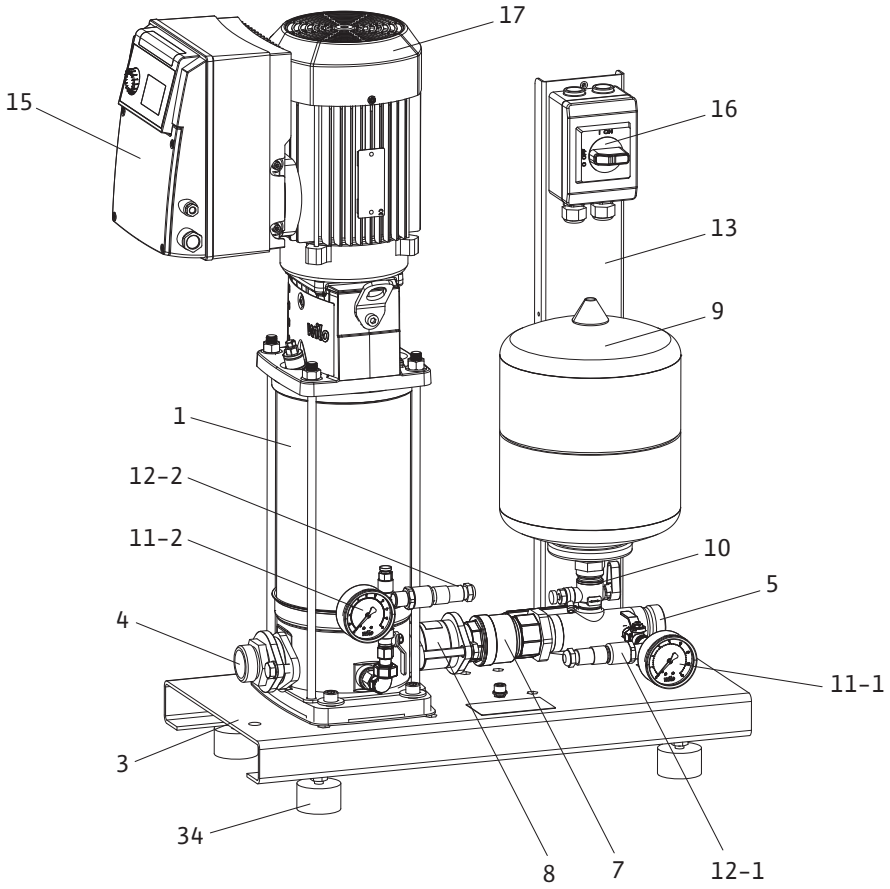
Pioneering for You

Wilo-SiBoost Smart 1...
Wilo-Comfort-Vario COR-1...-GE
Wilo-Comfort-Vario COR/T-1...-GE

en Installation and operating instructions

2 535 459-Ed.03 / 2020-11-Wilo

Fig. 1a: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11-1
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34
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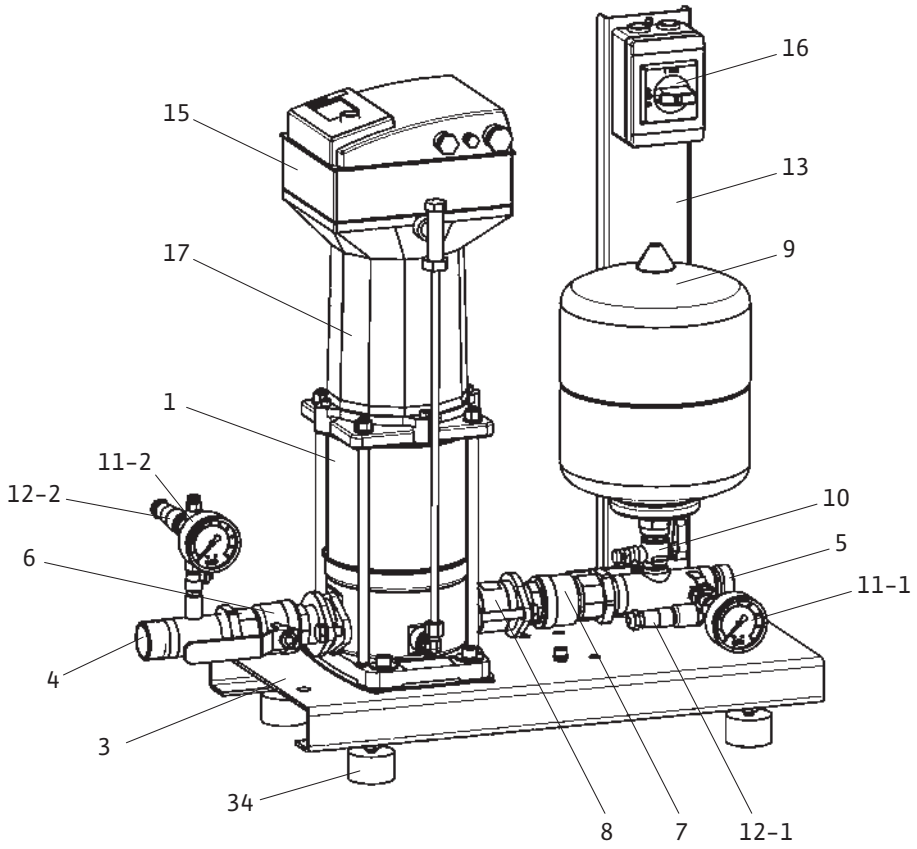
12-1

Fig. 1b: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12-1

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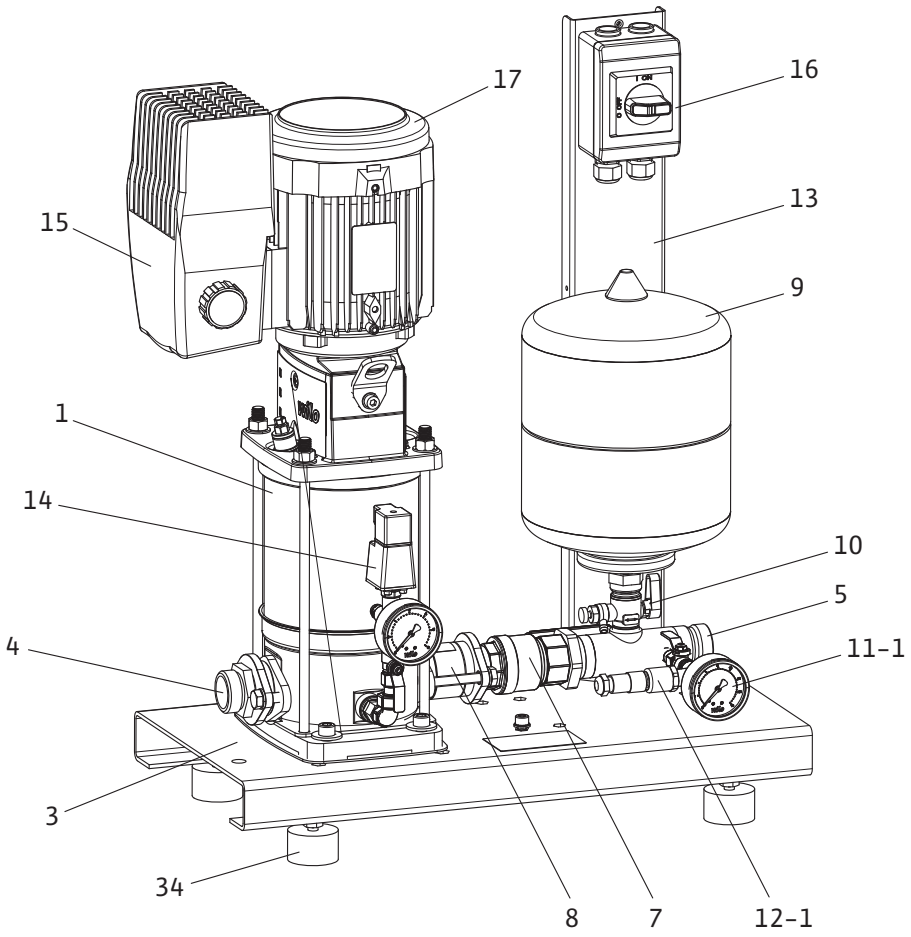
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12–1

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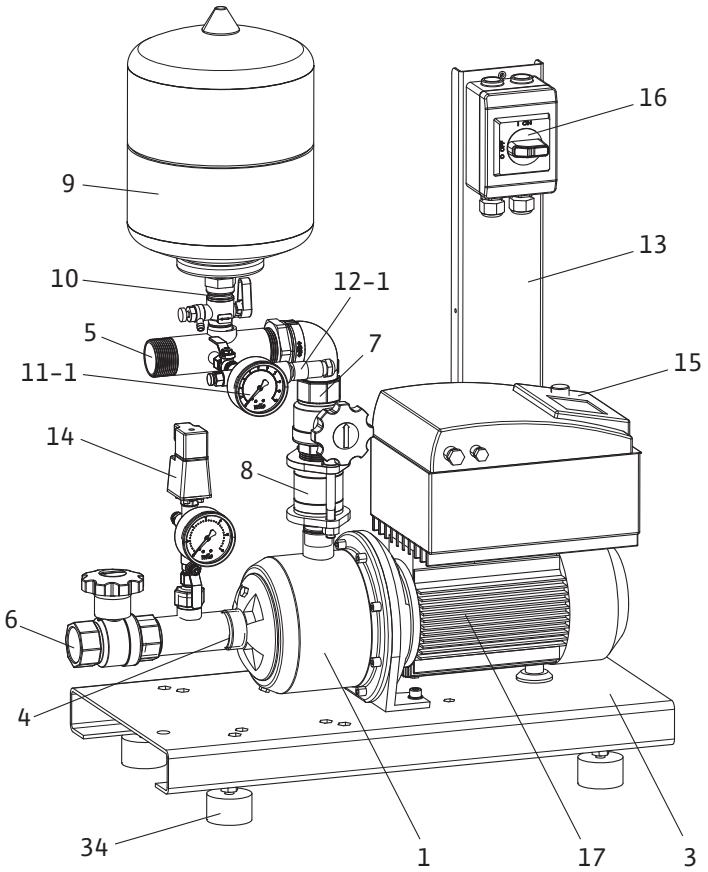
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34
1
17
3

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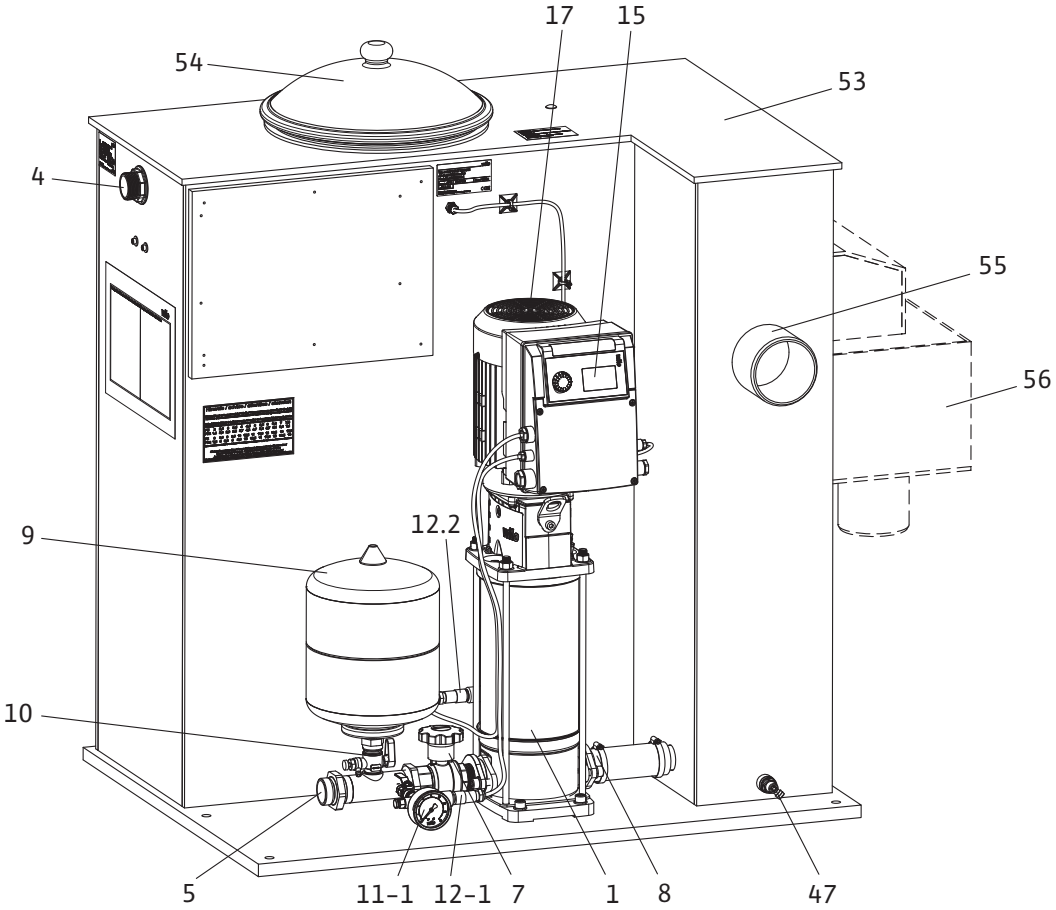
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11-1
12-1
7
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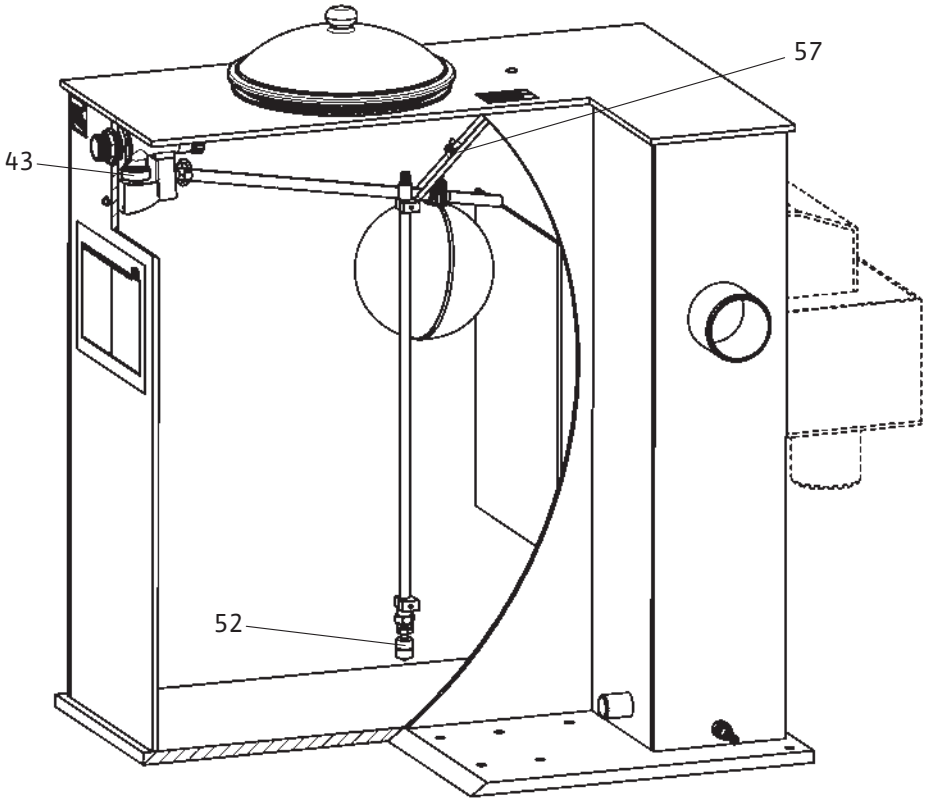
8
47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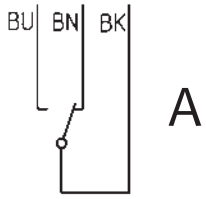
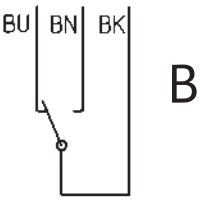
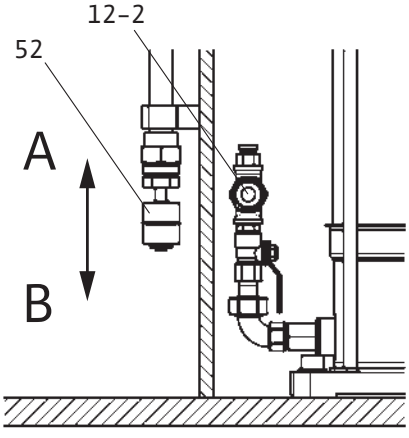

BU
BN
BK
A


BU
BN
BK
B


12-2
52
A
B

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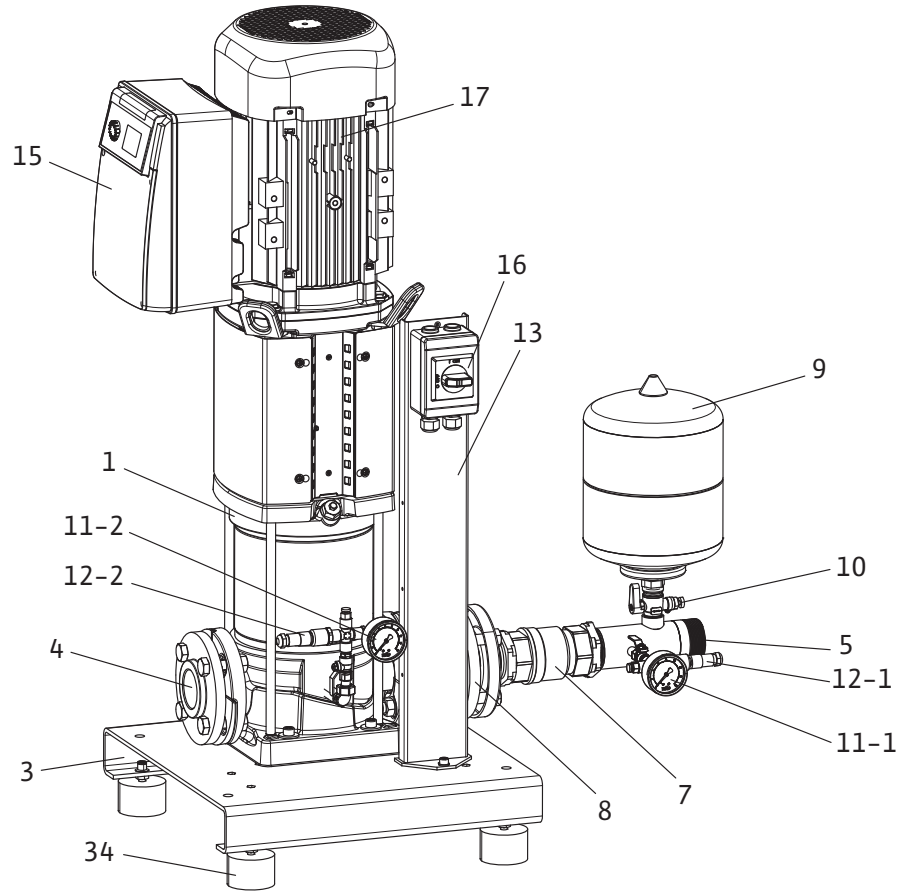
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16
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11–2
12–2
10
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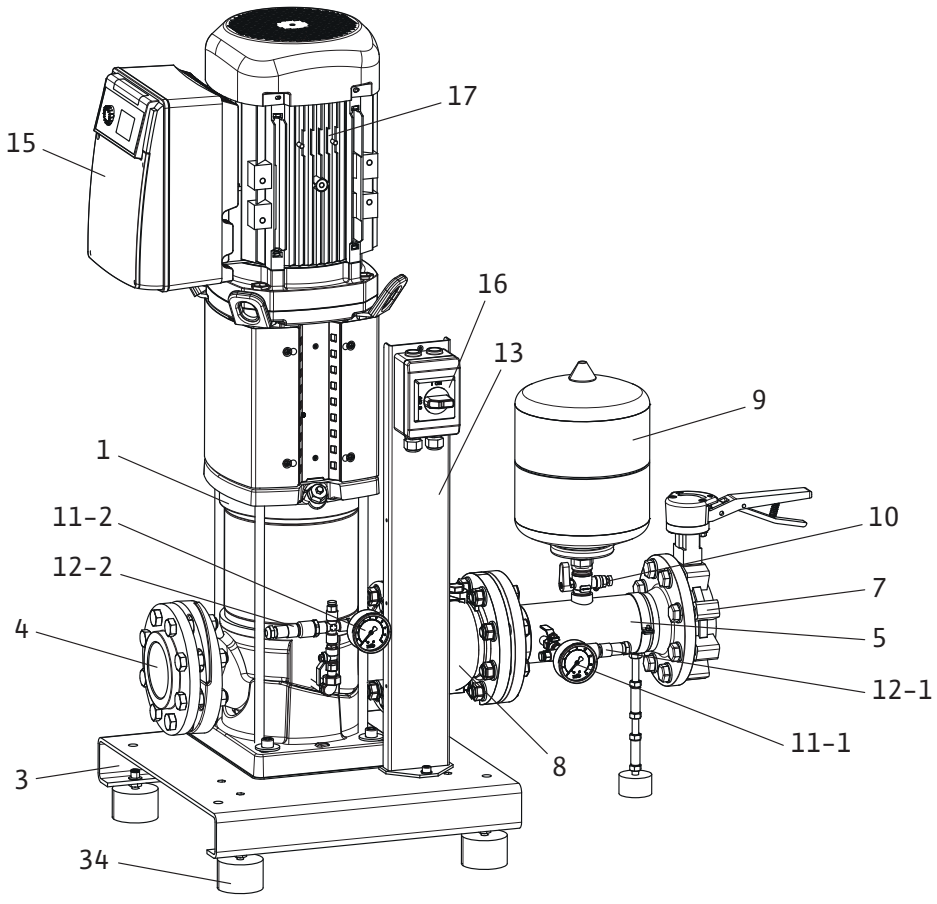
12–1
11–1
3
8
7
34

Fig. 1g: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11–1
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8
34

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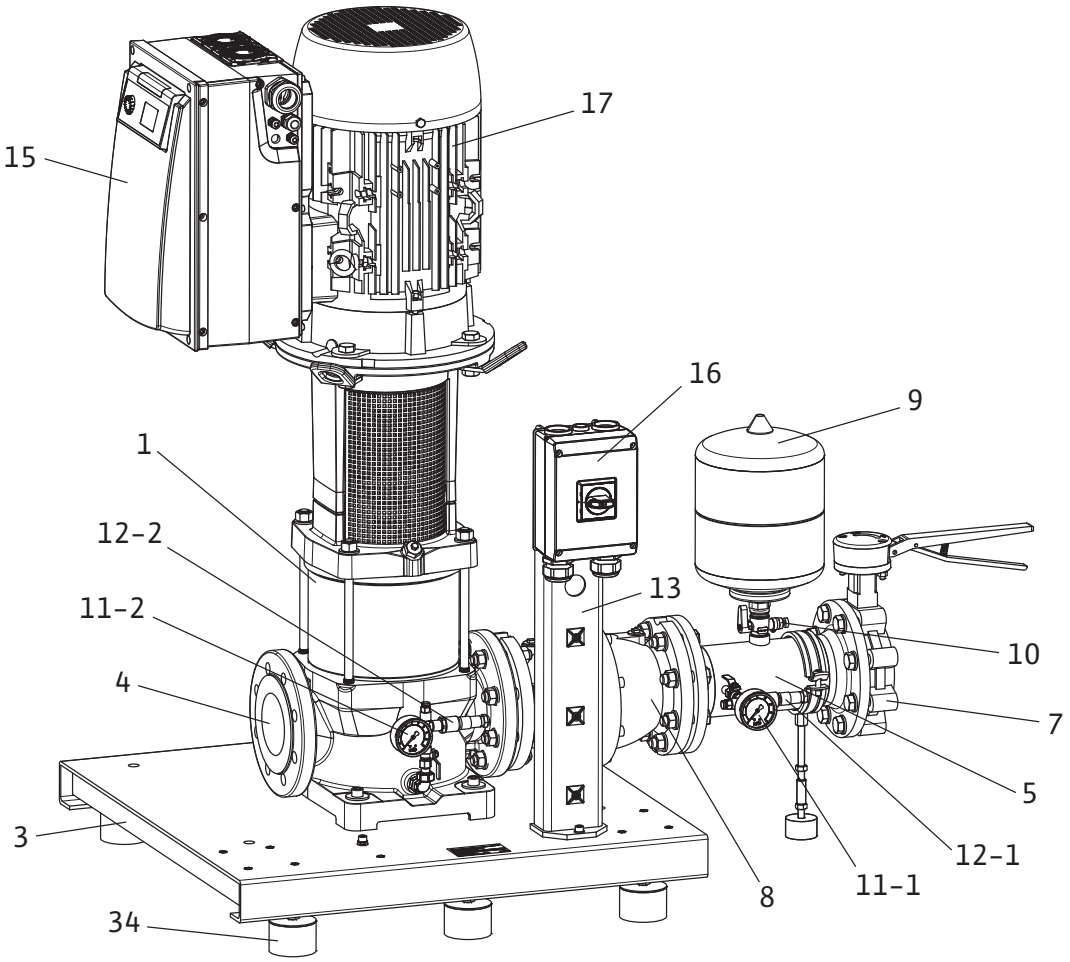

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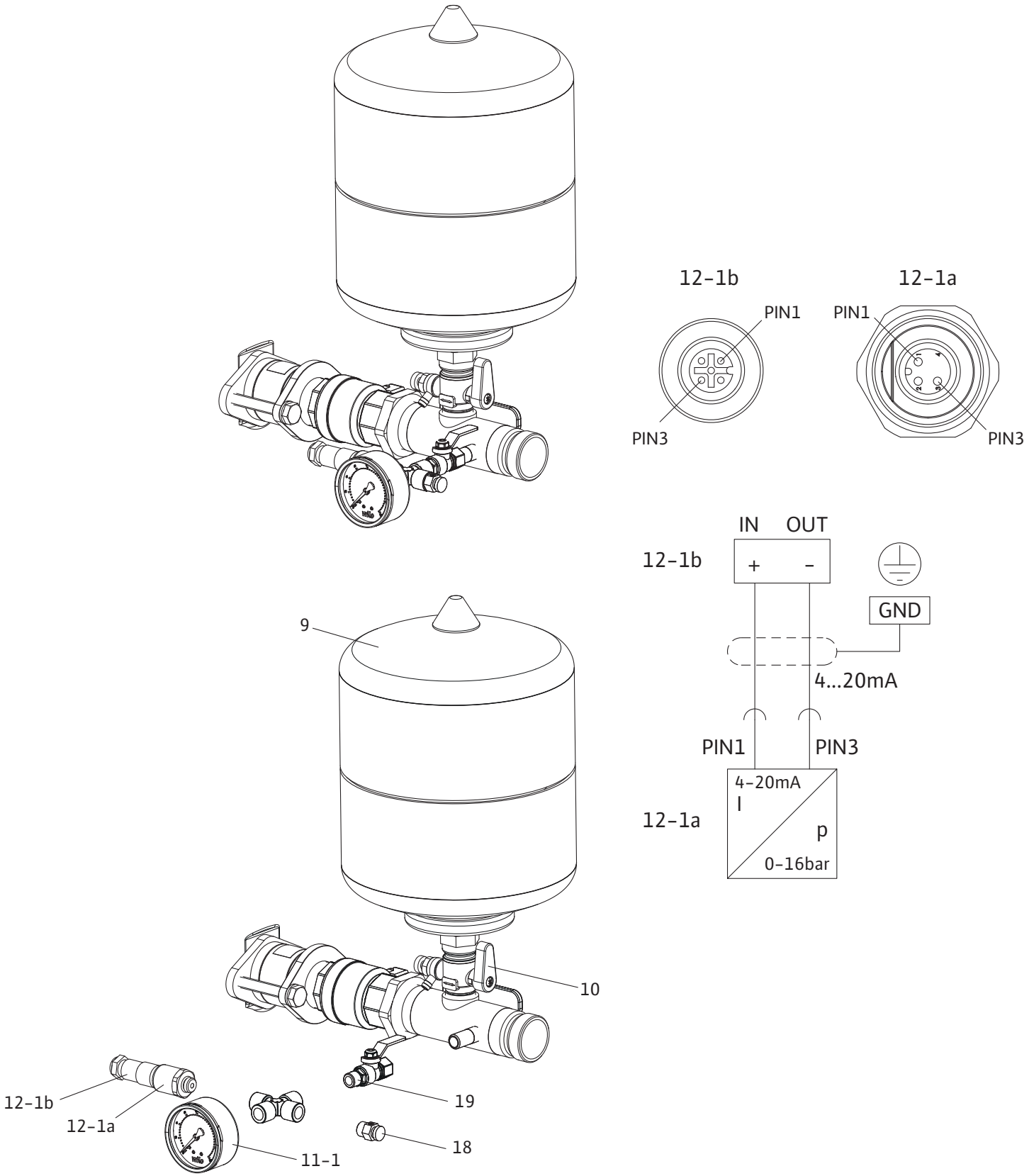
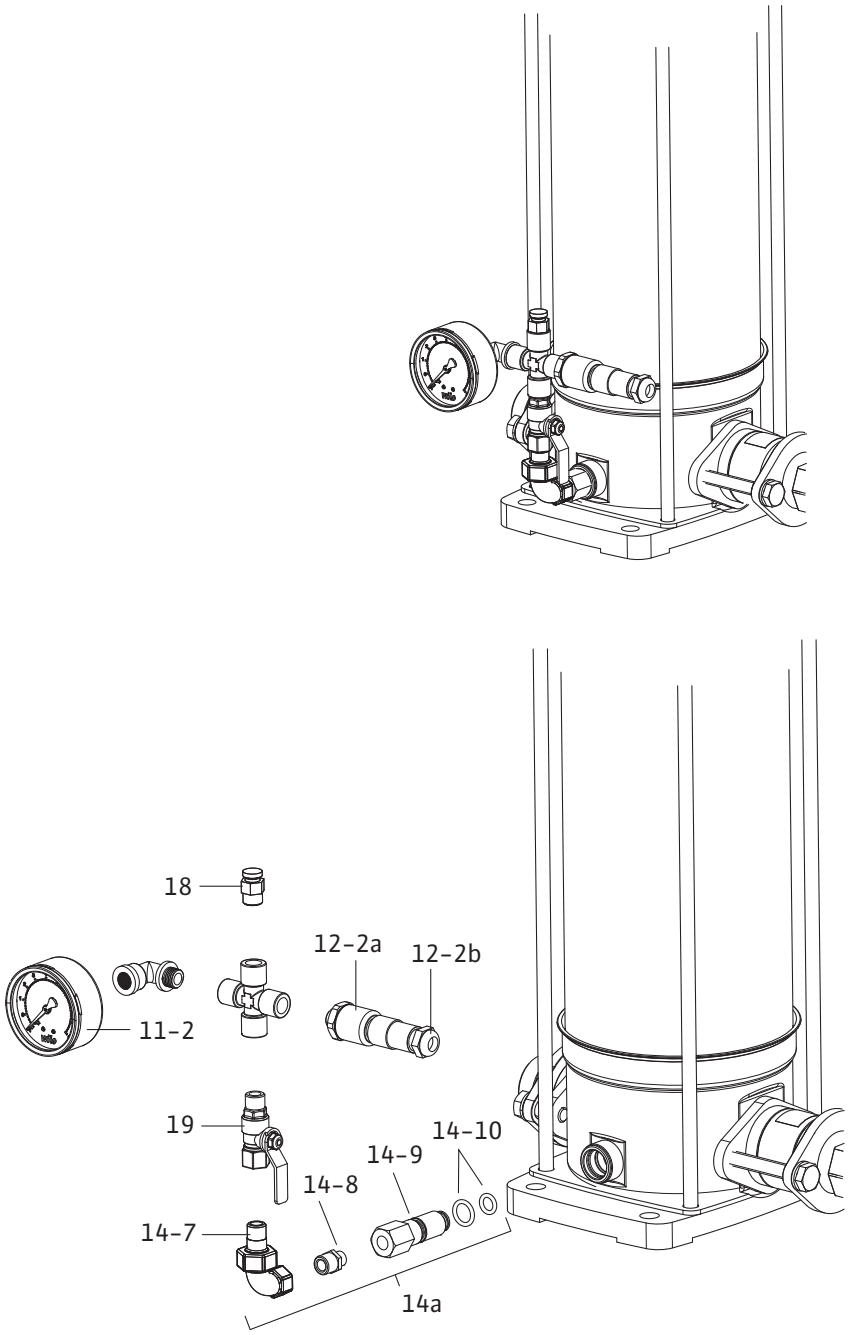
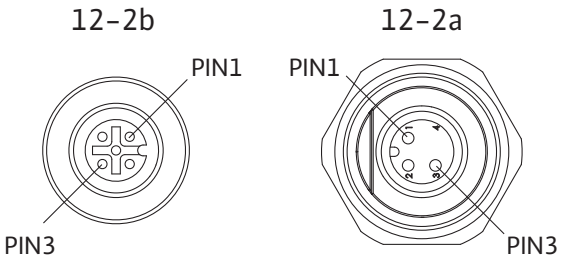

12-1b
PIN1
PIN3
12-1a
PIN1
PIN3
IN
OUT
12-1b
+
-
GND
4...20mA
PIN1
PIN3
4-20mA
I
p
0-16bar
12-1a
9
10
19
18
11-1
12-1b
12-1a

Fig. 2b:


18
12-2a
12-2b
11-2
19
14-10
14-9
14-8
14-7
14a


12-2b
PIN1
PIN3
12-2a
PIN1
PIN3

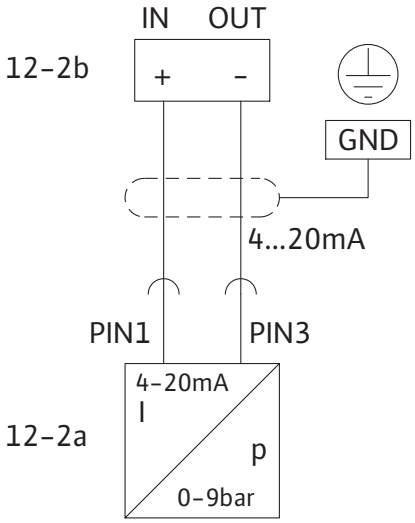
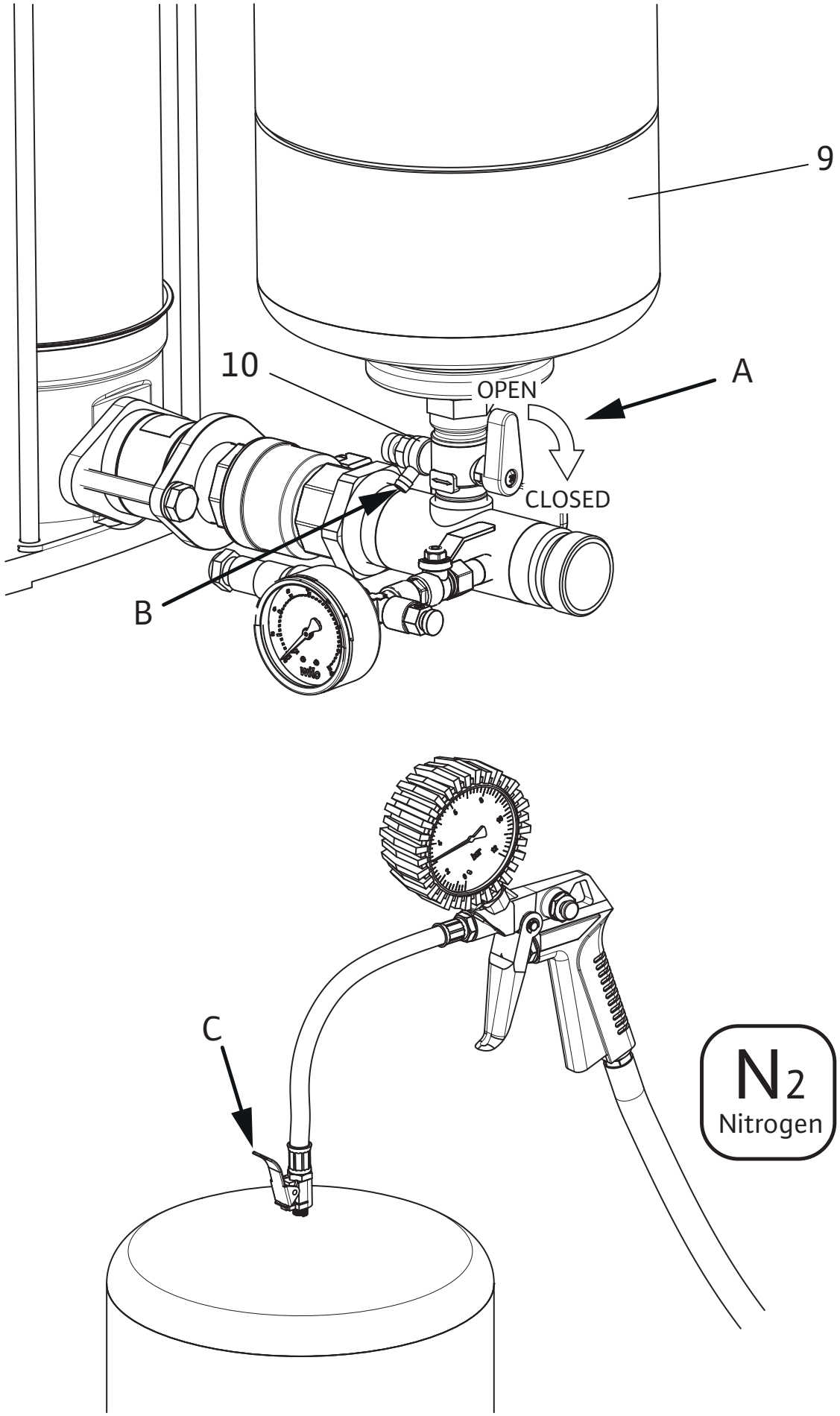

IN
OUT
12-2b
+
-
GND
4...20mA
PIN1
PIN3
4-20mA
I
p
0-9bar
12-2a

Fig. 3:



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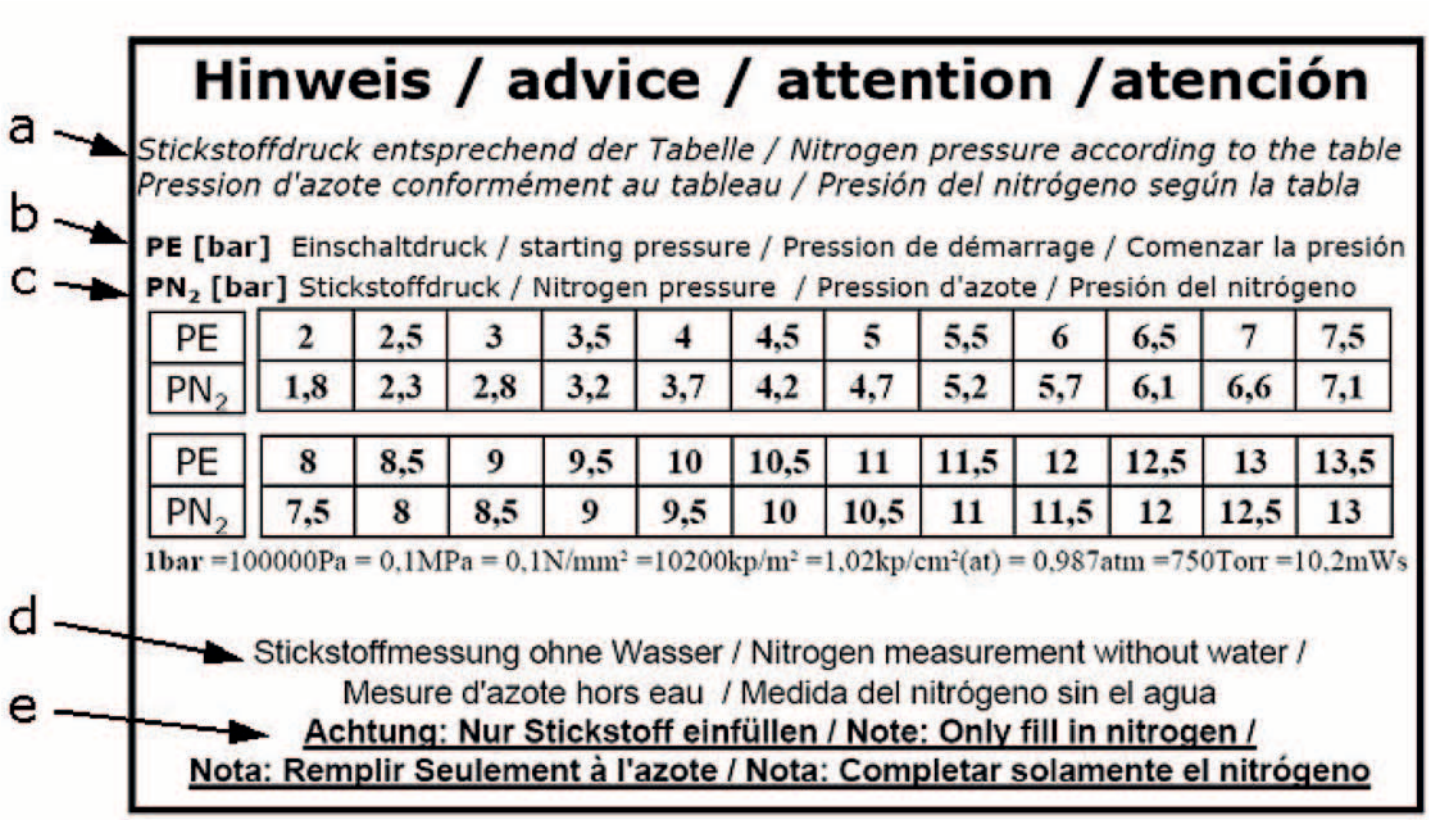
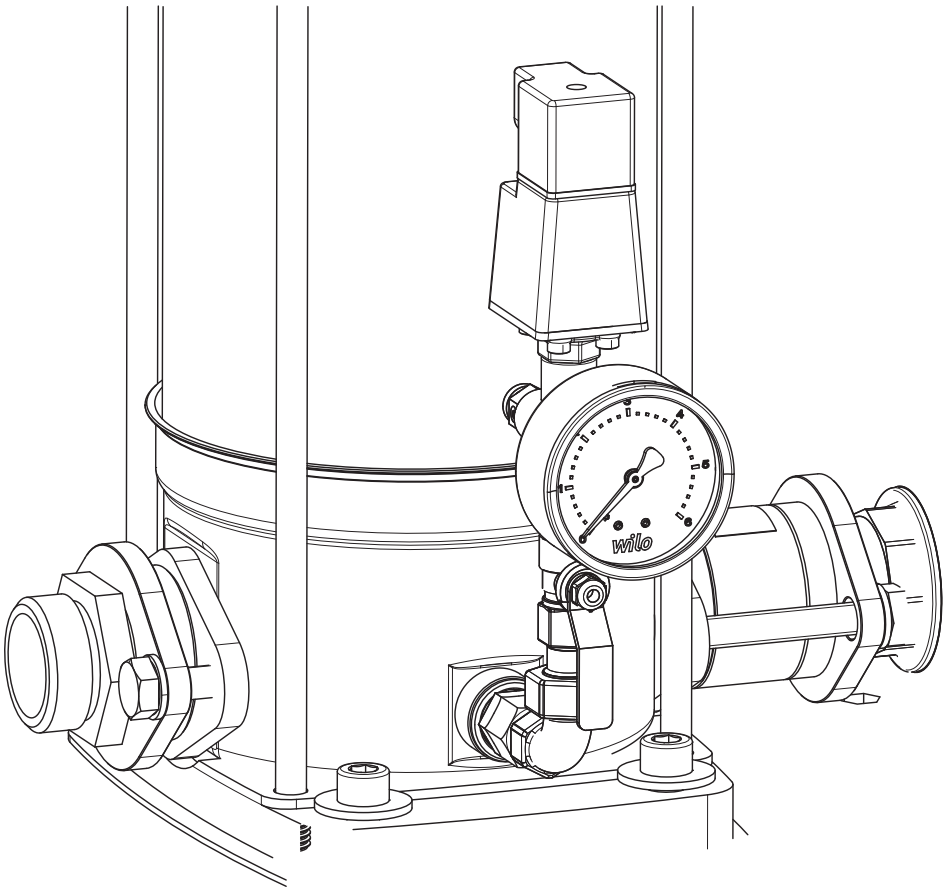
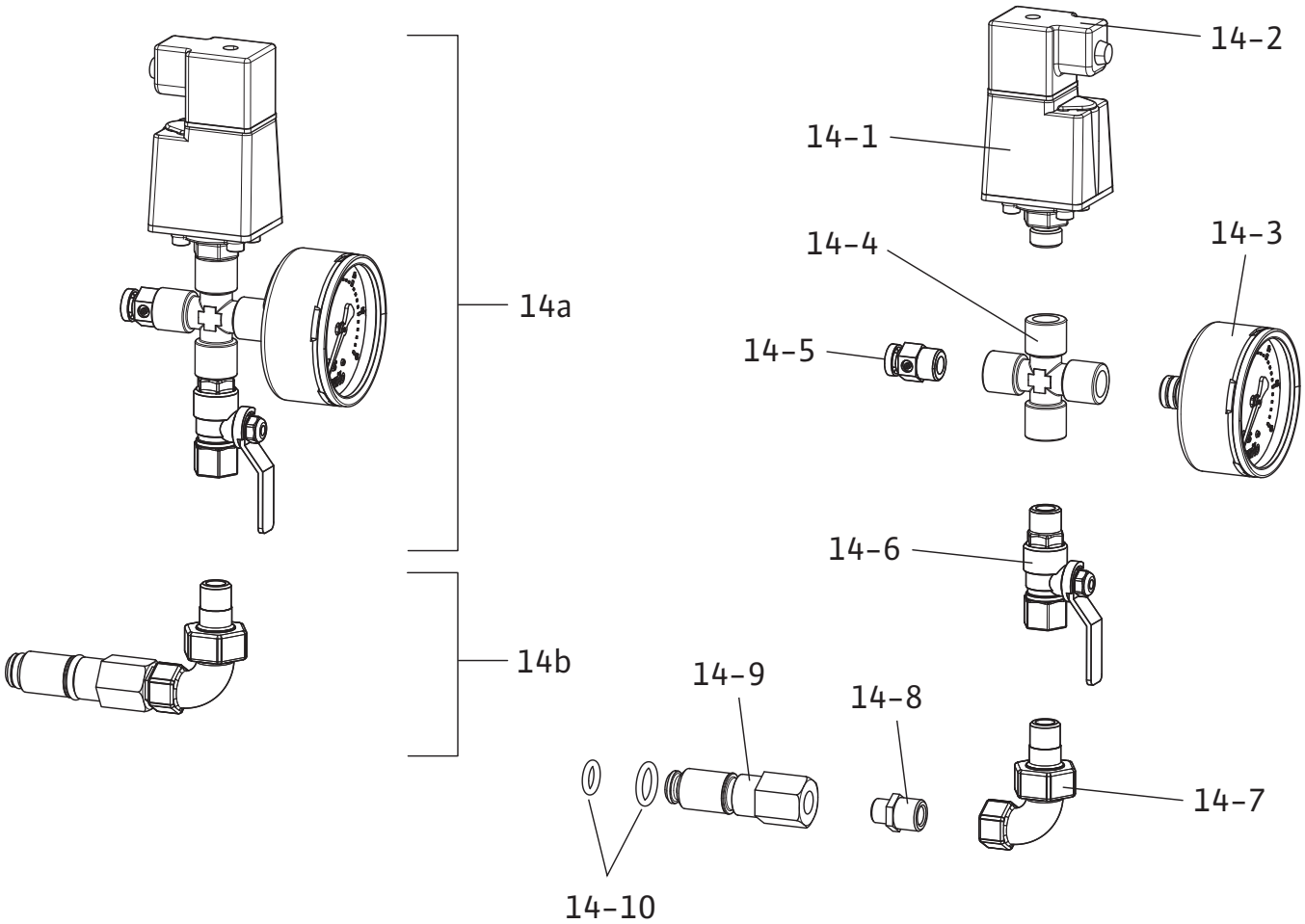

a
b
c
d
e
Hinweis / advice / attention /atención
Stickstoffdruck entsprechend der Tabelle / Nitrogen pressure according to the table
Pression d'azote conformément au tableau / Presión del nitrógeno según la tabla
PE [bar] Einschaltdruck / starting pressure / Pression de démarrage / Comenzar la presión
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. 5a:





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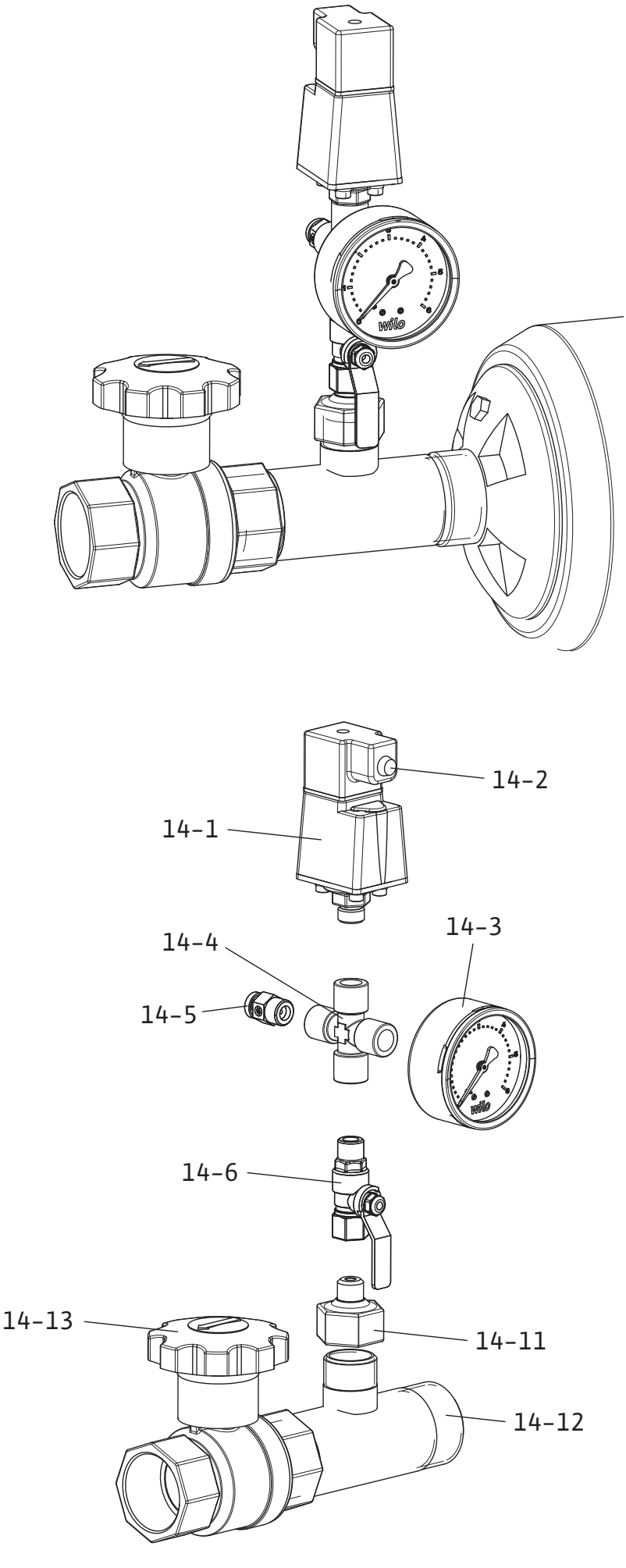

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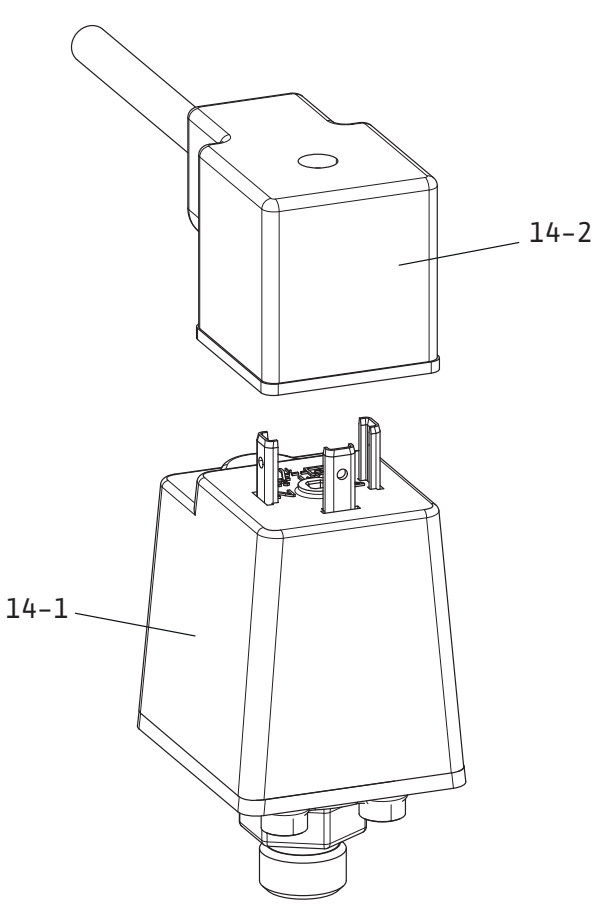
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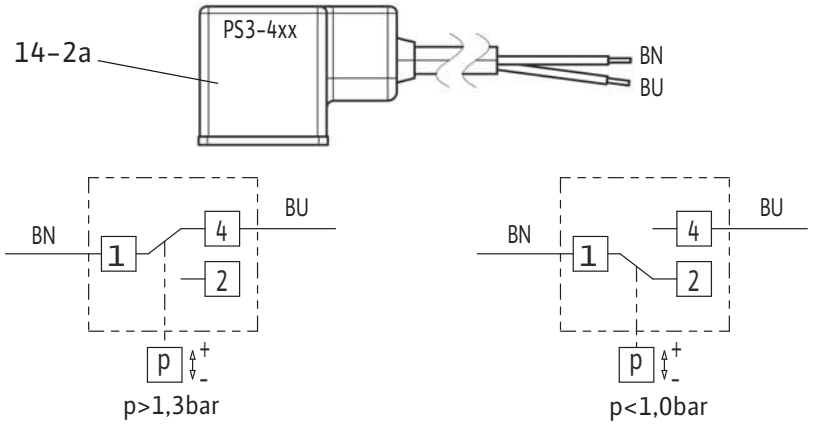
14-1


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

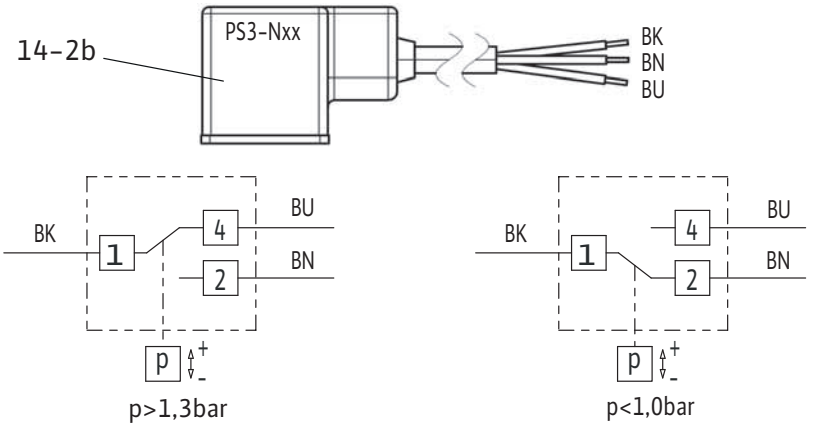
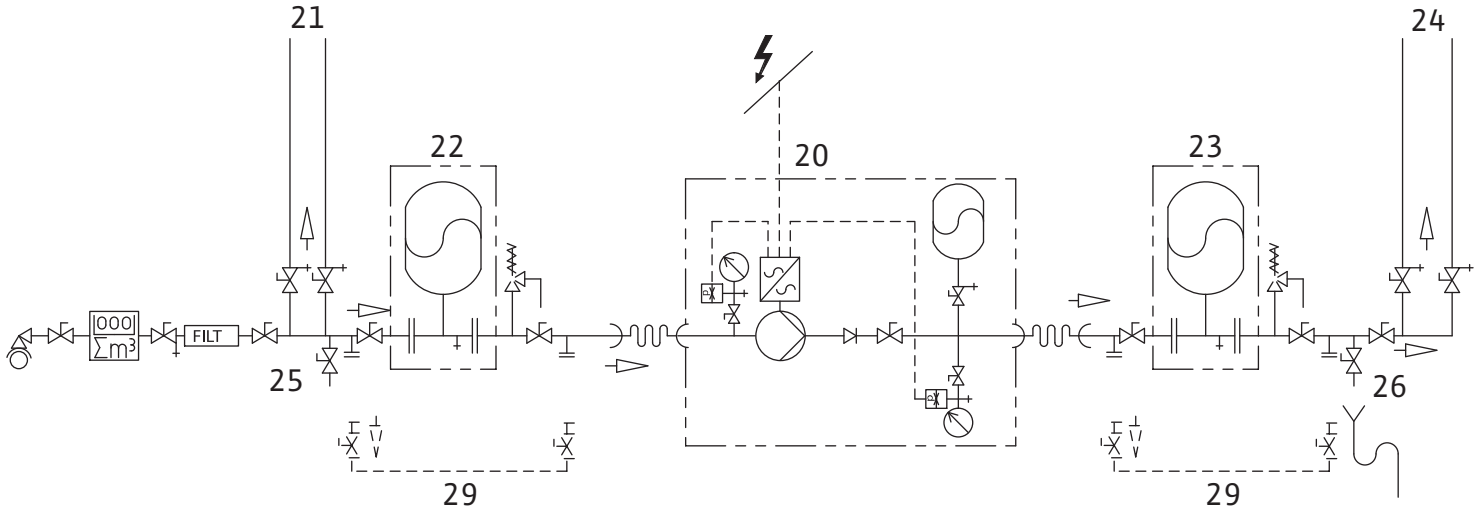

14-2b
PS3-Nxx
BK
BN
BU
BK
1
4
2
BU
BN
p
+
-
p>1,3bar
BK
1
4
2
BU
BN
p
+
-
p<1,0bar

Fig. 6a:



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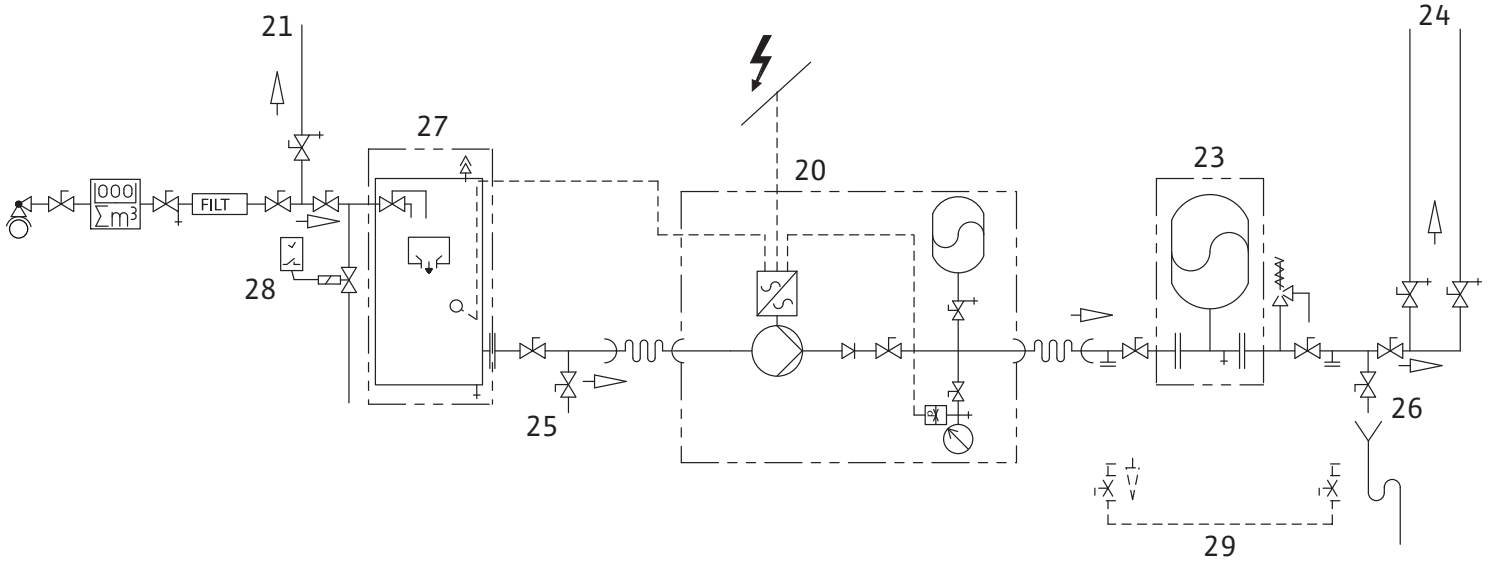

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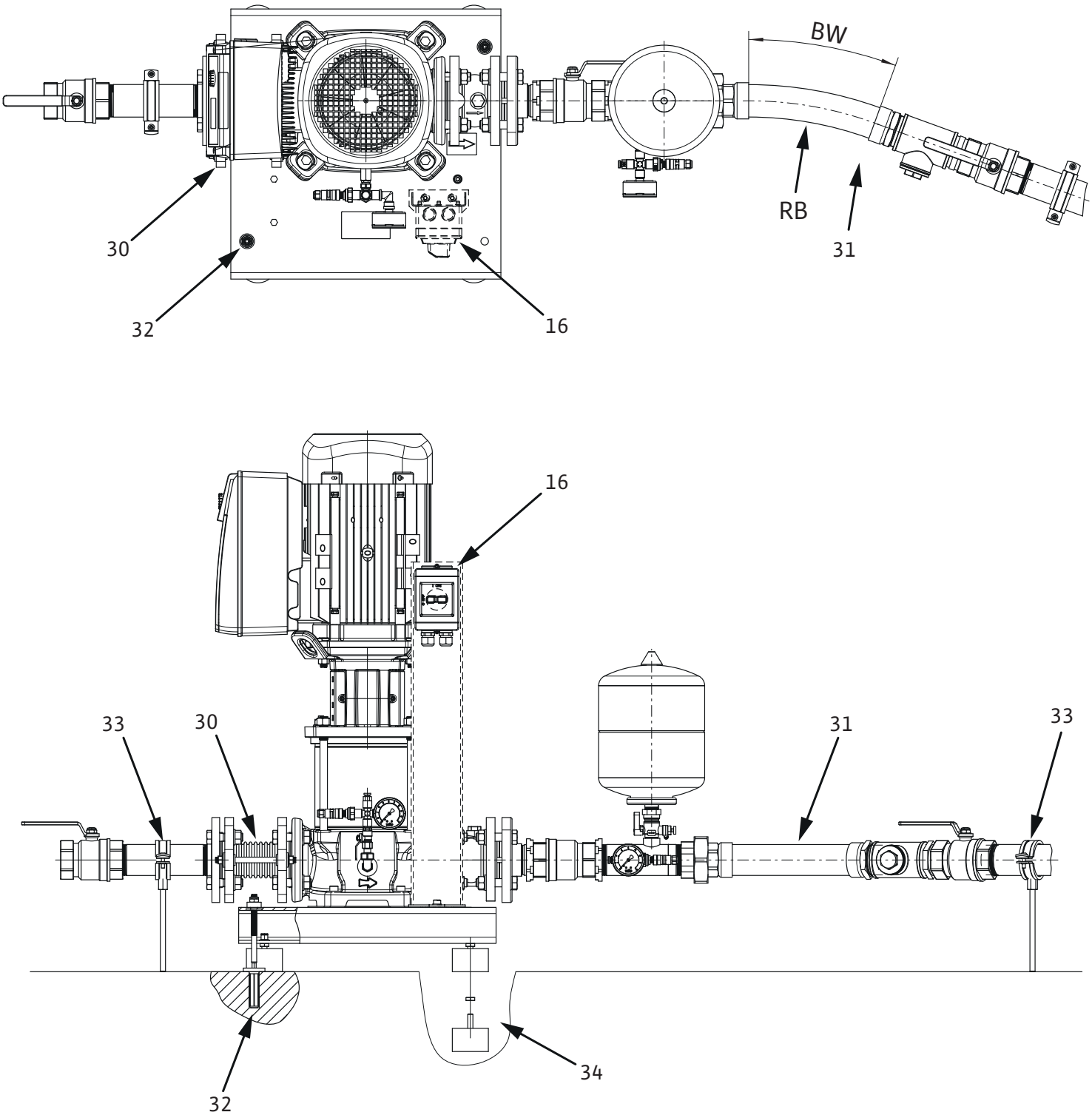

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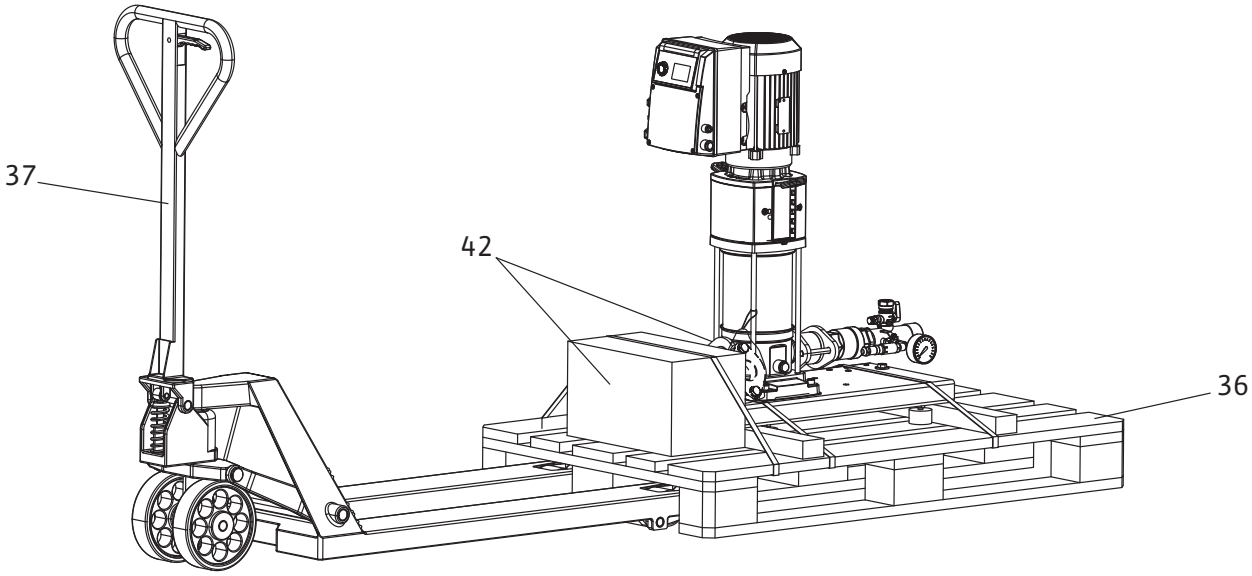

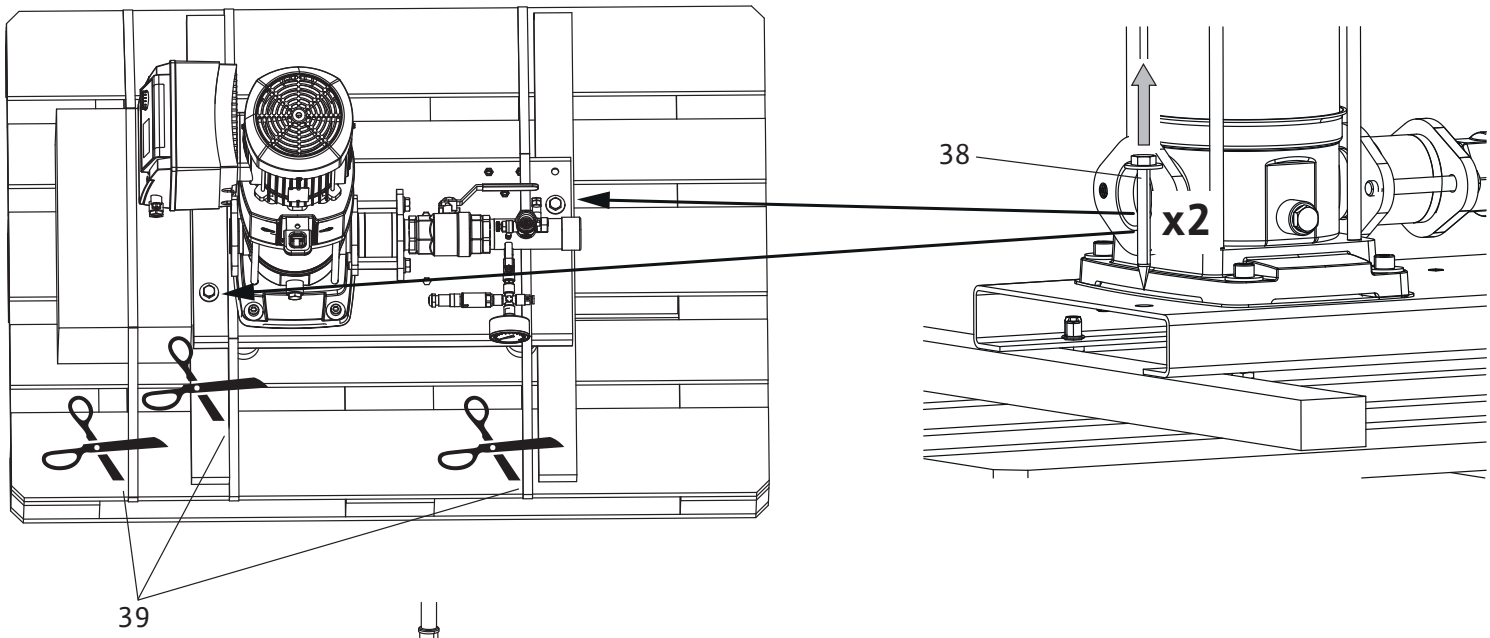

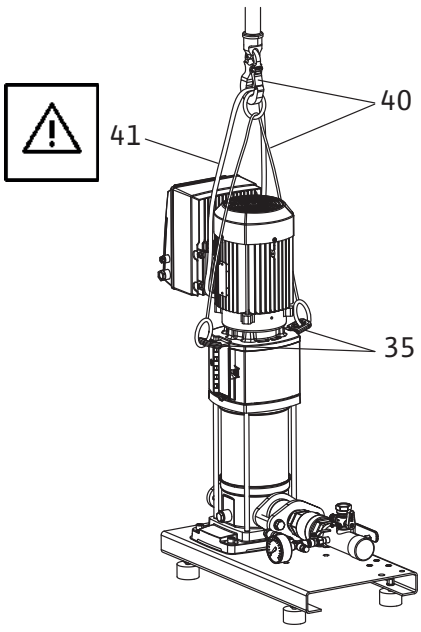

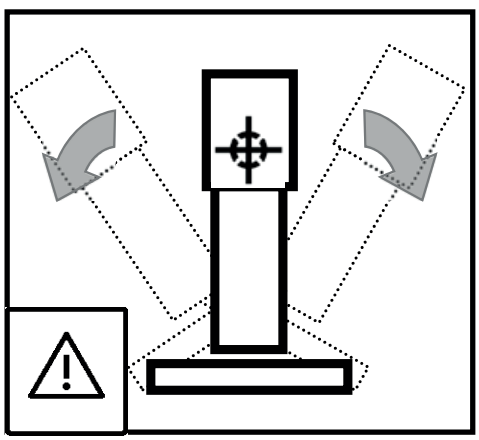

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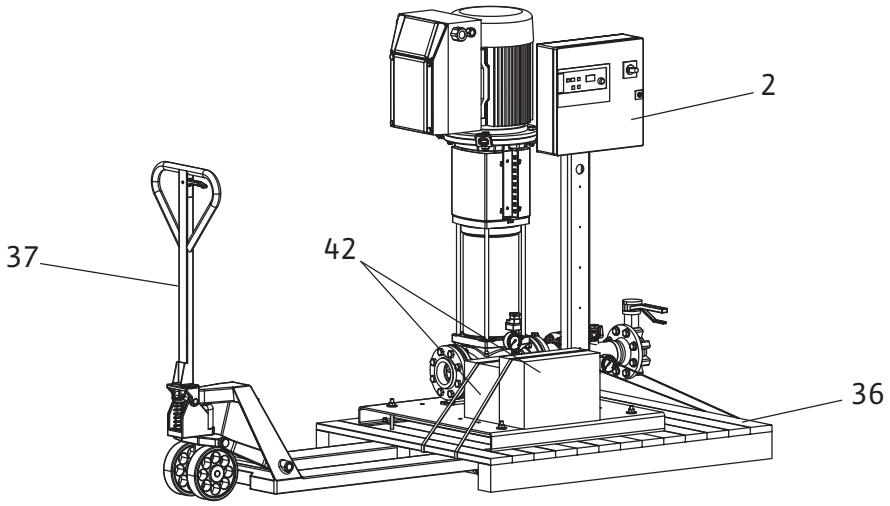

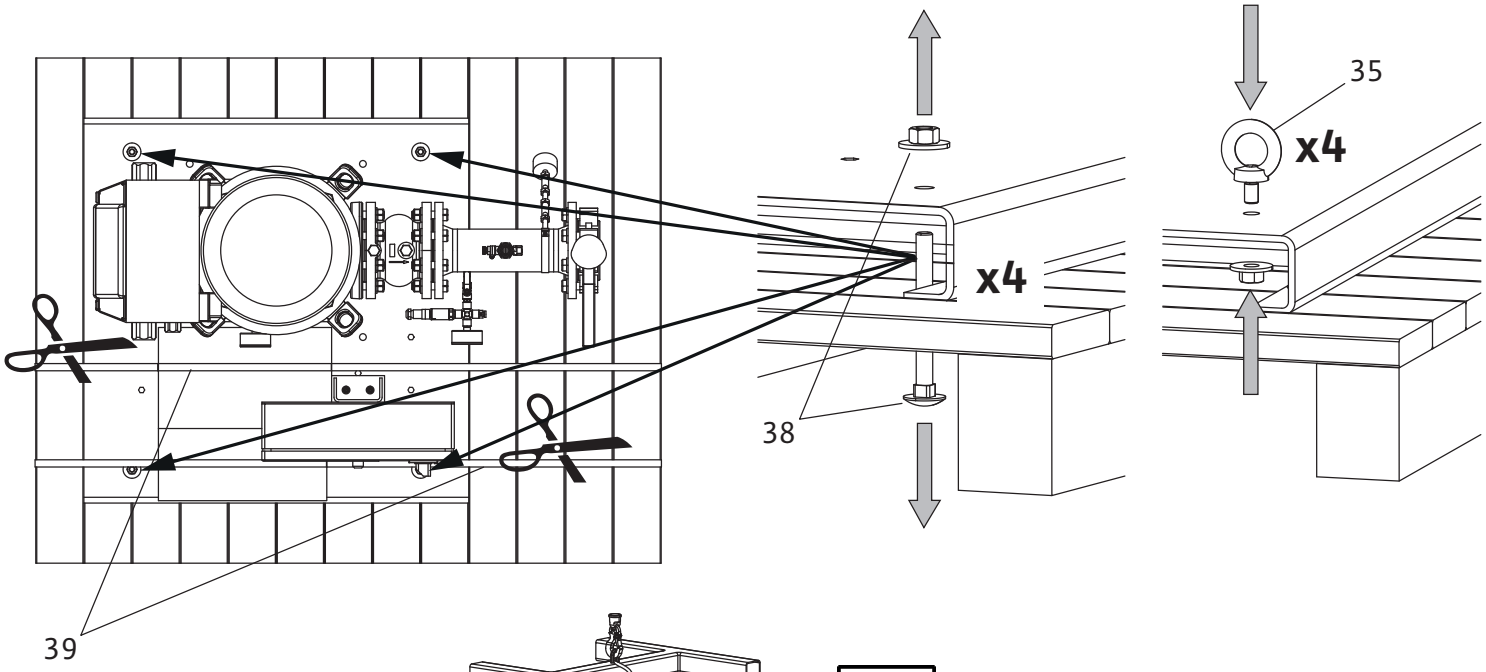

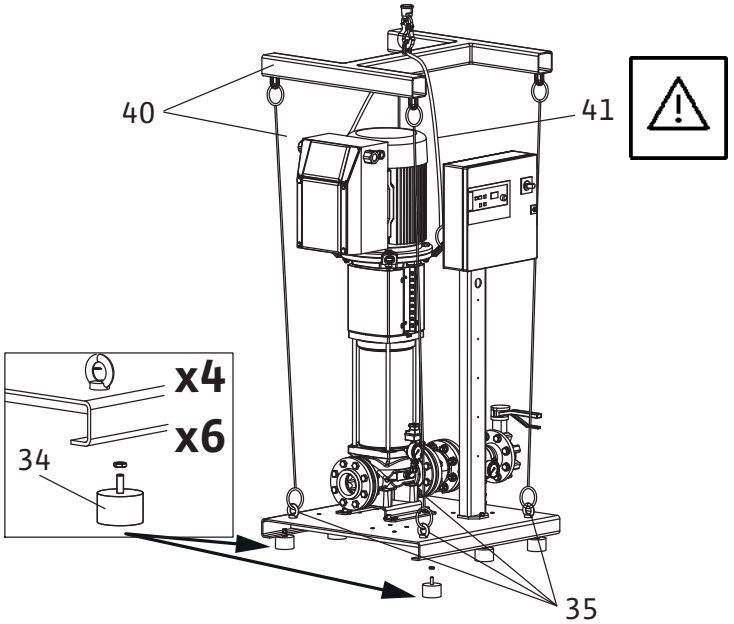

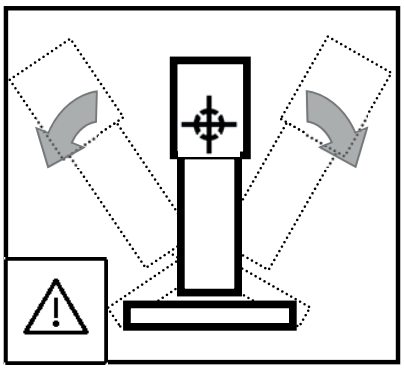

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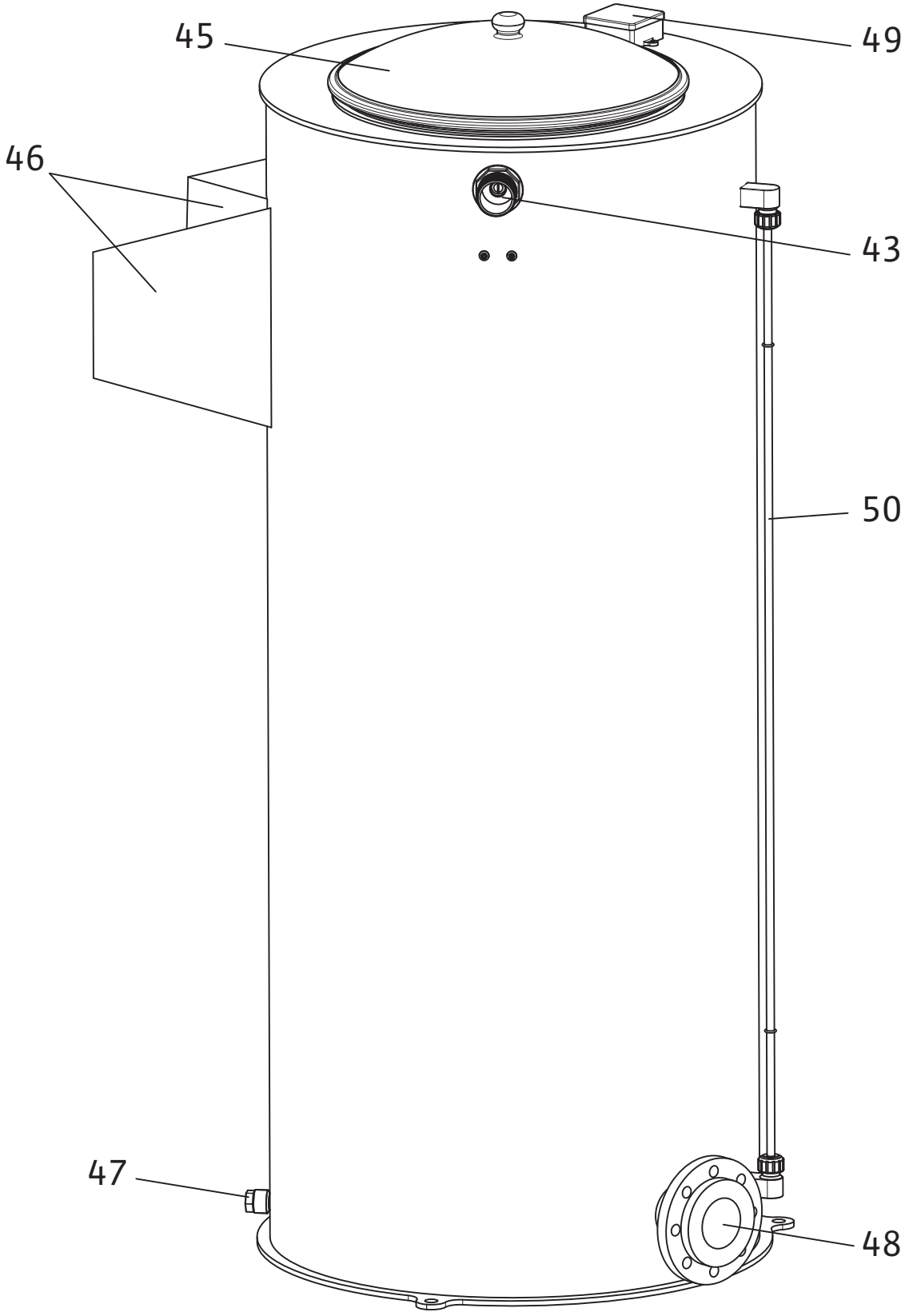

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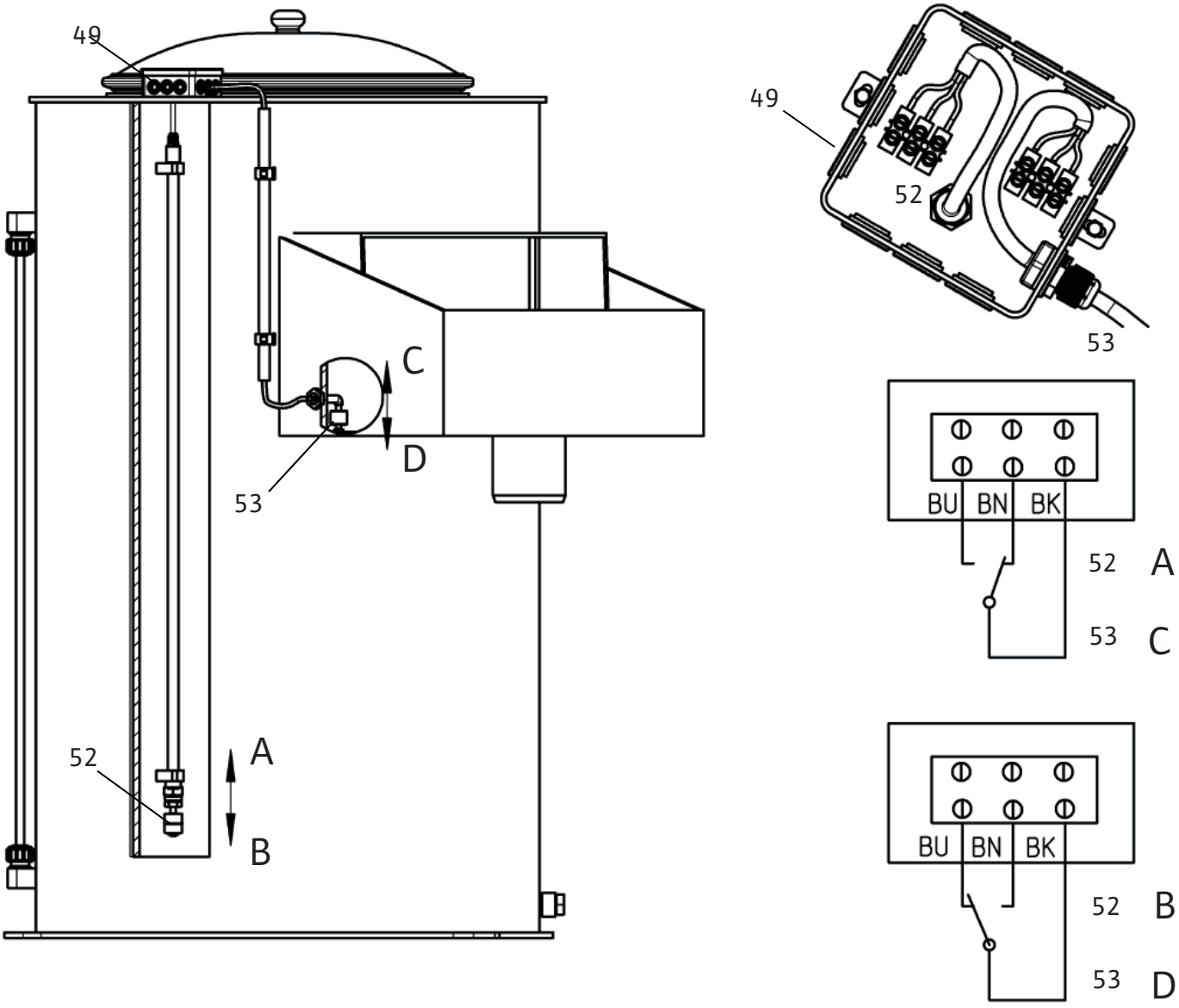


Captions

Fig. 1a	Example SiBoost Smart 1 HELIX VE 606
Fig. 1b	Example SiBoost Smart 1 MVISE 406
Fig. 1c	Example SiBoost Smart 1 HELIX VE 405-EM2
Fig. 1d	Example COR-1 MHIE 403-2G-GE
Fig. 1e	Example COR/T-1 HELIX VE 606-GE
Fig. 1f	Example SiBoost Smart 1 HELIX VE 2203-ES
Fig. 1g	Example SiBoost Smart 1 HELIX VE 5202-ES
Fig. 1h	Example COR-1MVIE702-GE
1	Pump
3	Base frame
4	Inlet connection
5	Pressure pipe
6	Shut-off valve on the inlet side (optionally for some types)
7	Shut-off valve on the pressure side
8	Non-return valve
9	Diaphragm pressure vessel
10	Throughflow fitting
11-1	Pressure gauge (on the pressure side)
11-2	Pressure gauge (on the inlet side)
12-1	Pressure sensor (on the pressure side)
12-2	Pressure sensor (on the inlet side)
13	Mounting bracket for fixation of the main switch (MS) (optional) or of the control device (special feature)
14	Low-water cut-out switchgear (WMS) (optional)
15	Frequency converter
16	Main switch (MS) (optional)
17	Motor
34	Vibration absorber
43	Float valve (inlet)
47	Drain
52	Low-water signal transmitter/float switch
A	Tank full, contact closed (water not low)
B	Tank empty, contact open (low water)
	Core colours
BN	BROWN
BU	BLUE
BK	BLACK
53	Break tank (COR/T)
54	Inspection opening/cover
55	Operational overflow (pipe socket)
56	Overflow box (optional)
57	Float valve securing mechanism (to be removed before commissioning)

Fig. 2a	Example pressure sensor (on the pressure side) and diaphragm pressure vessel kit
9	Diaphragm pressure vessel
10	Throughflow fitting
11-1	Pressure gauge
12-1a	Pressure sensor
12-1b	Electrical connection, pressure sensor
18	Drain/venting
19	Stop valve

Fig. 2b	Example pressure sensor (on the suction side) kit
11-2	Pressure gauge
12-2a	Pressure sensor
12-2b	Electrical connection, pressure sensor
18	Drain/venting
19	Stop valve

Fig. 3	Operation of throughflow fitting/ pressure test Diaphragm pressure vessel
9	Diaphragm pressure vessel
10	Throughflow fitting
A	Open/close
B	Drain
C	Check supply pressure

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

Fig. 5a	Low-water cut-out switchgear (WMS) kit mounted on drain connection (Helix VE; MVIE)
Fig. 5b	Low-water cut-out switchgear (WMS) kit mounted on inlet-side pipework (MHIE; MVISE)
Fig. 5c	Electrical connection options/WMS switching logic
14-a	WMS kit
14-1	PS3 pressure switch
14-2	Plug (PS3-Nxx or PS3-4xx versions)
14-2a	PS3-4xx two-core connection cable, normally-closed function (opens when pressure drops)
14-2b	PS3-Nxx three-core connection cable, changeover contact function
14-3	Pressure gauge
14-4	Distributor/fitting
14-5	Air vent valve
14-6	Stop valve
14-b	WMS connection kit
14-7	Screwed connection
14-8	Fitting
14-9	Pump drainage screw
14-10	O-ring seals
14-11	Thread adapter
14-12	Inlet-side pipework
14-13	Shut-off valve
BN	Brown
BU	Blue
BK	Black
	Connection in control device (see supplied terminal diagram)

Fig. 6a	Example of a direct connection (hydraulic diagram)
Fig. 6b	Example of an indirect connection (hydraulic diagram)
20	SiBoost Smart1/COR-1... system
21	Consumer connections upstream of the system
22	Diaphragm pressure vessel (accessory) on the inlet side with bypass
23	Diaphragm pressure vessel (accessory) on the discharge side with bypass
24	Consumer connections downstream of the system
25	Infeed connection for flushing the system
26	Drainage connection for flushing the system
27	Non-pressurised break tank (accessory) on the inlet side
28	Flushing apparatus for inlet connection of the break tank
29	Bypass for inspection/maintenance only (not permanently installed)

Fig. 8	Installation example
16	Main switch (MS) (optional)
30	Compensator with extension limiters (accessory)
31	Flexible connection pipe (accessory)
32	Floor fixation with structure-borne noise insulation (provided by the customer)
33	Fixation of pipes, e.g. with pipe clamp (provided by the customer)
34	Screw the vibration absorbers (included in scope of delivery) into the threaded inserts provided and secure them with counter nuts
BW	Bend angle for flexible connection pipe
RB	Bend radius for flexible connection pipe

Fig. 9a Fig. 9b	Transport information example for system without control device (up to 7.5 kW) Transport information example for system with control device (> 7.5 kW)
2	Control device
34	Screw the vibration absorbers (included in scope of delivery) into the threaded inserts provided and secure them with counter nuts
35	Eye bolts/transport eyes for the attachment of lifting gear
36	Transport pallet/transport frame (examples)
37	Transport equipment – (example – pallet truck)
38	Transport securing (screws)
39	Transport securing (strap)
40	Lifting device (example – crane gear (Fig. 9a), load bar (Fig. 9b)
41	Securing against overturning (lifting strap example)
42	Box/bag with accessories/accessories kit (e.g. diaphragm pressure vessel, counter flanges, vibration absorbers etc.)

Fig. 10a	Break tank (accessory – example)
43	Inlet (with float valve (accessory))
45	Inspection opening
46	Overflow Ensure adequate drainage. Provide siphon or valve to prevent ingress of insects. No direct connection to the sewer system (free drainage according to EN 1717)
47	Drain
48	Extraction (connection for pressure-boosting system)
49	Terminal box for low-water signal transmitter and/or overflow signal transmitter
50	Level display

Fig. 10b	Low-water signal transmitter (float switch) with connection diagram
49	Terminal box for low-water signal transmitter and/or overflow signal transmitter
52	Low-water signal transmitter/float switch
A	Floater top, tank full, contact closed (water not low)
B	Floater bottom, tank empty, contact open (low water)
53	Overflow signal transmitter/float switch
C	Floater top, overflow alarm
D	Floater bottom, no overflow alarm
	Core colours
BN	BROWN
BU	BLUE
BK	BLACK

1 General information

About this document:
The language of the original operating instructions is German. Versions of these instructions in any other language 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 intended use and correct operation of the product.
These installation and operating instructions correspond to the relevant version of the product and the underlying safety standards valid at the time of going to print.
EC declaration of conformity:
A copy of the EC declaration of conformity is supplied with the product as a separate document (booklet).
If a technical modification is made to the designs named in the declaration without our prior agreement, or the declarations made in the installation and operating instructions on product/personnel safety are not observed, this declaration is no longer valid.

2 Safety

These installation and operating instructions contain basic information which must be adhered to during installation, operation and maintenance. These installation and operating instructions must therefore be read by the service technician and the responsible qualified personnel/operator prior to installation and commissioning.
Not only must the general safety instructions listed under this main "Safety" section be adhered to, but also the special safety instructions that are marked by danger symbols and included under the following main sections.

2.1 Symbols and signal words in the operating instructions

Symbols:

General danger symbol

Danger due to electrical voltage

NOTICE

Signal words:
DANGER!
Acutely dangerous situation.
Failure to comply will result in death or extremely serious injuries.
WARNING!
The user could suffer (serious) injuries.
"Warning" implies that (serious) injury to persons is probable if this information is disregarded.
CAUTION!
There is a risk of damaging the product/system.
"Caution" implies that damage to the product is likely if this information is disregarded.
NOTICE:
Useful information on handling the product. It draws attention to possible problems.
Information that appears directly on the product, such as
- direction of rotation/flow symbol,
- identifiers for connections,
- rating plate,
- warning stickers,

must be complied with and kept in a legible condition.

2.2 Personnel qualifications

The installation, operation and maintenance personnel must have the appropriate qualifications for this work. The area of responsibility, competence and monitoring of the personnel are to be ensured by the operator. If the personnel do not possess the necessary knowledge, they must be trained and instructed. This can be carried out, if necessary, by the product manufacturer at the operator's request.

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/system. Non-observance of the safety instructions will render any claims for damages null and void. In particular, non-observance can, for example, result in the following risks:
- danger to persons due to electrical, mechanical and bacteriological factors,
- damage to the environment due to leakage of hazardous materials,
- material damage,
- failure of important product/system functions,
- failure of required maintenance and repair procedures.

2.4 Safety consciousness on the job

Safety instructions included in these installation and operating instructions, existing national regulations for accident prevention, as well as the operator's internal working, operating and safety regulations must be complied with.

2.5 Safety instructions for the operator

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

Children should be supervised to ensure that they do not play with the device.
- If hot or cold components on the product/system lead to hazards, measures must be taken on-site by the customer to prevent them from being touched.
- Guards for 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 removed so that there is no danger to persons or to the environment. Comply with national statutory provisions.
- Keep highly flammable materials away from the product.
- Avoid dangers caused by electrical currents. Local directives or general directives [e.g. IEC, VDE etc.] and instructions from 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 have sufficiently familiarised themselves with the installation and operating instructions by studying them in detail. Work on the product/system must only be carried out when it is at a standstill. The procedure described in the installation and operating instructions for shutting down the product/system must be observed.
Immediately after completing the work, all safety and protective devices must be put back in position and 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 void the manufacturer's declarations regarding safety.
Modifications to the product are only permissible following consultation with the manufacturer. Original spare parts and accessories authorised by the manufacturer ensure safety. The use of other parts will absolve the manufacturer of liability for any consequences arising therefrom.

2.8 Improper use

The operational reliability of the supplied product is only guaranteed if used as intended and in accordance with section 4 of the installation and operating instructions. The limit values must not fall below or exceed those values specified in the catalogue/data sheet.

3 Transport and temporary storage

The pressure-boosting system is supplied on one or more pallets or wooden transport frames (Fig. 9a and 9b), on transport boards or in a crate and is film-wrapped to protect it against moisture and dust. Transport and storage instructions attached to the packaging must be observed.

CAUTION! Risk of material damage!
Use approved lifting gear for transportation (examples Fig. 9a and 9b). Ensure the stability of the load since, with this particular pump design, the centre of gravity is shifted to the top (top-heavy). Attach transport straps or ropes to the transport lugs provided (Fig. 9a and 9b - item 35) or around the base frame. The pipes are not suitable for withstanding loads and should not be used to secure loads in transit.

CAUTION! Risk of damage!
Subjecting the pipes and valves to loads while in transit can result in leakages!

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

CAUTION! Risk of impairment or damage!
Suitable measures must be taken to protect the system against moisture, frost and heat as well as mechanical damage!

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

After removing the packaging, store or install the system according to the described installation conditions (see Section 7 "Setup/installation").

4 Intended use

Wilo pressure-boosting systems of the Wilo-SiBoost Smart 1... and COR-1... and COR/T-1... series are designed for water supply systems that do not need a standby pump. They are used for pressure boosting and pressure maintenance in commercial and domestic settings, e.g. for:
- domestic water supply and cooling systems,
- industrial water supply and cooling systems,
- fire water supply systems for self-help without any normative specifications,

- irrigation and sprinkling installations.
- The following standards and directives may apply during design and installation:
  - DIN 1988 (for Germany)
  - DIN 2000 (for Germany)
  - EU Directive 98/83/EC
  - Drinking Water Ordinance – TrinkwV2001 (for Germany)
  - DVGW directives (for Germany)

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

The COR-1... and SiBoost Smart 1... type automatically controlled pressure-boosting systems are supplied from the public drinking water supply network either directly (connected directly) or indirectly (connected indirectly) via a break tank. These break tanks (see range of accessories) are closed but are not pressurised, i.e. they are only under atmospheric pressure. The COR/T-1... system series is supplied with an integrated break tank and is therefore prepared for indirect connection to the water supply network.

5 Product information

5.1 Type key

Example:	SiBoost Smart 1 HELIX VE 606
SiBoost	Product family: pressure-boosting systems
Smart	Series designation
1	With one pump
HELIX	Pump series designation (see attached pump documentation)
VE	Pump design, vertical standard version
6	Rated flow rate of pump Q [m^3/h]
06	Number of pump stages

Example:	SiBoost Smart 1 HELIX VE 405/EM2
SiBoost	Product family: pressure-boosting systems
Smart	Series designation
1	With one pump
HELIX	Pump series designation (see attached pump documentation)
VE	Pump design, vertical standard version
4	Rated flow rate of pump Q [m^3/h]
05	Number of pump stages
EM2	Single-phase version with preset operating mode 2 – pressure control mode

Example:	SiBoost Smart 1 MVISE 806
SiBoost	Product family: pressure-boosting systems
Smart	Series designation
1	With one pump
MVISE	Pump series designation (see attached pump documentation)
8	Rated flow rate of pump Q [m^3/h]
06	Number of pump stages

Example:	COR/T-1 HELIX VE 410-GE
CO	Compact pressure-boosting system
R	Regulation (control) by frequency converter
/T	With integrated break tank for system separation
-1	With one pump
HELIX	Pump series designation (see attached pump documentation)
VE	Pump design, vertical electronic version
4	Rated flow rate of pump Q [m^3/h]
10	Number of pump stages
-GE	Basic unit, i.e. without an additional control device The system is controlled with the pump's integrated frequency converter.

Example:	COR-1 MVIE 7004/2-GE
CO	Compact pressure-boosting system
R	Regulation (control) by frequency converter
-1	With one pump
MVIE	Pump series designation (see attached pump documentation)
70	Rated flow rate of pump Q [m^3/h]
04	Number of pump stages
/2	Number of reduced stages
-GE	Basic unit, i.e. without an additional control device The system is controlled with the pump's integrated frequency converter.

Example:	COR-1 MHIE 406-2G-GE
CO	Compact pressure-boosting system
R	Regulation (control) by frequency converter
1	With one pump
MHIE	Pump series designation (see attached pump documentation)
4	Rated flow rate of pump Q [m^3/h]
06	Number of pump stages
-2G	Generation specification
-GE	Basic unit, i.e. without an additional control device The system is controlled with the pump's integrated frequency converter.

Additional designations for additional options pre-installed at the factory	
WMS	Including WMS kit (low-water cut-out switchgear for operation with supply pressure)
MS	Including main switch for switching the system on and off (mains cut-off switch)

5.2 Technical data

Max. volume flow	See catalogue/data sheet												
Max. delivery head	See catalogue/data sheet												
Speed	900 – 3600 rpm (variable speed)												
Mains voltage	3~ 400 V ±10 % V (L1, L2, L3, PE) (with EM2 – 1~230 V ±10 % V (L, N, PE)) See rating plate of pump/motor												
Rated current	See rating plate of pump/motor												
Frequency	50 Hz (60 Hz)												
Electrical connection	(See installation and operating instructions for the pump and, if available, installation and operating instructions and circuit diagram for the control device)												
Insulation class	F												
Protection class	IP54												
Power consumption P_1	See rating plate of pump/motor												
Power consumption P_2	See rating plate of pump/motor												
Sound-pressure level	Rated power (kW)												
Pumps with glanded motors	0.55	0.75	1.1	1.5	2.2	3	4	5.5	7.5	11	15	18.5	22
dB(A) tolerance +3dB(A)	66	68	70	70	70	71	71	72	72	78	78	81	81
Sound-pressure level	Rated power (kW)												
Pumps with glandless motors	1.1									2.0			
dB(A) tolerance +3dB(A)	53									55			
Nominal diameters													
Connection Suction/pressure pipe SiBoost Smart 1.../ COR-1...	Rp 1/R 11/4 (..1 MHIE 2) Rp 11/4/R 11/4 (..1 MHIE 4) (..1 MVISE 2) (..1 MVISE 4) (..1 HELIX VE 4) (..1 HELIX VE 6) Rp 11/2/R 11/2 (..1 MHIE 8) (..1 MVISE 8) (..1 HELIX VE 10) Rp 2/R 11/2 (..1 MHIE 16) (..1 HELIX VE 16) Rp 2/R 2 (..1 HELIX VE 22) Rp 2½/R 2½ (..1 HELIX VE 36) Rp 3/DN 80 (..1 HELIX VE 52) DN 100/DN 100 (..1 MVIE 70) (..1 MVIE 95)												
Inlet/discharge connection COR/T-1...	G 11/4/G 11/4 (..1 HELIX VE 4) (..1 HELIX VE 6) (Subject to change without prior notice / see also attached installation plan)												
Permitted ambient temperature	5 °C to 40 °C												
Permissible fluids	Pure water without settling sediments												
Permissible fluid temperature	3 °C to 60 °C (SiBoost Smart 1.../COR-1...) 3 °C to 40 °C (COR/T-1...)												
Max. permitted operating pressure	on the pressure side 16 bar (HELIX VE, MVIE) 10 bar (MHIE) (see rating plate)												
Max. permissible inlet pressure	indirect connection (max. 6 bar)												
Diaphragm pressure vessel	8 litres												

5.3 Scope of delivery

- pressure-boosting system
- box with accessories/accessories kit/add-on parts (Fig. 9a and 9b, item 42), if applicable
- installation and operating instructions for the pressure-boosting system,
- installation and operating instructions for the pump,
- factory test report,
- installation and operating instructions for the control device, if applicable,
- installation plan, if applicable,
- electrical circuit diagram, if applicable,
- installation and operating instructions for the frequency converter, if applicable,
- supplementary sheet with the factory settings for the frequency converter, if applicable,
- installation and operating instructions for the signal transmitter, if applicable,
- spare parts list, if applicable.

5.4 Accessories

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

- open break tank (example Fig. 10a),
- larger diaphragm pressure vessel (on the suction or discharge side),
- safety valve,
- dry-running protection:
  - protection against low water level (WMS) (Fig. 5a to 5c), in inlet mode (at least 1.0 bar) for COR-1 MHIE (Fig. 5b) and SiBoost Smart 1...EM2 (Fig. 5a) systems (is supplied fitted to the pressure-boosting system if part of the order). For SiBoost Smart 1 HELIX VE.../COR-1 MVIE... systems: a supply pressure sensor is fitted on the suction side as standard, functioning as a low-water cut-out switchgear during operation with supply pressure (Fig. 2b). For COR/T-1... systems: a float switch that switches the pump off when there is a water shortage (Fig. 1e, item 52) and a pressure sensor on the suction side (Fig. 1e, item 12-2) that switches the pump back on when the supply pressure reaches at least 0.3 bar, are installed in the break tank as standard.
  - float switch,
  - low-water electrodes with level relay,
  - electrodes for tank operation (special accessories on request),
- main switch (Fig. 1a to 1h; Fig. 16),
- flexible connection pipes (Fig. 8-31),
- compensators (Fig. 8-30),
- threaded flanges,
- sound-insulating unit casing (special accessories on request).

6 Description of the product and accessories

6.1 General description

The system with its non-self-priming, vertically (Helix VE, MVIE or MVISE) or horizontally (MHIE) mounted high-pressure multistage centrifugal pump with frequency converter is supplied with all pipework installed as a compact unit ready for connection. Only establish connections for the inlet and pressure pipe as well as the electrical mains connection. Systems from the SiBoost Smart 1... and COR-1... series (examples Fig. 1a to 1d and 1f to 1h) are mounted on a galvanised steel base frame (3) with vibration absorbers (34). Systems from series COR/T-1 (Fig. 1e) are mounted on a plastic baseplate together with a plastic break tank.
The supplied accessories ordered separately must be installed.

The SiBoost Smart 1... and COR-1... systems can be connected to the water supply network either directly (diagram in Fig. 6a) or indirectly (diagram in Fig. 6b). When supplied with a self-priming pump (special version), the system may be connected to the public water supply network only indirectly (system separation by a non-pressurised break tank). Information on the pump type used can be found in the attached installation and operating instructions for the pump.
COR/T-1... type systems are intended for indirect connection to the public water supply network by means of the integrated break tank with level-dependent replenishment and system separation (similar to diagram in Fig. 6b).
Observe the relevant, applicable regulations and standards when using the system for drinking water supply and/or fire extinguishing supply.
The systems must be operated and maintained in accordance with the relevant provisions (in Germany according to DIN 1988 (DVGW)) so that the operational reliability of the water supply is permanently guaranteed and neither the public water supply nor other consumption installations are detrimentally affected. The applicable standards and directives (see Section 4 “Intended use”) on the connection and connection type to public water supply networks must be observed. They may be supplemented by **regulations of the water supply companies (WVU) or the responsible fire protection authority**. The local conditions (e.g. a supply pressure that is too high or fluctuating considerably and which might require the installation of a pressure reducer) must also be observed.

6.2 Components of the system

The system consists of several main components, which are described in the following. The scope of delivery includes separate installation and operating instructions for the relevant operating parts/components. (see also the attached installation plan provided)

Mechanical and hydraulic system components SiBoost Smart 1... and COR-1... (Fig. 1a to 1d and 1f to 1h):

The system is installed on a base frame (3) with vibration absorbers (34). It consists of a high-pressure multistage centrifugal pump (1) with a three-phase current motor with an integrated frequency converter (15), with a shut-off valve (7) and a non-return valve (8) installed on the discharge side. There is also an assembly, which can be shut off, with a pressure sensor (12-1) and pressure gauge (11-1) as well as an 8-litre diaphragm pressure vessel (9) with a throughflow fitting (10) that can be shut off (for throughput according to DIN 4807, part 5). An assembly that can be shut off having a further pressure transmitter (12-2) and pressure gauge (11-2) is installed on the pump's drainage port or on the pipework on the inlet side as standard for SiBoost Smart 1 HELIX... and MVISE... as well as COR-1 MVIE...GE systems (Fig. 2b).

A low-water cut-out switchgear (WMS) assembly (14) can be optionally installed or retrofitted on the pump's drainage port or on the inlet pipe for systems in the COR-1 MHIE...GE and SiBoost Smart 1 Helix VE...EM2 series (Fig. 5a and 5b).

An optional main switch (16) is pre-assembled at the factory and pre-wired with the motor of the pump for systems in the COR-1...GE-HS and SiBoost Smart 1...-HS series. In this case, the electrical connection must be established by means of this switch (see Section 7.3 "Electrical connection").

For customer-specific systems, the scope of delivery may include an additional control device, which is installed on the base frame with an upright support bracket and fully wired to the electrical components of the system.

COR/T-1...(Fig. 1e):

The system components are mounted on a plastic baseplate belonging to the integrated break tank (53). The system consists of a high-pressure multistage centrifugal pump (1) with a three-phase current motor (17) with an integrated frequency converter (15), with a shut-off valve (7) and a connection pipe (5) installed on the discharge side. There is an assembly, which can be shut off, with a pressure sensor (12-1) and pressure gauge (11-1) as well as an 8-litre diaphragm pressure vessel (4) with a throughflow fitting (6) that can be shut off (for throughput according to DIN 4807, part 5). A non-return valve (8) as well as the connection to the tank with a hose are mounted on the inlet side. A float switch (52) is installed in the break tank as a signal transmitter for protection against low water level. The water from the supply mains is fed (4) into the break tank via a level-dependent opening and closing float valve (43).

These installation and operating instructions describe the overall system, without going into a detailed description of the operation of an additional control device (see section 7.3 and the accompanying documentation for the control device).

High-pressure multistage centrifugal pump (1) with three-phase current motor (17) and frequency converter (15):

Different types of high-pressure multistage centrifugal pumps are installed in the system depending on the application and the performance parameters required. Information on the pump and the setting and operation of the frequency converter is provided by the attached installation and operating instructions.

Diaphragm pressure vessel kit (Fig. 3):

Consisting of:

- diaphragm pressure vessel (9) with closable throughflow fitting (10) and drain valve

Pressure sensor kit on the pressure side (Fig. 2a) (for all types):

Consisting of:

- pressure gauge (11-1)
- pressure sensor (12-1a)
- electrical connection, pressure sensor (12-1b)
- drain/venting (18)
- stop valve (19)

Pressure sensor kit on the inlet side (Fig. 2b) (for SiBoost Smart 1 HELIX VE.../MVISE...and COR-1 MVIE...GE):

Consisting of:

- pressure gauge (11-2)
- pressure sensor (12-2a)
- electrical connection, pressure sensor (12-2b)
- drain/venting (18)
- stop valve (19)

Control device (2):

Systems from the SiBoost Smart 1..., COR-1...GE and COR/T-1...GE series do not have a separate control device. The system is controlled by the pump's integrated frequency converter (15). Information on operation and handling is provided in the separate installation and operating instructions for the pump and the frequency converter.

An additional control device is used to control and regulate some customer-specific types of systems. Information on this control device is provided by the documents attached separately, the installation and operating instructions and the circuit diagram.

6.3 Function of the system

Systems from the Wilo-SiBoost Smart 1 and Wilo-Comfort-Vario COR-1 and COR/T-1 series are fitted with a non self-priming, horizontal or vertical high-pressure multistage centrifugal pump with a three-phase current motor (17) and an integrated frequency converter (15) as standard. The pump is supplied with water via the inlet connection (4).
For suction mode (SiBoost Smart 1 and COR-1...) from lower-lying tanks, a separate, vacuum-proof and pressure-resistant suction line with a foot valve should be installed. It must be positioned at a constant upward inclination from the tank to the pump connection.
The pump increases the pressure and pumps the water to the consumer through the pressure pipe (5). To do this, it is switched on and off and controlled according to the pressure. One or two pressure sensors (12-1 and 12-2) are intended to monitor the pressure depending on the type of system (Fig. 2a and 2b). The pressure sensor or sensors continuously measure(s) the actual pressure value, convert(s) it into an analogue current signal and transmit(s) it to the frequency converter (15) of the pump (or if available the control device (2)). Depending on the demand and the control mode, the frequency converter (or the control device) switches the pump on or off or changes the speed of the pump until the set control parameters are reached. A more precise description of the control mode, control process and setting options can be found in the installation and operating instructions for the pump and the control device.
SiBoost Smart 1 HELIX VE.../MVISE... and COR-1 MVIE...GE type systems with frequency control on the pump and an installed pressure sensor on the inlet side (pump housing or suction line) can operate in p-v mode. For this purpose, special settings are possible and required on the frequency converter of the pump.
A more precise description of the control method and the setting possibilities can be found in the “p-v mode” section and in the separate documentation for the pump/frequency converter!

The diaphragm pressure vessel installed (9) (total capacity of approx. 8 litres) exercises a certain buffer effect on the pressure sensor and prevents oscillation of the control when switching the pump on and off. However, it also guarantees low water extraction (e.g. due to tiny leakages) from the available storage volume without switching on the pump. This reduces the switching frequency and stabilises the operating state of the system.

CAUTION! Risk of damage!
To protect the mechanical seal and plain bearings, do not allow the pumps to run dry. Dry running can lead to the pump developing leakages!

On SiBoost Smart 1 HELIX VE.../MVISE... and COR-1 MVIE...GE type systems, the supply pressure is continuously monitored by the pressure sensor on the inlet side and transmitted to the frequency converter as a current signal. If the supply pressure is too low, the system detects a fault and the pump is stopped.
On COR-1 MHIE...GE and SiBoost Smart 1 HELIX VE...EM2 type systems, a low-water protection device (WMS) (14) (Fig. 5a and 5b) is provided as an accessory for direct connection to the public water supply network. It monitors the available supply pressure and sends a switching signal which is processed by the frequency converter and control device. The WMS kit is installed on the pump's drainage opening (WMS connection kit (Fig. 5a, 14b) from the accessories range required) or at an installation point to be provided in the inlet pipe.
In the case of an indirect connection (system separation by non-pressurised break tank), provide a level-dependent signal transmitter installed in the break tank as a dry-running protection device. When using a Wilo break tank, a float switch (Fig. 10b item 52) is included in the scope of delivery.
COR/T-1 series systems that are fitted with an unpressurised break tank for system separation also have a float switch (Fig. 1e item 52), which is installed as a low-water signal transmitter in the tank.
For tanks provided by the customer, you can find various signal transmitters for subsequent installation in the Wilo range (e.g. WA65 float switch or low-water electrodes with level relay).

WARNING! Health hazard!
Use materials that do not adversely affect the quality of the water for drinking water systems!

An additional main switch is optionally provided, which can be retrofitted on all COR-1... GE and SiBoost Smart 1... series systems (Fig. 1a-1h and Fig. 8 item 16). It is used to disconnect the mains supply for maintenance and repair work on the system.

6.3.1 P-v mode

“p-v control” operating mode
Alongside the operating modes “Speed control”; “Constant pressure: p-c”; “Constant differential pressure Δp-c”; “PID control” and “Variable differential pressure Δp-v” described in more detail in the installation and operating instructions for the pump, a control mode “Variable pressure p-v” (hereinafter referred to as just p-v control), described in more detail below, can be set via the user interface of the frequency converter in the menu (see Section 6.3.2).

Fig. 6.3.1-1

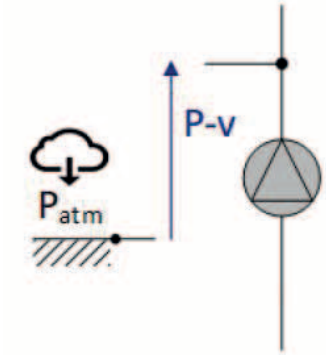
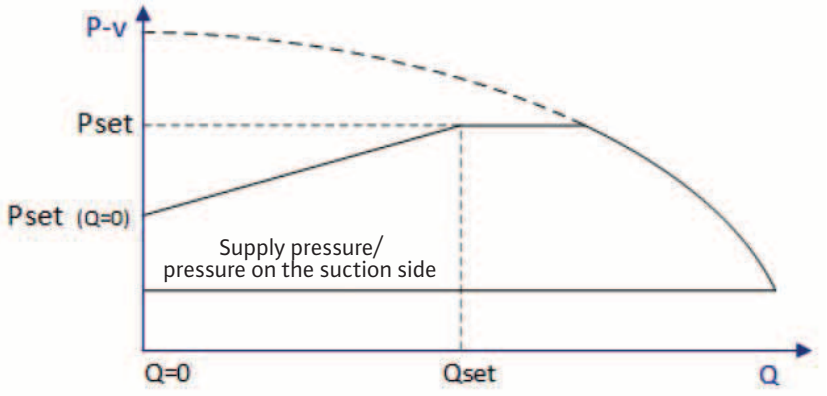


Fig. 6.3.1-2



In the “p-v control” operating mode, the frequency converter alters the delivery pressure of the pump as a linear function of the volume flow to be conveyed through the system (diagram Fig. 6.3.1-2). The use of one pressure sensor each on the suction and discharge side is required for this operating mode. A relative pressure sensor is used on the discharge side of the pump, and both a relative pressure sensor (standard ex-works) and an absolute pressure sensor can be used on the suction side of the pump.
The relative pressure sensor with a measurement range of -1 bar to 9 bar, which is mostly used at the factory, is depicted in the menu 5.4.0.0 “IN2” as an absolute pressure sensor [5.4.4.0 = ABS] from 0 to 10 bar [5.4.3.0 = 10 bar].
(Accuracy of the sensors ≤ 1% and application between 30 % and 100 % of the respective measurement range).
A relative pressure sensor measures the pressure in relation to atmospheric pressure (Fig. 6.3.1-1). An absolute pressure sensor measures the pressure in relation to zero pressure in a vacuum.

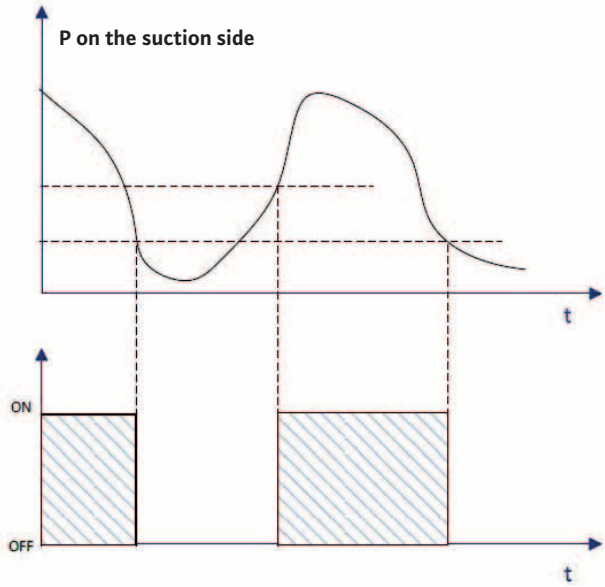
- The value for (Pset) is set manually via menu item 1.0.0.0.
- The value for (Qset) is set manually via menu item 2.3.3.0.
- The value for the zero flow rate (Pset(Q=0)) is set manually via menu item 2.3.4.0.
  See Section 6.3.2 for the settings.

In the p-v operating mode, the control detects a zero volume delivery, triggering the deactivation of the pump.

Recommendation for commissioning:
-Set the set pressure at the desired volume flow point (Pset) to 60 to 80% of the pump’s maximum pressure.
-Set the volume flow (Qset) to the pump’s rated flow rate.
-Set the desired pressure at zero delivery (Pset(Q=0)) to 90 % of Pset.

Low-water cut-out switchgear
For this operating mode, the pressure sensor on the inlet side is also used as a low-water cut-out switchgear, triggering the deactivation of the pump if the set cut-off pressure (Ps) is undershot. The pump is started if the inlet pressure rises above the set restart pressure (Pr) (compare Fig. 6.3.1-3).
The cut-off pressure (Ps) measured at the inlet side is set at the factory to 1 bar and the restart pressure (Pr) is set at the factory to 1.3 bar. (Relative pressure).
In order to disable this function, set Ps to the smallest possible value, (-1.0 bar relative pressure).
In order to avoid frequent deactivation and restart cycles, a deviation of 0.3 bar between the deactivation limit value (Ps) and the restart limit value (Pr) is recommended.

Fig. 6.3.1-3



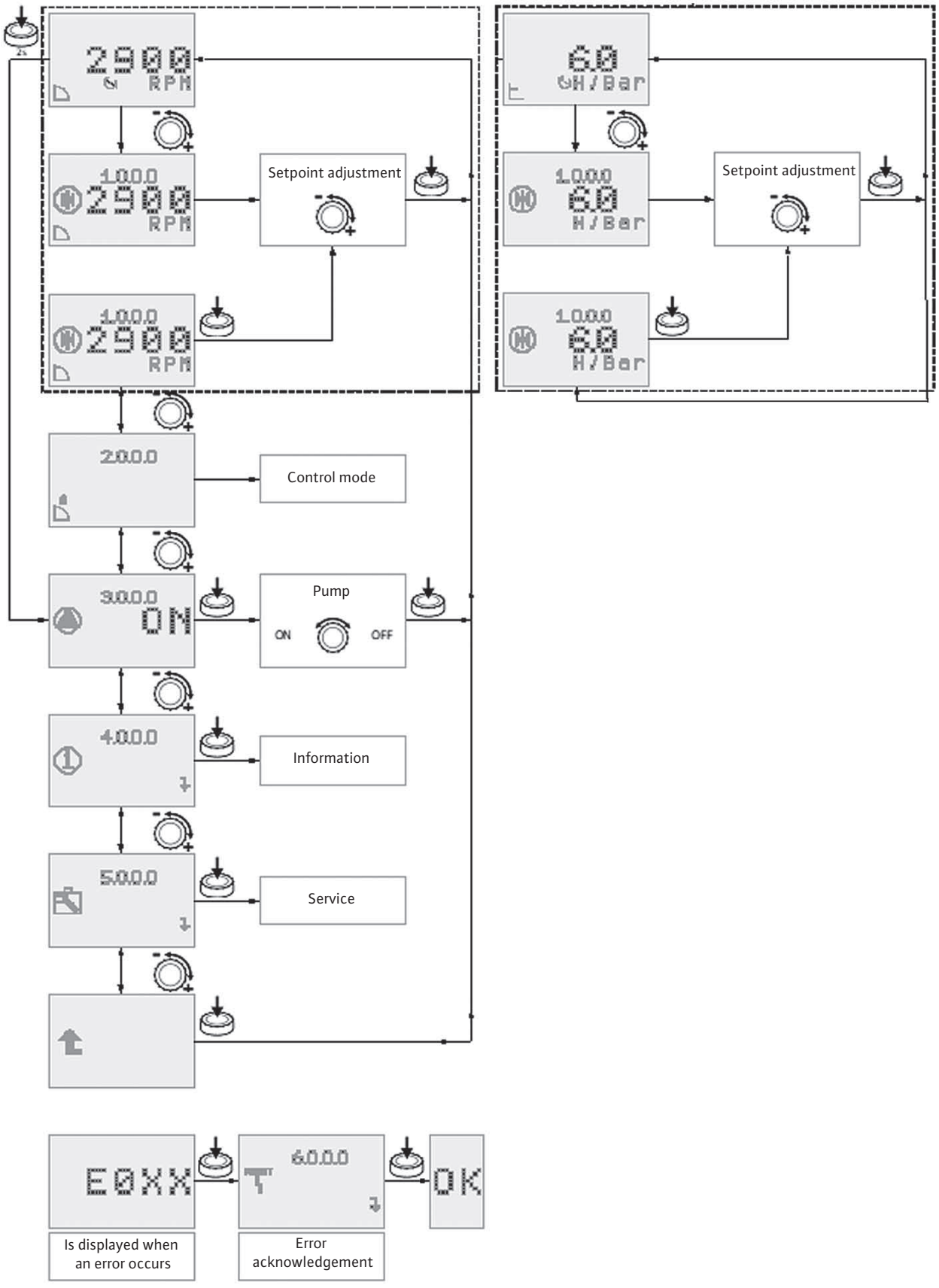
NOTICE! Relative pressure sensors are installed at the factory as standard, i.e. all pressures are measured in relation to atmospheric pressure!

When connecting the system to a break tank, i.e. indirect connection (Fig. 6b), it can be expedient to set the deactivation limit value (Ps) to –0.6 bar and the restart value (Pr) to 0.0 bar pressure value. The use of an additional float switch that is installed in the break tank (for break tanks from the Wilo range of accessories) or that has to be installed (for tanks provided by the customer) is recommended to protect the tank from being drained.

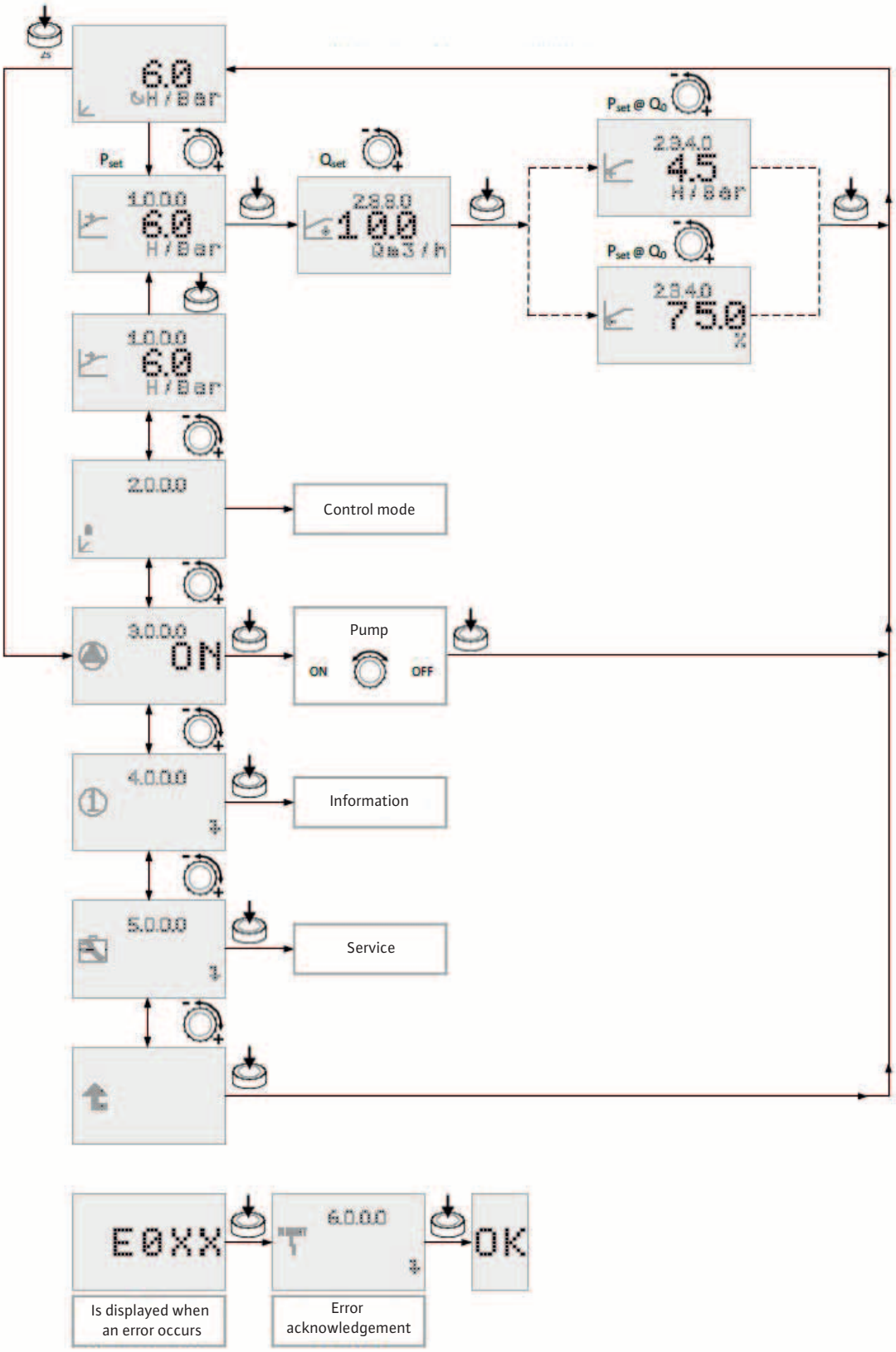
6.3.2 Navigation in the pump menus (see also installation and operating instructions for the pump)

Settings in the “Speed stage control” operating mode (switch 1 = OFF in “OPERATION” position)

Settings in the “Constant pressure” operating mode (switch 1 = OFF in “OPERATION” position)

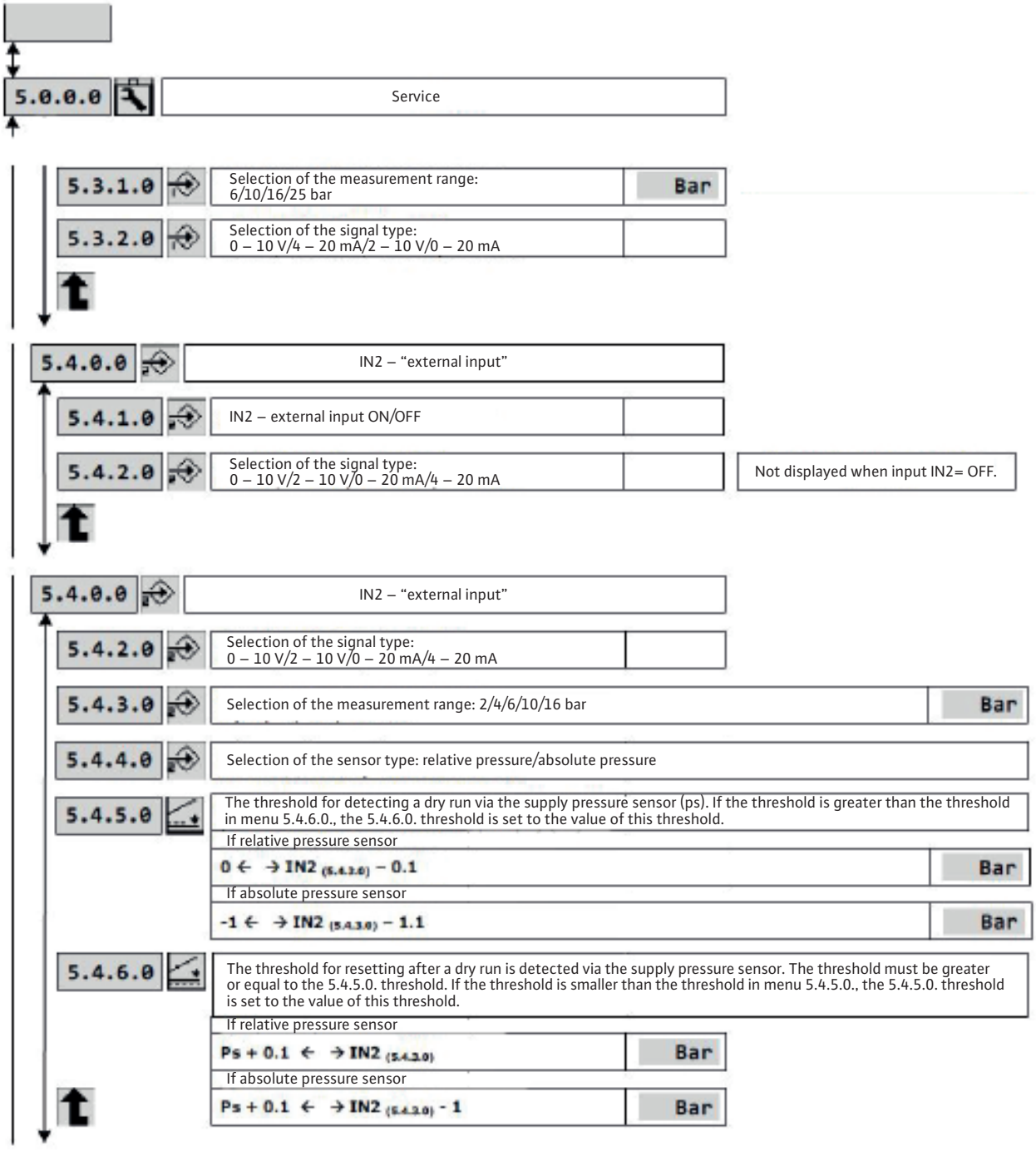


Settings in the “p-v control” operating mode (switch 1 = OFF in “OPERATION” position)

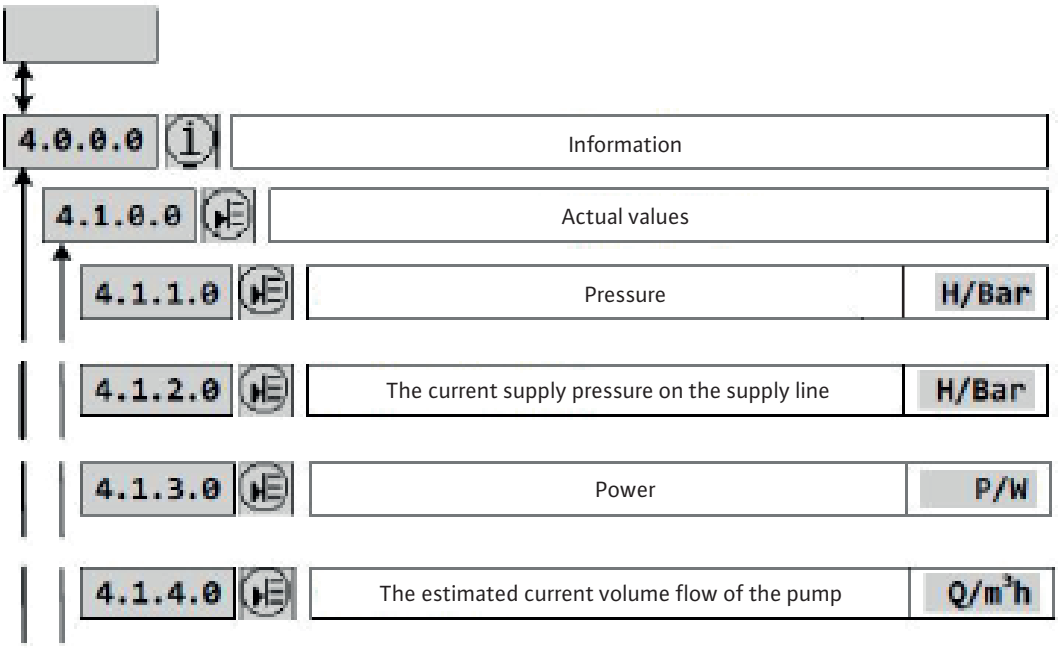


A pressure sensor installed on the suction side generally indicates a factory-configured p-v control.
The system-related parameters such as setpoint pressure (Pset) at rated volume flow (1.0.0.0), rated volume flow (Qset) (2.3.3.0) and setpoint at zero flow (Pset(Q=0)) (2.3.4.0) have to be adjusted during commissioning.
Further information on the pump menu can be found in the attached installation and operating instructions for the pump.

SETTINGS IN THE "EXPERT" MENU

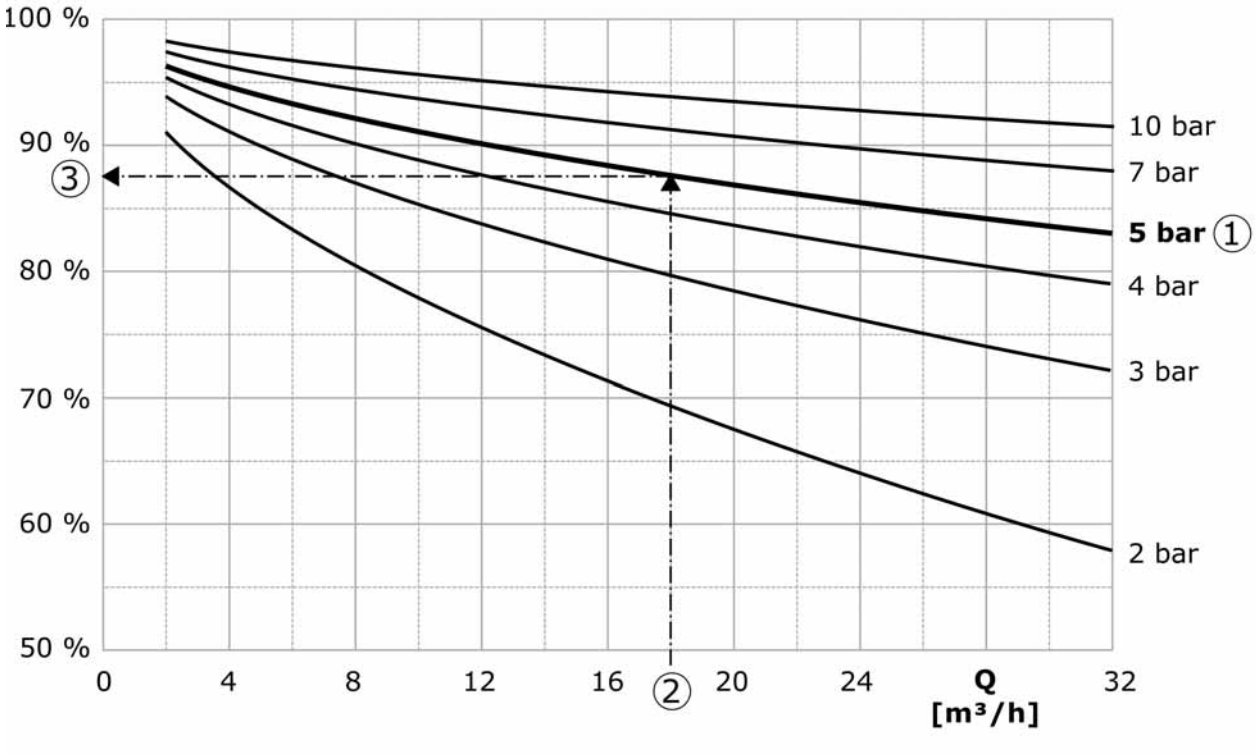


Information menu displays



The following graph shows typical default values for the setpoint at zero flow. The procedure will be explained with an example:

- Based on the reference setpoint ①, the characteristic curve to be used is selected (here: 5 bar).
- The point of intersection between this characteristic curve and the maximum volume flow of the system ② (here 18 m³/h) is used to determine the relative setpoint at zero flow ③ (here 87.5 %), which corresponds to a setpoint at zero flow of 4.4 bar (=5 bar x 0.875)!



NOTICE!
When using a diaphragm pressure vessel installed on the pressure side, use the “setpoint at zero flow” as the described “pump cut-in pressure pmin” (see Section 8.1 and Fig. 4).

6.4 Noise

Depending on the power requirements, the system is supplied with a wide variety of pumps which may vary considerably in terms of their noise and vibration characteristics. You can find the relevant data in Section 5.2, in the installation and operating instructions for the pump and in the catalogue specifications for the pump.

WARNING! Health hazard!
In the event of sound-pressure levels of above 80 dB(A), it is imperative that the operating personnel and persons who are nearby during operation wear suitable hearing protection!

7 Setup/installation

7.1 Installation site

- 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).
- An adequately dimensioned floor drainage system (drain connection or similar) must be provided in the installation room. A floor drainage system is mandatory for the COR/T-1 series!

WARNING! Overflowing water can cause material damage!
In order to avoid water damage, an adequately dimensioned floor drainage system must be provided in the installation room!

- No harmful gases may enter the room or be present there.
- Ensure adequate space for maintenance work. The main dimensions can be found in the attached installation plan. The system should be freely accessible from at least two sides.
- The installation surface must be horizontal and flat. A slight height adjustment for stabilisation is possible with the vibration absorbers in the base frame. If this is necessary, loosen the counter nut and unscrew the respective vibration absorber slightly. Then re-tighten the counter nut.
- The system is designed for a maximum ambient temperature of +0 °C to 40 °C at a relative humidity of 50 %.
- Installation and operation in the vicinity of living rooms and bedrooms is not recommended.
- In order to avoid the transmission of structure-borne noise and to ensure a stress-free connection to upstream and downstream pipes, use compensators (Fig. 8-30) with extension limiters or flexible connection pipes (Fig. 8-31)!

7.2 Installation

7.2.1 Foundation/bearing surface

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

NOTICE!
For transport reasons, the vibration absorbers may not be installed upon delivery. Before installing the system, check that all the vibration absorbers are fitted and locked using the threaded nut (Fig. 8; 9a and 9b-34).
If the customer also wants to secure the system to the floor (similar to example Fig. 8-32), make sure that suitable measures are taken to avoid structure-borne noise transmission.

7.2.2 Hydraulic connection and pipes

All hydraulic connection openings are sealed with dust caps or plugs at the factory. Remove the dust caps or plugs before starting connection work.

CAUTION! Risk of impairment or damage!
Dust caps or plugs that have not been removed can cause clogging and damage the pump!

For connections to the public drinking water supply network, the requirements of the responsible local water supply company must be met.
The system must not be connected until all the welding and soldering work, necessary flushing and, if required, disinfecting of the pipe system and the delivered system has been completed (see Section 7.2.3).

The customer's pipes must be installed without tension. Compensators with extension limiters or flexible connection pipes are recommended in order to avoid tension at the pipe adaptors and minimise the transmission of system vibrations to the building installation. In order to prevent the transmission of structure-borne noise to the building, do not secure the pipe clamps to the system pipework (example Fig. 8).
The flow resistance of the suction line must be kept as low as possible (i.e. short pipe, few elbows and sufficiently large shut-off valves), otherwise the protection against low water level may suffer severe pressure losses in the event of high volume flows. (Observe the NPSH of the pump and avoid pressure losses and cavitation).

7.2.3 Hygiene (TrinkwV 2001)

The supplied pressure-boosting system meets the standards of current technology and in particular satisfies DIN 1988. It was checked at the factory to make sure it functions correctly. Please remember that, when used in drinking water applications, the complete drinking water supply system must be handed over to the operator in a perfect state of hygiene.
Observe the corresponding specifications in DIN 1988 Part 2 Section 11.2 and the comments on the DIN. Pursuant to TwVO § 5 Paragraph 4, this also includes microbiological requirements, flushing if necessary and also disinfecting in some circumstances. The limit values to be observed are given in TwVO § 5.

WARNING! Contaminated drinking water is a health hazard!
Flushing the pipes and system reduces the risk of the drinking water quality being impaired! The water must be replaced after a long system standstill!

Once the system has been delivered, install it in the intended installation location as soon as possible.
Always flush the system.
The installation of a T-connector on the consumer side of the system (if there is a diaphragm pressure vessel on the end pressure side, immediately downstream of it) upstream of the next shut-off device is recommended for the simple flushing of the system. Its branch, which is provided with a shut-off device, is used to drain into the waste water system during the flushing process and must be dimensioned for the maximum volume flow of the pump (Fig. 6a and 6b). If it is not possible to achieve free drainage, such as when connecting a hose, the requirements of DIN 1988 T5 must be observed.

7.2.4 Protection against dry running/low water level (accessories)

Fitting dry-running protection:

- In the event of a direct connection to the public water supply network: For SiBoost Smart 1 HELIX VE.../MVISE... and COR-1 MVIE...GE type systems, a kit with a pressure sensor that monitors the input pressure and forwards it to the pump's control device as a current signal is installed on the suction side. No additional accessories are necessary!
  For COR-1 MHIE...GE and SiBoost Smart 1 HELIX VE...EM2 type systems, screw in the low-water protection device (WMS) on one of the connection ports provided for that purpose into the suction line (in the case of retrofitting) or on the drainage connection of the pump (HELIX VE) and seal it (Fig. 5a). Additionally use the WMS connection kit for CO-1... for this purpose. For MHIE pumps, the WMS kit is installed on the suction side as shown in the figure (Fig. 5b). Establish the electrical connection in accordance with the installation and operating instructions for the pump and in accordance with the installation and operating instructions and circuit diagram for the control device.
- For COR/T-1 type systems, a float switch is installed in the tank as a low-water signal transmitter and completely wired to the pump's frequency converter. No additional accessories are necessary!
- In the event of an indirect connection using a Wilo break tank, a float switch for level monitoring is provided as standard as a means of dry-running protection. Establish the electrical connection to the control device of the system in accordance with the installation and operating instructions and circuit diagram for the control device. Observe the installation and operating instructions of the break tank.
- In the event of 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. Establish the electrical connection in accordance with the installation and operating instructions for the pump and in accordance with the installation and operating instructions and circuit diagram for the control device.
- Alternative: You can use a level controller and install three submersible electrodes in the break tank. Arrange them as follows:
  Position the first electrode as an earth electrode just above the base of the tank (must always be submerged), for the lower switching level (low water).
  Position the second electrode approximately 100 mm above the draw-off connection. For the upper switching level (low water rescinded), place the third electrode at least 150 mm above the lower electrode.
  Establish the electrical connection between the level control device and the frequency converter of the pump or control device in accordance with the installation and operating instructions and circuit diagram for the level control device and for the pump or control device.

7.2.5 Main switch (accessories)

A manually operated main switch (16) which is optionally part of the scope of delivery (for systems from the COR-1...GE-**HS** and SiBoost Smart 1...**HS** series) is used to connect and disconnect the electrical power supply for maintenance work on the pump or other components which need to be temporarily taken out of service.

7.2.6 Diaphragm pressure vessel (accessories)

For transportation and hygiene reasons, the (8-litre) diaphragm pressure vessel which is part of scope of delivery of the pressure-boosting system may be delivered unmounted as an accessories kit in the box (Fig. 9a and 9b-42). Install the diaphragm pressure vessel (9) on the throughflow fitting (10) prior to commissioning (Fig. 2a and 3).

NOTICE
Make sure that the throughflow fitting is not twisted. The fitting is installed correctly when the drain valve (Fig. 3, B) and the flow direction arrows printed on it are parallel to the pipe.
If an additional larger diaphragm pressure vessel is installed, observe the corresponding installation and operating instructions. 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 diaphragm pressure vessels.

NOTICE
Diaphragm pressure vessels require regular testing according to Directive 97/23/EC (in Germany, also take into account the Ordinance on Industrial Safety and Health §§ 15(5) and 17 as well as Annex 5).

Shut-off valves must be provided upstream and downstream of the tank for tests, inspection and maintenance work on the piping. In order to prevent system downtimes, provide connections for a bypass upstream and downstream of the diaphragm pressure vessel for maintenance work. The bypass (for examples see diagram Fig. 6a and 6b item 29) must be removed at the end of the work to avoid stagnation of the water! Special maintenance and test instructions can be found in the installation and operating instructions for the diaphragm pressure vessel concerned.
The respective system conditions and the system pumping data must be taken into account when selecting the size of the diaphragm pressure vessel. 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 (see table 1 and the specifications on the rating plate and the installation and operating instructions for the tank).

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

Table 1

7.2.7 Safety valve (accessories)

Install a component-tested safety valve on the discharge side if the sum of the maximum possible supply pressure and the maximum delivery pressure of the pressure-boosting system exceeds the permissible operating pressure of an installed system component. The safety valve should 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 permissible level (dimensioning data is given in the data sheets/characteristic curves of the system). Securely drain off the outflowing water flow. The corresponding installation and operating instructions and the relevant provisions must be observed when installing the safety valve.

7.2.8 Non-pressurised break tank (accessories)

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 (example Fig. 10a). The rules for the pressure-boosting system apply to the installation of the break tank as well (see Section 7.1). The entire base 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 bearing capacity of the bearing surface.
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).
The tank must not slant when full because an uneven load can cause destruction.
The non-pressurised (i.e. under atmospheric pressure), closed PE tank supplied by Wilo as an accessory must be installed according to the transport and installation instructions supplied with the tank. The following procedure applies:
Connect the tank without mechanical tension before commissioning. This means establishing the connection with flexible components such as compensators or hoses. The tank overflow must be connected according to the applicable regulations (in Germany, DIN 1988/T3 and 1988-300). Take suitable measures to prevent heat transmission through the connection pipes. PE tanks from the Wilo range are only designed to accommodate clean water. The maximum temperature of the water must not exceed 40 °C!

Caution! Risk of material damage!
The tanks are statically designed for their nominal capacity. Subsequent changes can affect the static forces and cause impermissible deformations or lead to the tank being destroyed!

The electrical connection (protection against low water level) to the system's control device must be established before the system is commissioned (see the details in the installation and operating instructions for the pump and control device).

NOTICE!
Clean and flush the tank before filling it!

Caution! Health hazard and risk of damage! Do not walk on plastic tanks! Walking on the cover or subjecting it to loads can cause accidents resulting in damage!

7.2.9 Compensators (accessories)

Connect the pipes using compensators for the stress-free installation of the system (example Fig. 8, 30). The compensators must be equipped with a structure-borne noise-insulating extension limitation to absorb reaction forces that occur. Install the compensators stress-free in the pipes. Do not compensate for alignment errors or pipe displacement with compensators. The screws should be uniformly tightened crosswise during the installation. The ends of the screws must not project beyond the flange. If welding work is done nearby, cover the compensators to protect them (from sparks, radiated heat). Do not paint the rubber parts of compensators and protect them against oil. The compensators must be accessible for inspection within the system at all times and must therefore not be covered by the pipe insulation.

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).

7.2.10 Flexible connection pipes (accessories)

In the case of pipes with threaded connections, use flexible connection pipes for stress-free installation of the pressure-boosting system and in the event of slight pipe displacement (Fig. 8-31). The flexible connection pipes from the Wilo range consist of a high quality stainless steel corrugated hose, sheathed with stainless steel braiding. A flat-sealing stainless steel screwed connection with a female thread is provided at one end for installation on the pressure-boosting system. A male pipe thread is provided at the other end to connect to additional pipework. Depending on the respective size, certain maximum permissible deformation limits must be observed (see Table 2 and Fig. 8). Flexible connection pipes are not suitable for absorbing axial vibrations and compensating the corresponding movements. A suitable tool must be used to prevent kinking or twisting during the 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. The flexible connection pipes in the system must be accessible for inspection at all times and must therefore not be covered by the pipe insulation.

Nominal diameter Connection	Threaded Screw connection	Conical Male thread	Permissible bend radius ∞up to RB in mm	Max. bend angle 0 to BW in °
DN 32	Rp 11/4"	R 11/4"	220	75
DN 40	Rp 11/2"	R 11/2"	260	60
DN 50	Rp 2"	R 2"	300	50
DN 65	Rp 21/2"	R 21/2"	370	40

Table 2

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

7.2.11 Pressure reducer (accessories)

The use of a pressure reducer becomes necessary in the event of pressure fluctuations in the inlet pipe of more than 1 bar or if the supply pressure fluctuation is so high that the deactivation of the system is necessary or the total pressure (supply pressure and pump delivery head at the zero flow point - see characteristic curve) of the system 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 delivery head calculation of the pressure-boosting system. Provide inlet piping of approximately 600 mm when installing a pressure reducer on the supply pressure side.

7.3 Electrical connection

DANGER! Risk of fatal injury!
The electrical connection must be established in compliance with the local regulations (VDE regulations) by an electrician approved by the local energy supply company.

To establish the electrical connection, observe the corresponding installation and operating instructions and the attached electrical circuit diagrams for the pump or control device. Systems from the COR-1...GE -**HS** and SiBoost Smart 1...**HS** series with optionally integrated main switch are connected to the mains supply by means of the main switch. Please also observe the attached installation instructions for the main switch.
Points to be considered are listed in the following:

- The current type and voltage of the mains connection must comply with the specifications on the rating plate and circuit diagram of the pump and control device.

- The electrical connection cable should be adequately dimensioned in accordance with the overall power of the system (see installation and operating instructions and attached electrical circuit diagrams for the pump and control device).
- The external fuse protection should be provided in accordance with DIN 57100/ VDE0100 part 430 and part 523 (see installation and operating instructions and attached electrical circuit diagrams for the pump and control device).
- As a protective measure, the system should be earthed according to regulations (i.e. according to the local regulations and conditions); designated connections are identified (see also the circuit diagram).

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

- **For a pressure-boosting system fitted with a frequency converter, a universal-current-sensitive residual-current device with a trigger current of 300 mA should be installed.**
- **The protection class of the system and of the individual components can be found on the rating plates and/or data sheets.**
- **Further measures/settings etc. can be found in the installation and operating instructions as well as the circuit diagram for the pump and/or control device and/or main switch.**

8 Commissioning/shutdown

Recommendation: 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 central Wilo customer service department directly.

8.1 General preparations and control measures

- Check that all on-site wiring has been performed correctly, in particular the earthing, prior to the initial start-up.
- 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.

Caution! Risk of material damage!
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 pump), the pump and the suction line must be filled via the opening in the venting screw (use a funnel).
- If a diaphragm pressure vessel (optional or accessory) is installed, check that it is set to the correct supply pressure (see Fig. 3 and 4).
- To do so:
  - Depressurise the tank 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 dust cap) of the diaphragm pressure vessel with an air pressure gauge (C, Fig. 3). If necessary, correct the pressure if too low (PN 2 = pump cut-in pressure pmin less 0.2-0.5 bar or value given in the table) on the tank (see also Fig. 3) by adding nitrogen (contact Wilo customer service).
  - If the pressure is too high, release nitrogen from the valve until the required value is reached. Put the dust cap back on.
  - Close the drain valve on the flow-through fixture and open the flow-through fixture.
- In the event of system pressures > PN 16, observe the filling instructions according to the manufacturer's installation and operating instructions for the diaphragm pressure vessel.

DANGER! Risk of fatal injury!
Excessive supply pressure (nitrogen) in the diaphragm pressure vessel leads to damage or destruction of the tank and thereby also to personal injury.
Observe the safety measures for handling pressurised vessels and technical gases.
The pressure specifications in this documentation (Fig. 4) are given in bar(!). If other units of pressure measurement are used, convert the figures correctly!

- 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 (at least 1 bar).
- Check for proper installation of the correct dry-running protection (Section 7.2.4.).
- Position the float switch or electrodes for protection against low water level in the break tank to ensure the system is securely switched off at the minimum water level (Section 7.2.4).
- Check the motor protection switch in the control device (only if present!) to make sure that the correct rated current is set according to the specifications on the motor rating plates. Observe the installation and operating instructions for the control device.
- The pumps may run only briefly against the closed gate valve on the pressure side.
- Check and set the required operating parameters on the frequency converter of the pump and control device according to the attached installation and operating instructions.

8.2 Protection against low water level

The values for shutting down the system when the pressure falls below 1.0 bar and for restarting it when the pressure exceeds 1.3 bar are set at the factory. This applies to the pressure switch of the low-water protection device (WMS) and also to the pressure control for systems with a second pressure sensor on the suction side.
COR/T-1 series systems are shut down due to low water when the water level falls below the lower switching point of the low-water signal transmitter (Fig. 1e, 52 level B). The system is restarted once the water level reaches the upper switching point of the low-water signal transmitter (Fig. 1e, 52 level A) and once a minimum supply pressure of 0.3 bar on the pressure sensor on the suction side has been reached!
These settings are not intended to be changed.

8.3 Commissioning the system

Once all preparations have been made and all control measures taken in accordance with Section 8.1:

- for COR-1...GE-HS and SiBoost Smart 1...HS systems, activate the system with an optional main switch.
- for systems with an additional control device, activate the system with the main switch on the control device and set the control to automatic mode.
- for COR-1...GE type systems (without factory main switch), activate the system with a separate main switch to be provided by the customer.

The pressure control system switches on the pump until the consumer piping is filled with water and the set pressure has built up. If the pressure no longer changes (no consumer requirement within a preset time), the control system switches off the pump. Refer to the installation and operating instructions for the pump and control device for a precise description.

Warning! Health hazard!
Flush the system thoroughly at this point at the latest. (See Section 7.2.3)

8.4 Shutting down the system

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

- Switch off the voltage supply and secure against unauthorised reactivation.
- Close the shut-off valve upstream and downstream of the system.
- Shut off the diaphragm pressure vessel at the throughflow fitting and drain it.
- Drain the system completely if necessary.

9 Maintenance

To guarantee maximum operational reliability at the lowest possible operating costs, we recommend that the system is checked and maintained regularly (see DIN 1988 standard). It is advisable to enter into a maintenance contract with a specialist company or with the central 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 seal of the pump. For the purpose of lubrication, the mechanical seal requires water, which can also leak out slightly from the gasket. If this is noticeable, replace the mechanical seal.
- Inspection of the diaphragm pressure vessel (every 3 months is recommended) to make sure the correct supply pressure is set (Fig. 3 and Fig. 4).

Caution! Risk of material damage!
If the supply pressure is incorrect, the function of the diaphragm pressure vessel is not guaranteed, leading to increased wear of the diaphragm and system faults.

- Depressurise the tank 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 diaphragm pressure vessel valve (top; remove dust cap) with an air pressure gauge (C, Fig. 3).
- If necessary, correct the pressure by adding nitrogen. (PN 2 = pump cut-in pressure pmin minus 0.2-0.5 bar or value given in the table on the tank (Fig. 4) – Wilo customer service).
- If the pressure is too high, release nitrogen from the valve.

DANGER! Risk of fatal injury!
Excessive supply pressure (nitrogen) in the diaphragm pressure vessel leads to damage or destruction of the tank and thereby also to personal injury.
Observe the safety measures for handling pressurised vessels and technical gases.
The pressure specifications in this documentation (Fig. 4) are given in bar(!). If other units of pressure measurement are used, convert the figures correctly!

- In the case of systems with a frequency converter, the inlet and outlet filter of the fan must be cleaned if they are very dirty.
If the system is shut down for a prolonged period, proceed as described in 8.4 and drain the pump by opening the drain plug at the pump support foot. (Observe the corresponding section in the attached installation and operating instructions for the pump).

10 Faults, causes and remedies

Faults, particularly those affecting the pumps or the control system, may only be remedied by Wilo's customer service or a specialist company.

NOTICE!
The general safety instructions must be observed during any maintenance or repair work! Observe the installation and operating instructions for the pump and control device, in particular for the display of error messages!

The faults specified here are general faults. If errors are displayed on the display of the frequency converter or control device, observe the installation and operating instructions for these devices.

Fault	Cause	Remedy
Pump does not start	No mains voltage	Check the fuses, cables and connections
	Main switch "OFF"	Activate the main switch
	Water level in break tank too low, i.e. low-water level reached	Check the break tank's inlet valve/ supply line
	Low-water level switch has triggered	Check the inlet pressure
	Low-water level switch or pressure sensor on the inlet side defective	Check and, if necessary, replace the low-water level switch or pressure sensor
	Electrodes connected incorrectly or supply pressure switch set incorrectly	Check installation and setting and correct as required
	Inlet pressure is above start-up pressure	Check the default values and correct them if necessary
	Shut-off device closed at pressure sensor/pressure switch	Check, open shut-off valve
	Start-up pressure set too high	Check the setting and correct it if necessary
	Fuse defective	Check fuses and replace 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. Also check the motor for defects and replace 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 does not shut down	Major fluctuations of the inlet pressure	Check the inlet pressure and take measures to stabilise the supply pressure if necessary (e.g. pressure reducers)
	Inlet pipe clogged or shut off	Check the inlet pipe and, if necessary, remove the clogging or open the shut-off valve
	Nominal diameter of the inlet pipe too small	Check the inlet pipe and increase the cross-section of the inlet pipe if necessary
	Inlet pipe installed incorrectly	Check the inlet pipe and change the pipe routing if necessary
	Air in the inlet	Check and, if necessary, seal the piping and vent the 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, fully open the shut-off valve
	Flow rate too high	Check the pump data and default values and correct if necessary
	Shut-off device closed at pressure sensor	Check, open shut-off valve
	Switch-off pressure set too high	Check the setting and correct it if necessary
	Incorrect direction of rotation of the motor	Check the direction of rotation and repair or replace the frequency converter module if necessary

Fault	Cause	Remedy
Switching frequency too high or fluttering	Major fluctuations of the inlet pressure	Check the inlet pressure and take measures to stabilise the supply pressure if necessary (e.g. pressure reducers)
	Inlet pipe clogged or shut off	Check the inlet pipe and, if necessary, remove the clogging or open the shut-off valve
	Nominal diameter of the inlet pipe too small	Check the inlet pipe and increase the cross-section of the inlet pipe if necessary
	Inlet pipe installed incorrectly	Check the inlet pipe and change the pipe routing if necessary
	Shut-off device closed at pressure sensor	Check, open shut-off valve
	Incorrect supply pressure at diaphragm pressure vessel	Check the supply pressure and correct it if necessary
	Valve at diaphragm pressure vessel closed	Check the valve and open it if necessary
	Switching difference set too low	Check the setting and correct it if necessary
Pump is not stable and/or making unusual noises	Major fluctuations of the inlet pressure	Check the inlet pressure and take measures to stabilise the supply pressure if necessary (e.g. pressure reducers)
	Inlet pipe clogged or shut off	Check the inlet pipe and, if necessary, remove the clogging or open the shut-off valve
	Nominal diameter of the inlet pipe too small	Check the inlet pipe and increase the cross-section of the inlet pipe if necessary
	Inlet pipe installed incorrectly	Check the inlet pipe and change the pipe routing if necessary
	Air in the inlet	Check and, if necessary, seal the piping and vent the 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 repair or replace the frequency converter module if necessary
	Mains voltage: A phase is missing	Check the fuses, cables and connections
	Pump not adequately secured 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, fully open the shut-off valve
	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 sensor	Check, open shut-off valve
	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

Fault	Cause	Remedy
	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 generates no or insufficient power	Major fluctuations of the inlet pressure	Check the inlet pressure and take measures to stabilise the supply pressure if necessary (e.g. pressure reducers)
	Inlet pipe clogged or shut off	Check the inlet pipe and, if necessary, remove the clogging or open the shut-off valve
	Nominal diameter of the inlet pipe too small	Check the inlet pipe and increase the cross-section of the inlet pipe if necessary
	Inlet pipe installed incorrectly	Check the inlet pipe and change the pipe routing if necessary
	Air in the inlet	Check and, if necessary, seal the piping and vent the pumps
	Impellers clogged	Check the pump and replace it or have it repaired if necessary
	Non-return valve leaking	Check and replace the seal or non-return valve if necessary
	Non-return valve clogged	Check and remove the clogging or replace the non-return valve if necessary
	Gate valve in the system closed or not sufficiently open	Check, fully open the shut-off valve
	Low-water level switch has triggered	Check the inlet pressure
Pump generates no or insufficient power	Incorrect direction of rotation of the motor	Check the direction of rotation and repair or replace the frequency converter module 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 installation and setting and correct as required
	Low-water level switch or pressure sensor on the inlet side defective	Check and, if necessary, replace the low-water level switch or pressure sensor
Dry-running protection does not switch off in spite of low water	Electrodes connected incorrectly or supply pressure switch set incorrectly	Check installation and setting and correct as required
	Low-water level switch or pressure sensor on the inlet side defective	Check and, if necessary, replace the low-water level switch or pressure sensor

Additional fault table for the pump in p-v mode (see the pump installation and operating instructions for further information)

Error code	Ramp time before error message	Time before processing the error after message	Wait time before automatic reactivation	Max. errors within 24 hours	Fault Possible causes	Remedy	Wait time before reset
E043	~ 5 s	0 s	unlimited	1	The sensor cable IN2 is open-circuit	Check that the power supply and wiring of the sensor are correct	60 s
E062	~ 10 s	0 s	0 s, if malfunction is suppressed	unlimited	Pressure on the suction side too low	Check the supply pressure/pressure on the suction side and setting of the limit value for the low-water cut-out switchgear on the inlet/suction side (Ps)	0 s
					Limit value for restarting the pump (Pr) too close to the limit value for the low-water cut-out switchgear on the inlet/suction side (Ps)	Check Pr - Ps > 0.3 bar	0 s

NOTICE!
You can 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 company or your nearest Wilo customer service or representative.

11 Spare parts

Spare parts or repairs may be ordered from local installers and/or Wilo customer service.
To avoid queries and order errors, please provide all data on the rating plate with every order.

12 Disposal

12.1 Oils and lubricants

Coolant/lubricants must be collected in suitable tanks and disposed of in accordance with the locally applicable guidelines.

12.2 Water-glycol mixture

The coolant/lubricant complies with water-polluting 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 of 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 risks to personal health.

NOTICE
Disposal in domestic waste is forbidden!
In the European Union, this symbol can appear 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:

- Only hand over these products at designated, certified collecting points.
- 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. Further recycling information can be found at www.wilo-recycling.com.

12.5 Batteries/rechargeable batteries

Batteries and rechargeable batteries do not belong in domestic waste and must be removed before the product is disposed of. 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 dealers.

NOTICE

Disposal in domestic waste is forbidden!

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

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

Subject to technical modifications without prior notice!

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