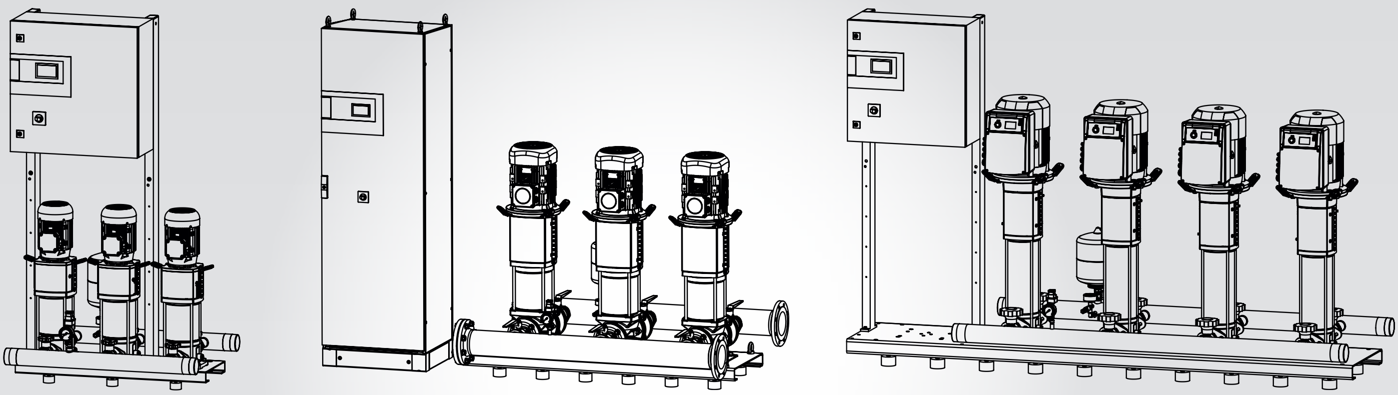
Pioneering for You

Wilo-Comfort-CO(R) .. MVI .../ .. MVIS ...
Wilo-Comfort-CO(R) .. Helix V ... / .. Helix VE ...



en Installation and operating instructions

2535456-Ed.02 / 2021-09-Wilo

Fig. 1a:

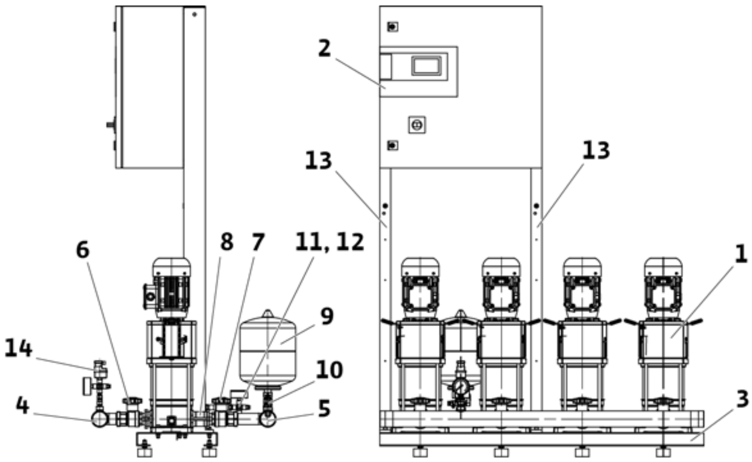
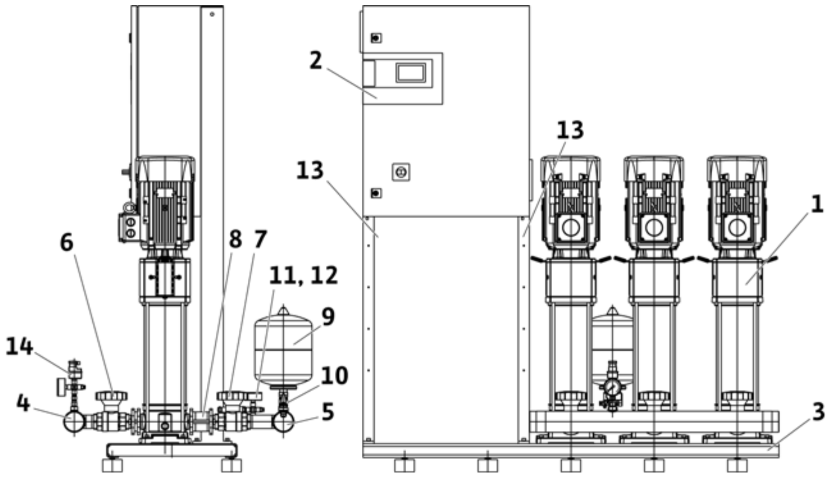


Fig. 1b:



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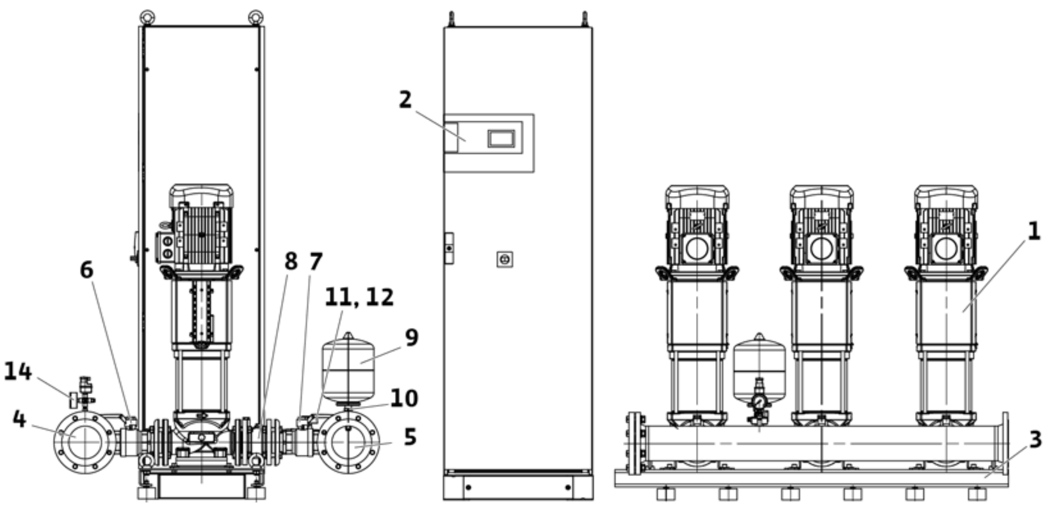


Fig. 1d:

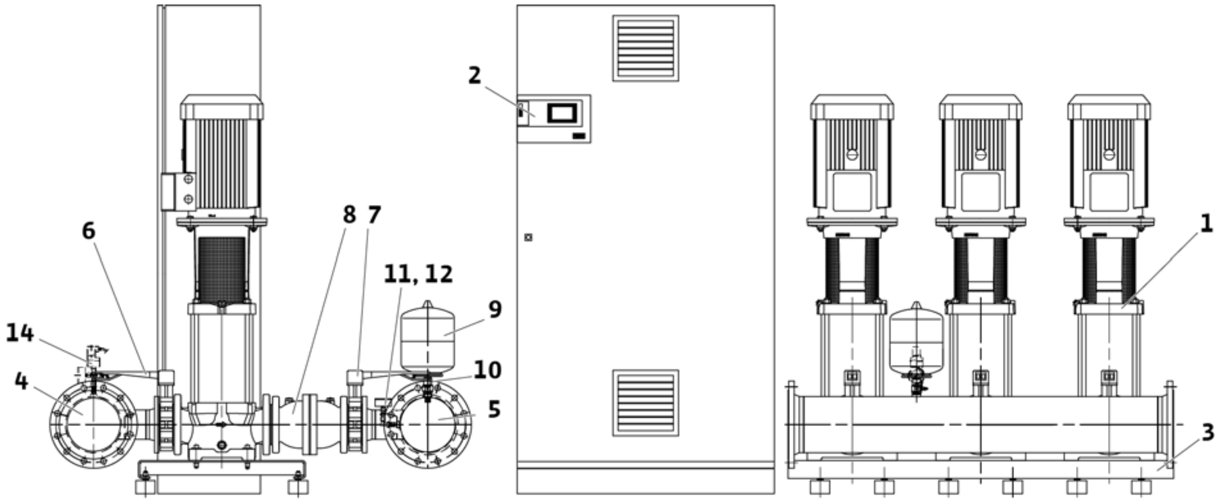


Fig. 1e:

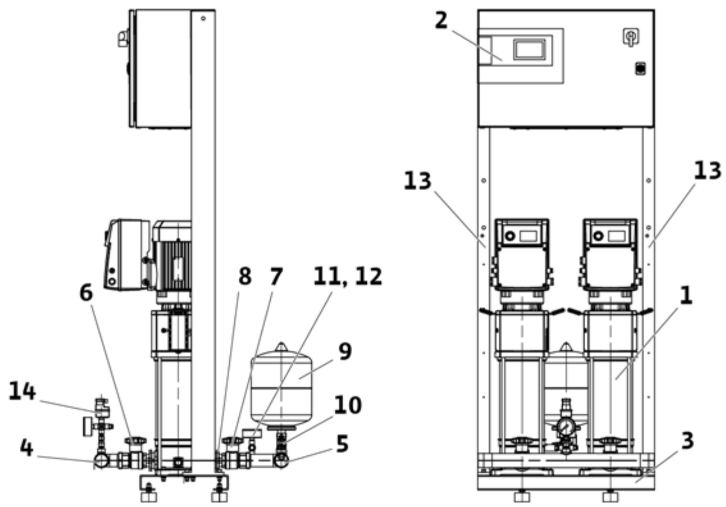


Fig. 1f:

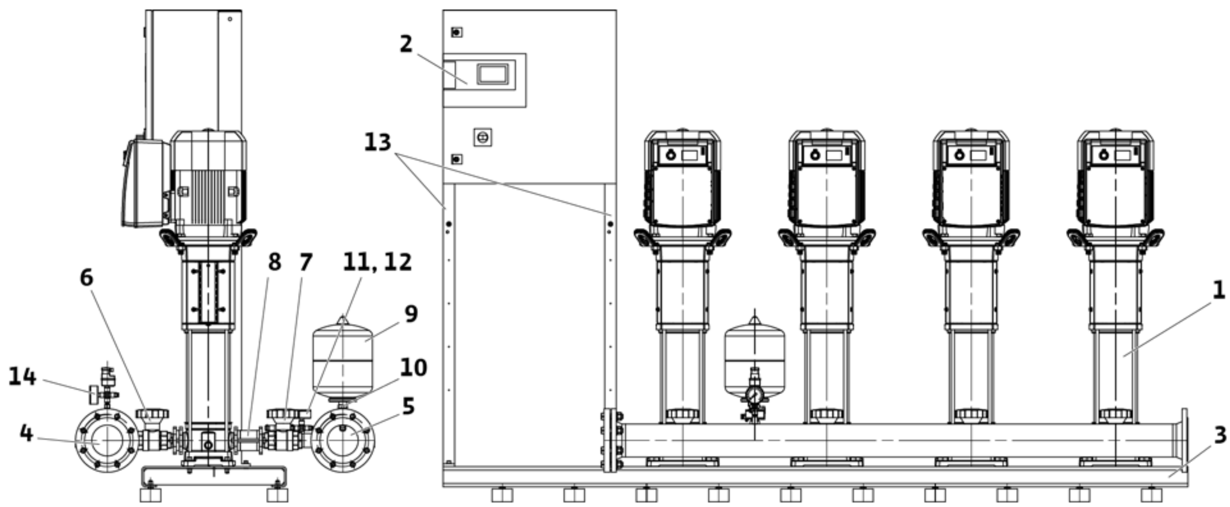
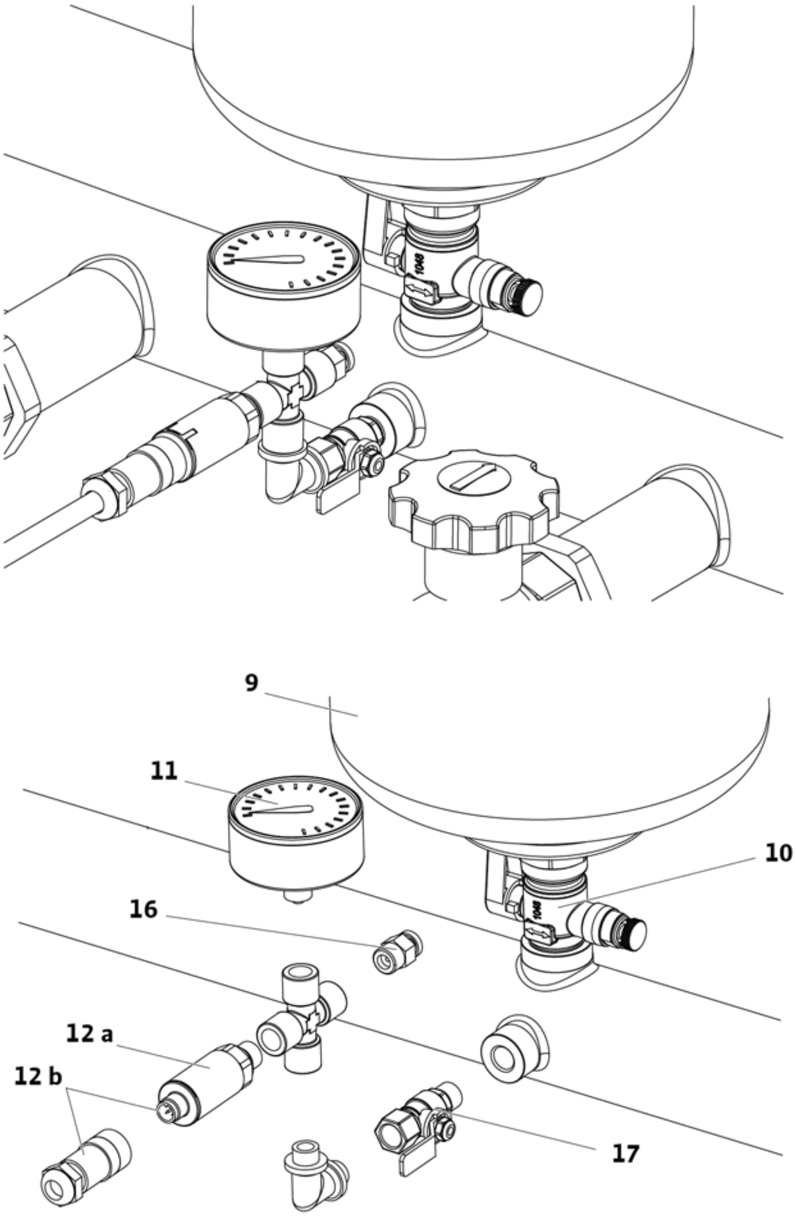
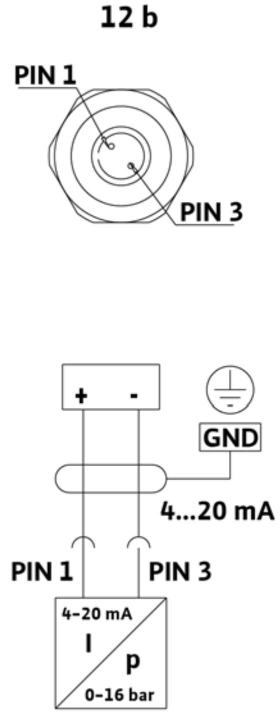


Fig. 2:



9
11
10
16
12 a
12 b
17



12 b
PIN 1
PIN 3
+
-
GND
4...20 mA
PIN 1
PIN 3
4-20 mA
I
p
0-16 bar

Fig. 3:

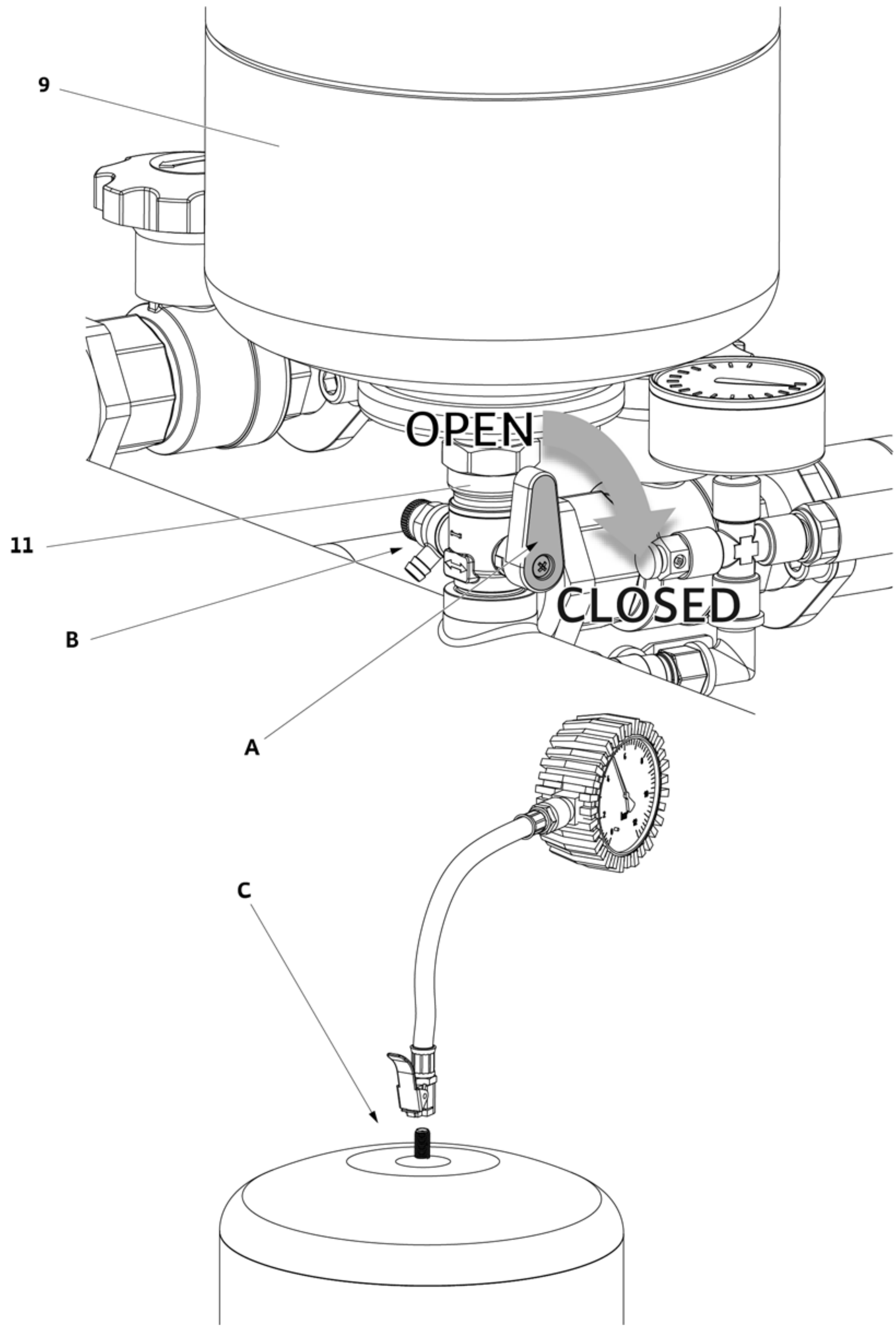


Fig. 4:

a b c d e

Hinweis / advice / attention /atención

a *Stickstoffdruck entsprechend der Tabelle / Nitrogen pressure according to the table*
Pression d'azote conformément au tableau / Presión del nitrógeno según la tabla

b **PE [bar]** Einschaltdruck / starting pressure / Pression de démarrage / Comenzar la presión

c **PN_2 [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
PN_2	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
PN_2	7,5	8	8,5	9	9,5	10	10,5	11	11,5	12	12,5	13

1bar =100000Pa = 0.1MPa = 0.1N/mm² =10200kp/m² =1.02kp/cm²(at) = 0.987atm =750Torr =10.2mWs

d Stickstoffmessung ohne Wasser / Nitrogen measurement without water /
Mesure d'azote hors eau / Medida del nitrógeno sin el agua

e **Achtung: Nur Stickstoff einfüllen / Note: Only fill in nitrogen /**
Nota: Remplir Seulement à l'azote / Nota: Completar solamente el nitrógeno

Fig. 5a:

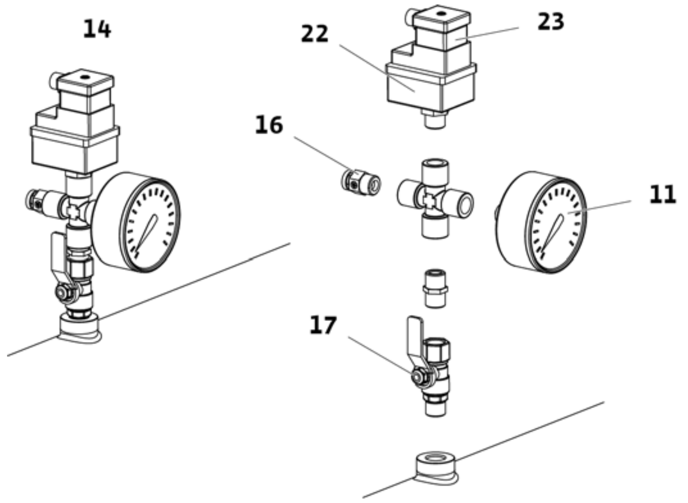


Fig. 5b:

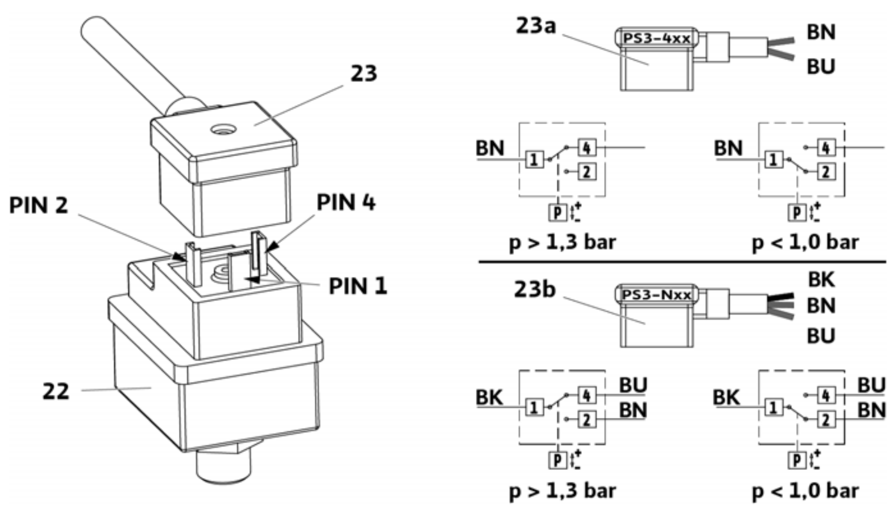


Fig. 5c:

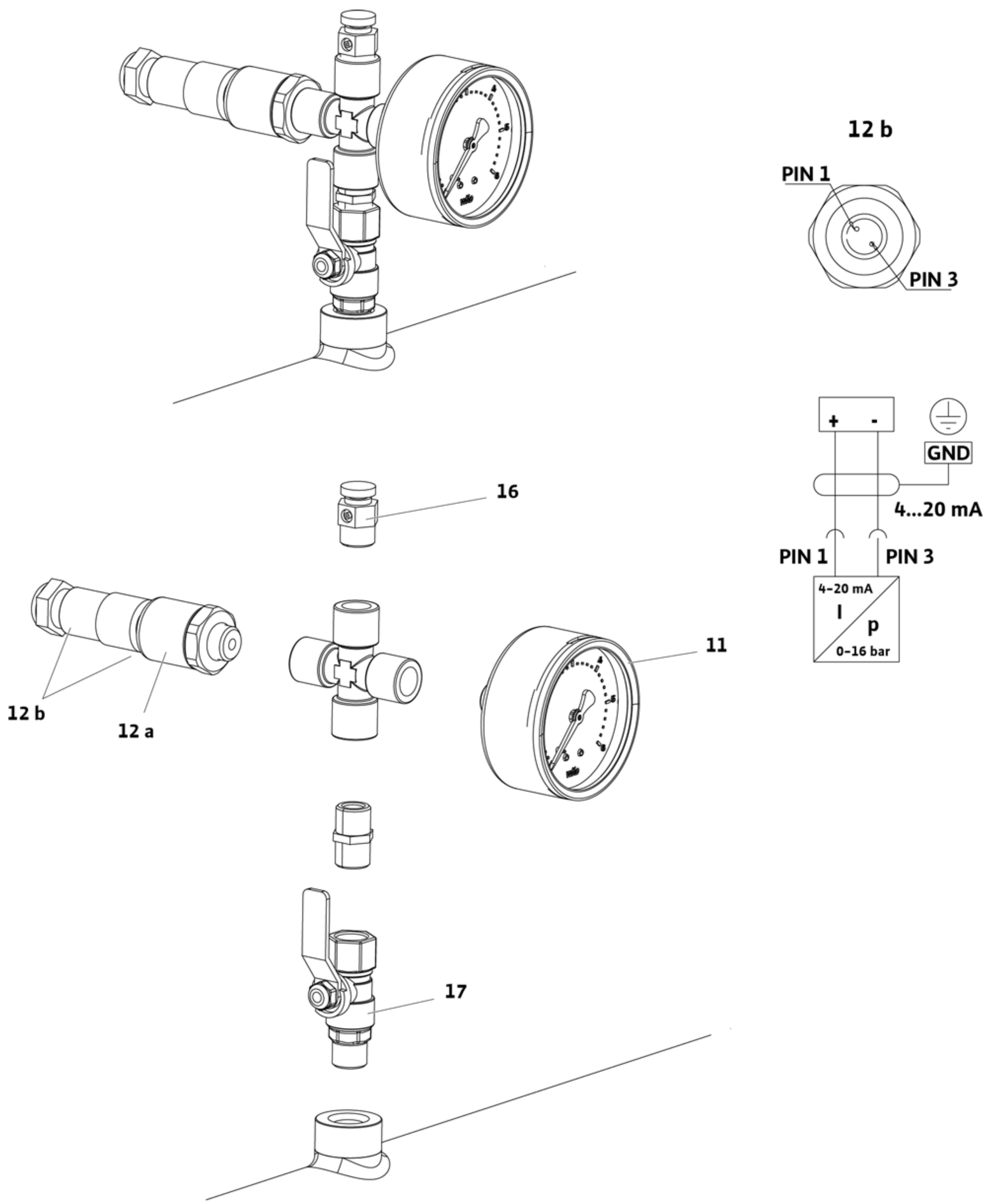

12 b
PIN 1
PIN 3
+
-
GND
4...20 mA
PIN 1
PIN 3
4–20 mA
I
p
0–16 bar
16
12 b
12 a
11
17

Fig. 6:

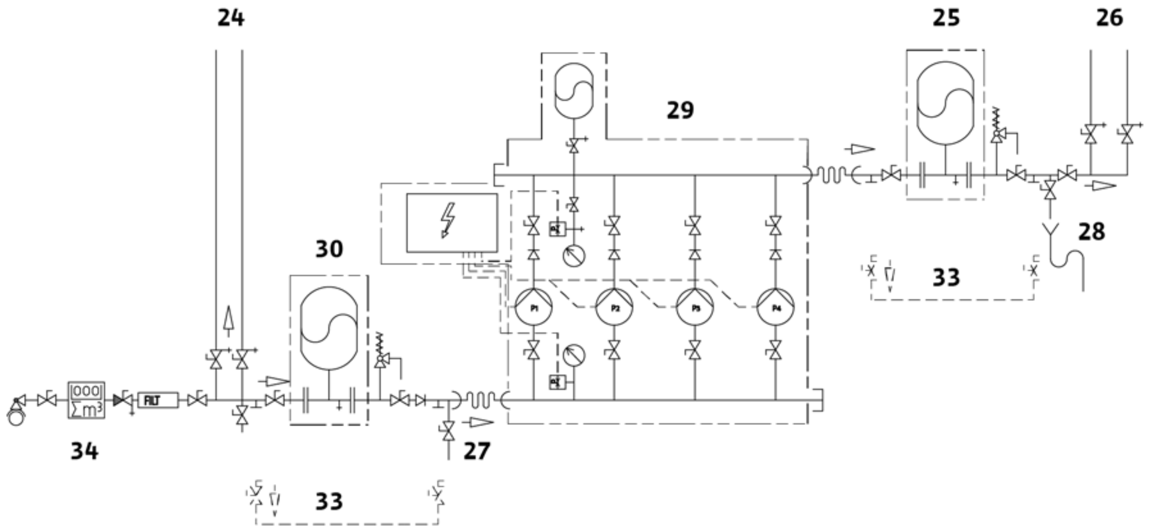

24
25
26
29
30
28
33
34
27
33
FILT
P1
P2
P3
P4

Fig. 7:

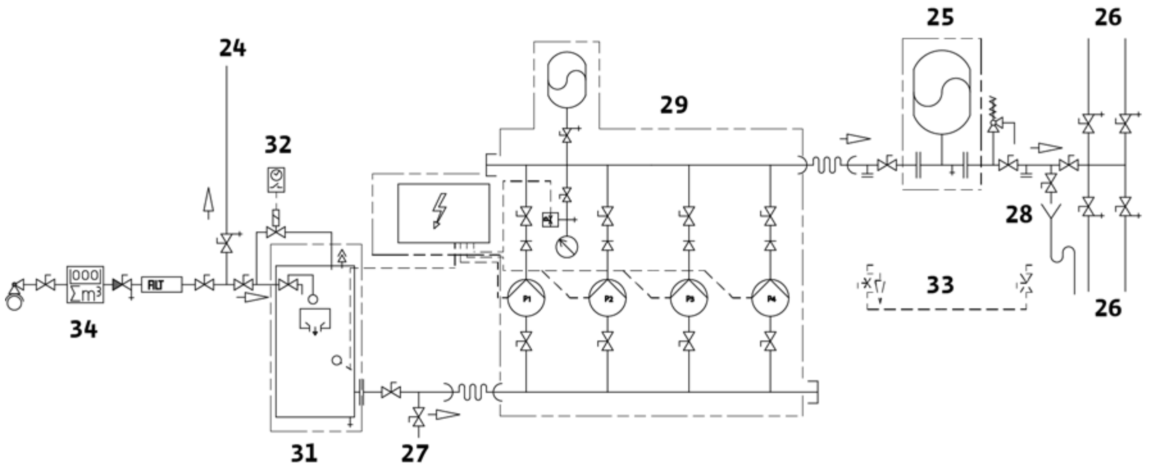

24
32
29
25
26
28
33
26
34
31
27
FILT
P1
P2
P3
P4

Fig. 8:

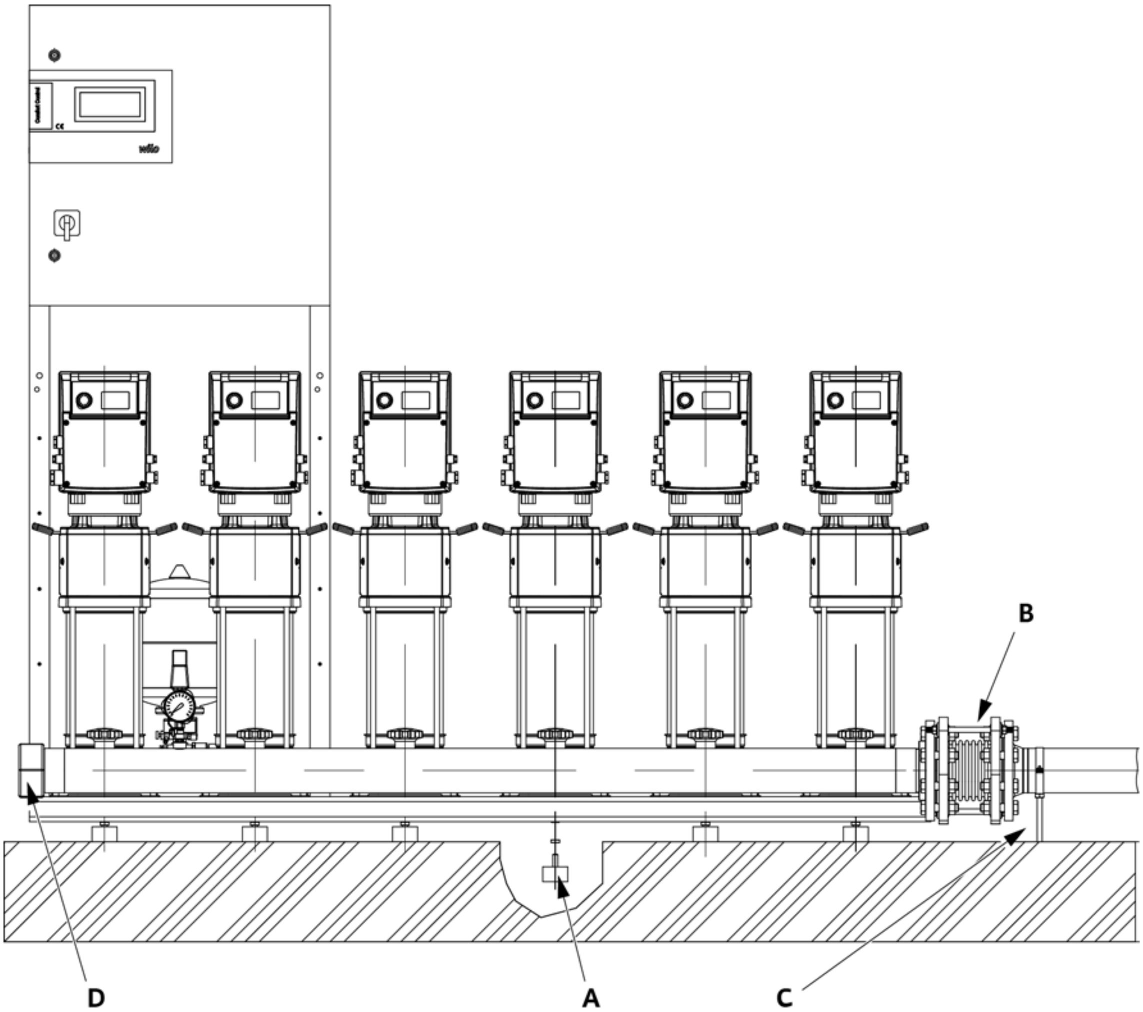


Fig. 9:

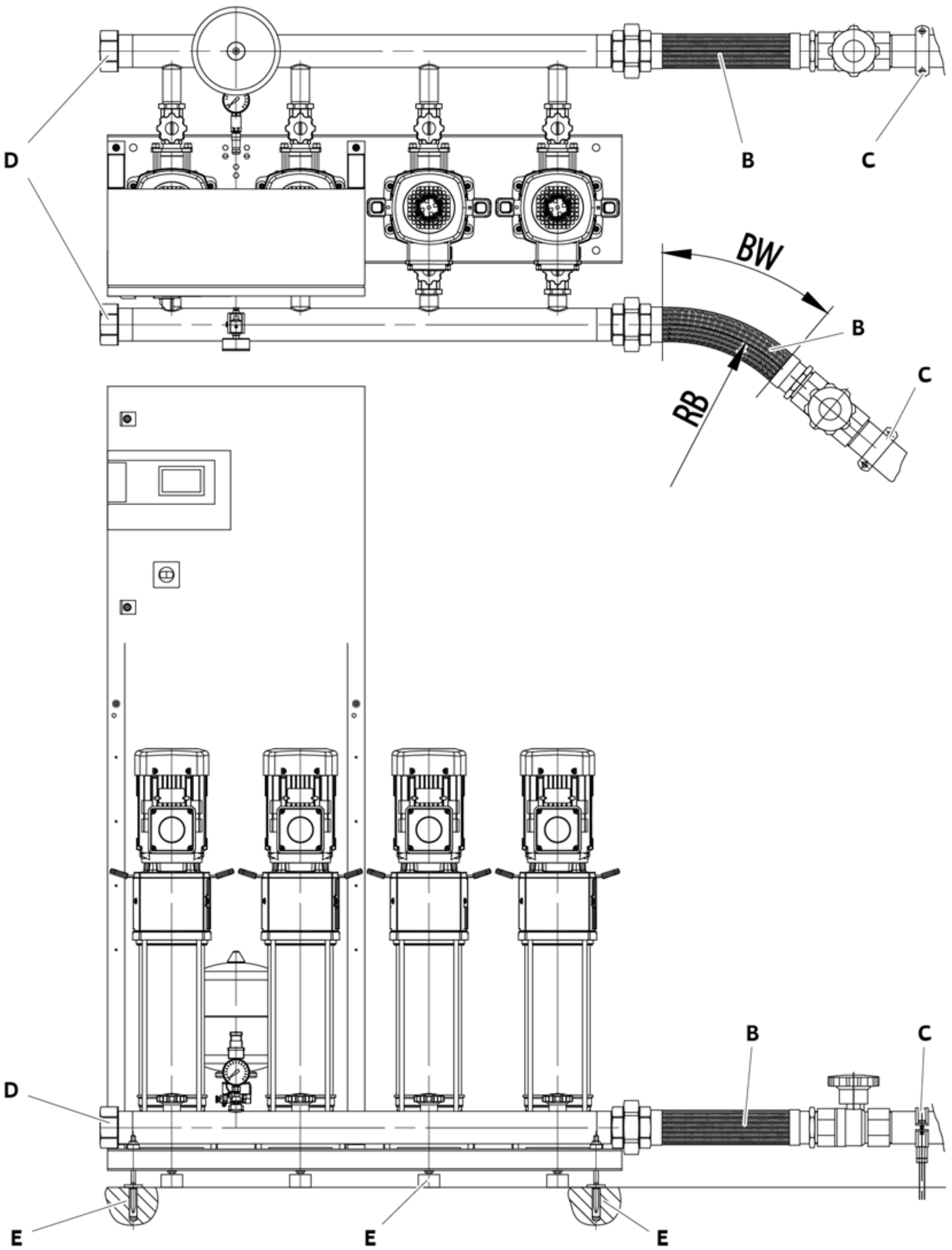


Fig. 10a:

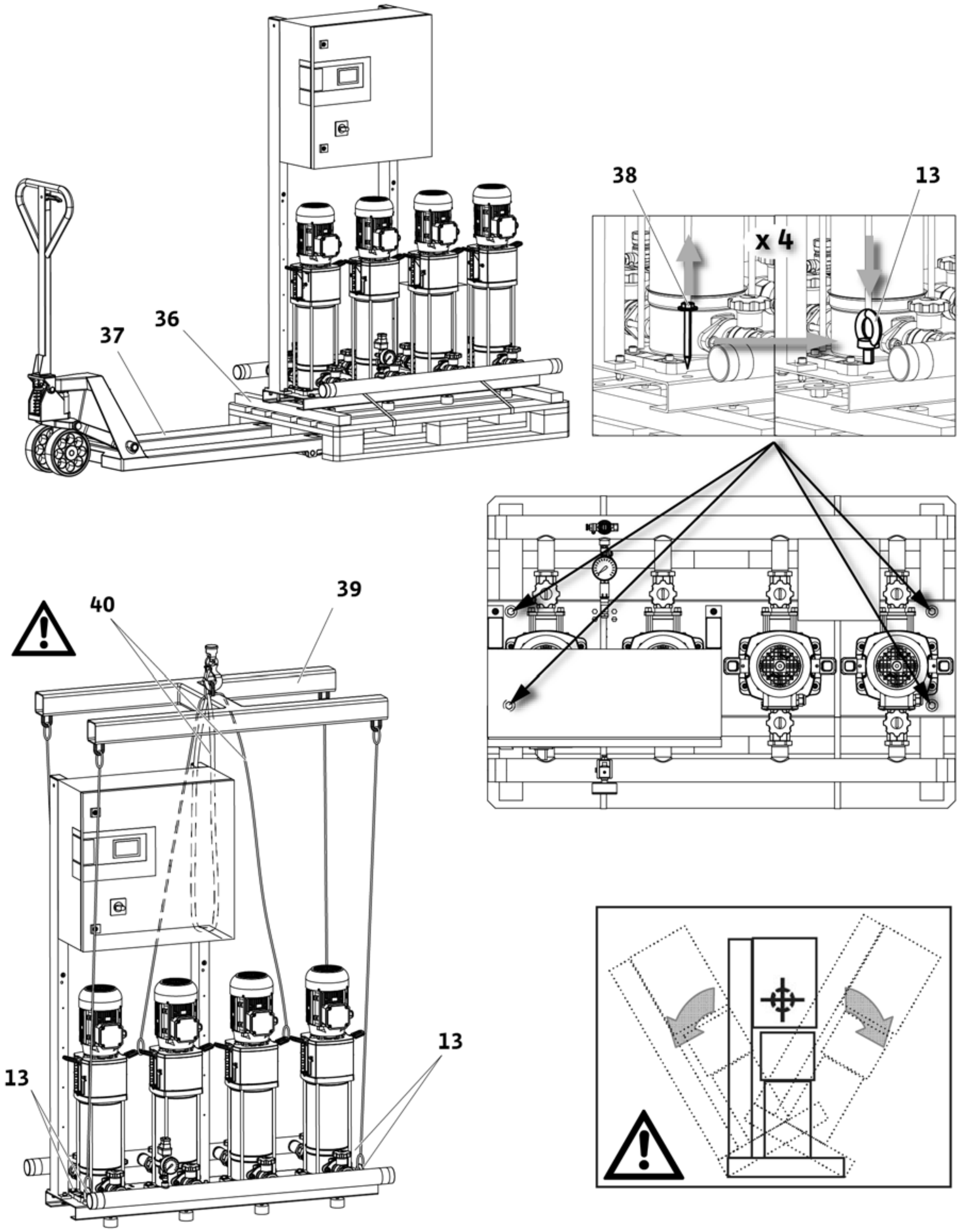


Fig. 10b:

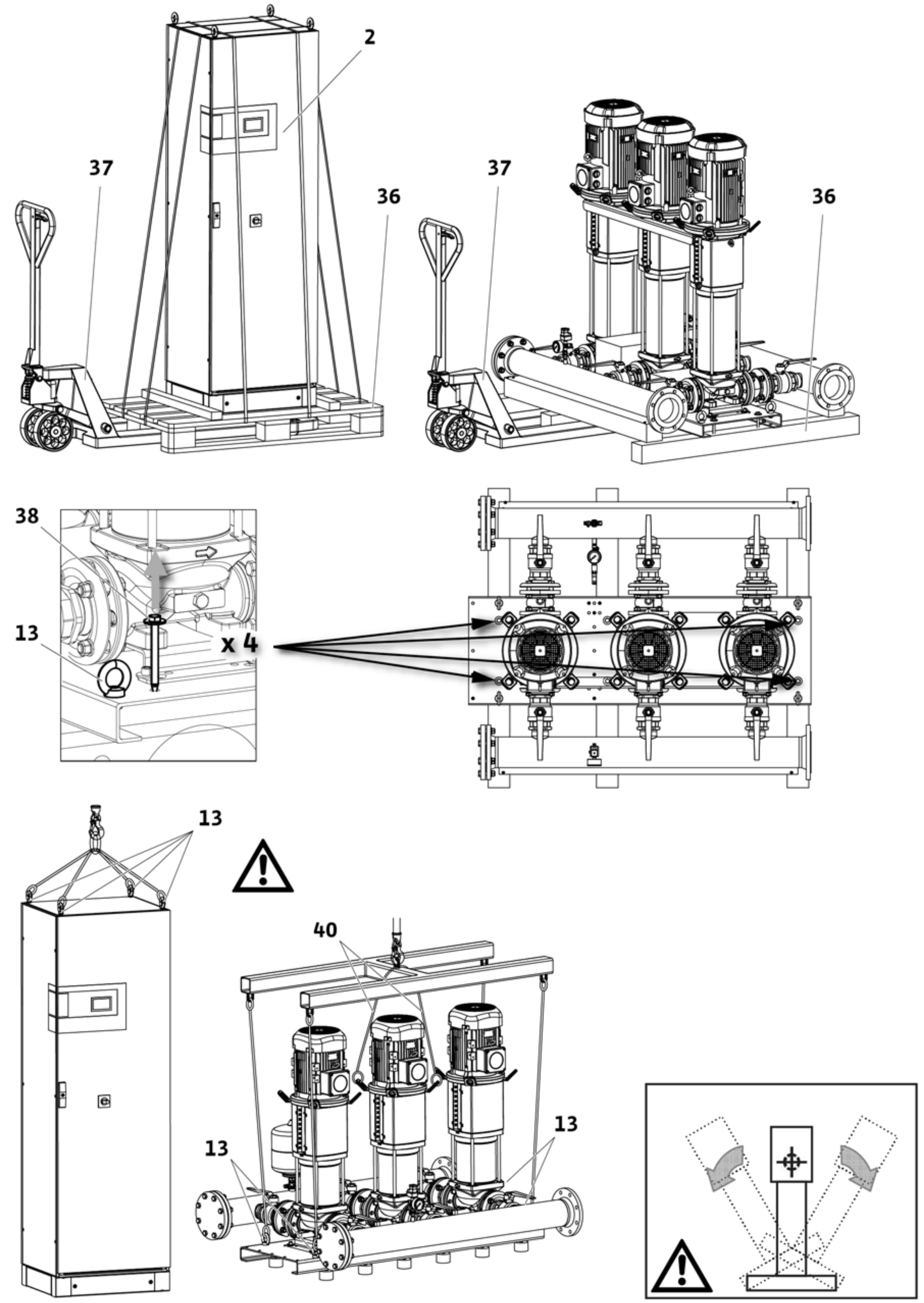


Fig. 11:

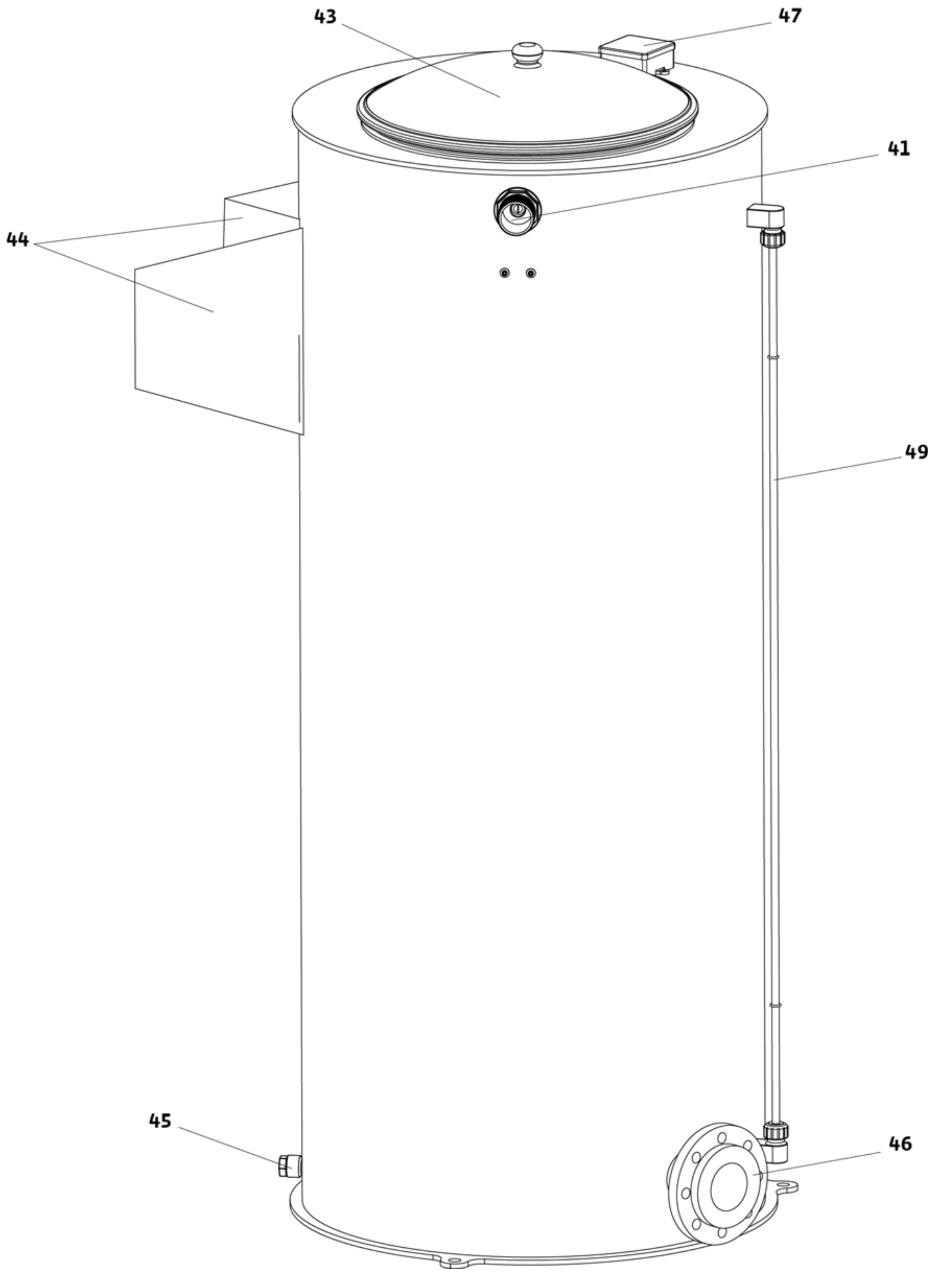
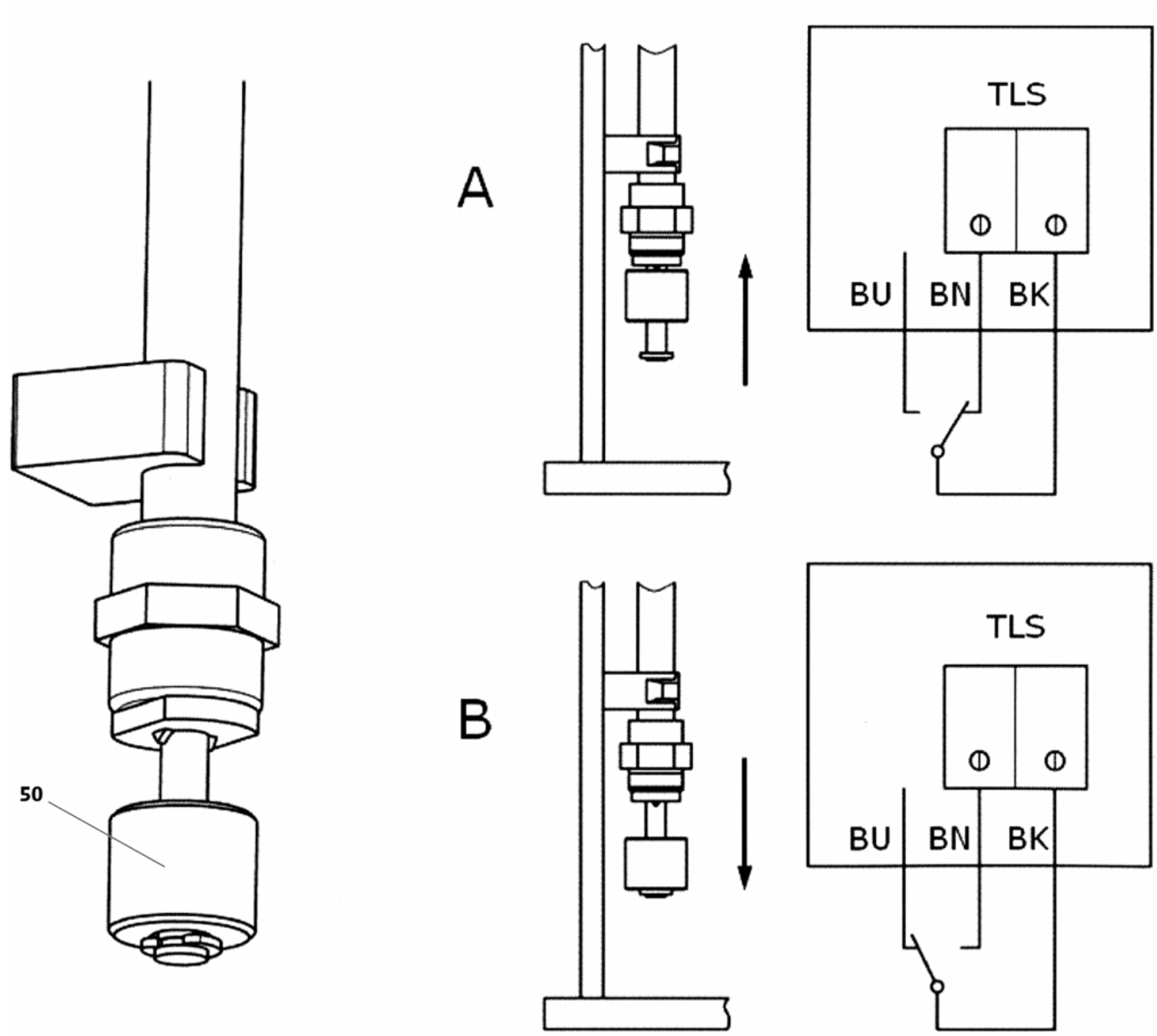


Fig. 12:



Captions

Fig. 1a	Example, pressure boosting system, control device above the pumps “CO(R)-4 HELIX V.../CC”
Fig. 1b	**Example, pressure boosting system, control device next to the pumps “CO(R)-3 HELIX V.../CC”**
Fig. 1c	**Example, pressure boosting system, control device in separate free-standing cabinet (BM) “CO(R)-3 HELIX V.../CC”**
Fig. 1d	**Example, pressure boosting system, control device in separate free-standing cabinet (BM) “CO(R)-3MVI70.../CC”**
Fig. 1e	**Example, pressure boosting system, control device above the pumps “COR-2HELIX VE...CCe”**
Fig. 1f	**Example, pressure boosting system, control device next to the pumps “COR-4HELIX VE...CCe”**
1	Pumps
2	Control device
3	Base frame
4	Inlet collecting pipe
5	Pressure collecting pipe
6	Shut-off device on the intake side
7	Shut-off device on the pressure side
8	Non-return valve
9	Diaphragm pressure vessel, 8 litres
10	Throughflow fitting
11	Pressure gauge
12	Pressure sensor
13	Mounting bracket for fixation of the control device
14	Low-water cut-out switchgear (WMS), optional

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

Fig. 3	Throughflow fitting operation/pressure testing the diaphragm pressure vessel
9	Diaphragm pressure vessel
10	Throughflow fitting
A	Opening/closing
B	Draining
C	Checking the supply pressure

Fig. 4	Information table: nitrogen pressure, diaphragm pressure vessel (example) (supplied as a sticker!)
a	Nitrogen pressure according to the table
b	Start-up pressure, base-load pump, in bar **PE**
c	Nitrogen pressure in bar **PN 2**
d	Notice: Nitrogen measurement without water
e	Notice: Attention! Introduce nitrogen only

Fig. 5a	Protection against low water level (WMS) kit
11	Pressure gauge
14	Low-water cut-out switchgear (WMS), optional
16	Draining/venting
17	Stop valve
22	Pressure switch
23	Plug connector

Fig. 5b	Protection against low water level (WMS) kit, pin assignment and electrical connection
22	Pressure switch (type PS3)
23	Plug connector
23a	Plug connector type PS3-4xx (2-core) (normally closed contact)
23b	Plug connector type PS3-Nxx (3-core) (changeover contact)
	Core colours
BN	BROWN
BU	BLUE
BK	BLACK

Fig. 5c	Kit for pressure sensor on the inlet side (COR – CC-FC and CCe)
11	Pressure gauge
12a	Pressure sensor
12b	Pressure sensor (plug), electrical connection, PIN assignment
16	Draining/venting
17	Stop valve

Fig. 6 Fig. 7	Example of a direct connection (hydraulic diagram) Example of an indirect connection (hydraulic diagram)
24	Consumer connections upstream of the pressure boosting system
25	Diaphragm pressure vessel on the discharge side
26	Consumer connections downstream from the pressure boosting system
27	Infeed connection for system flushing (nominal diameter = pump connection)
28	Drainage connection for system flushing (nominal diameter = pump connection)
29	Pressure boosting system (here with 4 pumps)
30	Diaphragm pressure vessel on the inlet side
31	Unpressurised break tank on the inlet side
32	Flushing apparatus for inlet connection of the break tank
33	Bypass for inspection/maintenance (not permanently installed)
34	Building connection to the water supply mains

Fig. 8	Installation example: vibration absorber and compensator
A	Vibration absorber (screw it into the threaded inserts provided and secure it with counter nuts)
B	Compensator with extension limiters (accessory)
C	Fixing the pipes downstream from the pressure boosting system, e.g. with pipe clamp (provided by the customer)
D	Threaded caps (accessory)

Fig. 9	Installation example: Flexible connection pipes and fixing to the floor
A	Vibration absorber (screw it into the threaded inserts provided and secure it with counter nuts)
B	Flexible connection pipe (accessory)
BW	Bend angle
RB	Bend radius
C	Fixing the pipes downstream from the pressure boosting system, e.g. with pipe clamp (provided by the customer)
D	Threaded caps (accessory)
E	Floor fixation with structure-borne noise insulation (provided by the customer)

Fig. 10a Fig. 10b	Transport instructions, compact unit Transport instructions, separate control device (switch cabinet)
2	Control device
13	Eye bolts for attachment of lifting gear
36	Transport pallet/transport frame (example)
37	Transport equipment – (example – pallet truck)
38	Transport securing (screws)
39	Lifting device (example – load bar)
40	Protection against overturning (example)

Fig. 11	Break tank (accessory - example)
41	Inlet (with float valve (accessory))
42	Ventilation/exhaust with insect barrier
43	Inspection opening
44	Overflow Ensure adequate drainage. Protect siphon or valve against ingress of insects. No direct connection to the sewer system (free drainage according to EN 1717)
45	Draining
46	Extraction (connection for pressure boosting system)
47	Terminal box for low-water signal transmitter
48	Connection for flushing apparatus inlet
49	Level display

Fig. 12	Low-water signal transmitter (float switch) with connection diagram
50	Low-water signal transmitter/float switch
A	Tank full, contact closed (no low water)
B	Tank empty, contact open (low water)
	Core colours
BN	BROWN
BU	BLUE
BK	BLACK

1 General information

About this document

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

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

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

2 Safety

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

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

2.1 Symbols and signal words in the operating instructions

Symbols:

General danger symbol

Danger due to electrical voltage

USEFUL INFORMATION

Signal words:

DANGER!

Acutely dangerous situation.

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

WARNING!

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

CAUTION!

There is a risk of damaging the pump/unit. “Caution” implies that damage to the product is 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:

- rotation/direction of flow symbol,
- identifiers for connections,
- rating plate, and
- warning sticker

must be strictly complied with and kept in a fully legible condition.

2.2 Personnel qualifications

The installation, operating and maintenance personnel must have the appropriate qualifications for this work. Area of responsibility, terms of reference and monitoring of the personnel are to be ensured by the operator. If the personnel are not in possession of the necessary knowledge, they 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 the risk of injury to persons and damage to the environment and the product/unit. Non-observance of the safety instructions leads to loss of any claims to damages.

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/unit functions, and
- failure of required maintenance and repair procedures.

2.4 Safety consciousness on the job

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

2.5 Safety instructions for the operator

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or who lack experience and knowledge, unless they have been given supervision or instruction 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/unit lead to hazards, measures must be taken 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 led away so that no danger to persons or to the environment arises. National statutory provisions must be observed.
- Highly flammable materials should always be kept a safe distance from the product.
- Danger from electrical current must be eliminated. 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/unit must only be carried out when it is at a standstill. It is mandatory that the procedure described in the installation and operating instructions for shutting down the product/unit is observed.
Immediately upon completing work, all safety and protective devices must be put back in position and/or recommissioned.

2.7 Unauthorised modification and manufacture of spare parts

Unauthorised modification and manufacture of spare parts will impair the safety of the product/personnel and make 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 for its intended use (see Section 4 of the installation and operating instructions). The limit values must on no account fall below or exceed those values specified in the catalogue/data sheet.

3 Transport and temporary storage

The pressure-boosting system is foil-wrapped to protect it against moisture and dust. Transport and storage instructions applied to the packaging must be observed.
Transport methods:

- on one or more pallets,
- in a wooden transport frame (see, for example, Fig. 10a, 10b),
- on transport boards, or
- in a crate.

DANGER! Risk of injury!
Use approved lifting gear to transport the unit (Fig. 10a and 10b). Ensure the stability of the load since, with this particular pump design, the centre of gravity is shifted to the top (top-heavy). Connect transport slings or ropes to the transport eyes provided (see Fig. 10a and 10b – Position 13) or around the base frame. The pipes are not suitable to withstand loads and should not be used to secure loads in transit.

CAUTION! Risk of damage!
Subjecting the pipes to loads when in transit can result in leakages!

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

CAUTION! Risk of detriment or damage!
The system must be protected by suitable measures against moisture, frost and heat and also mechanical damage!
When receiving and unpacking the pressure boosting system and the supplied accessories, first check the packaging for damage.
If damage is found which may have been caused by the system having fallen or similar impacts:

- check the pressure boosting system and accessories for possible damage, and
- inform the delivery company (forwarding agent) or our 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 Setup/installation).

4 Intended use

Wilo pressure boosting systems in the Comfort series are designed for pressure boosting and maintaining pressure in water supply systems.
They are used in:

- Drinking water supply systems (does not apply to CO(R)-MVI.../CC), primarily in high-rise apartments, hospitals, offices and industrial buildings, the structure, function and requirements of which comply with the following standards, guidelines and directives:
  - DIN 1988 (for Germany)
  - DIN 2000 (for Germany)
  - EU Directive 98/83/EC
  - Drinking Water Ordinance – TrinkwV2001 (for Germany)
  - DVGW guidelines (for Germany),
- industrial water supply and cooling systems,
- fire extinguishing water supply systems for local use, and
- irrigation and sprinkling installations.

Make sure that the fluid to be pumped in the system 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.
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 are sealed but are not pressurised, i.e. they are under only atmospheric pressure. The pressure-boosting system of the CO(R)-MVI.../CC series is not designed for drinking water applications.

5 Product information

5.1 Type key

Example:	COR-2 MVI S 8 04/CC-EB
CO	COmpact pressure boosting system
R	Controller, at least one pump controlled by frequency converter
2	Number of pumps
MVI	Pump series designation (see attached pump documentation)
S	Glandless pump motor
8	Rated flow rate Q [m^3/h] (2-pin version 50 Hz)
04	Number of pump stages
CC	Control device, in this case, Comfort Controller
EB	Additional reference, in this case, e.g. European Booster

Example:	CO-3 MVI 70 02/CC
CO	COmpact pressure boosting system
3	Number of pumps
MVI	Pump series designation (see attached pump documentation)
70	Rated flow rate Q [m^3/h] (2-pin version 50 Hz)
02	Number of pump stages
CC	Control device, in this case, Comfort Controller

Example:	CO-2 Helix V 4 03/CC-01
CO	COmpact pressure boosting system
2	Number of pumps
Helix	Pump series designation (see attached pump documentation)
V	Pump design, vertical standard version
4	Rated flow rate Q [m^3/h] (2-pin version 50 Hz)
03	Number of pump stages
CC	Control device, in this case, Comfort Controller
01	Additional reference, in this case, e.g. -01: material variant; pipework 1.4571

Example:	COR-4 Helix V 10 05/CC-01
CO	COmpact pressure boosting system
R	Controller, at least one pump controlled by frequency converter
4	Number of pumps
Helix	Pump series designation (see attached pump documentation)
V	Pump design, vertical standard version
10	Rated flow rate Q [m^3/h] (2-pin version 50 Hz)
05	Number of pump stages
CC	Control device, in this case, Comfort Controller
01	Additional reference, in this case, e.g. -01: material variant; pipework 1.4571

Example:	COR-5 Helix VE 16 02/CCe-01
CO	COmpact pressure boosting system
R	Controller, at least one pump controlled by frequency converter
5	Number of pumps
Helix	Pump series designation (see attached pump documentation)
VE	Pump design, vertical pump with electronic speed control
10	Rated flow rate Q [m^3/h] (2-pin version 50 Hz)
02	Number of pump stages
CCe	Control device, in this case, Comfort Controller for electronic pumps
01	Additional reference, in this case, e.g. -01: material variant; pipework 1.4571

5.2 Technical data (standard version)

Max. volume flow	see catalogue/data sheet
Max. delivery head	see catalogue/data sheet
Speed	2800 – 2900 rpm (fixed speed) Helix V, MVI 900 – 3600 rpm (variable speed) Helix VE
Mains voltage	3~ 400 V ±10 % V (L1, L2, L3, PE)
Rated current	see rating plate
Frequency	50 Hz
Electrical connection	(see installation and operating instructions and circuit diagram of the control device)
Insulation class	F
Protection class	IP54
Power consumption P1	see rating plate of pump/motor
Power consumption P2	see rating plate of pump/motor
Nominal diameters	
Connection Suction/pressure pipe	R 1½/R 1½: (..2 Helix V/VE 4..) (..3 Helix V 4..)
	R 2/R 2: (..2 Helix V/VE 6..) (..3 Helix VE 4..) (..4 Helix V 4..) (..2 MVIS 2..) (..2 MVIS 4..) (..3 MVIS 2..) (..3 MVIS 4..) (..4 MVIS 2..) (..5 MVIS 2..) (..6 MVIS 2..)
	R 2½/R 2½: (..2 Helix V/VE 10..) (..2 Helix V 16..) (..3 Helix V/VE 6..) (..3 Helix V/VE 10..) (..4 Helix VE 4..) (..4 Helix V/VE 6..) (..5 Helix V/VE 4..) (..6 Helix V/VE 4..) (..2 MVIS 8..) (..3 MVIS 8..) (..4 MVIS 4..) (..4 MVIS 8..) (..5 MVIS 4..) (..6 MVIS 4..)

5.2 Technical data (standard version)

	R 3/R 3: (..2 Helix VE 16..) (..2 Helix V/VE 22..) (..3 Helix VE 10..) (..3 Helix V 16..) (..4 Helix V/VE 10..) (..5 Helix V/VE 6..) (..6 Helix V/VE 6..) (..5 MVIS 8..) (..6 MVIS 8..)
	DN 100/DN 100: (..2 Helix V/VE 36..) (..3 Helix VE 16..) (..3 Helix V/VE 22..) (..4 Helix V/VE 16..) (..5 Helix V/VE 10..) (..5 Helix V/VE 16..) (..6 Helix V/VE 10..)
	DN 125/DN 125: (..2 Helix V/VE 52..) (..3 Helix V/VE 36..) (..4 Helix V/VE 22..) (..5 Helix V 22..) (..6 Helix V/VE 16..) (..6 Helix V 22..)
	DN 150/DN 150: (..3 Helix V/VE 52..) (..4 Helix V/VE 36..) (..5 Helix V 36..) (..6 Helix V 36..)
	DN 200/DN 200: (..4 Helix V/VE 52..) (..5 Helix V 52..) (..6 Helix V 52..) (..2 MVI 70..) (..2 MVI 95..) (..3 MVI 70..) (..3 MVI 95..) (..4 MVI 70..)
	DN 250/DN 250: (..4 MVI 95..) (..5 MVI 70..) (..5 MVI 95..) (..6 MVI 70..) (..6 MVI 95..) (Subject to change without prior notice/see also installation plan provided)
Permitted ambient temperature	5 °C to 40 °C
Permitted fluids	pure water without settling sediments
Permissible fluid temperature	3 °C to 50 °C
Maximum permitted operating pressure	on the pressure side, 16 bar (see rating plate)
Maximum permitted inlet pressure	indirect connection (however max. 6 bar)
Further data...	
Diaphragm pressure vessel	8 L

5.3 Scope of delivery

- Pressure boosting system
- Installation and operating instructions for the pressure boosting system
- Installation and operating instructions for the pumps
- Installation and operating instructions for the control device
- factory test report
- 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 in Fig. 11)
- Larger diaphragm pressure vessel (on the suction or discharge side)
- Safety valve
- Protection against low water level and dry-running

  In the case of operation with supply pressure for systems with frequency control (COR – CC-FC and CCe), a pressure sensor is installed on the intake side as standard and serves as protection against low water level! (Fig. 5c)

  In the case of operation with supply pressure for systems without frequency control (CO – CC):
  - Protection against low water level (WMS) kit (at least 1.0 bar) supplied as separate accessory (Fig. 5a and 5b) (supplied fitted to the pressure boosting system if part of the order)
  - Float switch
  - Low water warning electrodes with level control relay
  - Electrodes for tank operation (special accessories on request)
- Flexible connection pipes (Fig. 9, B)
- Compensators (Fig. 8, B)
- Threaded flanges and caps (Fig. 8 and 9, D)
- Sound-insulating unit casing (special accessories on request)

6 Description of the product and accessories

6.1 General description

The Wilo pressure boosting system type Comfort is supplied ready for connection as a compact unit with built-in controls. It consists of 2 to 6 non self-priming vertical high-pressure multistage centrifugal pumps which are supplied completely piped to each other and mounted on a common base frame.

The only connections that have to be made are for the inlet and pressure pipes and the electrical mains connection. It may also be necessary to install the supplied accessories ordered separately.

The pressure boosting system with non self-priming pumps can be connected both indirectly (Fig. 7 - system separation through a non-pressurised break tank) and directly (Fig. 6 - connection without system separation) to the water supply mains. Detailed instructions for the pump type used can be found in the attached installation and operating instructions for the pump.

Observe the relevant, applicable regulations and standards when using the system for drinking water supply (does not apply to CO(R)-MVI.../CC) and/or fire extinguishing supply. **The system must be operated and maintained in accordance with the relevant instructions** (in Germany according to DIN 1988 (DVGW)) **so that the operational reliability of the water supply is permanently guaranteed and neither the public water supply nor other consumption installations are detrimentally affected.** The respective applicable regulations or standards (see Section 4) on the connection and type of connection to public water supply networks must be observed. They may be supplemented by **regulations of the water supply companies or the responsible fire protection authority**. In addition, 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 pressure boosting system

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

Mechanical and hydraulic system components (Fig. 1a, 1b, 1c, 1d, 1e, 1f):

The compact unit is mounted on a **base frame with vibration absorbers (3)**. It consists of a group of 2 to 6 **high-pressure multistage centrifugal pumps (1)**, which are combined by means of an **inlet manifold pipe (4)** and a **pressure collecting pipe (5)** to form a complete system. Each pump is fitted with a **shut-off device on the intake side (6)**, a **shut-off device on the pressure side (7)** and a **non-return valve (8)** on the pressure side.

The **pressure collecting pipe (5)** is also fitted with an assembly that can be shut off with a **pressure sensor (12)** and **pressure gauge (11)** 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) (see also Fig. 2 and 3).

For systems with frequency control (COR – CC-FC and CCe), the inlet collecting pipe is also fitted as standard with an assembly that can be shut off

with an additional **pressure sensor (12)** and **pressure gauge (11)** (see Fig. 5c).
For systems without frequency control (CO – CC), an assembly for a **low-water cut-out switchgear (WMS) (14)** can optionally be installed or mounted at a later time at the inlet collecting pipe (see Fig. 5a and 5b).
The **control device (2)** is mounted directly on the base frame and ready-wired to the system's electrical components. In the case of larger systems, the control device is accommodated in a separate free-standing cabinet (BM) and the electrical components are pre-wired to the corresponding connection cable. For the separate free-standing cabinet (BM) (e.g. Fig. 1c, 1d (2)) the final wiring is completed by the customer (see Section 7.3 and the documentation included with the control device).
The present installation and operating instructions contain only a general description of the complete system.
High-pressure multistage centrifugal pumps (1):
Different types of high-pressure multistage centrifugal pumps are installed in the pressure boosting system depending on the application and the performance parameters required. Their number can vary from 2 to 6 pumps. Pumps with built-in frequency converter (Helix VE) or without built-in frequency converter (Helix V) are used. The attached installation and operating instructions provide information on the pumps.
Control device (2):
The CC, CC-FC or CCe series control devices are used to control and regulate the Wilo-Comfort pressure boosting system. The size and components of the control device may vary depending on the design and performance parameters of the pumps. The attached installation and operating instructions and the corresponding circuit diagram provide information on the control device installed in this pressure boosting system.
Diaphragm pressure vessel kit (Fig. 2 and 3):
- Diaphragm pressure vessel (9) with flow-through fixture (10)

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

Pressure sensor kit (Fig. 5c) on the intake side (only for COR – CC-FC and CCe systems)
- Pressure gauge (11)
- Pressure sensor (12a)
- Electrical connection for pressure sensor (12b)
- Draining/venting (16)
- Stop valve (17)

6.3 Function of the pressure boosting system

Wilo pressure boosting systems in the Wilo-Comfort series are standard-equipped with non self-priming high-pressure multistage centrifugal pumps, with or without built-in frequency converter. These are supplied with water via the inlet collecting pipe.
Where self-priming pumps are used for special versions, or generally in the case of suction mode from lower-lying tanks, a separate vacuum-proof and pressure-resistant suction line with a foot valve must be installed for each pump. The line must rise continuously from the tank to the system.
The pumps increase the pressure and pump the water to the consumer via the pressure collecting pipe. To do this, they are switched on and off and controlled depending on the pressure. The pressure sensor continuously measures the actual pressure value, converts it into a current signal and transmits it to the control device.
Depending on the requirement and the control mode, the control device switches the pumps on, switches them in, or switches them off. If pumps with built-in frequency converter are used, the speed of one or more of the pumps is changed until the control parameter settings are achieved. (A more precise description of the control mode and the control process is given in the installation and operating instructions for the control device).
The total delivery volume of the system is distributed over several pumps. This has the big advantage that the system output is adapted very precisely to the actual demand and the pumps are operated in the most favourable performance range in each case. This design delivers a high level of efficiency and ensures economical energy consumption for the system.
The first pump that starts up is called the base-load pump. The remaining pumps needed to reach the system operating point are called peak-load pump(s). If the system is configured for drinking water supply (does not apply to CO(R)-MVI.../CC) according to DIN 1988, one pump must be designated as a standby pump, i.e. at maximum extraction, one pump is always decommissioned or on stand-by.
To ensure that all the pumps are used equally, the control unit cycles the pumps continuously, i.e. the order of switching on and the allocation of the base load/peak load or standby pump functions change regularly.
The diaphragm pressure vessel installed (total capacity of approx. 8 litres) exercises a certain buffer effect on the pressure sensor on the pressure side and prevents oscillation of the control when switching the system on and off. It also guarantees low water extraction (e.g. for very small leakages) from the storage volume at hand without switching on the base-load pump. This reduces the pumps' switching frequency and stabilises the operating status of the pressure boosting system.

CAUTION! Risk of damage!
To protect the mechanical seal or plain bearings, do not allow the pumps to run dry. Dry running can lead to the pump developing leakages!
For systems with frequency control (**COR** – CC-FC or CCe), the pressure sensor on the intake side

monitors the supply pressure and transmits this as a current signal to the control device. If the supply pressure is too low, the system detects a fault and the pumps are stopped. (For a more detailed description, see the installation and operating instructions for the control device).
For systems without frequency control (**CO** – CC), various kits are offered as accessories for direct connection to the public water mains as protection against low water level (WMS) (14) (Fig. 5a and 5b). Each kit incorporates a built-in pressure switch (22). This pressure switch monitors the supply pressure and if the pressure is low it sends a switching signal to the control device.
An installation point for this purpose is provided as standard at the inlet collecting pipe.
In the case of an indirect connection (system separation by non-pressurised break tank), a level-dependent signal transmitter must be provided and installed in the break tank as a dry-running protection device. If a Wilo break tank is installed (as in Fig. 11), a float switch is included in the scope of delivery (see Fig. 12).
For existing on-site tanks, you will find various signal transmitters in the Wilo range that can be retrofitted (e.g. float switch WA65 or low water warning electrodes with level relay).

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

6.4 Noise

Pressure boosting systems are supplied with different pump types and a variable number of pumps, as described in Chapter 5.1. No specific overall noise level can therefore be listed here for all variants of pressure boosting systems.
In the following overview, pumps of the standard series MVI/Helix V up to a maximum motor power of 7.5 kW are taken into account **without** frequency converter:

Max. sound-pressure level (*) Lpa in [dB(A)]	Rated power (kW)									
	0.37	0.55	0.75	1.1	1.5	2.2	3	4	5.5	7.5
1 pump	56	57	58	59	60	63	66	68	70	70
2 pumps	59	60	61	62	63	66	70	71	73	73
3 pumps	61	62	63	64	65	68	72	73	75	75
4 pumps	62	63	64	65	66	69	73	74	76	76
5 pumps	64	65	66	67	68	71	75	76	78	78
6 pumps	65	66	67	68	69	72	76	77	79	79

(*) Values for 50 Hz (fixed speed) with tolerance of +3 dB(A)
Lpa = workplace-related emission level in dB(A)

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

Sound-pressure level max. (**) Lpa in [dB(A)]	Rated power (kW)				
	1.1	2.2	4	5.5	7.5
1 pump	70	70	71	72	72
2 pumps	73	73	74	75	75
3 pumps	75	75	76	77	77
4 pumps	76	76	77	78	78
5 pumps	71	75	80 LWA=92dB(A)	82 LWA=93dB(A)	82 LWA=93dB(A)
6 pumps			81 LWA=92dB(A)	83 LWA=94dB(A)	83 LWA=94dB(A)

(*) Values for 60 Hz (variable speed) with tolerance of +3 dB(A)
Lpa = workplace-related emission level in dB(A)

The actual rated power of the delivered pumps can be found on the motor's rating plate.
For motor powers not listed here and/or other pump series, see the individual pump noise value from the installation and operating instructions for the pumps or from the catalogue information on the pumps. With the following procedure, it is possible to approximate the overall noise level of the complete system using the noise value for an individual pump of the type supplied.

Calculation		
Single pump	....	dB(A)
2 pumps, total	+3	dB(A) (tolerance +0.5)
3 pumps, total	+4.5	dB(A) (tolerance +1)
4 pumps, total	+6	dB(A) (tolerance +1.5)
5 pumps, total	+7	dB(A) (tolerance +2)
6 pumps, total	+7.5	dB(A) (tolerance +3)
Overall noise level =	....	dB(A)

Example (pressure boosting system with 4 pumps)		
Single pump	74	dB(A)
6 pumps, total	+7.5	dB(A) (tolerance +3)
Overall noise level =	81.5...84.5	dB(A)

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 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).
- Adequately dimensioned floor drainage (drain connection or similar) 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 supplied installation plan. The system should be freely accessible from at least two sides.
- The installation surface must be horizontal and flat. A slight adjustment in height of the vibration absorber in the base frame may be necessary to achieve stabilisation. If this is necessary, undo the counter nuts and unscrew the respective vibration absorber slightly. Then re-tighten the counter nuts.
- 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.
- To avoid the transmission of structure-borne noise and to ensure a stress-free connection to upstream and downstream pipes, compensators (Fig. 8, B) with extension limiters or flexible connection pipes (Fig. 9, B) should be used.

7.2 Installation

7.2.1 Foundation/bearing surface

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

NOTICE!
For transport reasons, the vibration absorbers may not be installed upon delivery. Before installing the pressure boosting system, check that all the vibration absorbers are fitted and locked using threaded nuts (also see Fig. 8, A).

Note:
If the customer also wants to secure the installation to the floor (similar to example Fig. 9, E), suitable measures must be taken to avoid structure-borne noise transmission.

7.2.2 Hydraulic connection and pipes

For connections to the public drinking water supply network (does not apply to CO(R)-MVI.../CC), the requirements of the responsible local water supply company must be met.
The installation must not be connected until all the welding and soldering work, necessary flushing and, if required, disinfecting of the pipe system and the pressure boosting system has been done (see Point 7.2.3).
On-site piping installation must be completed voltage-free! Compensators with extension limiters or flexible connection pipes are recommended for this purpose in order to avoid stress 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 pressure boosting system pipework (for example, see Fig. 9, 10, C).
The connection is made either on the right or left of the system, depending on the site conditions. It may be necessary to move pre-assembled blind flanges or threaded caps.
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 devices), 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) (does not apply to CO(R)-MVI.../CC)

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

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

Recommendation for simple flushing of the system:

- Install a T-connector on the end pressure side of the pressure boosting system upstream of the next shut-off device. For a diaphragm pressure vessel on the pressure side, place it directly downstream of this.
  The T-connector branch, provided with a shut-off device, drains into the waste water system during the flushing process and must be dimensioned according to the maximum volume flow of a single pump (see Fig. 6 and 7, Item 28). 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 (accessory)

Fitting dry-running protection

- In the event of a direct connection to the public water supply network:
  For systems with frequency control (COR – CC-FC or CCe), a kit with a pressure sensor is installed on the intake side. It monitors the supply pressure and transmits this as a current signal to the control device. In this case, no additional accessories are necessary!
  For systems without frequency control (CO – CC), screw the protection against low water level (WMS) kit into the connection port provided on the suction collecting pipe and - if retrofitting - seal it. Make the electrical connection in the control device according to the installation and operating instructions and the control device circuit diagram (Fig. 5a and 5b).
- In the event of an indirect connection, i.e. for operation with tanks provided by the customer:
  Install the float switch in the tank so that the “low water” switching signal is transmitted if the water

level drops to approximately 100 mm above the draw-off connection. (If break tanks from the Wilo range are used, a float switch is already installed (Fig. 11 and 12)).

- Alternative: Install 3 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 upper switching level (low water), position the second electrode approx. 100 mm above the draw-off connection.
  - For the lower switching level (no longer low water), position the third electrode at least 150 mm above the lower electrode.

Connect the wiring to the control device according to the installation and operating instructions and circuit diagram of the control device.

7.2.5 Diaphragm pressure vessel (accessory)

For transportation and hygienic reasons, the diaphragm pressure vessel (8 litre) – which is part of the scope of delivery – may be delivered non-installed as an accessories kit. The diaphragm pressure vessel must be mounted on the throughflow fitting before commissioning (see Fig. 2 and 3).

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

A throughflow diaphragm pressure vessel according to DIN 4807 must be installed for drinking water installations. When installing a diaphragm pressure vessel, also make sure there is enough room for maintenance or replacement work.

NOTICE
Diaphragm pressure vessels require regular testing according to Directive 97/23/EC (In Germany, the Operating Safety Ordinance §§ 15(5) and 17, as well as Annex 5, must also be taken into account).
Shut-off devices must be provided upstream and downstream of the vessel for tests, inspection and maintenance work on the piping.
To prevent system downtimes, connections for a bypass can be provided upstream and downstream of the diaphragm pressure vessel. Such a bypass (as for example in the diagrams Fig. 6 and 7, Item 33) must be completely removed at the end of the work to avoid stagnation of the water. Special maintenance and test instructions can be taken from the installation and operating instructions for the diaphragm pressure vessel concerned.
The system conditions and the system pumping data must be taken into account when selecting the size of the diaphragm pressure vessel. When doing so, ensure there is sufficient flow through the diaphragm pressure vessel. The maximum flow rate of the pressure boosting system must not exceed the maximum permissible flow rate of the diaphragm pressure vessel connection (see Table 1 or the specifications on the rating plate, and the installation and operating instructions for the vessel).

Nominal diameter Connection	DN 20 (Rp ¾")	DN 25 (Rp 1")	DN 32 (Rp 1¼")	DN 50 Flange	DN 65 Flange	DN 80 Flange	DN 100 Flange
Max. volume flow (m^3/h)	2.5	4.2	7.2	15	27	36	56

Table 1

7.2.6 Safety valve (accessory)

A component-tested safety valve needs to be installed on the discharge side if the sum of the maximum possible supply pressure and the maximum delivery pressure of the pressure boosting system may exceed the permissible operating pressure of an installed system component. The safety valve must be designed so that it will drain off the volume flow occurring in the pressure boosting system when the positive operating pressure is 1.1-times the admissible level (design data is given in the data sheets/pump curves of the pressure boosting system). The outflowing water current must be safely drained away. The corresponding installation and operating instructions and the relevant provisions must be observed when installing the safety valve.

7.2.7 Non-pressurised break tank (accessory)

To connect the pressure boosting system indirectly to the public drinking water mains, it must be installed together with a non-pressurised break tank according to DIN 1988. The same rules apply to the installation of the break tank as to the pressure boosting system (see 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 destroy the tank.
The non-pressurised (i.e. under atmospheric pressure) closed PE tank which we supply as an accessory must be installed according to the transport and installation instructions supplied with the tank.

In general, the following procedure applies: Connect the tank without mechanical tension before commissioning. This means that the connection must be made with flexible components, like compensators or hoses.
The tank overflow must be connected according to the applicable regulations (in Germany, DIN 1988/T3).
Take suitable measures to prevent heat transmission through the connection pipes. PE tanks in the Wilo range are only designed to accommodate clean water. The maximum temperature of the water must not exceed 50 °C!

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

The electrical wiring (protection against low water level) to the system's control device must also be connected before the pressure boosting system is commissioned (see the details in the installation and operating instructions for the control device).

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

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

7.2.8 Compensators (accessories)

For stress-free installation of the pressure boosting system, connect the pipes using compensators (Fig. 8, B). The compensators must be equipped with a structure-borne noise-insulating extension limiter to absorb the reaction forces that occur. The compensators must be installed stress-free in the pipes. Compensators must not be used to compensate for alignment errors or pipe displacement.
When installing, the screws must be tightened uniformly, working across diagonals. The ends of the screws must not project beyond the flange. If welding work is done nearby, the compensators must be covered for protection (sparks, radiated heat). The rubber parts of compensators may not be painted and must be protected from oil. The compensators must be accessible for inspection within the system at any time 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).

7.2.9 Flexible connection pipes (accessory)

In the case of pipes with threaded connections, flexible connection pipes can be used for stress-free installation of the pressure boosting system and in the event of slight pipe displacement (Fig. 9, B). The flexible connection pipes in the Wilo range consist of a high quality stainless steel corrugated hose 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 further pipework. Depending on the size, certain maximum permissible deformation limits must be met (see Table 2 and Fig. 9). 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, it is necessary to fixate the system to the floor, taking into account suitable measures to reduce the structure-borne noise. The flexible connection pipes in the system must be accessible for inspection at any time and must therefore not be covered by the pipe insulation.

Nominal diameter, Connection	Threaded Screwed connection	Conical Male thread	Max. bend radius RB in mm	Max. bend angle BW in °
DN 40	Rp 1½"	R 1½"	260	60
DN 50	Rp 2"	R 2"	300	50
DN 65	Rp 2½"	R 2½"	370	40

Table 2

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

7.2.10 Pressure reducer (accessory)

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

7.3 Electrical connection

DANGER! Risk of fatal injury!
The electrical connection must be established according to local regulations (in Germany: VDE regulations) by an electrical installation engineer approved by the local energy supply company.

Pressure boosting systems in the Wilo-Comfort series are equipped with control devices in the CC, CC-FC or CCe series. To make the electrical connection, the corresponding installation and operating instructions and attached electrical wiring diagrams must be observed. General points to be considered are listed in the following:

- the current type and voltage of the mains connection must comply with the details on the rating plate and circuit diagram of the control device,
- the electrical connection pipe must be adequately dimensioned for the total power of the pressure boosting system (see rating plate and data sheet),
- external fuse protection must be provided according to DIN 57100/VDE0100 Part 430 and Part 523 (see data sheet and wiring diagrams),
- as a protective measure, the pressure boosting system must be earthed according to regulations (i.e. according to the local regulations and circumstances); the connections intended for this purpose are identified (see also the circuit diagram).

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

- **For pressure boosting systems without a frequency converter (CC), a residual-current device (FI switch) with a trigger current of 30 mA must be installed.**
- **For pressure boosting systems fitted with a frequency converter (CC-FC or CCe), a universal-current-sensitive residual-current device with a trigger current of 300 mA must be installed.**
- **The protection class of the system and of the individual components can be taken from the rating plates and/or data sheets.**
- **Further measures/settings, etc. are described in the installation and operating instructions and also the circuit diagram of the control device.**

8 Commissioning/decommissioning

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 contact the central Wilo customer service department directly to arrange this.

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 subject it to a visual inspection for leakages.
- Open the shut-off devices 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 pumps), the pump and the suction line must be filled via the opening in the venting screw (use a funnel as required).
- If a diaphragm pressure vessel (optional or accessory) is installed, check that it is set to the correct supply pressure (see Fig. 3 and 4).
- To do so:
  - depressurise the vessel on the water side (close the flow-through fixture (Fig. 3, A) and allow the residual water to drain (Fig. 3, B)), and
  - check the gas pressure at the air valve (top; remove dust cap) of the diaphragm pressure vessel with an air pressure gauge (Fig. 3, C). If necessary, correct the pressure if too low [(PN 2 = pump switch-on pressure Pmin less 0.2 – 0.5 bar) or value given in the table on the vessel (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,
  - reapply the dust cap,
  - close the drain valve on the flow-through fixture and open the flow-through fixture.
- In the event of system pressures > PN 16, the manufacturer's filling instructions should be observed for the diaphragm pressure vessel in accordance with the installation and operating instructions.

DANGER! Risk of fatal injury!
Excessive supply pressure (nitrogen) in the diaphragm pressure vessel can lead to damage or destruction of the tank and can thereby also cause personal injury.
The safety measures for handling pressurised vessels and technical gases must be observed.
The pressure specifications in this documentation (Fig. 4) are given in bar (!).

If other units of pressure measurement are used, always be sure to convert the figures correctly!

- In the case of an indirect connection, check that the water level in the break tank is adequate, or with a direct connection, that the inlet pressure is adequate (minimum inlet pressure 1 bar)
- Correct installation of the right dry-running protection (Section 7.2.4.)
- In the break tank, position the float switch or electrodes for protection against low water level so that the pressure boosting system is switched off at minimum water level (Section 7.2.4)
- Checking the direction of rotation of pumps with a standard motor without integrated frequency converter (Helix V): Switch on briefly to check whether the direction of rotation of the pump matches the arrow on the pump housing. Swap 2 phases if the direction of rotation is incorrect.

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

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

8.2 Protection against low water level (WMS)

For operation with supply pressure

- System without frequency control (CO – CC)
  The pressure switch for the optional protection against low water level (WMS) kit (Fig. 5a and 5b) for monitoring the supply pressure is permanently factory-set to the thresholds 1 bar (deactivates if pressure below this value) and about 1.3 bar (reactivates when pressure goes above this value). It is not possible to change this setting.
- System with frequency control (CO – CC-FC or CCe)
  The pressure sensor installed on the intake side can also by activated by the control device as a signal transmitter for protection against low water level (Fig. 5c) to monitor supply pressure. The pressure value for switching off and switching back on can be set to a specific range in the control device. The system's factory settings are that the system deactivates when pressure falls below 1.0 bar and reactivates when it exceeds 1.3 bar. (For more detailed descriptions of the activation procedure and settings, see the installation and operating instructions provided for the control device).
  If another pressure switch is used as the low-water signal transmitter, observe the accompanying description about its configuration options. The necessary control device settings for this are to be taken from the installation and operating instructions provided for the control device.

For operation with break tank (inlet mode)

With Wilo break tanks, the level-dependent low water monitoring is done with a float switch. This must be electrically connected to the control device before commissioning.
Observe the installation and operating instructions and accompanying documents for the control device when making this connection and applying the necessary settings.

8.3 Commissioning the system

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

Warning! Health hazard!
If the system has not been flushed up to now, it should be flushed thoroughly at this point at the latest (see Section 7.2.3).

8.4 Decommissioning the system

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

- switch off the voltage supply and secure it against being switched on again inadvertently,
- close the shut-off devices upstream and downstream of the system, and
- 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 cost, we recommend regular inspection and maintenance of the pressure boosting system (see DIN 1988). It is advisable to conclude a maintenance contract with a specialist company or with our central customer service department. The following checks should be made regularly:

- Inspection of the operational readiness of the pressure boosting system.
- Check the mechanical seals on the pumps. The mechanical seals need water for lubrication and this can leak out of the seal slightly. If this is noticeable, replace the mechanical seal.
- Check the diaphragm pressure vessel (optional or accessory) (a 3-monthly cycle is recommended) for correct supply pressure setting and impermeability (see Fig. 3 and 4).

Caution! Risk of material damage!
If the supply pressure is incorrect, the function of the diaphragm pressure vessel is not guaranteed, which increases the diaphragm wear and can cause system faults.

To check the supply pressure:

- depressurise the vessel on the water side (close the flow-through fixture (A, Fig. 3) and allow the residual water to drain (B, Fig. 3),
- check the gas pressure at the diaphragm pressure vessel valve (top; remove dust cap) with an air pressure gauge (Fig. 3, C), and
- if necessary, correct the pressure by adding nitrogen (PN 2 = pump start-up pressure Pmin minus 0.2 – 0.5 bar or value specified in the table on the vessel (Fig. 4) – Wilo customer service). If the pressure is too high, discharge nitrogen from the valve.

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

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

10 Faults, causes and remedies

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

NOTICE!
The general safety instructions absolutely must be observed during any maintenance or repair work! The installation and operating instructions of the pumps and the control device must also be observed!

Fault	Cause	Remedy
Pump(s) do not start	No mains voltage	Check the fuses, cables and connections
	Main switch "OFF"	Switch on the main switch
	Water level in break tank too low, i.e. low water level reached	Check the break tank's inlet valve / supply line
	Low water level indicated	Check the inlet pressure and the level in the break tank
	Low water cut-out switch or pressure sensor on the intake side is faulty	Check and, if necessary, replace the low water switch or pressure sensor
	Electrodes connected incorrectly or pressure for low water cut-out switch set incorrectly	Check installation and setting and correct as required
	Inlet pressure is above start-up pressure	Check default values and correct if necessary
	Shut-off device is closed at pressure sensor	Check and open the shut-off device if necessary
	Start-up pressure set too high	Check the setting and correct if necessary
	Fuse defective	Check fuses and replace if necessary
	Motor protection has triggered	Check the default values against the pump or motor data, measure the current values and correct the setting if necessary. Check the motor for defects and replace if necessary
	Power contactor is defective	Check it and replace it if necessary
	Turn-to-turn fault in the motor	Check, if necessary replace motor or have it repaired

Fault	Cause	Remedy
Pump(s) do not switch off	Major fluctuations in the inlet pressure	Check the inlet pressure and take measures to stabilise the inlet pressure if necessary (e.g. pressure reducers).
	Inlet pipe is blocked or shut off	Check the inlet pipe and remove the clogging or open the shut-off device if necessary
	Nominal diameter of the inlet pipe is too small	Check the inlet pipe and increase the cross-section of the inlet pipe if necessary
	Inlet pipe is installed incorrectly	Check the inlet pipe and change the pipe routing if necessary
	Air in the inlet	Check and shut off the piping and vent the pumps if necessary
	Impellers are blocked	Check the pump and replace it or have it repaired if necessary
	Non-return valve is leaking	Check and replace the seal or non-return valve if necessary
	Non-return valve is blocked	Check and remove the clogging or replace the non-return valve if necessary
	Gate valve in the system is closed or not sufficiently open	Check and open the shut-off device completely if necessary
	Flow rate is too high	Check the pump data and default values and correct them if necessary
	Shut-off device is closed at pressure sensor	Check and open the shut-off device if necessary
	Switch-off pressure is set too high	Check the setting and correct if necessary
	Incorrect direction of rotation of the motors	Check the direction of rotation and correct by swapping over the phases if necessary
Switching frequency is too high or fluttering	Major fluctuations in the inlet pressure	Check the inlet pressure and take measures to stabilise the inlet pressure if necessary (e.g. pressure reducers).
	Inlet pipe is blocked or shut off	Check the inlet pipe and remove the clogging or open the shut-off device if necessary
	Nominal diameter of the inlet pipe is too small	Check the inlet pipe and increase the cross-section of the inlet pipe if necessary
	Inlet pipe is installed incorrectly	Check the inlet pipe and change the pipe routing if necessary
	Shut-off device is closed at pressure sensor	Check and open the shut-off device if necessary
	No diaphragm pressure vessel present (optional or accessory)	Retrofit a diaphragm pressure vessel
	Supply pressure at existing diaphragm pressure vessel incorrect	Check the supply pressure and correct it if necessary
	Valve on existing diaphragm pressure vessel closed	Check the valve and open it if necessary
	Existing diaphragm pressure vessel defective	Check the diaphragm pressure vessel and replace if necessary
	Switching difference is set too low	Check the setting and correct if necessary

Fault	Cause	Remedy
Pump(s) not stable and/or make unusual noises	Major fluctuations in the inlet pressure	Check the inlet pressure and take measures to stabilise the inlet pressure if necessary (e.g. pressure reducers).
	Inlet pipe is blocked or shut off	Check the inlet pipe and remove the clogging or open the shut-off device if necessary
	Nominal diameter of the inlet pipe is too small	Check the inlet pipe and increase the cross-section of the inlet pipe if necessary
	Inlet pipe is installed incorrectly	Check the inlet pipe and change the pipe routing if necessary
	Air in the inlet	Check and shut off the piping and vent the pumps if necessary
	Air in the pump	Vent the pump, check the impermeability of the suction line and seal it if necessary
	Impellers are blocked	Check the pump and replace it or have it repaired if necessary
	Flow rate is too high	Check the pump data and default values and correct them if necessary
	Incorrect direction of rotation of the motors	Check direction of rotation and correct by changing over phases if necessary
	Mains voltage: A phase is missing	Check the fuses, cables and connections
	Pump is 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 become too warm	Air in the inlet	Check and shut off the piping and vent the pumps if necessary
	Gate valve in the system is closed or not sufficiently open	Check and open the shut-off device completely if necessary
	Impellers are blocked	Check the pump and replace it or have it repaired if necessary
	Non-return valve is blocked	Check and remove the clogging or replace the non-return valve if necessary
	Shut-off device is closed at pressure sensor	Check and open the shut-off device if necessary
	Deactivation point set too high	Check the setting and correct if necessary
	Bearing damage	Check the pump/motor and replace it or have it repaired if necessary
	Turn-to-turn fault in the motor	Check, if necessary replace motor or have it repaired
	Mains voltage: A phase is missing	Check the fuses, cables and connections
Current consumption is too high	Non-return valve is leaking	Check and replace the seal or non-return valve if necessary
	Flow rate is too high	Check the pump data and default values and correct them 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 is defective	Check and replace the non-return valve if necessary
	Flow rate is too high	Check the pump data and default values and correct them if necessary
	Power contactor is 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

Fault	Cause	Remedy
Pump(s) produces no or too little power	Major fluctuations in the inlet pressure	Check the inlet pressure and take measures to stabilise the inlet pressure if necessary (e.g. pressure reducers).
	Inlet pipe is blocked or shut off	Check the inlet pipe and remove the clogging or open the shut-off device if necessary
	Nominal diameter of the inlet pipe is too small	Check the inlet pipe and increase the cross-section of the inlet pipe if necessary
	Inlet pipe is installed incorrectly	Check the inlet pipe and change the pipe routing if necessary
	Air in the inlet	Check and shut off the piping and vent the pumps if necessary
	Impellers are blocked	Check the pump and replace it or have it repaired if necessary
	Non-return valve is leaking	Check and replace the seal or non-return valve if necessary
	Non-return valve is blocked	Check and remove the clogging or replace the non-return valve if necessary
	Gate valve in the system is closed or not sufficiently open	Check and open the shut-off device completely if necessary
	Low water level indicated	Check the inlet pressure and the level in the break tank
	Incorrect direction of rotation of the motors	Check direction of rotation and correct by changing over phases if necessary
	Turn-to-turn fault in the motor	Check, if necessary replace motor or have it repaired
Dry-running protection switches off although water is present	Major fluctuations in the inlet pressure	Check the inlet pressure and take measures to stabilise the inlet pressure if necessary (e.g. pressure reducers).
	Nominal diameter of the inlet pipe is too small	Check the inlet pipe and increase the cross-section of the inlet pipe if necessary
	Inlet pipe is installed incorrectly	Check the inlet pipe and change the pipe routing if necessary
	Flow rate is too high	Check the pump data and default values and correct them if necessary
	Electrodes connected incorrectly or supply pressure switch set incorrectly	Check installation and setting and correct as required
	Low water cut-out switch or pressure sensor on the intake side is faulty	Check and, if necessary, replace the low water switch or pressure sensor
Dry-running protection does not switch off despite low water level	Electrodes connected incorrectly or supply pressure switch set incorrectly	Check installation and setting and correct as required
	Low water switch defective	Check and, if necessary, replace the low water switch
Rotation direction control lamp on (not for all pump types)	Incorrect direction of rotation of the motors	Check direction of rotation and correct by changing over phases if necessary

You will find information on pump or control device faults not dealt with here in the attached documentation for the components concerned.
If the operating fault cannot be resolved, contact a specialist technician or the Wilo customer service department.

11 Spare parts

Spare parts or repairs may be ordered from local specialist technicians and/or the Wilo after-sales service.
To avoid queries and order errors, please supply all data on the rating plate with every order.

Subject to change without prior notice!

Local contact at
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