overflow alarm)
D	Tank not overflowing, contact open (no overflow alarm)
	Core colours
BN	BROWN
BU	BLUE
BK	BLACK

Fig. 12 Drain pipe for flushing	
25	Infeed connection for system flushing (nominal diameter = pump connection)
26	Draining connection for system flushing (nominal diameter = pump connection)
Notice:	If a diaphragm pressure vessel is located on the end pressure side, arrange for drainage to be placed directly downstream of the diaphragm pressure vessel.

Fig. 13a Transport example ISAR MODH1 Fig. 13b Transport example ISAR MODV1	
55	Transport pallet (example)
56	Wooden supports
57	Fastening screws
58	Box with accessories (example)
59	Plastic cover/dust protection
60	Approx. position centre of gravity of the system

wilo

Local contact at
www.wilo.com/contact

WILO SE
Wilopark 1
44263 Dortmund
Germany
T +49 (0)231 4102-0
T +49 (0)231 4102-7363
wilo@wilo.com
www.wilo.com

Pioneering for You