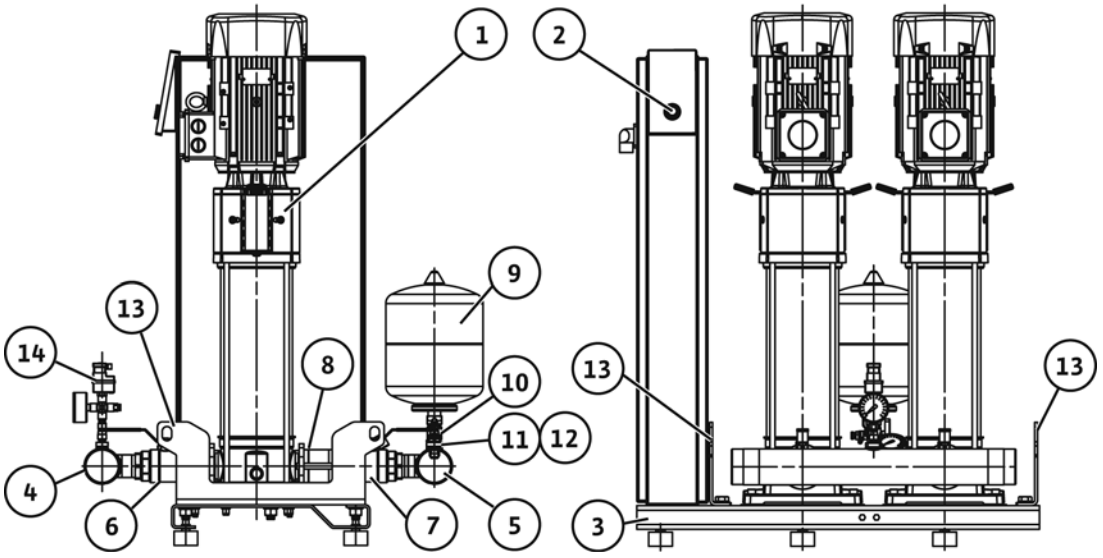
Pioneering for You

Wilo-SiBoost Smart (FC) ... Helix V/... Helix VE/... Helix EXCEL

de Einbau- und Betriebsanleitung
en Installation and operating instructions
fr Notice de montage et de mise en service
nl Inbouw- en bedieningsvoorschriften

2 535 457-Ed.03 / 2015-11-Wilo

Fig. 1a:



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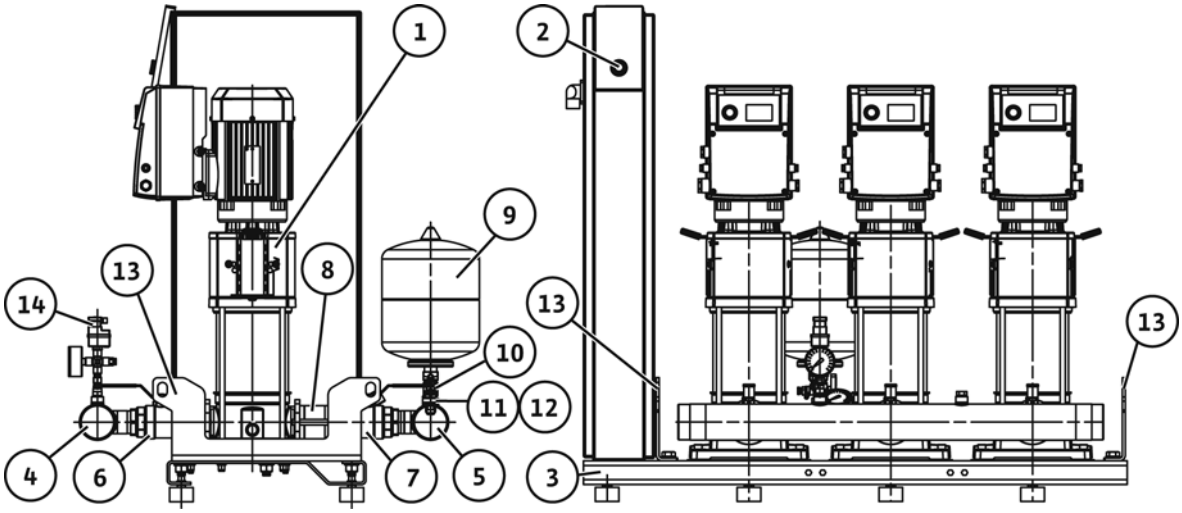

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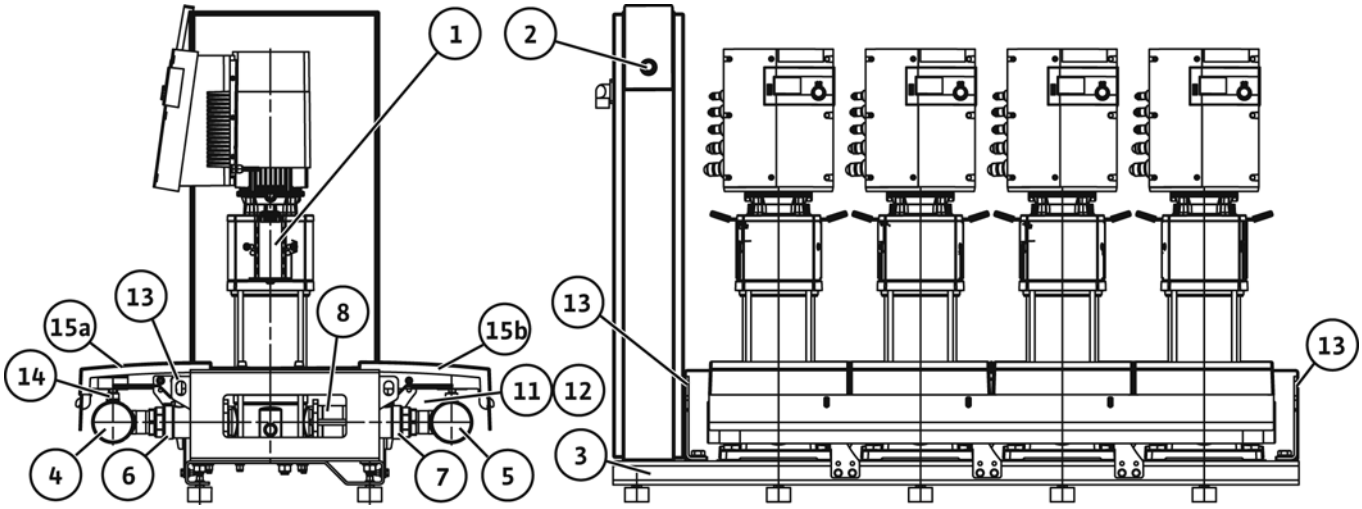

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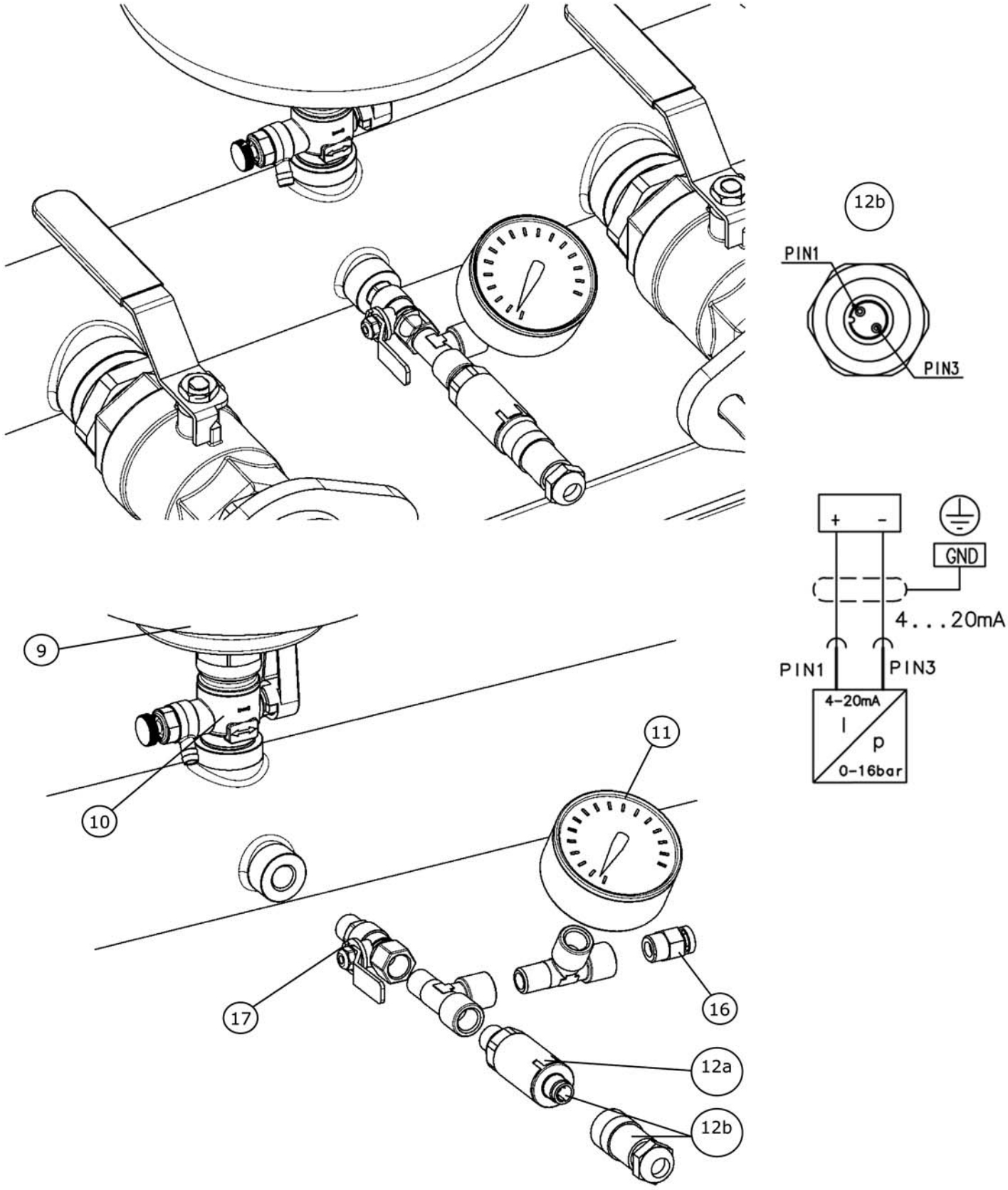
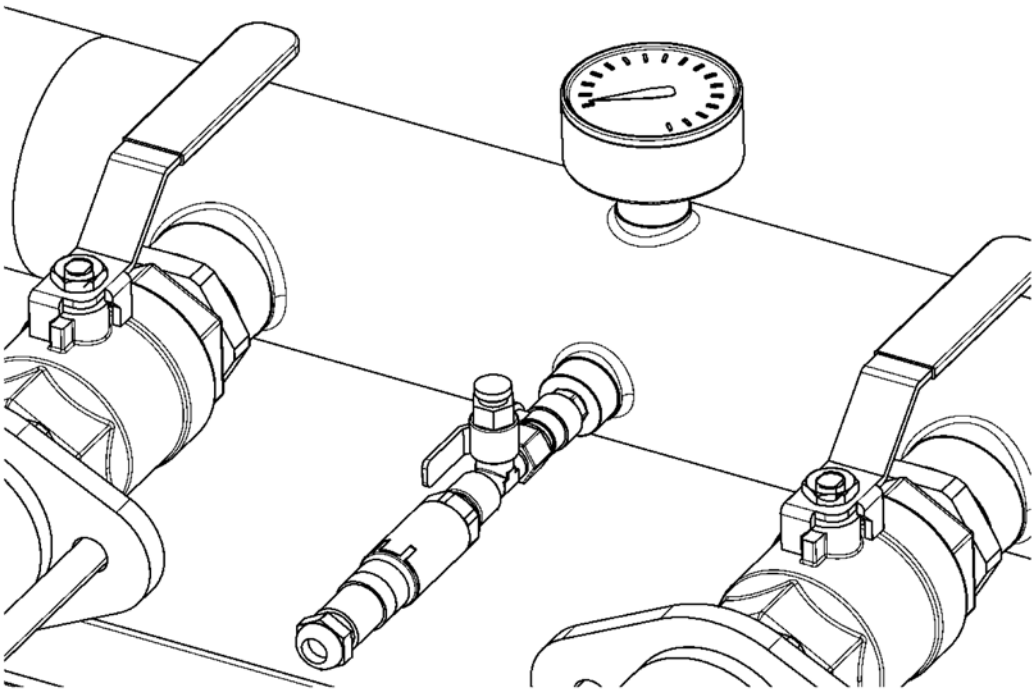
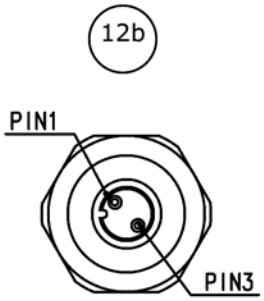
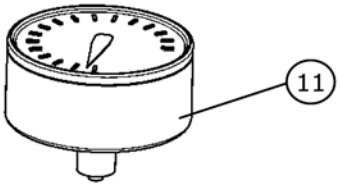

12b
PIN1
PIN3
+
-
GND
4...20mA
PIN1
PIN3
4-20mA
I
p
0-16bar
9
10
11
17
16
12a
12b

Fig. 2b:




12b
PIN1
PIN3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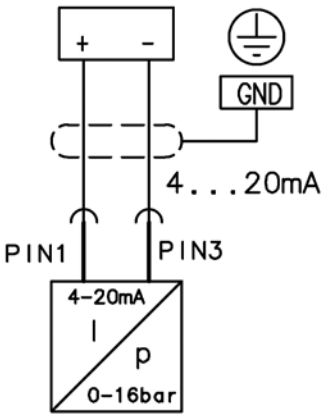
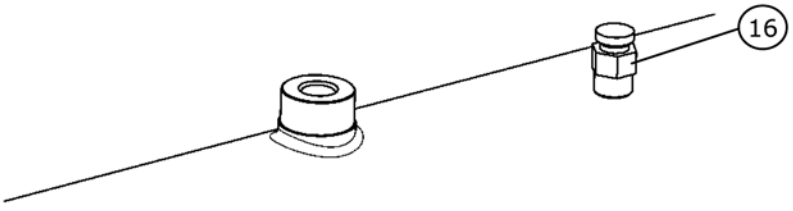

+
-
GND
4...20mA
PIN1
PIN3
4-20mA
I
p
0-16bar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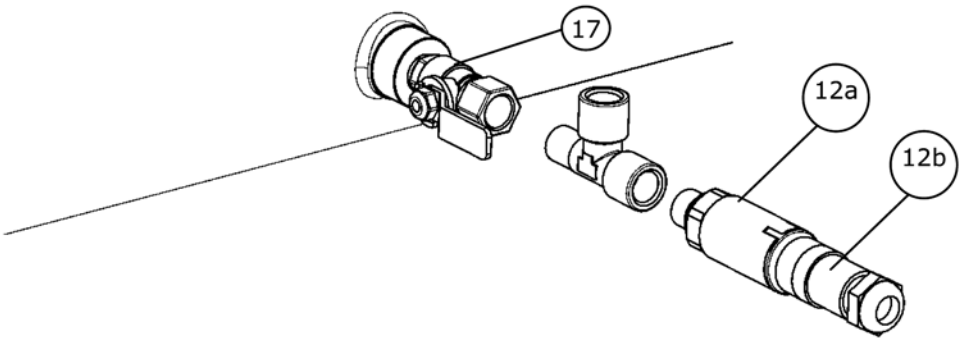
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12a
12b

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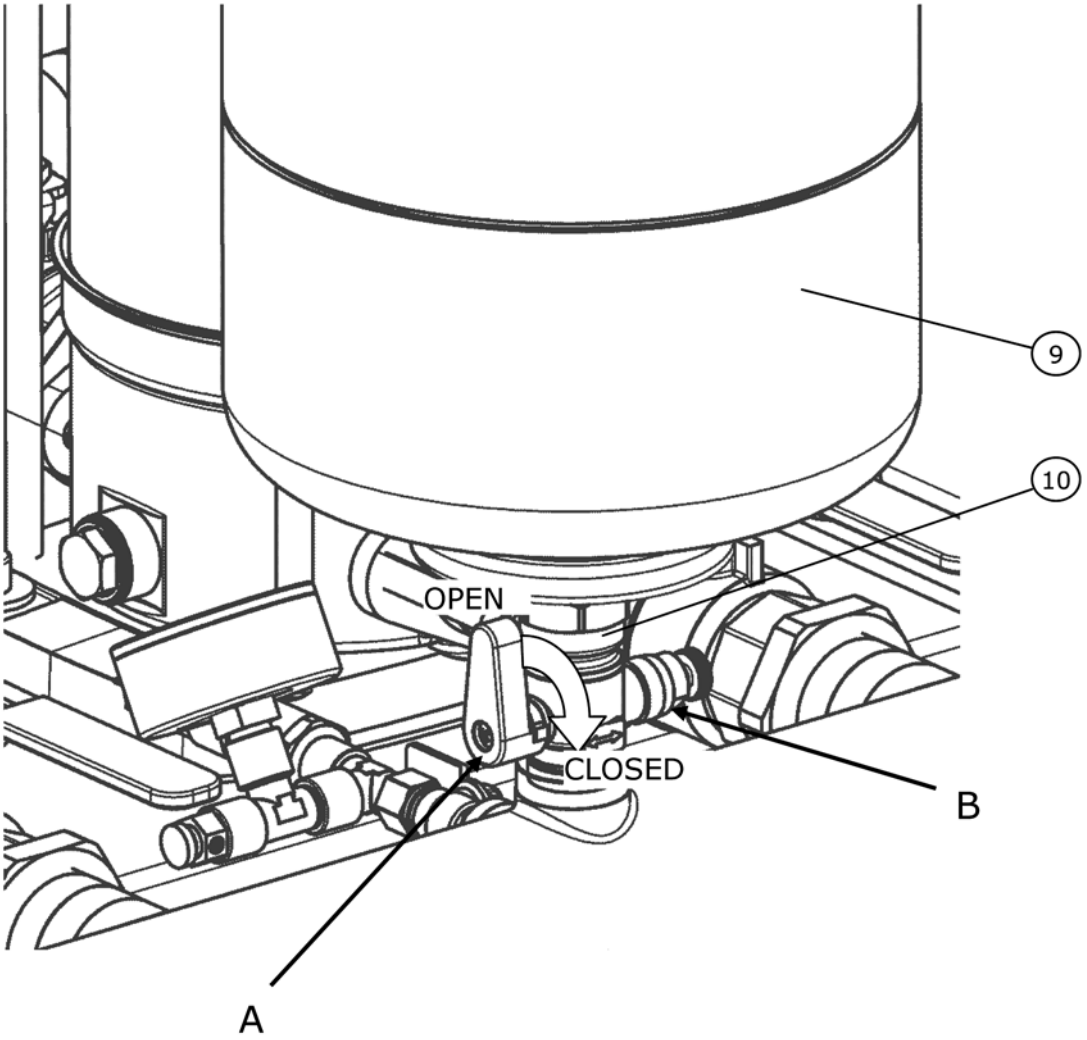


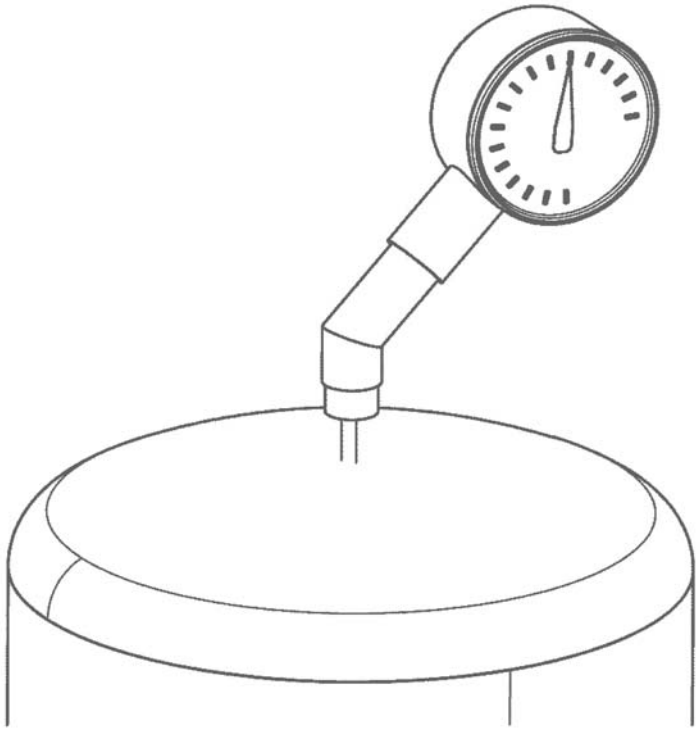
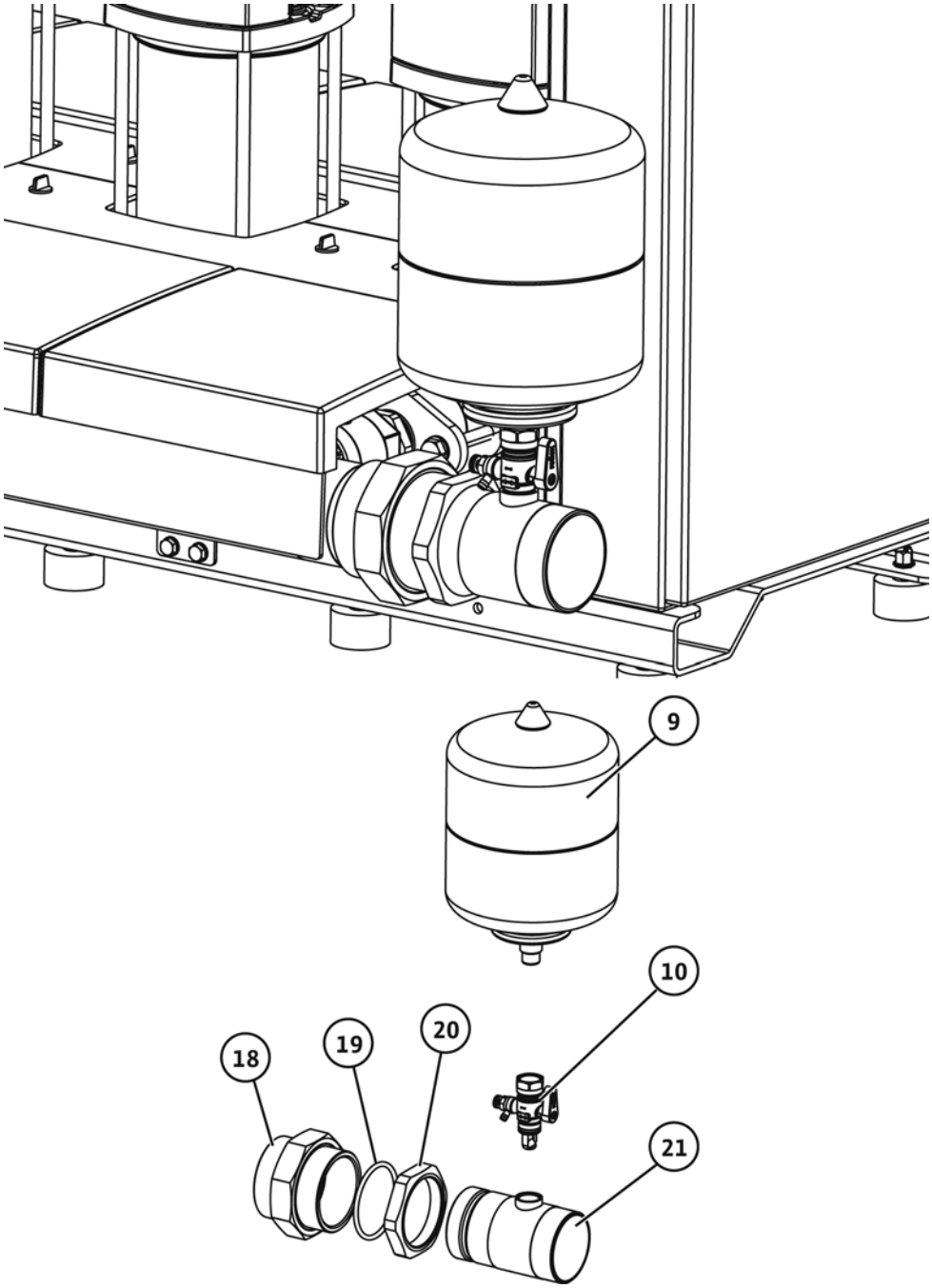


Fig. 4:


a
b
c
d
e
Hinweis / advice / attention /atención
Stickstoffdruck entsprechend der Tabelle / Nitrogen pressure according to the table
Pression d'azote conformément au tableau / Presión del nitrógeno según la tabla
PE [bar] Einschaltdruck / starting pressure / Pression de démarrage / Comenzar la presión
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
Stickstoffmessung ohne Wasser / Nitrogen measurement without water /
Mesure d'azote hors eau / Medida del nitrógeno sin el agua
Achtung: Nur Stickstoff einfüllen / Note: Only fill in nitrogen /
Nota: Remplir Seulement à l'azote / Nota: Completar solamente el nitrógeno

Fig. 5:



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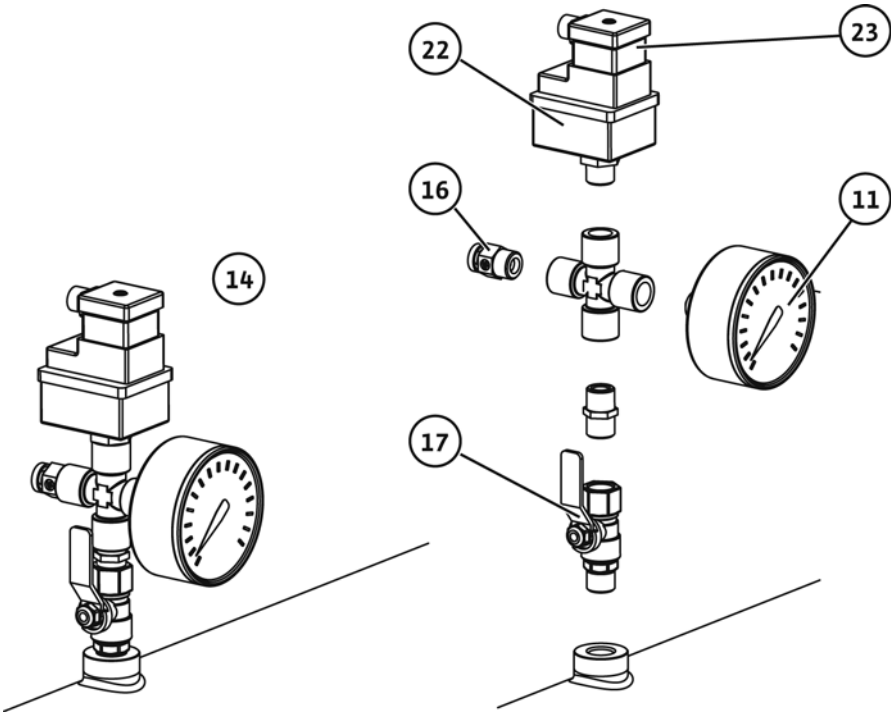

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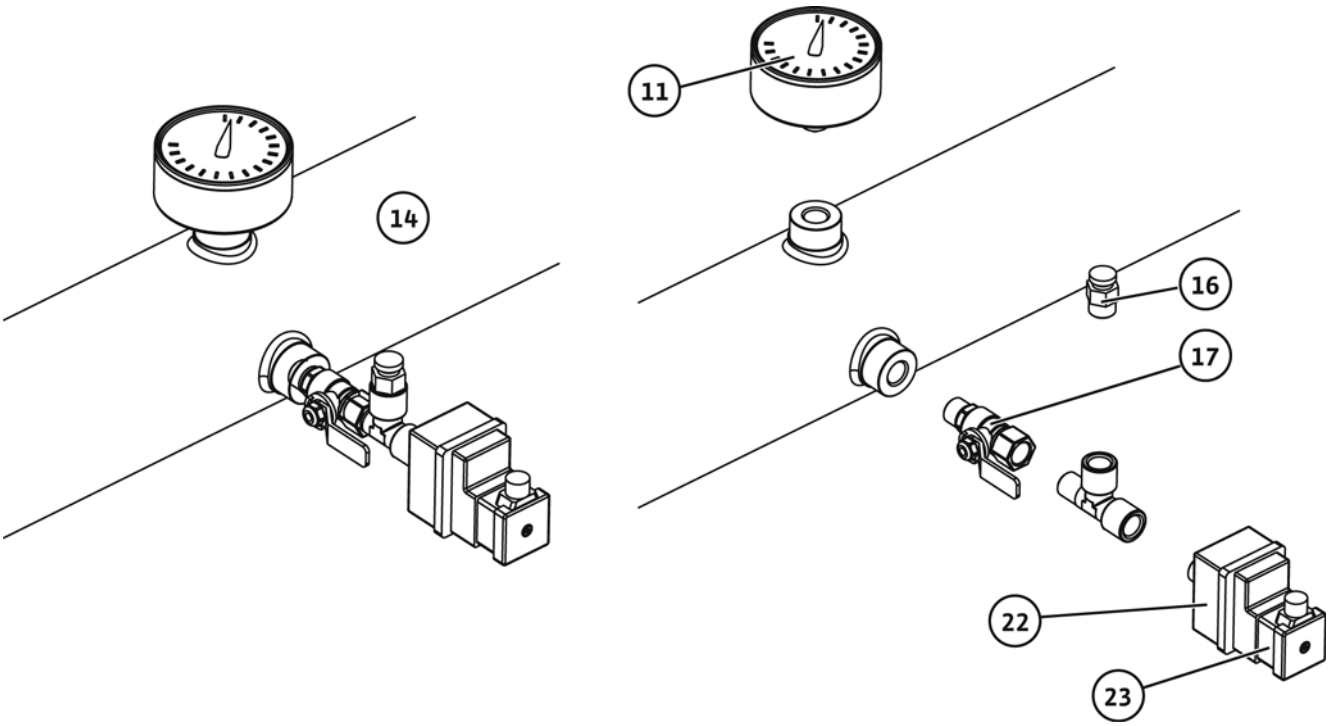

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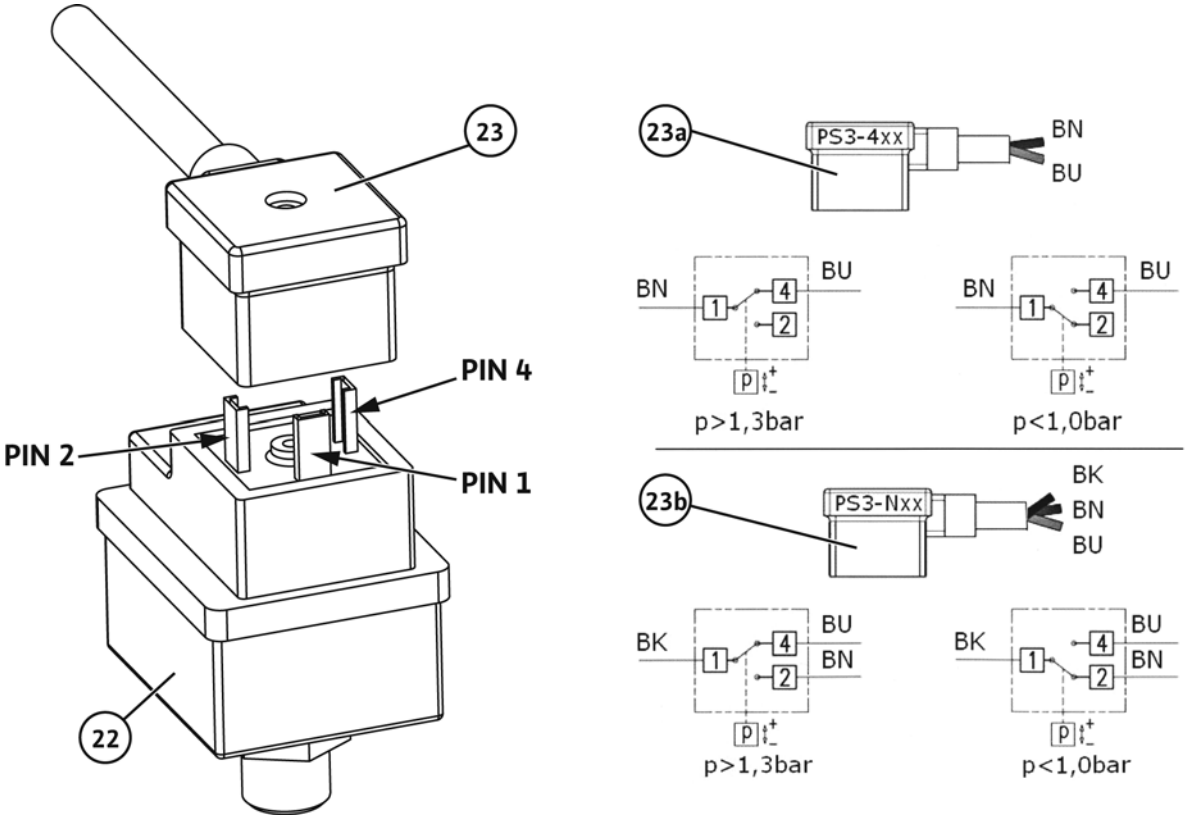
23
PIN 4
PIN 2
PIN 1
22
23a
PS3-4xx
BN
BU
BN
BU
1
4
2
p
p>1,3bar
BN
BU
1
4
2
p
p<1,0bar
23b
PS3-Nxx
BK
BN
BU
BK
BU
BN
1
4
2
p
p>1,3bar
BK
BU
BN
1
4
2
p
p<1,0bar

Fig. 7:

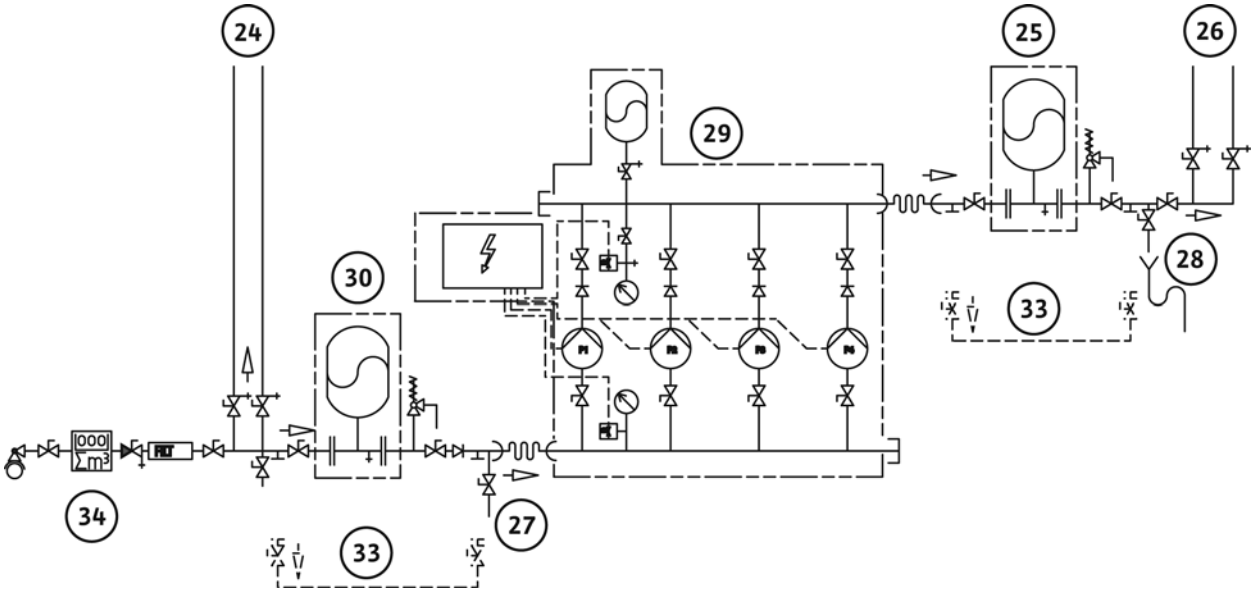
24
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Fig. 8:

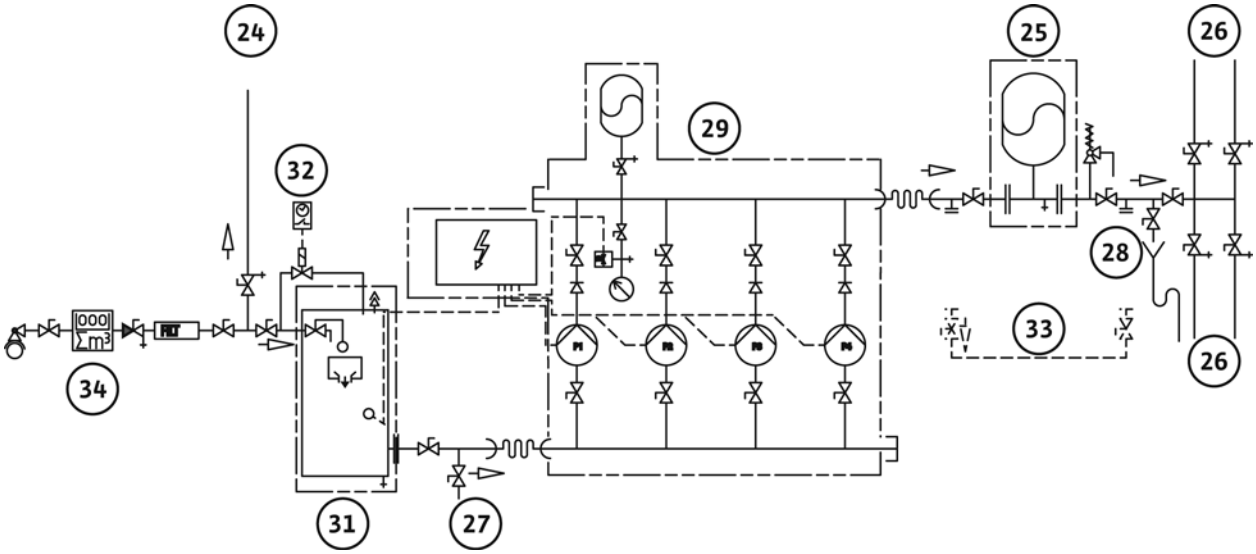
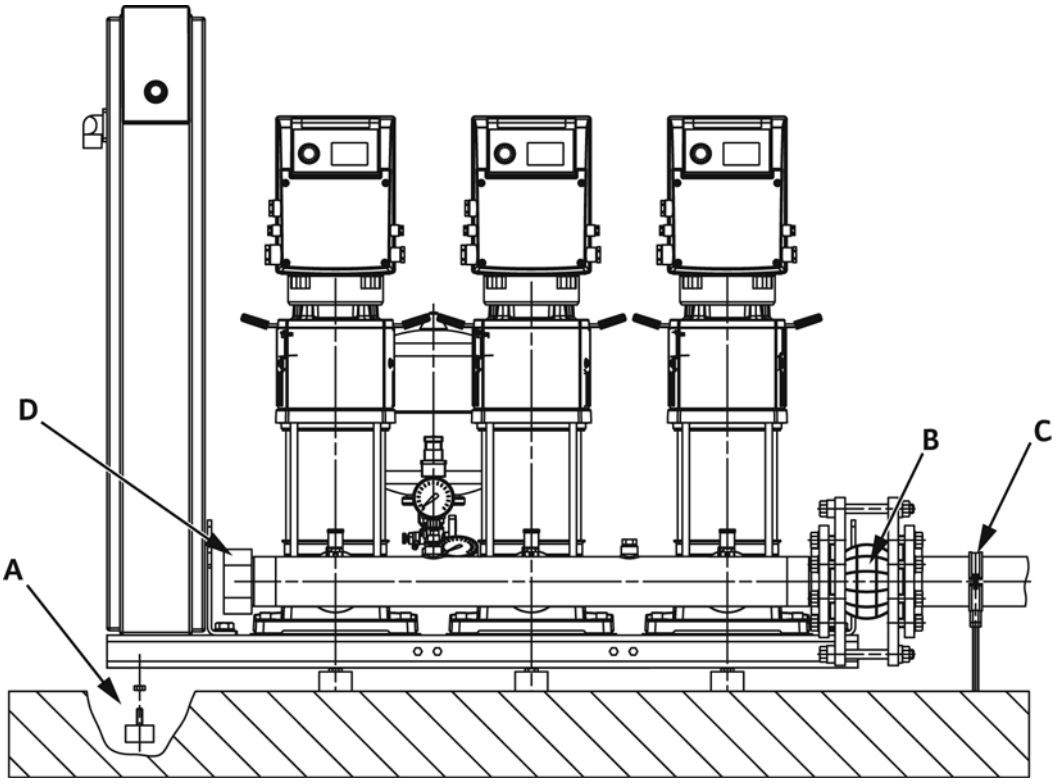


Fig. 9:



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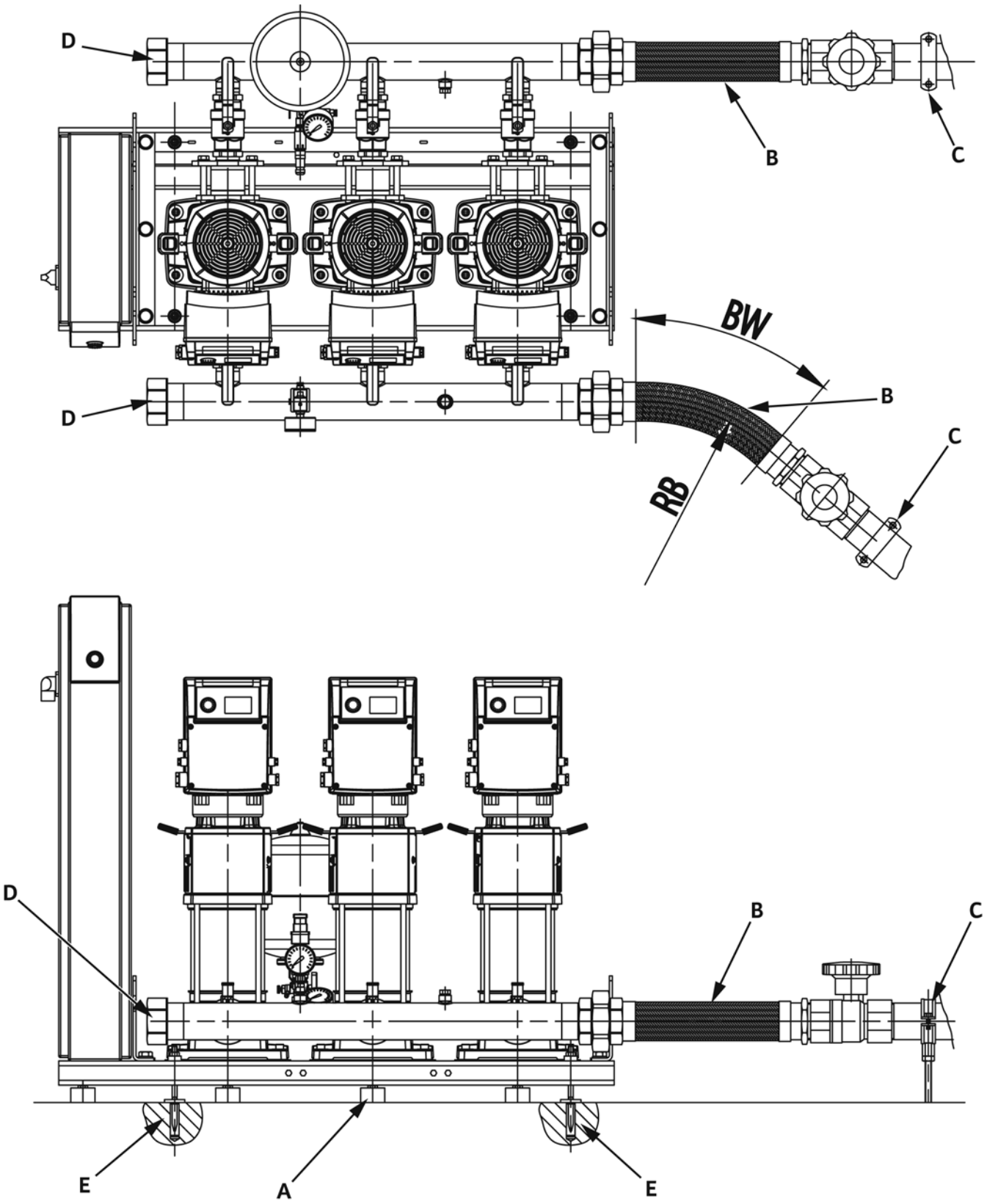
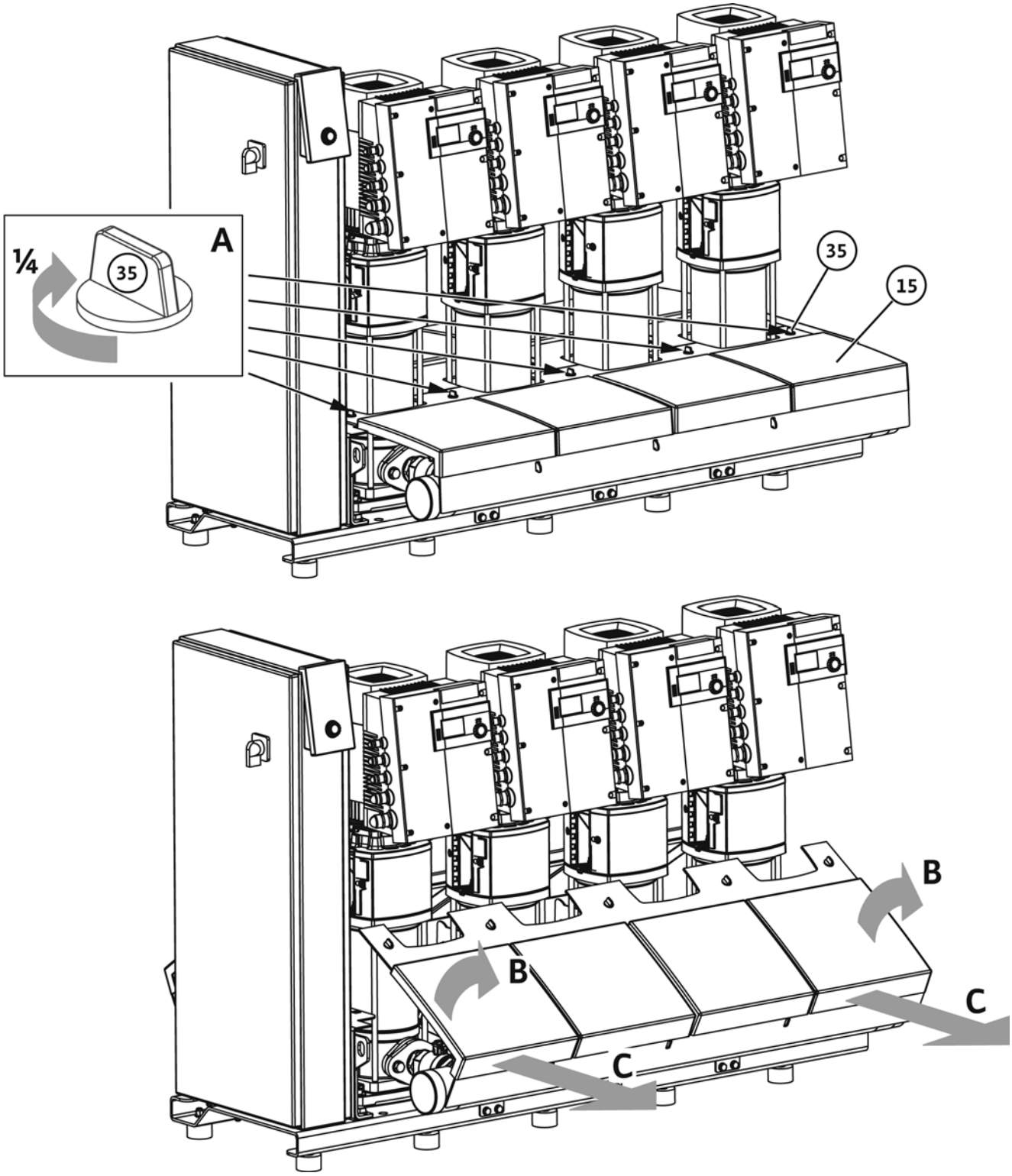


Fig. 11a:



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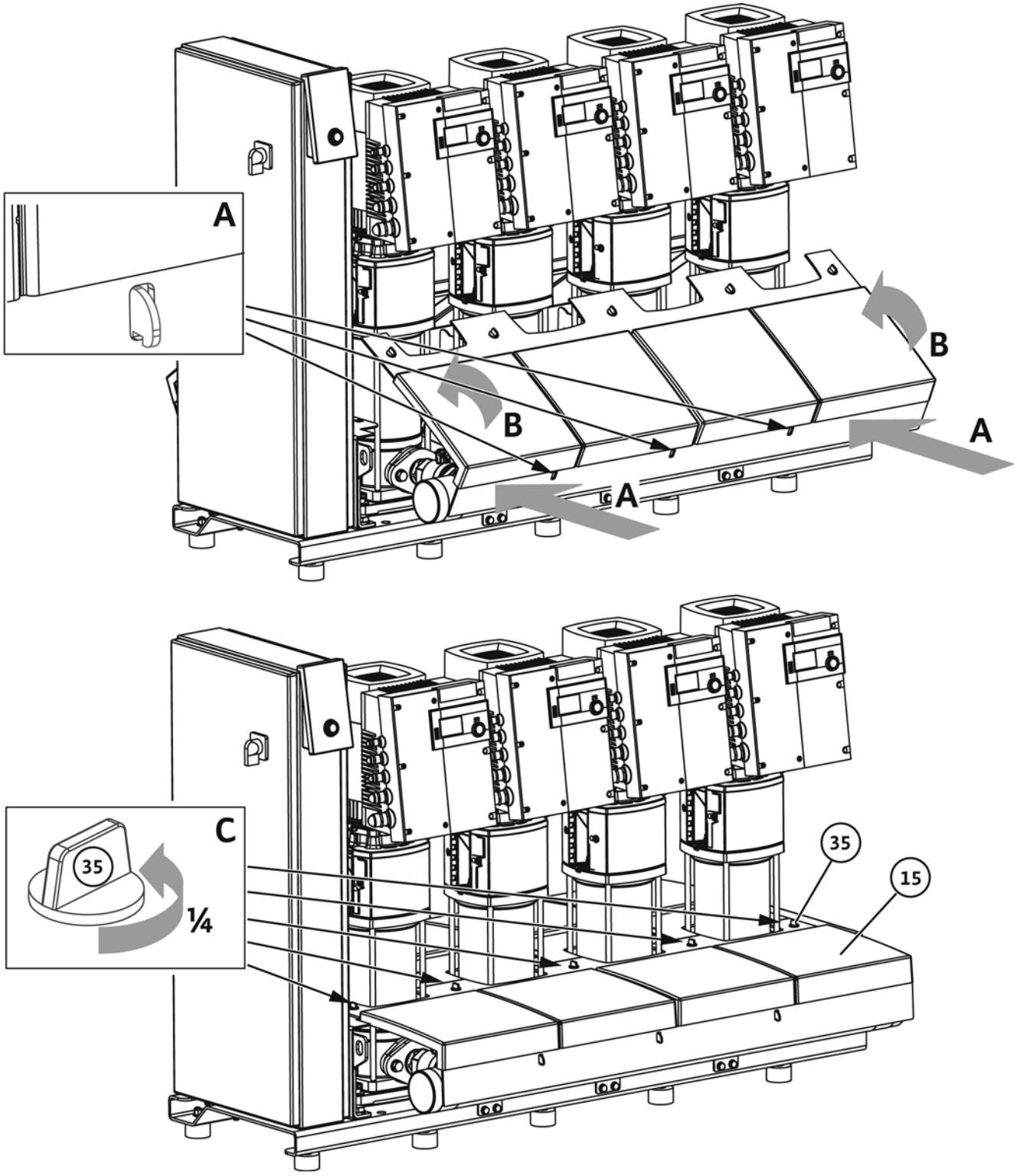

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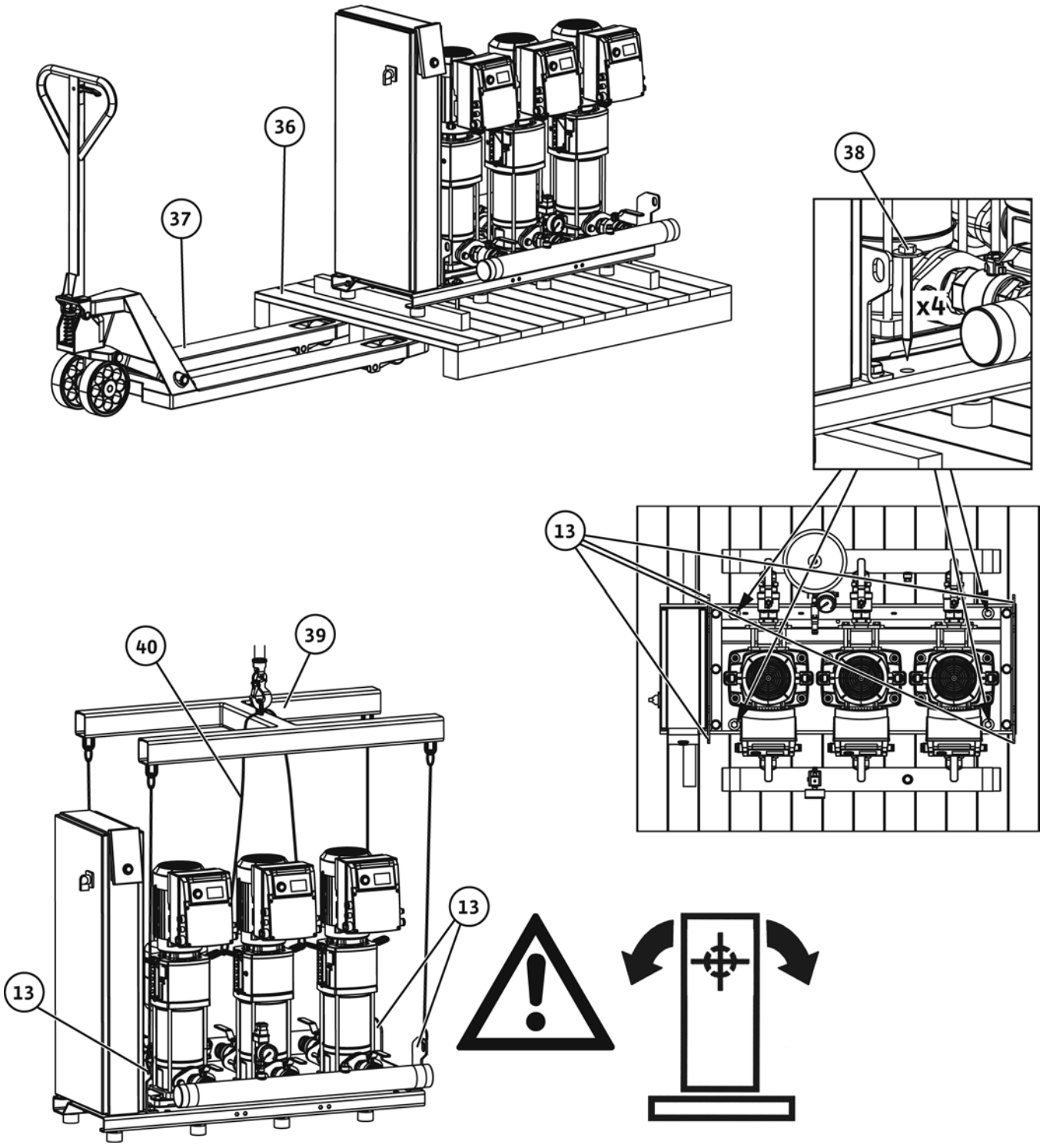

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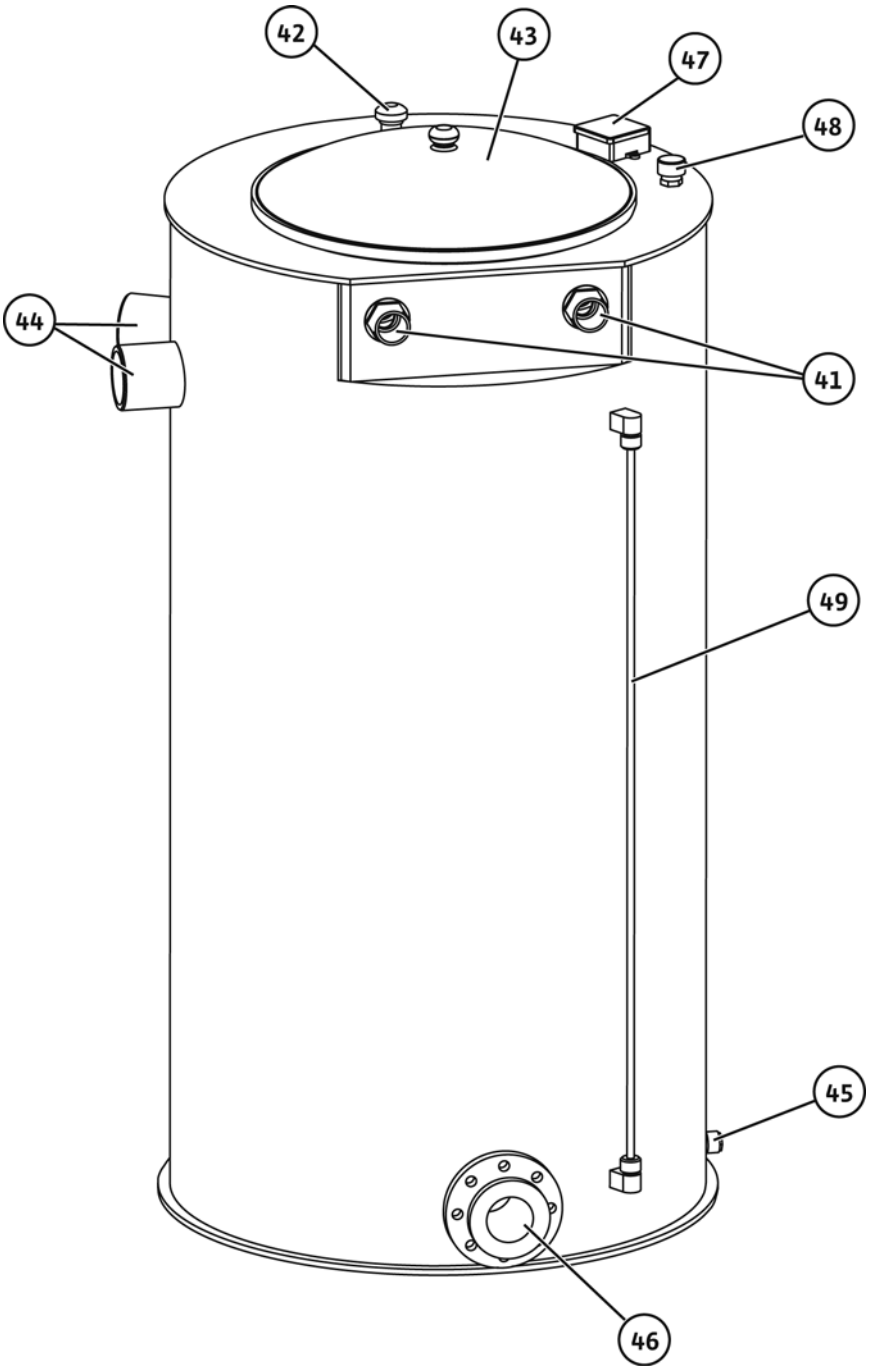

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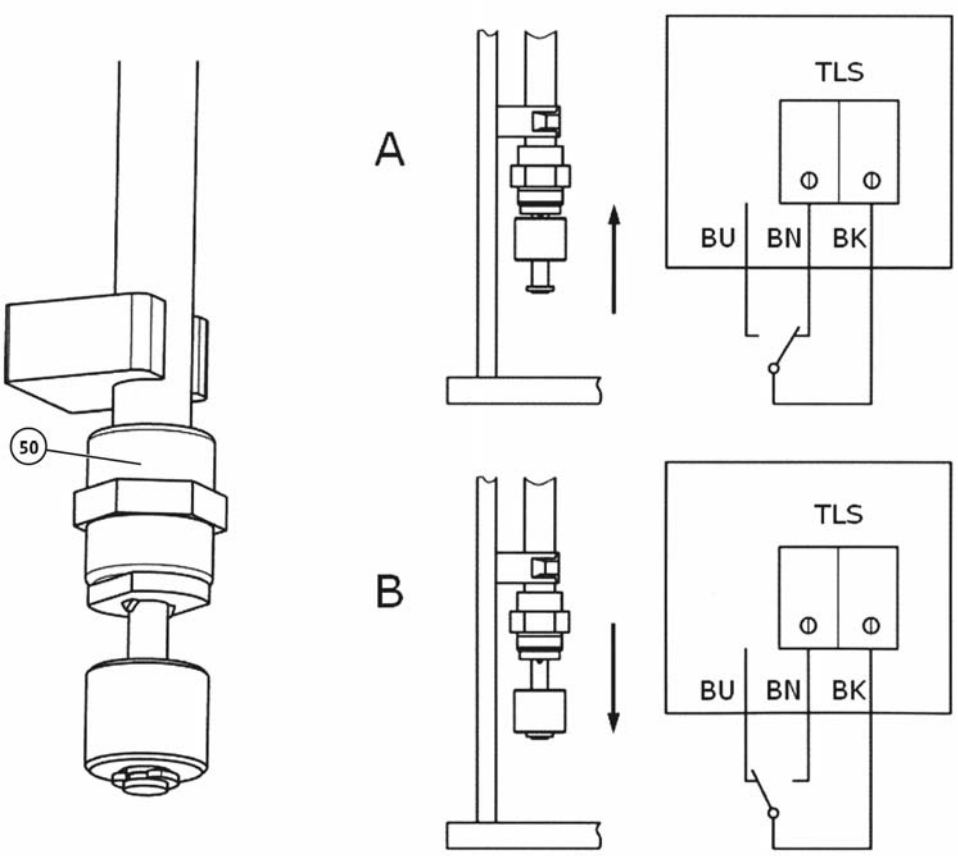

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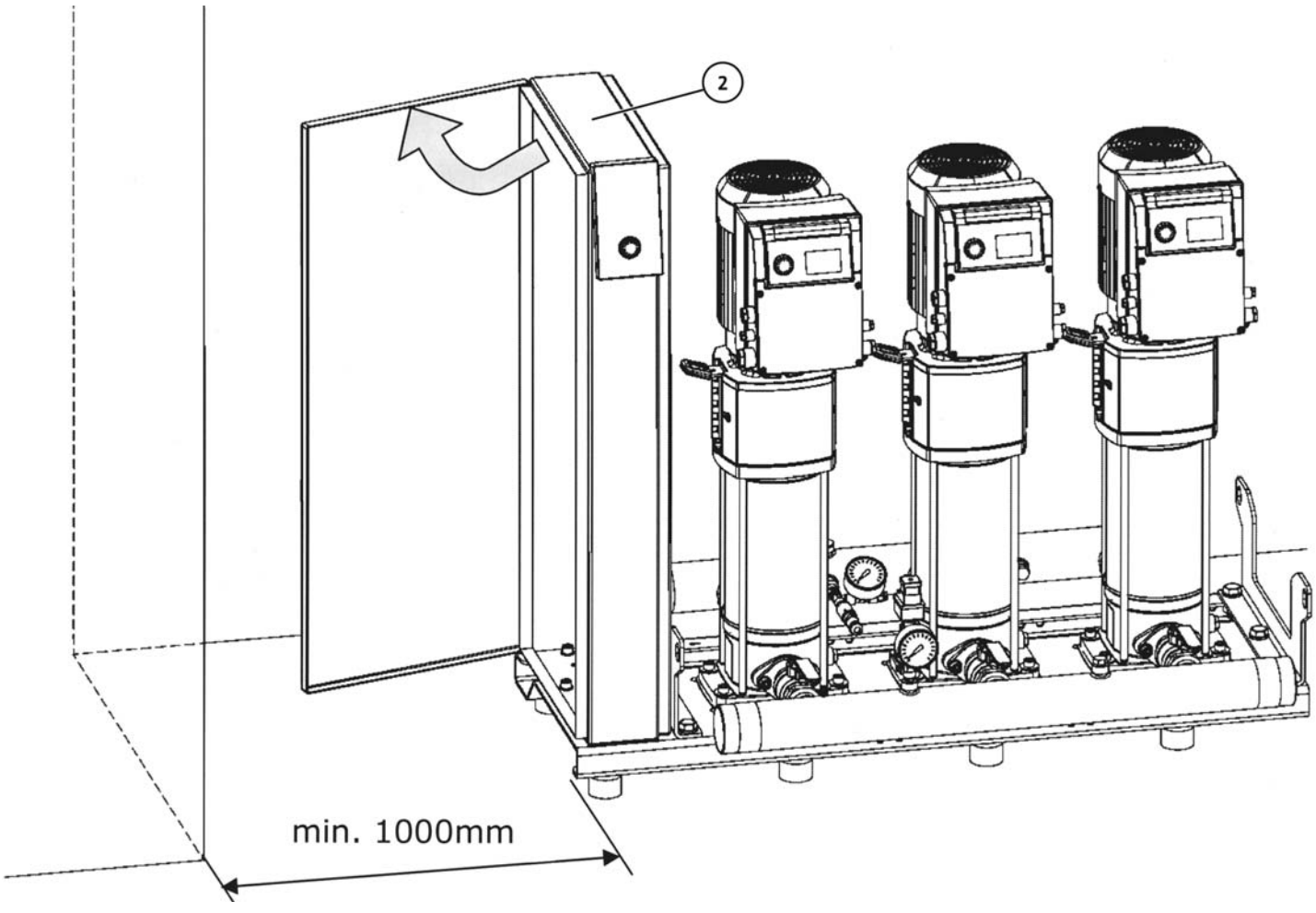

Captions

Fig. 1a Fig. 1b Fig. 1c	Example of pressure boosting system “SiBoost Smart 2 Helix V...” Example of pressure boosting system “SiBoost Smart 3 Helix VE...” Example of pressure boosting system “SiBoost Smart 4 Helix EXCEL”
1	Pumps
2	Control device
3	Base frame
4	Intake manifold pipe
5	Delivery manifold pipe
6	Check valve on the intake side
7	Check valve on the pressure side
8	Non-return valve
9	Diaphragm pressure vessel
10	Throughflow valve
11	Pressure gauge
12	Pressure sensor
13	Lifting point for attachment of lifting gear
14	Low-water cut-out switchgear (WMS), optional
15	Casing (only with pump types Helix EXCEL)
15a	Intake-side casing hood (only with pump types Helix EXCEL)
15b	Pressure-side casing hood (only with pump types Helix EXCEL)

Fig. 2a	Pressure sensor kit (series with Helix V und Helix VE)
9	Diaphragm pressure vessel
10	Throughflow valve
11	Pressure gauge
12a	Pressure sensor
12b	Pressure sensor (plug), electrical connection, PIN assignment
16	Draining/venting
17	Stop valve

Fig. 2b	Pressure sensor kit (series with Helix EXCEL)
11	Pressure gauge
12a	Pressure sensor
12b	Pressure sensor (plug), electrical connection, PIN assignment
16	Draining/venting
17	Stop valve

Fig. 3	Throughflow valve operation / pressure testing the diaphragm pressure vessel
9	Diaphragm pressure vessel
10	Throughflow valve
A	Open/close
B	Draining
C	Check supply pressure

Fig. 4	Information 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 bar **PE**
c	Nitrogen pressure in bar **PN2**
d	Note: Nitrogen measurement without water
e	Note: Attention! Introduce nitrogen only

Fig. 5	8l diaphragm pressure vessel kit (only for SiBoost Smart Helix EXCEL)
9	Diaphragm pressure vessel
10	Throughflow valve
18	Threaded pipe union (to suit the nominal diameter of the system)
19	O-ring (seal)
20	Lock nut
21	Pipe nipple

Fig. 6a Fig. 6b	Protection against low water level (WMS) kit SiBoost Smart Helix V und Helix VE Protection against low water level (WMS) kit SiBoost Smart Helix EXCEL
14	Low-water cut-out switchgear (WMS), optional
11	Pressure gauge
16	Draining/venting
17	Stop valve
22	Pressure switch
23	Plug connector

Fig. 6c	Protection against low water level (WMS) kit, pin assignment and electrical connection
22	Pressure switch (type PS3)
23	Plug connector
23a	Plug connector type PS3-4xx (2-core) (normally closed contact)
23b	Plug connector type PS3-Nxx (3-core) (changeover contact)
	Core colours:
BN	BROWN
BU	BLUE
BK	BLACK

Fig. 7 Fig. 8	Example of a direct connection (hydraulic diagram) Example of an indirect connection (hydraulic diagram)
24	Consumer connections upstream of the pressure boosting system
25	Diaphragm pressure vessel on the end pressure side
26	Consumer connections downstream from the pressure boosting system
27	Infeed connection for system flushing (nominal diameter = pump connection)
28	Draining connection for system flushing (nominal diameter = pump connection)
29	Pressure boosting system (here with 4 pumps)
30	Diaphragm pressure vessel on the inlet side
31	Unpressurised break tank on the inlet side
32	Flushing apparatus for the inlet connection of the break tank
33	Building connection to the water supply mains
34	Building connection to the water supply mains

Fig. 9	Installation example: vibration absorber and compensator
A	Vibration absorber (screw it into the threaded inserts provided and secure with it lock nuts)
B	Expansion joint with extension limiters (accessory)
C	Fixing the pipes downstream from the pressure boosting system, e.g. with pipe clips (by the customer)
D	Threaded caps (accessory)

Fig. 10	Installation example: Flexible connection lines and fixing to the floor
A	Vibration absorber (screw it into the threaded inserts provided and secure with it lock nuts)
B	Flexible connection line (accessory)
BW	Bend angle
RB	Bend radius
C	Fixing the pipes downstream from the pressure boosting system, e.g. with pipe clips (by the customer)
D	Threaded caps (accessory)
E	Floor fixing, with structure-borne noise insulation (by the customer)

Fig. 11a	Removing the casing
15	Casing (only with pump types Helix EXCEL)
35	Quick-release fastening for casing
A	Open the quick-release fastenings
B	Swing up the casing hoods
C	Remove the casing hoods

Fig. 11b	Fitting the casing
15	Casing (only with pump types Helix EXCEL)
35	Quick-release fastening for casing
A	Fitting the casing hoods (engage the guide tabs)
B	Swing back the casing hoods
C	Close the quick-release fastenings

Fig. 12	Transport instructions
13	Lifting point for attachment of lifting gear
36	Transport pallet (example)
37	Transport equipment - (example - pallet truck)
38	Transport securing (screws)
39	Hoisting gear (example - spreader beam)
40	Protective wrapper (example)

Fig. 13a	Break tank (accessory – example)
41	Inlet (with float valve (accessory))
42	Air supply/vent with insect protection
43	Inspection opening
44	Overflow Ensure adequate drainage. Protect siphon or valve against ingress of insects. No direct connection to the sewer system (free drainage according to EN1717)
45	Drainage
46	Extraction (connection for pressure boosting system)
47	Terminal box for low-water signal transmitter
48	Connection for flushing apparatus intake
49	Level display

Fig. 13b	Low-water signal transmitter (float switch) with connection diagram
50	Low-water signal transmitter/float switch
A	Tank full, contact closed (water not low)
B	Tank empty, contact open (water low)
	Core colours:
BN	BROWN
BU	BLUE
BK	BLACK

Fig. 14	Required space for the access to the controller
2	Controller

1 General

About this document

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

These installation and operating instructions are an integral part of the product. They must be kept readily available at the place where the product is installed. Strict adherence to these instructions is a precondition for the proper use and correct operation of the product.

The installation and operating instructions correspond to the relevant version of the product and the underlying safety regulations and standards valid at the time of going to print.

EC declaration of conformity:

A copy of the EC declaration of conformity is a component of these operating instructions.

If a technical modification is made on the designs named there without our agreement or the declarations made in the installation and operating instructions on product/personnel safety are not observed, this declaration loses its validity.

2 Safety

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

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

2.1 Indication of instructions in the operating instructions

Symbols:

General danger symbol

Danger due to electrical voltage

USEFUL INFORMATION

Signal words:

DANGER!

Acutely dangerous situation.

Non-observance results in death or the most serious of injuries.

WARNING!

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

CAUTION!

There is a risk of damaging the pump/unit. "Caution" implies that damage to the product is possible if this information is disregarded.

NOTE:

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

Information that appears directly on the product, such as:

- direction of rotation arrow
- identification for connections
- rating plate
- warning sticker

must be strictly complied with and kept in legible condition.

2.2 Personnel qualifications

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

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

Non-observance of the safety instructions can result in risk of injury to persons and damage to the environment and the product/unit. Non-observance of the safety instructions results in the loss of any claims to damages.

In detail, non-observance can, for example, result in the following risks:

- Danger to persons from electrical, mechanical and bacteriological influences
- Damage to the environment due to leakage of hazardous materials
- Property damage
- Failure of important product/unit functions
- Failure of required maintenance and repair procedures

2.4 Safety consciousness on the job

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

2.5 Safety instructions for the operator

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

- If hot or cold components on the product/the unit lead to hazards, local measures must be taken to guard them against touching.

- Guards protecting against touching moving components (such as the coupling) must not be removed whilst the product is in operation.
- Leakages (e.g. from the shaft seals) of hazardous fluids (which are explosive, toxic or hot) must be led away so that no danger to persons or to the environment arises. National statutory provisions are to be complied with.
- Highly flammable materials are always to be kept at a safe distance from the product.
- Danger from electrical current must be eliminated. Local directives or general directives [e.g. IEC, VDE etc.] and local energy supply companies must be adhered to.

2.6 Safety instructions for installation and maintenance work

The operator must ensure that all installation and maintenance work is carried out by authorised and qualified personnel, who are sufficiently informed due to their own detailed study of the operating instructions.

Work to the product/unit must only be carried out when at a standstill. It is mandatory that the procedure described in the installation and operating instructions for shutting down the product/unit be complied with.

Immediately on conclusion of the work, all safety and protective devices must be put back in position and/or recommissioned.

2.7 Unauthorised modification and manufacture of spare parts

Unauthorised modification and manufacture of spare parts will impair the safety of the product/ personnel and will make void the manufacturer's declarations regarding safety.

Modifications to the product are only permissible after consultation with the manufacturer. Original spare parts and accessories authorised by the manufacturer ensure safety. The use of other parts will absolve us of liability for consequential events.

2.8 Improper use

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

3 Transport and interim storage

The pressure boosting system is supplied on a pallet (see examples Fig. 12), on transport boards or in a crate and is film-wrapped to protect it against moisture and dust. Transport and storage instructions marked on the packing must be observed.

CAUTION! Risk of damage to property!
Use approved lifting gear (Fig. 12) to transport the system. Stability of the load must be ensured, since with this particular range of pumps the centre of gravity is shifted to the top (top-heavy). Connect transport slings or ropes to the transport eyes provided (see Fig. 1a, 1b, 1c, 12 – item 13) or around the base frame. The pipes are not designed to withstand loads and should not be used to secure loads in transit.

CAUTION! Risk of damage!
Subjecting the pipes to loads while in transit can result in leaks!

NOTE!
Where systems are fitted with covers it is recommended that these are removed when using the lifting gear, and are refitted after all installation and set-up work has been completed (see Fig.11a and 11b).

The transport dimensions, weights and necessary passageways and transport areas at the installation are given in the attached installation plan or other documentation.

CAUTION! Risk of detriment or damage!
The system must be protected by means of suitable measures against moisture, frost and heat and also mechanical damage!

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

If damage is found which may have been caused by being dropped or the like:

- check the pressure boosting system and accessories for possible damage
- inform the delivery company (forwarding agent) or our customer service department, even if at first you do not find any obvious damage to the system or its accessories.

After removing the packing, store or install the unit according to the installation conditions described (see section entitled Installation).

4 Intended use

Wilo pressure boosting systems of the SiBoost-Smart series are designed for pressure boosting and pressure support in water-supply systems. They are used in:

- drinking water supply systems, primarily in high-rise apartments, hospitals, offices and industrial buildings, the structure, function and requirements of which comply with the following standards, guidelines and directives:
  - DIN1988 (for Germany)
  - DIN2000 (for Germany)
  - EU Directive 98/83/EC
  - Drinking Water Ordinance – TrinkwV2001 (for Germany)
  - DVGW directives (for Germany),
- Industrial water supply and cooling systems
- Fire water and supply systems for local use,
- Irrigation and sprinkling installations

It is important to ensure that the medium to be conveyed don't attack the used materials in the system, neither chemically nor mechanically and does not contain abrasive or long-fiber constituents.

Automatically controlled pressure boosting systems are supplied from the public drinking water mains either directly (connected directly) or indirectly (connected indirectly) using a break tank. These break tanks are sealed but are not pressurised, i.e. they are under only atmospheric pressure.

5 Product information

5.1 Type key

Example:	Wilo-SiBoost-Smart-2 Helix V605
Wilo	Brand name
SiBoost	Product family: pressure boosting systems (system intelligence booster)
Smart	Series designation
2	Number of pumps
Helix	Series designation of pumps (see enclosed pump documentation)
V	Pump design, vertical standard version
6	Nominal flow rate Q [m^3/h] (2-pole version 50 Hz)
05	Number of pump stages

Example:	Wilo-SiBoost-Smart FC-3 Helix V1007
Wilo	Brand name
SiBoost	Product family: pressure boosting systems (system intelligence booster)
Smart	Series designation
FC	With built-in frequency converter in the control device
3	Number of pumps
Helix	Series designation of pumps (see enclosed pump documentation)
V	Pump design, vertical standard version
10	Nominal flow rate Q [m^3/h] (2-pole version 50 Hz)Number of pump stages
07	Number of pump stages

Example:	Wilo-SiBoost-Smart -4 Helix VE1603
Wilo	Brand name
SiBoost	Product family: pressure boosting systems (system intelligence booster)
Smart	Series designation
4	Number of pumps
Helix	Series designation of pumps (see enclosed pump documentation)
VE	Pump design, vertical electronic version (with frequency converter)
16	Nominal flow rate Q [m^3/h] (2-pole version 50 Hz)
03	Number of pump stages

Example:	Wilo-SiBoost-Smart -4 Helix EXCEL1005
Wilo	Brand name
SiBoost	Product family: pressure boosting systems (system intelligence booster)
Smart	Series designation
4	Number of pumps
Helix	Series designation of pumps (see enclosed pump documentation)
EXCEL	Pump design, (high-efficiency motor with frequency converter)
10	Nominal flow rate Q [m^3/h] (2-pole version 50 Hz)
05	Number of pump stages

5.2 Technichal Data)	
Max. flow rate	see catalogue/data sheet
Max. delivery head	see catalogue/data sheet
Speed	2800 – 2900 rpm (fixed speed) Helix V 900 – 3600 rpm (variable speed) Helix VE 500 – 3600 rpmn (variable speed) Helix EXCEL
Mains voltage	3~ 400 V ±10 % V (L1, L2, L3, PE)
Rated current	See rating plate
Frequency	50 Hz
Electrical connection	(see installation and operating instructions and wiring diagram of the control device)
Insulation class	F
Protection class	IP 54
Power consumption P1	See rating plate of the pump/motor
Power consumption P2	See rating plate of the pump/motor
Nominal diameters	
Suction/pressure pipe connection	R 1½/R 1½ (..2 Helix VE 2..) (..2 Helix V/VE/EXCEL 4..) (..3 Helix VE 2..) (..3 Helix V 4..) R 2/R 2 (..2 Helix V/VE/EXCEL 6..) (..3 Helix VE/EXCEL 4..) (..4 Helix VE 2..) (..4 Helix V 4..) R 2½/R 2½ (..2 Helix V/VE/EXCEL 10..) (..2 Helix V 16..) (..3 Helix V/VE/EXCEL 6..) (..3 Helix V/VE/EXCEL 10..) (..4 Helix VE/EXCEL 4..) (..4 Helix V/VE/EXCEL 6..) R 3/R 3 (..2 Helix VE/EXCEL 16..) (..2 Helix V/VE/EXCEL 22..) (..3 Helix V 16..) (..4 Helix V/VE/EXCEL 10..) DN 100/DN 100 (..2 Helix V/VE/EXCEL 36..) (..3 Helix VE/EXCEL 16..) (..3 Helix V/VE/EXCEL 22..) (..4 Helix V/VE/EXCEL 16..) DN 125/DN 125 (..2 Helix V/VE/EXCEL 52..) (..3 Helix V/VE/EXCEL 36..) (..4 Helix V/VE/EXCEL 22..) DN 150/DN 150 (..3 Helix V/VE/EXCEL 52..) (..4 Helix V/VE/EXCEL 36..) DN 200/DN 200 (..4 Helix V/VE/EXCEL 52..) (subject to change without prior notice / refer also to the enclosed installation plan)
Permissible ambient temperature	5 °C bis 40 °C
Permissible fluids	Pure water without settling sediment
Permissible temperature of the fluid	3 °C bis 50 °C
Max. permissible operating pressure	on the pressure side 16 bar (see rating plate)
Max. permissible inlet pressure	indirect connection (however max. 6 bar)
Further data...	
Diaphragm pressure vessel	8 L

5.3 Scope of delivery

- Pressure boosting system,
- Installation and operating instructions of the pressure boosting system,
- Installation and operating instructions of the pumps,
- Installation and operating instructions of the control device,
- Factory acceptance test certificate (in accordance with 10204 3.1.B),
- Installation plan if applicable
- Electrical wiring diagram if applicable
- Installation and operating instructions of the frequency converter if applicable
- Additional sheet with the factory setting of the frequency converter if applicable
- Installation and operating instructions of the signal transmitter if applicable
- Spare parts list if applicable.

5.4 Accessories

Accessories must be ordered separately if needed. The accessories included in the Wilo range include the following:

- Open break tank (example Fig. 13a),
- Larger diaphragm pressure vessel (on the suction side or discharge side)
- Safety valve
- Dry-running protection:
  - Protection against low water level (WMS) (Fig. 6a and 6b) in inlet mode (at least 1.0 bar) (supplied fitted to the pressure boosting system if part of the order)
  - Float switch
  - Low-water warning electrodes with level relay
  - Electrodes for tank operation (special accessories on request)
- Flexible connection lines (Fig. 10 - B),
- Expansion joints (Fig. 9 - B),
- Threaded flanges and caps (Fig. 9 and 10 – D),
- Sound-insulating casing (special accessory on request).

6 Description of the product and accessories

6.1 General description

The Wilo -pressure boosting system type Siboost-Smart is supplied ready for connection as a compact unit with built-in controls. It consists of 2 to 4 non-self-priming multistage vertical high-pressure centrifugal pumps which are supplied completely piped to each other and mounted on a common base frame. The only connections that have to be made are for the inlet and pressure pipes and the electrical mains supply. It may also be necessary to install accessories ordered and supplied separately.

The pressure boosting system with non-self-priming pumps can be connected both indirectly (Fig. 8 - system separated by a non-pressurised water break tank) and directly (Fig. 7 - connection without separation of the system) to the water supply mains. Detailed instructions for the pump type used can be found in the attached installation and operating instructions for the pump. Observe the relevant, applicable regulations and standards for using the potable water supply and/or fire extinguishing supply. **The system must be operated and maintained in accordance with the relevant instructions** (in Germany according to DIN 1988 (DVGW)) **so that the security of the water supply is permanently guaranteed and neither the public water supply nor other consumption installations are detrimentally affected.** The relevant instructions or standards (see section 1.1) on connection and the type of connection to the public water mains must be observed; and supplemented by **regulations of water companies or the responsible fire protection authorities**, as required. In addition, local conditions (e.g. a supply pressure that is too high or fluctuates sharply and which might require the installation of a pressure relief valve) must also be observed.

6.2 Components of the pressure boosting system

The complete system is made up of various main components. The scope of delivery includes separate installation and operating instructions for the operating parts/components. (Also see attached installation plan)

Mechanical and hydraulic system components (Fig. 1a, 1b and 1c) :
The compact unit is mounted on a **base frame with vibration absorbers (3)**. It consists of a group of 2 to 4 **high-pressure multistage centrifugal pumps (1)**, which are combined by means of an **intake manifold pipe (4)** and a **delivery manifold pipe (5)** to form a complete system. Each pump is fitted with a **(6) check valve** on the intake side, a **(7) check valve** on the pressure side and a **non-return valve (8)** on the pressure side. A module with isolation valves is fitted on the pressure manifold, which contains a **pressure sensor (12) and pressure gauge (11)** (see also Fig. 2a and 2b). For systems with pumps of the Helix V and Helix VE series, an **8-litre diaphragm pressure vessel (9) with a throughflow valve (10)** (for throughflow according to DIN 4807-part 5) (see also Fig. 3) is fitted to the **pressure manifold (5)**. For systems with pumps of the Helix EXCEL series a kit with an 8-litre diaphragm pressure vessel is in the scope of supply (see Fig. 5).
An optional module for **low-water cut-out switchgear (WMS) (14)** can be fitted or retrofitted to the intake manifold (see Fig. 6a and 6b).
The **control device (2)** is mounted directly on the base frame and ready-wired to the electrical components of the system. In the case of larger systems, the control device is accommodated in a separate free-standing cabinet (SG) and the electrical components are pre-wired to the corresponding connecting cable. For the separate free-standing cabinet (SG), the final wiring is done by the customer (see section 7.3 and the documentation included with the control device).
The present installation and operating instructions contain only a general description of the complete system.
Systems with pumps of the Helix EXCEL series (except pumps of the 52-series) are equipped additionally with a casing (Fig. 1c, 15a and 15b) around the valves and joint tubing.
High-pressure multistage centrifugal pumps (1):
Different types of multistage high pressure centrifugal pumps are installed in the pressure boosting system depending on the application and the performance parameters required. Their number can vary from 2 to 4 pumps. Pumps with built-in frequency convert-in frequency converters (Helix V) are used. The attached installation and operating instructions provide information on the pumps.

Control device (2):
The SC series control device is used to control and regulate the Siboost-Smart pressure boosting system. The size and components of the control device may vary depending on the design and performance parameters of the pumps. The attached installation and operating instructions, and the corresponding wiring diagram provide information on the control device installed in this pressure boosting system.
Diaphragm pressure vessel kit (Fig. 3 to Fig. 5):
- Diaphragm pressure vessel (9) with throughflow valve (10)

Pressure sensor kit (Fig. 2a and 2b):
- Pressure gauge (11)
- Pressure sensor (12)
- Electrical connection for pressure sensor (12)
- Draining / venting (16)
- Stop valve (17)

6.3 Function of the pressure boosting system

Wilo pressure boosting systems of the series SiBoost-Smart are fitted as standard with non-self-priming multistage high-pressure centrifugal pumps with or without built-in frequency converters. These are supplied with water via the inlet manifold pipe.
Where self-priming pumps are used for special versions, or generally in the case of suction from lower-lying tanks, a separate vacuum-proof and pressure-resistant suction line with a foot valve must be installed for each pump. The line must rise continuously from the tank to the system.
The pumps increase the pressure and pump the water to the consumer via the delivery manifold pipe. To do this, they are switched on and off or controlled depending on the pressure. The pressure sensor continuously measures the actual pressure value, converts it into a current signal and transmits it to the control device.
Depending on the requirement and the type of control, the control device switches the pumps on, switches them in, or switches them off. If pumps with built-in frequency converters are used, the speed of one or more of the pumps is changed until the control parameter settings are achieved (a more precise description of the control mode and the control process is given in the installation and operating instructions for the control device).
The total delivery volume of the system is distributed over several pumps. This has the big advantage that the system output is adapted very precisely to the actual demand and the pumps are operated in the most favourable performance range in each case. This design delivers a high level of efficiency and an economical energy consumption for the system.
The first pump that starts up is called the base-load pump. 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 stand-by. To ensure that all the pumps are used equally, the control unit cycles the pumps continuously, i.e. the order of switching on and the allocation of the base load/peak load or standby pump functions change regularly.
The diaphragm pressure vessel (total content approx. 8 litres) performs a certain buffering function on the pressure sensor and prevents oscillation of the control system when switching the system on and off. It also guarantees low water extraction (e.g. for very small leaks) 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.

CAUTION! Risk of damage!
To protect the mechanical seal or slide bearing, do not allow the pumps to run dry. If the pumps run dry they may develop leaks.
Various kits are offered as accessories for direct connection to the public water mains as protection against low water level (WMS) (14) (Fig. 6a and 6b). Each kit incorporates a built-in pressure switch (22). This pressure switch monitors the supply pressure and if the pressure is low it sends a switching signal to the control device.
An installation point for this purpose is provided as standard at the inlet manifold pipe.
In the case of an indirect connection (system separation through non-pressurised break tank), a level-dependent signal transmitter must be provided and installed in the break tank as a dry-running protection device. If a Wilo break tank is installed (as in Fig. 13a) a float switch is already included in the scope of delivery (see Fig. 13b).
For existing onsite tanks, the Wilo range offers various signal transmitters for retrofitting (e.g. float switches WA65 or low water electrodes with level relays).

WARNING! Health hazard!
Only materials that have no adverse effects on the quality of the water may be used for drinking water systems!

6.4 Noise

Pressure boosting systems are supplied with different types of pumps and a variable number of pumps, as listed under point 5.1. 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 MVI/Helix V up to a maximum motor power of 37 kW are taken into account **without** frequency converters:

Sound-pressure level max. (*) Lpa in [dB(A)]	Nominal motor power (kW)									
	0,37	0,55	0,75	1,1	1,5	2,2	3	4	5,5	7,5
1 pump	56	57	58	58	58	62	63	68	69	69
2 pumps	59	60	61	61	61	65	66	71	72	72
3 pumps	61	62	63	63	63	66	68	73	74	74
4 pumps	62	63	64	64	64	68	69	74	75	75

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

Lpa = workplace-related emission level in dB(A)

Sound-pressure level max. (*) Lpa in [dB(A)]	Nominal motor power (kW)						
	9	11	15	18,5	22	30	37
1 pump	70	71	71	72	74	75	80 (LWA=91 dB(A))
2 pumps	73	74	74	75	77	78	83 (LWA=94 dB(A))
3 pumps	75	76	76	77	79	80 (LWA=91 dB(A))	85 (LWA=96 dB(A))
4 pumps	76	77	77	78	80 (LWA=91 dB(A))	81 (LWA=92 dB(A))	86 (LWA=97 dB(A))

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

Lpa = workplace-related emission level in dB(A)

LWA = Sound-pressure level in dB(A) indicated from Lpa = 80 dB(A)

In the following overview, pumps of the standard series MVIE Helix VE up to a maximum motor power of 22 kW are taken into account **with** frequency converters:

Sound-pressure level max. (**) Lpa in [dB(A)]	Nominal motor power (kW)						
	0,55	0,75	1,1	1,5	2,2	3	4
1 pump	66	68	70	70	70	71	71
2 pumps	69	71	73	73	73	74	74
3 pumps	71	73	75	75	75	76	76
4 pumps	72	74	76	76	76	77	77

(**) Values for 60 Hz (variable speed) with tolerance of +3 dB(A)

Lpa = workplace-related emission level in dB(A)

Sound-pressure level max. (**) Lpa in [dB(A)]	Nominal motor power (kW)					
	5,5	7,5	11	15	18,5	22
1 pump	72	72	78	78	81 (LWA=92 dB(A))	81 (LWA=92 dB(A))
2 pumps	75	75	81 (LWA=92 dB(A))	81 (LWA=92 dB(A))	84 (LWA=95 dB(A))	84 (LWA=95 dB(A))
3 pumps	77	77	83 (LWA=94 dB(A))	83 (LWA=94 dB(A))	86 (LWA=97 dB(A))	86 (LWA=97 dB(A))
4 pumps	78	78	84 (LWA=95 dB(A))	84 (LWA=95 dB(A))	87 (LWA=98 dB(A))	87 (LWA=98 dB(A))

(**) Values for 60 Hz (variable speed) with tolerance of +3 dB(A)

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

LWA = Sound-pressure level in dB(A) indicated from Lpa = 80 dB(A)

In the following overview, pumps of the standard series Helix EXCEL up to a maximum motor power of 7.5 kW are taken into account **with** frequency converters:

Sound-pressure level max. (**) Lpa in [dB(A)]	Nominal motor power (kW)						
	1,1	2,2	3,2	4,2	5,5	6,5	7,5
1 pump	70	70	71	71	72	72	72
2 pumps	73	73	74	74	75	75	75
3 pumps	75	75	76	76	77	77	77
4 pumps	76	76	77	77	78	78	78

(**) Werte für 60Hz (veränderbare Drehzahl) mit Toleranz von +3dB(A)

Lpa = Arbeitsplatzbezogener Emissionspegel in dB(A);

The actual rated motor power of the delivered pumps can be seen on the rating plate on the motor.

For motor powers not listed here and/or other pump series, see the individual 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 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 +1)
4 pumps, total	+6	dB(A) (tolerance +1,5)
Overall noise level =	....	dB(A)

Example (pressure boosting system with 4 pumps)		
Single pump	74	dB(A)
4 pumps, total	+6	dB(A) (tolerance +3)
Overall noise level =	80...83	dB(A)

WARNING! Health hazard!
In the event of sound-pressure levels over 80 dB(A), operating personnel and persons who are nearby must wear suitable hearing protection.

7 Installation

7.1 Installation location

- The pressure boosting system is installed in the technical control room or in a dry, well ventilated and frost-proof, separate room that can be locked (e.g. as required by DIN 1988).
- Adequately dimensioned floor drainage (drain connection or similar) must be provided in the installation room.
- No harmful gases may penetrate into the room or be present there.
- Provide adequate space for maintenance work. The leading dimensions can be found in the accompanying installation plan. The system should be freely accessible from at least two sides.
- Pay attention for adequate freedom of movement to open the door of the controller (left side at look towards the control panel) and for maintenance in the control unit (at least 1000mm - see Figure 14)
- The installation surface must be horizontal and flat. A slight adjustment in height at the vibration absorber may be necessary to achieve stabilisation on the base frame. If this is necessary, slacken the lock nuts and screw the respective the vibration absorber out a little. Then retighten the lock nuts.
- The system is designed for a maximum ambient temperature of +0 °C to 40 °C with a relative atmospheric humidity of 50 %.
- Installation and operation in the vicinity of living rooms and bedrooms is not recommended.
- To avoid the transmission of structure-borne noise and to ensure a stress-free connection to upstream and downstream pipes, expansion joints (Fig. 9 - B) with extension limiters or flexible connection lines (Fig. 10 – B) should be used.

7.2 Installation

7.2.1 Foundation/bearing surface

The pressure boosting system is designed for installation on a flat concrete floor. A structure borne noise insulation against the building is given due to mounting the base frame on height-adjustable vibration absorbers.

NOTE:
For transport reasons, the vibration absorbers may be supplied not fitted to the equipment. Before installing the pressure boosting system, check that all the vibration absorbers are fitted and locked by threaded nuts. (See also Fig. 9)
Please note:
If the customer also wants to secure the installation to the floor, suitable measures must be taken to avoid structure-borne noise transmission.

7.2.2 Hydraulic connection and pipes

When connecting to the public potable water mains, the requirements of the local water supply company must be met.

The installation must not be connected until all the welding and soldering work and the necessary flushing and, if necessary, disinfecting of the pipe system and the pressure boosting system installation has been done (see 7.2.3).

The customer's pipes must be installed free from stresses. Expansion joints with extension limiters or flexible connection lines are recommended for this purpose in order to avoid stresses on the pipe connections and to minimise the transmission of system vibrations to the building pipework. In order to prevent the transmission of structure-borne noise to the building, do not secure the pipe clamps to the pressure boosting system pipes (see Fig. 9 for example; 10 – C).

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

The flow resistance of the suction line must be kept as low as possible (i.e. short pipe, few elbows and sufficiently large check valves), otherwise the protection against low water level may suffer severe pressure losses in the event of high volume flows. (Observe NPSH of the pump, avoid pressure loss and cavitation).

NOTE!

Where systems are fitted with casings it is recommended that these are removed before connecting the system and are refitted after all installation and set-up work has been completed (see Fig.11a and 11b).

7.2.3 Hygiene (TrinkwV 2001)

The pressure boosting system supplied represents current technology and in particular satisfies DIN1988. It was checked at the factory to make sure it functions perfectly. Please remember that when used in the drinking water sector, the complete drinking water supply system has to be handed over to the operator in a perfect state of hygiene.

Also observe the corresponding specifications in DIN 1988 Part 2 section 11.2 and the comments on the DIN. TwVO § 5. para 4 requires that this also includes microbiological requirements, flushing if necessary and also disinfecting in some circumstances. The limit values to be met are stated in TwVO § 5.

WARNING! Contaminated potable water is a health hazard!

Flushing the pipes and the system reduces the risk of affecting the quality of the potable water!

The water must be completely replaced after a long period of system standstill.

For the simple flushing of the system, we recommend the installation of a T-piece on the end pressure side of the pressure boosting system (if there is a diaphragm pressure vessel on the pressure side, immediately downstream of it) upstream of the next shut-off device. Its branch, provided with a shut-off device, drains into the waste water system during the flushing process and has to be dimensioned according to the maximum volume flow of an individual pump (see Fig. 7 and 8, item 28). If it is not possible to achieve free drainage, the requirements in DIN 1988 T5 must be observed when connecting a hose, for example.

7.2.4 Dry-running protection/protection against low water level (accessory)

Fitting dry-running protection:

- Direct connection to the public water mains: Screw the protection against low water level (WMS) into the socket provided on the suction manifold pipe and seal (if retrofitting) and make the electrical connection in the control device according to the installation and operating instructions and the control unit wiring diagram (Fig. 6a and 6b)
- In the case of an indirect connection, i.e. for operating with the customer's tanks: fit the float switch in the tank so that if the water level drops to approximately 100 mm above the draw-off connection, the "low water" switching signal is transmitted. (If break tanks from the Wilo range are used, a float switch is already installed (Fig. 13a and 13b).
- Alternatively: install submersible electrodes in the break tank. The arrangement is as follows: a 1st electrode is installed just above the floor of the tank as an earth electrode (must always be submerged) and for the bottom switching level (low water) a 2nd electrode is installed approximately 100 mm above the extraction connection. For the upper switching level (no longer low water) a third electrode should be fitted at least 150 mm above the lower electrode. Connect the wiring to the control device according to the installation and operating instructions and wiring diagram of the control device.

7.2.5 Diaphragm pressure vessel (accessory)

The 8-litre diaphragm pressure vessel available to the scope of delivery may for transport technical and hygiene reasons be supplied as a separate unfitted part. The diaphragm pressure vessel must be mounted on the throughflow valve before commissioning (see Fig. 2a and 3).

NOTE

When doing this, ensure that the throughflow valve is not twisted. The fitting is correctly mounted when the drain valve (see also Fig. 3) or rather the flow direction arrows stamped on it are parallel to the manifold pipe.

A assembly with a diaphragm pressure vessel is also in the scope of delivery to a system series with pumps of the HELIX EXCEL (with cover!).

If an additional larger diaphragm pressure vessel must be installed, follow the corresponding installation and operating instructions. In the case of a potable water installation, a throughflow diaphragm pressure vessel according to DIN 4807 must be used. When installing a diaphragm pressure vessel, also make sure there is enough room for maintenance work or replacement.

NOTE

Diaphragm pressure vessels require regular testing according to directive 97/23/EC (In Germany, also taking into account the Operating Safety Ordinance §§ 15(5) and 17 and also Appendix 5) Check valves must be provided upstream and downstream of the vessel for tests, overhaul and maintenance work on the pipe. To prevent system downtime, connections for a bypass can be fitted before and after the diaphragm pressure vessel. Such a bypass (as for example in the diagram Fig. 7 and 8 item 33) must be completely removed after completion of the work, so as to avoid stagnation of the water! Special maintenance and test instructions are given in the installation and operating instructions of the diaphragm pressure vessel concerned.

The installation conditions and delivery specifications of the system 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 admissible volume flow for the diaphragm pressure vessel connection (see Table 1 or the specifications on the rating plate, and the installation and operating instructions of the vessel).

Nominal diameter	DN 20	DN 25	DN 32	DN 50	DN 65	DN 80	DN 100
Connection	(Rp ¾“)	(Rp 1“)	(Rp 1¼“)	Flange	Flange	Flange	Flange
Max. volume flow (m^3/h)	2,5	4,2	7,2	15	27	36	56

Table 1

7.2.6 Safety valve (accessory)

A component-tested safety valve must be installed on the discharge side if the sum of the maximum possible supply pressure and the maximum delivery pressure of the pressure boosting system can exceed the admissible positive operating pressure of an installed system component. 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 (design data are given in the data sheets/characteristic curves of the pressure boosting system).

The water that flows off must be safely drained away. The corresponding installation and operating instructions and the relevant conditions must be observed during the installation of the safety valve.

7.2.7 Non-pressurised break tank (accessory)

To connect the pressure boosting system indirectly to the public drinking water mains, it must be installed 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 (see 7.1).

The entire bottom of the tank must be in contact with a solid bearing surface. The maximum volume of the tank concerned must be considered when designing the load-bearing capacity of the bearing surface. When installing, sufficient space must be allowed for overhaul work (at least 600 mm above the tank and 1000 mm on the connection sides). The tank must not slant when full, because an uneven load can lead to its destruction.

The non-pressurised enclosed PE tank (i.e. under atmospheric pressure) which we supply as an accessory must be installed according to the transport and installation instructions included with the tank. The following procedure applies generally: Before commissioning, connect the tank so that it is free of mechanical stresses. This means that the connection must be made using flexible components, like expansion joints or hoses.

The tank overflow must be connected according to the applicable regulations (in Germany, DIN 1988/T3). Heat transmission through the connection pipes must be avoided by taking suitable measures. PE tanks in the Wilo range are only designed to accommodate clean water. The maximum temperature of the water must not exceed 50 °C.

CAUTION! Risk of damage to property!
The tanks are designed for static operation at their nominal capacity. Subsequent changes can affect the static forces and lead to inadmissible deformation or even destruction of the tank.
The electrical wiring (for low-water protection device) to the system's control device must also be connected before the pressure boosting system is commissioned (see the details in the installation and operating instructions for the control device).

NOTE!
Before filling the tank, clean it and flush it!

CAUTION! Health hazard and risk of damage!
You must not walk on plastic tanks. Walking on the cover or subjecting it to loads can lead to accidents and result in damage.

7.2.8 Expansion joints (accessory)

For stress-free installation of the pressure boosting system, connect the pipes using expansion joints (Fig. 9 – B). The compensators must be equipped with a structure-borne noise-insulating extension limiter to absorb the reaction forces that occur. The expansion joints must be installed stress-free in the pipes. Alignment errors or pipe displacement must not be compensated for using expansion joints. When installing, the screws must be tightened uniformly, working across diagonals. The ends of the bolts must not project beyond the flange. If welding work is done nearby, the expansion joints must be covered for protection (sparks, radiated heat). The rubber parts of expansion joints must not be painted and must be protected from oil. In the installation, the expansion joints must be accessible for inspection at any time and therefore must not be covered by the pipe insulation.

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

7.2.9 Flexible connection lines (accessory)

In the case of pipes with threaded connections, flexible connection lines can be used for stress-free installation of the pressure boosting system and in the event of slight pipe displacement (Fig. 10 – B). The flexible connection lines in the Wilo range consist of a high quality stainless steel corrugated hose, sheathed with stainless steel braiding. A flat-sealing stainless steel screw connection with an internal thread is provided at one end for fitting to the pressure boosting system. An external pipe thread is provided at the other end to connect to further pipework. Depending on the size, certain maximum admissible deformation limits must be met (see Table 2 and Fig. 10). Flexible connection lines are not suitable for absorbing axial vibrations and compensating corresponding movements. A suitable tool must be used to prevent kinking or twisting when fitting. In the case of angular displacement of the pipes, it is necessary to fix the system to the floor, taking into account suitable measures to reduce structure-borne noise. The flexible connection lines in the system must be accessible for inspection at any time and must therefore not be covered by the pipe insulation.

Nominal diameter Connection	Thread Screwed connection	Tapered male thread	Max. bend radius RB in mm	Max. bend angle BW in °
DN 40	Rp 1½“	R 1½“	260	60
DN 50	Rp 2“	R 2“	300	50
DN 65	Rp 2½“	R 2½“	370	40

Table 2

NOTE!
Flexible connection lines are subject to wear in operation. Check regularly for leaks or other defects (see recommendations in DIN 1988).

7.2.10 Pressure reducer (accessory)

The use of a pressure reducer is necessary if the pressure fluctuations in the inlet pipe are more than 1 bar or if the supply pressure fluctuations are so great that the system has to be switched off or the total pressure (supply pressure and pump head at the zero volume point – see the system pump curve) exceeds the rated pressure. The pressure reducer can only perform its function if there is a minimum pressure gradient of approx. 5 m or 0.5 bar. The pressure downstream of the pressure reducer (back-pressure) is the basis for the total head calculation of the pressure boosting system. When installing a pressure reducer, there should be an installation section of approximately 600 mm on the supply pressure side.

7.3 Electrical connection

DANGER! Risk of fatal accident!
The electrical connection must be made according to the local regulations (VDE regulations) by an electrical installation engineer approved by local energy supply companies.
Pressure boosting systems of the SiBoost Smart ALTI NEXIS series are equipped with control devices of the SC, SC-FC or SCe series. To make the electrical connection, the corresponding installation and operating instructions and attached electrical wiring diagrams must be observed. General points to be considered are listed below:

- the current type and voltage of the mains connection must comply with the details on the rating plate and wiring diagram of the control device
- the electrical connection cable must be adequately dimensioned for the total power of the pressure boosting system (see rating plate and data sheet),
- external protection must be provided according to DIN 57100/VDE 0100 Part 430 and Part 523 (see data sheet and wiring diagrams),
- as a protective measure, the pressure boosting system must be earthed according to regulations (i.e. according to the local regulations and circumstances); the connections intended for this purpose are identified accordingly (see also the wiring diagram).

DANGER! Risk of fatal injury!
As protective measures against dangerous contact voltages:

- **if the pressure boosting system is without a frequency converter (SC) a residual-current-operated protection switch (FI switch) with a trigger current of 30 mA must be installed, or**
- **if the pressure boosting system is fitted with a frequency converter (SC-FC or SCe), a universal-current-sensitive residual-current-operated protection switch with a trigger current of 300 mA must be installed,**
- **the protection class of the system and of the individual components are indicated by the rating plates and/or data sheets,**
- **further measures/settings, etc. are described in the installation and operating instructions and also the wiring diagram of the control device.**

8 Commissioning / decommissioning

We recommend that the initial commissioning of the system is performed by Wilo customer service. Contact your dealer, the nearest Wilo representative or contact our central customer service department directly for details.

8.1 General preparations and checking

- Before switching on for the first time, check that all on-site wiring has been done correctly, particularly the earthing
- Check that the pipes are not under stress,
- Fill the system and visually check for leaks,
- Open the check valves on the pumps and in the suction pipe and pressure pipe,
- Open the pump venting screws and slowly fill the pumps with water so that the air can escape completely.

CAUTION! Risk of damage to property!
Do not allow the pump to run dry. Dry-running destroys the mechanical seal and leads to motor overloading.

- 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 as required).
- If a diaphragm pressure vessel (optional or accessory) is installed, this should be checked to ensure the supply pressure is correctly set (see Fig. 3 and 4)
- To do this:
  - depressurise the vessel on the water side (close the flow-through fixture (A, Fig. 3) and allow the residual water to drain (B, Fig. 3),
  - check the gas pressure at the air valve (top; remove protective cap) on the diaphragm pressure vessel using an air pressure gauge (C, Fig. 3). If necessary correct the pressure if it is too low [(PN2 = pump start-up pressure pmin less 0.2-0.5 bar or the value given in the table on the vessel) (see also Fig. 5)] by adding nitrogen (contact (Wilo customer service).
  - If the pressure is too high, release nitrogen at the valve until the value required is reached.
  - Refit the protective cap,
  - Close the drain valve on the throughflow valve and open the throughflow valve.
- For system pressures > PN16, the manufacturer's filling instructions according to the installation and operating instructions must be observed for the diaphragm pressure vessel,

DANGER! Risk of fatal injury!
Excessive supply pressure (nitrogen) in the diaphragm pressure vessel can lead to damage or destruction of the vessel and thereby also to personal injury.
The safety measures for the handling of pressurised vessels and technical gases must be observed.
The pressure specifications in this documentation (Fig. 5) are given in bar(!) If other units of pressure measurement are used, always be sure to convert the figures correctly.

- In the case of an indirect connection, check that the water level in the storage tank is adequate, or with a direct connection, that the inlet pressure is adequate (minimum inlet pressure 1 bar)
- Correct installation of the right dry-running protection (section 7.2.4.),
- In the break tank, position the float switch or electrodes for the low-water protection device so that the pressure boosting system is switched off at minimum water level (section 7.2.4),

- Check the direction of rotation of pumps with standard motors without built-in frequency converters (Helix-V): Switch on briefly to check whether the direction of rotation of the pump matches the arrow on the pump housing. Swap over two phases if the direction of rotation is incorrect.

DANGER! Risk of fatal injuries!
Switch off the system's main switch before swapping over the phases.

- Check the motor protection switch in the control device to make sure that the right nominal current is set according to the specifications on the motor rating plate.
- The pumps should only briefly run against the closed gate valve on the pressure side.
- Check and set the operating parameters required on the control device according to the attached installation and operating instructions.

8.2 Protection against low water level (WMS)

The pressure switch for protection against low water level (WMS) (Fig. 6) for monitoring the supply pressure is permanently factory-set to 1 bar (switches off if less than this) and 1.3 bar (switches on again if more than this).

8.3 Commissioning the system

After all the preparations and checks according to section 8.1 have been made, switch on the main switch and set the control system to automatic mode. The pressure sensor measures the pressure at hand and transmits a corresponding current signal to the control device. If the pressure is less than the set start-up pressure, depending on the parameter settings and the type of control, it first switches on the base-load pump and, as required, the peak-load pump (s) until the consumer pipes are filled with water and the set pressure has built up.

WARNING! Health hazard!
If the installation has not been flushed up to now, flush it through well at this point at the latest. (See section 7.2.3)

8.4 Decommissioning the system

If the pressure boosting system has to be taken out of service for maintenance, repair or other measures, proceed as follows!

- Switch off the voltage supply and secure it against being switched on again without authorisation
- Close the check valves upstream and downstream of the system
- Shut off the diaphragm pressure vessel at the throughflow valve and drain it
- Drain the system completely if necessary

9 Maintenance

To guarantee maximum operational reliability at the lowest possible operating cost, 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 our central customer service department. The following checks should be made regularly:

- Check that the pressure boosting system is ready to operate
- Check the mechanical seals on the pumps. The mechanical seals need water for lubrication and this can leak out of the seal slightly. If this is very noticeable, change the seal.
- Check the diaphragm pressure vessel (optional or accessory) (a 3-monthly cycle is recommended) for correct supply pressure setting and leaktightness (see Fig. 3 and 4).

CAUTION! Risk of damage to property!
If the supply pressure is incorrect, the function of the diaphragm pressure vessel is not guaranteed, which increases diaphragm wear and can lead to system faults.

To check the supply pressure:

- Depressurise the vessel on the water side (close the flow-through valve (A, Fig. 3) and allow the residual water to drain (B, Fig. 3),
- Check the gas pressure at the diaphragm pressure vessel valve (top; remove protective cap) using an air pressure gauge (C, Fig. 3)
- If necessary correct the pressure by adding nitrogen. (PN2 = pump start-up pressure pmin less 0.2-0.5 bar or the value given in the table on the vessel (Fig. 4) – Wilo customer service). If the pressure is too high, discharge nitrogen at the valve.

In the case of installations with a frequency converter, the inlet and outlet filter of the fan must be cleaned if these are very dirty.

If the system at a standstill for a long period due to decommissioning, proceed as described in 8.1 and drain each pump by opening the drainage plug on the pump base.

10 Faults, causes and remedies

Faults, particularly those affecting the pumps or the control system, should only be remedied by Wilo cus**tomer service or a specialist company.**

NOTE!
The general safety instructions must be observed when doing any maintenance or repair work. Also follow the installation and operating instructions of the pumps and the control device.

Fault	Cause	Remedy
Pump does (pumps do) not start	No mains voltage	Check fuses, cables and connections
	Main switch "OFF"	Switch on the main switch
	Water level in break tank too low, i.e. low-water level reached	Check break tank inlet valve/inlet pipe
	Low-water level switch has triggered	Check intake pressure
	Low-water level switch defective	Check, if necessary replace the low-water level switch
	Electrodes incorrectly connected or supply pressure switch incorrectly set	Check installation or setting and correct
	Intake pressure exceeds start-up pressure	Check settings and correct if necessary
	Check valve closed at pressure sensor	Inspect, open check valve if necessary
	Start-up pressure set too high	Check setting and correct if necessary
	Fuse defective	Check fuses and replace if necessary
	Motor protection has triggered	Check set values against the pump or motor data, measure current values and correct setting if necessary. Check motor for defects and replace if necessary
	Contactor defective	Check and replace if necessary
	Turn-to-turn fault in motor	Check, if necessary replace motor or have repaired
Pump does (pumps do) not switch off	Intake pressure fluctuates severely	Check intake pressure, if necessary take measures to stabilise supply pressure (e.g. pressure reducer)
	Intake pipe blocked or shut off	Check inlet pipe, if necessary remove blockage or open check valve
	Nominal diameter of inlet pipe too small	Check the inlet pipe, increase the cross-section for the inlet pipe if necessary
	Inlet pipe incorrectly installed	Check inlet pipe, if necessary change pipe guide
	Air in inlet	Check, if necessary seal pipe. Vent pumps
	Impellers blocked	Check pump, if necessary replace or have repaired
	Non-return valve leaking	Check, if necessary replace seal or replace non-return valve
	Non-return valve blocked	Check, if necessary remove blockage or replace non-return valve
	Gate valve in system closed or not sufficiently open	Check, open the check valve completely if necessary
	Volume flow too large	Check pump data and default values and correct if necessary
	Check valve closed at pressure sensor	Inspect, open check valve if necessary
	Switch-off pressure set too high	Check setting and correct if necessary
	Direction of motor rotation false	Check the direction of rotation and correct by changing over the phases if necessary
Switching frequency too high or fluttering	Intake pressure fluctuates severely	Check intake pressure, if necessary take measures to stabilise supply pressure (e.g. pressure reducer)
	Intake pipe blocked or shut off	Check inlet pipe, if necessary remove blockage or open check valve
	Nominal diameter of inlet pipe too small	Check the inlet pipe, increase the cross-section for the inlet pipe if necessary

Fault	Cause	Remedy
Switching frequency too high or fluttering	Inlet pipe incorrectly installed	Check inlet pipe, if necessary change pipe guide
	Check valve closed at pressure sensor	Inspect, open check 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 supply pressure and correct if necessary
	Valve on existing diaphragm pressure vessel closed	Check valve and open if necessary
	Existing diaphragm pressure vessel defective	Check the diaphragm pressure vessel and replace if necessary
	Set switching difference too small	Check setting and correct if necessary
Pump(s) not stable and/or make unusual noises	Major fluctuations in intake pressure	Check intake pressure, if necessary take measures to stabilise supply pressure (e.g. pressure reducer)
	Intake pipe blocked or shut off	Check inlet pipe, if necessary remove blockage or open check valve
	Nominal diameter of inlet pipe too small	Check the inlet pipe, increase the cross-section for the inlet pipe if necessary
	Inlet pipe incorrectly installed	Check inlet pipe, if necessary change pipe guide
	Air in inlet	Check, if necessary seal pipe. Vent pumps
	Air in the pump	Vent pump, check suction line for leaks and seal if necessary
	Impellers blocked	Check pump, if necessary replace or have repaired
	Volume flow too large	Check pump data and default values and correct if necessary
	Direction of motor rotation false	Check direction of rotation and correct by changing over phases if necessary
Pump runs (pumps run) not stable and/or make unusual noises	Mains voltage: a phase is missing	Check fuses, cables and connections
	Pump not adequately secured to base frame	Check fixation, tighten fastening screws if necessary
	Bearing damage	Check pump/motor, replace if necessary or have repaired
Motor or pump get too warm	Air in inlet	Check, if necessary seal pipe. Vent pumps
	Gate valve in system closed or not sufficiently open	Check, open the check valve completely if necessary
	Impellers blocked	Check pump, if necessary replace or have repaired
	Non-return valve blocked	Check, if necessary remove blockage or replace non-return valve
	Check valve closed at pressure sensor	Inspect, open check valve if necessary
	Switch-off point set too high	Check setting and correct if necessary
	Bearing damage	Check pump/motor, replace if necessary or have repaired
	Turn-to-turn fault in motor	Check, if necessary replace motor or have repaired
	Mains voltage: a phase is missing	Check fuses, cables and connections
Current consumption too high	Non-return valve leaking	Check, if necessary replace seal or replace non-return valve
	Volume flow too large	Check pump data and default values and correct if necessary
	Turn-to-turn fault in motor	Check, if necessary replace motor or have repaired
	Mains voltage: a phase is missing	Check fuses, cables and connections
Motor protection switch triggers	Non-return valve defective	Check, if necessary replace non-return valve

Fault	Cause	Remedy
Motor protection switch triggers	Volume flow too large	Check pump data and default values and correct if necessary
	Contactor defective	Check and replace if necessary
	Turn-to-turn fault in motor	Check, if necessary replace motor or have repaired
	Mains voltage: a phase is missing	Check fuses, cables and connections
Pump(s) produces no or too little power	Major fluctuations in Intake pressure	Check intake pressure, if necessary take measures to stabilise supply pressure (e.g. pressure reducer)
	Intake pipe blocked or shut off	Check inlet pipe, if necessary remove blockage or open check valve
	Nominal diameter of inlet pipe too small	Check the inlet pipe, increase the cross-section for the inlet pipe if necessary
	Inlet pipe incorrectly installed	Check inlet pipe, if necessary change pipe routing
	Air in inlet	Check, if necessary seal pipe. Vent pumps
	Impellers blocked	Check pump, if necessary replace or have repaired
	Non-return valve leaking	Check, if necessary replace seal or replace non-return valve
	Non-return valve blocked	Check, if necessary remove blockage or replace non-return valve
	Gate valve in system closed or not sufficiently open	Check, open the check valve completely if necessary
	Low-water level switch has triggered	Check intake pressure
Pump(s) produces no or too little power	Direction of motor rotation false	Check direction of rotation and correct by changing over phases if necessary
	Turn-to-turn fault in motor	Check, if necessary replace motor or have repaired
Dry-running protection system switches off, although water is present	Major fluctuations in Intake pressure	Check intake pressure, if necessary take measures to stabilise supply pressure (e.g. pressure reducer)
	Nominal diameter of inlet pipe too small	Check the inlet pipe, increase the cross-section for the inlet pipe if necessary
	Inlet pipe incorrectly installed	Check inlet pipe, if necessary change pipe guide
	Volume flow too large	Check pump data and default values and correct if necessary
	Electrodes incorrectly connected or supply pressure switch incorrectly set	Check installation or setting and correct
	Low-water level switch defective	Check, if necessary replace the low-water level switch
Dry-running protection does not switch off, although water low	Electrodes incorrectly connected or supply pressure switch incorrectly set	Check installation or setting and correct
	Low-water level switch defective	Check, if necessary replace the low-water level switch
Rotation direction warning light on (not for all pump types)	Direction of motor rotation false	Check direction of rotation and correct by changing over phases if necessary

You will find information on pump or control device faults not dealt with here in the attached documentation for the components concerned.

If the operating fault cannot be remedied, please consult a specialist technician or the Wilo customer service office.

11 Spare parts

Spare parts or repairs may be ordered from local specialist retailers and/or Wilo-customer service. In order to avoid queries and incorrect orders, all data on the rating plate should be submitted for each order.

Technical information subject to change without prior notice!

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