

# Pressure Booster System

## DeltaPrimo

DeltaPrimo F  
DeltaPrimo VC  
DeltaPrimo SVP

## Installation/Operating Manual



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Installation/Operating Manual DeltaPrimo

Original operating manual

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## Glossary

### Accumulator

Pressure losses may occur in the piping downstream of the pressure booster system as a result of losses due to leakage. The accumulator serves to compensate for pressure losses and minimises the frequency of starts of the pressure booster system.

### Certificate of decontamination

A certificate of decontamination is enclosed by the customer when returning the product to the manufacturer to certify that the product has been properly drained to eliminate any environmental and health hazards arising from components in contact with the fluid handled.

### Dry running protection

Dry running protection devices prevent the pump from being operated without the fluid to be handled, which would result in pump damage.

### IE3

Efficiency class to IEC 60034-30: 3 = Premium Efficiency (IE = International Efficiency)

### IE5

Efficiency class to IEC TS 60034-30-2:2016 = Ultra Premium Efficiency (IE = International Efficiency)

### Manual mode

Direct operation on the power supply network, independently of the control unit.

### Switchgear and controlgear assembly

Control cabinet with one or several control units / switchgears and electrical equipment.

## 1 General

### 1.1 Principles

This operating manual is valid for the type series and variants indicated on the front cover.

The operating manual describes the proper and safe use of this equipment in all phases of operation.

The name plate indicates the type series, the main operating data and the serial number. The serial number uniquely describes the product and is used as identification in all further business processes.

In the event of damage, immediately contact your nearest KSB service facility to maintain the right to claim under warranty.

### 1.2 Software changes

The software has been specially created for this product and thoroughly tested. Making changes or additions to the software or parts of the software is prohibited. This does not, however, apply to software updates supplied by KSB.

### 1.3 Installation of partly completed machinery

To install partly completed machinery supplied by KSB refer to the sub-sections under Servicing/Maintenance.

### 1.4 Target group

This operating manual is aimed at the target group of trained and qualified specialist technical personnel. (⇒ Section 2.3, Page 10)


### 1.5 Other applicable documents

**Table 1:** Overview of other applicable documents

Document	Contents
Sub-supplier product literature	Operating manuals, circuit diagram and other product literature describing accessories and integrated machinery components







### 1.6 Symbols

**Table 2:** Symbols used in this manual

Symbol	Description
✓	Conditions which need to be fulfilled before proceeding with the step-by-step instructions
▷	Safety instructions
⇒	Result of an action
⇔	Cross-references
1. 2.	Step-by-step instructions
	Note Recommendations and important information on how to handle the product

### 1.7 Key to safety symbols/markings

Table 3: Definition of safety symbols/markings

Symbol	Description
	<b>DANGER</b> This signal word indicates a high-risk hazard which, if not avoided, will result in death or serious injury.
	<b>WARNING</b> This signal word indicates a medium-risk hazard which, if not avoided, could result in death or serious injury.
	<b>CAUTION</b> This signal word indicates a hazard which, if not avoided, could result in damage to the machine and its functions.
	<b>General hazard</b> In conjunction with one of the signal words this symbol indicates a hazard which will or could result in death or serious injury.
	<b>Electrical hazard</b> In conjunction with one of the signal words this symbol indicates a hazard involving electrical voltage and identifies information about protection against electrical voltage.
	<b>Machine damage</b> In conjunction with the signal word CAUTION this symbol indicates a hazard for the machine and its functions.



## 2 Safety

All the information contained in this section refers to hazardous situations.

In addition to the present general safety information the action-related safety information given in the other sections must be observed.

### 2.1 General

- This operating manual contains general installation, operating and maintenance instructions that must be observed to ensure safe operation of the system and prevent personal injury and damage to property.
- Comply with all the safety instructions given in the individual sections of this operating manual.
- The operating manual must be read and understood by the responsible specialist personnel/operators prior to installation and commissioning.
- The contents of this operating manual must be available to the specialist personnel at the site at all times.
- Information and markings attached directly to the product must always be complied with and kept in a perfectly legible condition at all times. This applies to, for example:
  - Arrow indicating the direction of rotation
  - Markings for connections
  - Name plate
- The operator is responsible for ensuring compliance with all local regulations not taken into account.

### 2.2 Intended use

- The pressure booster system must only be operated within the operating limits described in the other applicable documents.
- Only operate pressure booster systems which are in perfect technical condition.
- Do not operate partially assembled pressure booster systems.
- The pressure booster system must only handle the fluids described in the product literature of the respective design variant.
- Never operate the pressure booster system without the fluid to be handled.
- Observe the information on minimum flow rates specified in the product literature (to prevent overheating, bearing damage, etc).
- Observe the maximum flow rates indicated in the data sheet or product literature (to prevent overheating, cavitation damage, bearing damage, etc).
- Do not throttle the flow rate on the suction side of the pressure booster system (to prevent cavitation damage).
- Consult the manufacturer about any other modes of operation not described in the product literature.

#### 2.2.1 Prevention of foreseeable misuse

- Never exceed the permissible application and operating limits specified in the data sheet or product literature regarding temperature, etc.
- Observe all safety information and instructions in this manual.

### 2.3 Personnel qualification and personnel training

- All personnel involved must be fully qualified to install, operate, maintain and inspect the product this manual refers to.
- The responsibilities, competence and supervision of all personnel involved in transport, installation, operation, maintenance and inspection must be clearly defined by the operator.
- Deficits in knowledge must be rectified by means of training and instruction provided by sufficiently trained specialist personnel. If required, the operator can commission the manufacturer/supplier to train the personnel.
- Training on the pressure booster system must always be supervised by specialist technical personnel.

### 2.4 Consequences and risks caused by non-compliance with this manual

- Non-compliance with these operating instructions will lead to forfeiture of warranty cover and of any and all rights to claims for damages.
- Non-compliance can, for example, have the following consequences:
  - Hazards to persons due to electrical, thermal, mechanical and chemical effects and explosions
  - Failure of important product functions
  - Failure of prescribed maintenance and servicing practices
  - Hazard to the environment due to leakage of hazardous substances

### 2.5 Safety awareness

In addition to the safety information contained in this operating manual and the intended use, the following safety regulations shall be complied with:

- Accident prevention, health regulations and safety regulations
- Explosion protection regulations
- Safety regulations for handling hazardous substances
- Applicable standards, directives and laws

### 2.6 Safety information for the operator/user

- Fit protective equipment (e.g. contact guards) supplied by the operator for hot, cold or moving parts, and check that the equipment functions properly.
- Do not remove any protective equipment (e.g. contact guards) during operation.
- Eliminate all electrical hazards. (In this respect refer to the applicable national safety regulations and/or regulations issued by the local energy supply companies.)
- If stopping the pump does not increase potential risk, fit an emergency-stop control device in the immediate vicinity of the pump (set) during pump set installation.

### 2.7 Safety information for maintenance, inspection and installation

- Modifications or alterations of the pressure booster system are only permitted with the manufacturer's prior consent.
- Use only original spare parts or parts authorised by the manufacturer. The use of other parts can invalidate any liability of the manufacturer for resulting damage.
- The operator ensures that maintenance, inspection and installation are performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.
- Carry out work on the pressure booster system during standstill only.
- The pump casing must have cooled down to ambient temperature.
- Pump pressure must have been released and the pump must have been drained.

- When taking the pressure booster system out of service always adhere to the procedure described in the manual.
- Decontaminate pressure booster systems which handle fluids posing a health hazard.
- As soon as the work has been completed, re-install and/or re-activate any safety-relevant and protective devices. Before returning the product to service, observe all instructions on commissioning.
- Make sure the pressure booster system cannot be accessed by unauthorised persons (e.g. children).
- Prior to opening the device, pull the mains plug and wait for at least 10 minutes.

**2.8 Unauthorised modes of operation**

Always observe the limits stated in the product literature.

The warranty relating to the operating reliability and safety of the pressure booster system supplied is only valid if the equipment is used in accordance with its intended use. (⇒ Section 2.2, Page 9)

**2.9 Electromagnetic compatibility (EMC)**

**2.9.1 Interference emission requirements**

The EN 61800-3 EMC product standard is relevant for electric variable speed drives/control systems. It specifies all pertinent requirements and refers to the relevant generic standards for complying with the EMC Directive.

Frequency inverters are commonly used by operators as a part of a system, plant or machine assembly. It should be noted that the operator bears all responsibility for the final EMC properties of the equipment, plant or installation.

A prerequisite or requirement for complying with the relevant standards or the limit values and inspection/test levels referenced by them is that all information and descriptions regarding EMC-compliant installation be observed and followed.

In accordance with the EMC product standard, the EMC requirements to be met depend on the purpose or intended use of the frequency inverter. Four categories are defined in the EMC product standard:

**Table 4:** Categories of intended use

Category	Definition	Limits to EN 55011
C1	Frequency inverters with a supply voltage under 1000 V installed in the first environment (residential and office areas).	Class B
C2	Frequency inverters with a supply voltage under 1000 V installed in the first environment (residential and office areas) that are neither ready to be plugged in/connected nor are mobile and must be installed and commissioned by specialist personnel.	Class A, Group 1
C3	Frequency inverters with a supply voltage under 1000 V installed in the second environment (industrial environments).	Class A, Group 2
C4	Frequency inverters with a supply voltage over 1000 V and a nominal current over 400 A installed in the second environment (industrial environments) or that are envisaged for use in complex systems.	No borderline/boundary <sup>1)</sup>

The following limit values and inspection/test levels must be complied with if the generic standard on interference emissions applies:

1983.811/05-EN

<sup>1</sup> An EMC plan must be devised.

**Table 5:** Classification of installation environment

Environment	Generic standard	Limits to EN 55011
First environment (residential and office areas)	EN/IEC 61000-6-3 for private, business and commercial environments	Class B
Second environment (industrial environments)	EN/IEC 61000-6-4 for industrial environments	Class A, Group 1

The frequency inverter meets the following requirements:

**Table 6:** EMC properties of the frequency inverter

Power [kW]	Cable length [m]	Category to EN 61800-3	Limits to EN 55011
≤ 11	≤ 5	C1	Class B

The EN 61800-3 standard requires that the following warning be provided for drive systems that do not comply with category C1 specifications:  
This product can produce high-frequency interference emissions that may necessitate targeted interference suppression measures in a residential or office environment.

### 2.9.2 Line harmonics requirements

The product is a device for professional applications as defined by EN 61000-3-2. The following generic standards apply when establishing a connection to the public power grid:

- EN 61000-3-2  
for symmetric, three-phase devices (professional devices with a total power of up to 1 kW)
- EN 61000-3-12  
for devices with a phase current of between 16 A and 75 A and professional devices from 1 kW up to a phase current of 16 A.

### 2.9.3 Interference immunity requirements

In general, the interference immunity requirements for a frequency inverter hinge on the specific environment in which the inverter is installed.

The requirements for industrial environments are therefore higher than those for residential and office environments.

The frequency inverter is designed such that the immunity requirements for industrial environments and, thus, the lower-level requirements for residential and office environments, are met and fulfilled.

The following relevant generic standards are used for the interference immunity test:

- EN 61000-4-2: Electromagnetic compatibility (EMC)
  - Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test
- EN 61000-4-3: Electromagnetic compatibility (EMC)
  - Part 4-3: Testing and measurement techniques – Radiated, radio-frequency, electromagnetic field immunity test
- EN 61000-4-4: Electromagnetic compatibility (EMC)
  - Part 4-4: Testing and measurement techniques – Electrical fast transient/burst immunity test
- EN 61000-4-5: Electromagnetic compatibility (EMC)
  - Part 4-5: Testing and measurement techniques – Surge immunity test
- EN 61000-4-6: Electromagnetic compatibility (EMC)
  - Part 4-6: Testing and measurement techniques – Immunity to conducted disturbances, induced by radio-frequency fields



### 3 Transport/Storage/Disposal

#### 3.1 Checking the condition upon delivery

1. On transfer of goods, check each packaging unit for damage.
2. In the event of in-transit damage, assess the exact damage, document it and notify KSB or the supplying dealer and the insurer about the damage in writing immediately.

#### 3.2 Transport

	<b>⚠ DANGER</b>
	<p><b>Pressure booster system tipping over</b>            Danger to life from falling pressure booster system!</p> <ul style="list-style-type: none"> <li>▷ Never suspend the pressure booster system by its power cable.</li> <li>▷ Do not lift the pressure booster system by its manifold.</li> <li>▷ Observe the applicable local accident prevention regulations.</li> <li>▷ Observe the information on weights, centre of gravity and fastening points.</li> <li>▷ Use suitable and permitted transport equipment, e.g. crane, forklift or pallet jack.</li> </ul>

- ✓ Transport equipment / lifting equipment suitable for the corresponding weight has been selected and is on hand.
1. Remove the packaging. Remove the caps from the connection openings.
  2. Check for any in-transit damage.
  3. Transport the pressure booster system to the place of installation.
  4. Detach the pressure booster system from the pallet using a suitable tool.
  5. Separate the pressure booster system from the wooden skids with a suitable tool. Lift the pressure booster system off. Dispose of the wooden skids.
  6. Carefully place down the pressure booster system at the site of installation.

#### 3.3 Storage/preservation

	<b>CAUTION</b>
	<p><b>Damage during storage due to frost, moisture, dirt, UV radiation or vermin</b>            Corrosion/contamination of pressure booster system!</p> <ul style="list-style-type: none"> <li>▷ Store the pressure booster system in a frost-proof room. Do not store outdoors.</li> </ul>
	<b>CAUTION</b>
	<p><b>Wet, contaminated or damaged openings and connections</b>            Leakage or damage of the pressure booster system!</p> <ul style="list-style-type: none"> <li>▷ Only open the openings of the pressure booster system at the time of installation.</li> </ul>
	<b>NOTE</b>
	<p>Rotate the shaft by hand every three months, e.g. via the motor fan.</p>

If commissioning is to take place some time after delivery, the following measures are recommended when storing the pressure booster system:

Store the pressure booster system in a dry, protected room where the atmospheric humidity is as constant as possible.

**Table 7:** Ambient conditions for storage

Ambient condition	Value
Relative humidity	50 % maximum
Ambient temperature	0 °C to +40 °C

- Frost-free
- Well-ventilated

**3.4 Return to supplier**

1. Drain the pressure booster system as per operating instructions.
2. Always flush and clean the pressure booster system, particularly if it has been used for handling noxious, explosive, hot or other hazardous fluids.
3. If the pressure booster system has handled fluids whose residues could lead to corrosion damage in the presence of atmospheric humidity or could ignite upon contact with oxygen, the pressure booster system must also be neutralised and treated with anhydrous inert gas to ensure drying.
4. Always complete and enclose a certificate of decontamination when returning the pressure booster system. (⇒ Section 12, Page 87)  
Always indicate any safety and decontamination measures taken.

	<b>NOTE</b>
	If required, a blank certificate of decontamination can be downloaded from the following web site: <a href="http://www.ksb.com/certificate_of_decontamination">www.ksb.com/certificate_of_decontamination</a>

**3.5 Disposal**

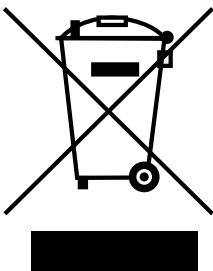
	<b>WARNING</b>
	<p><b>Fluids handled, consumables and supplies which are hot and/or pose a health hazard</b></p> <p>Hazard to persons and the environment!</p> <ul style="list-style-type: none"> <li>▷ Collect and properly dispose of flushing fluid and any fluid residues.</li> <li>▷ Wear safety clothing and a protective mask if required.</li> <li>▷ Observe all legal regulations on the disposal of fluids posing a health hazard.</li> </ul>

1. Dismantle the pressure booster system.  
Collect greases and other lubricants during dismantling.
2. Separate and sort the pump materials, e.g. by:
  - Metals
  - Plastics
  - Electronic waste
  - Greases and other lubricants
3. Dispose of materials in accordance with local regulations or in another controlled manner.

Electrical or electronic equipment marked with the adjacent symbol must not be disposed of in household waste at the end of its service life.

Contact your local waste disposal partner for returns.

If the used electrical or electronic equipment contains personal data, the operator is responsible for deleting it before the equipment is returned.



## 4 Description

### 4.1 General description

- Pressure booster system

### 4.2 Product information as per Regulation No. 1907/2006 (REACH)

For information as per European chemicals regulation (EC) No. 1907/2006 (REACH) see <https://www.ksb.com/en-global/company/corporate-responsibility/reach>.

### 4.3 Designation

Example: DeltaPrimo SVP 3/1507

Table 8: Designation key

Code	Description	
DeltaPrimo	Type series	
SVP	Design	
	F	Fixed speed pressure booster system
	VC	Pressure booster system with cabinet-mounted variable speed system
	SVP	Pressure booster system with variable speed system and KSB SuPremEmotor
3	Number of pumps	
15	Size	
	Movitec 15	
07	Number of pump stages	

### 4.4 Name plate

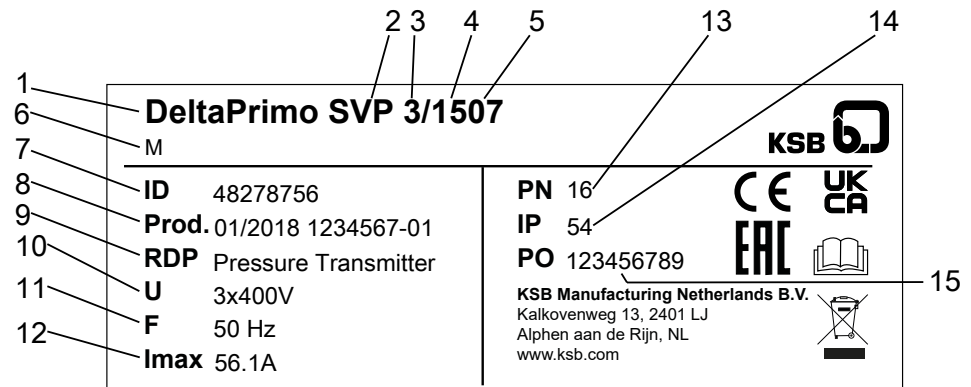


Fig. 1: Name plate (example)

1	Type series	9	Dry running protection
2	Design	10	Power supply voltage
3	Number of pumps	11	Power supply frequency
4	Size	12	Maximum current input
5	Number of pump stages	13	Max. operating pressure
6	Inlet conditions <sup>2)</sup>	14	Enclosure

<sup>2)</sup> M = Inlet side of pressure booster system connected to the municipal water supply, suction head operation, F = Pressure booster system with break tank arranged on same level as pump, suction head operation, L = Pressure booster system with break tank arranged at a lower level, suction lift operation

7	Serial number	15	Order number
8	Month of production / year of production, consecutive number		

#### 4.5 Design details

##### Design

- Compact system mounted on a common base frame
- 2 (F / SVP / VC) / 3 (F / SVP / VC) / 4 (F / SVP) vertical high-pressure pumps
- Hydraulic components made of stainless steel / brass
- Integrated dry running protection

DeltaPrimo F:

- DOL starting

DeltaPrimo VC, SVP:

- With variable speed system

Multiple pump system:

- Discharge-side gate valve per pump

For inlet conditions M and F only:

- Check valve per pump
- Suction side ball valve or shut-off butterfly valve per pump

DeltaPrimo F:

- Power contactor per pump

DeltaPrimo VC, SVP:

- One frequency inverter per pump
- Power contactor per pump

##### Installation

- Stationary dry installation

##### Drive

DeltaPrimo F, VC:

- Electric motor
- Efficiency class IE3 to IEC 60034-30

DeltaPrimo SVP:

- Magnetless synchronous reluctance motor
- Efficiency class IE5 to IEC 60034-30
- KSB SuPremE

##### Automation

- Control unit (IP54 enclosure)
  - Sheet steel housing: colour RAL 7035
  - KSB BoosterCommand Pro
  - Control panel (display, dial with key function, LED indicators, Bluetooth LE interface for app connection)
  - Modbus RTU
  - Lockable master switch (repair switch)
  - Motor protection switch per pump
  - Bluetooth LE interface for app connection KSB Delta FlowManager
  - LEDs for signalling the operating status

- 2 volt-free contacts on terminals are provided for reporting warnings and alerts.

4.6 Configuration and function

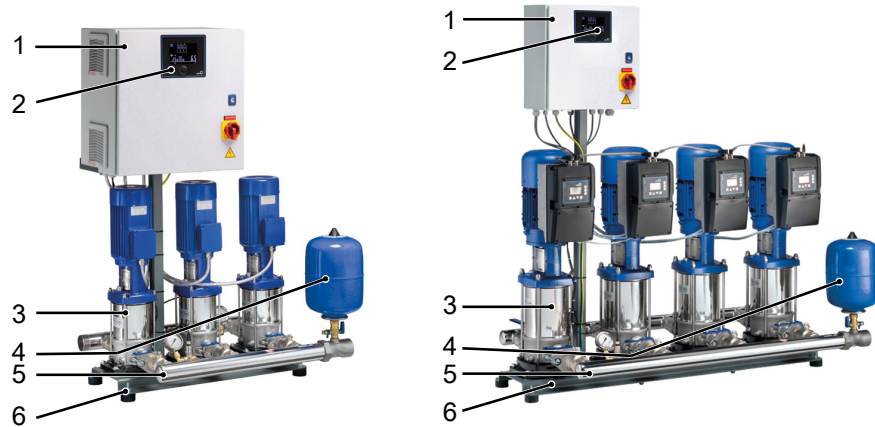


Fig. 2: Configuration DeltaPrimo VC / SVP

1	Control box	4	Membrane-type accumulator
2	Control unit	5	Manifold
3	Pump	6	Baseplate

**Design** Fully automatic pressure booster system with two, three or four vertical high-pressure pumps (3) for ensuring the required supply pressure.

**Function** DeltaPrimo F:

Either two, three or four pumps are controlled and monitored by a microprocessor control unit (KSB BoosterCommand Pro). The first pump is started up when the pressure falls below the set start-up pressure (setpoint minus half bandwidth). Additional pumps are sequenced in automatically in line with actual demand. When demand decreases, the pumps are sequenced out again as the stop pressure (setpoint plus half bandwidth) is reached. The pump that has been started up first will be stopped first. The pumps are automatically started up in a different order for each new cycle. The actual pressure is measured by an analog pressure transmitter. The function of this pressure transmitter is monitored (broken wire detection).

This ensures equal distribution of pump operating hours.

If a duty pump fails, the next pump is started up immediately. A general fault message can be transmitted via a volt-free contact (e.g. to the control station).

DeltaPrimo VC, SVP:

Either two, three (VC) or four (SVP) pumps are controlled and monitored by a microprocessor control unit (KSB BoosterCommand Pro). Each pump is operated on a frequency inverter and controlled by the control unit so as to ensure a constant discharge pressure of the pressure booster system.

As the demand increases or decreases, peak load pumps are started and stopped automatically. As soon as the demand increases again after one pump has been stopped, another pump which has not been in operation before is started up. When the last pump has been stopped and the demand increases again, the next pump in line is started up on a frequency inverter. The stand-by pump is also included in the alternating cycle.

The standard setting is for the pressure booster system to start automatically as a function of pressure. As long as the pressure booster system is in operation, the pumps are started and stopped as a function of demand (standard setting). In this

way it is ensured that the individual pumps operate only in line with actual demand. If the demand drops towards 0, the pressure booster system slowly runs down to the stop point.

DeltaPrimo SVP:

1 volt-free general contact is provided in the control cabinet for reporting warnings and alerts, respectively.

If a pump has not been in operation for 24 hours, a test run is initiated for this pump.

#### 4.7 Noise characteristics

The pressure booster system is available with different numbers and sizes of pumps. For the noise characteristics refer to the operating manual of the pump set. To calculate the expected total sound pressure level, add a defined value to the individual pump set's expected sound pressure level.

**Table 9:** Values for calculating the total expected sound pressure level

Number of pump sets	Value
	dB(A)
2	+ 3
3	+ 4,5
4	+ 6
5	+ 7
6	+ 7,5

**Example** Pressure booster system with 4 pump sets (value: + 6 dB(A))

Single pump = 48 dB(A)

48 dB(A) + 6 dB(A) = 54 dB(A)

The expected total sound pressure level of 54 dB(A) may develop when all 4 pump sets are running under full-load conditions.

#### 4.8 Scope of supply

Depending on the model, the following items are included in the scope of supply:

- 2 or 3 vertical high-pressure centrifugal pumps with oval flange
- Powder-coated / epoxy resin-coated steel baseplate
- Check valve per pump
- Discharge-side gate valve per pump
- Suction side ball valve or shut-off butterfly valve per pump
- Suction-side manifold and discharge-side manifold made of stainless steel
- Pressure transmitter on the discharge side
- Pressure gauge
- Pressure transmitter on the inlet side for dry running protection
- Discharge-side, direct-flow membrane-type accumulator, approved for drinking water
- Control unit (IP54 enclosure)
  - Sheet steel housing: colour RAL 7035
  - Parameterisable KSB BoosterCommand Pro Plus control unit
  - Control panel (display, keys, LEDs, service interface)
  - Three LEDs signalling the operating status
  - Lockable master switch (repair switch)
  - Motor protection switch per pump
  - One frequency inverter per pump

4.8.1 Inlet conditions, version M

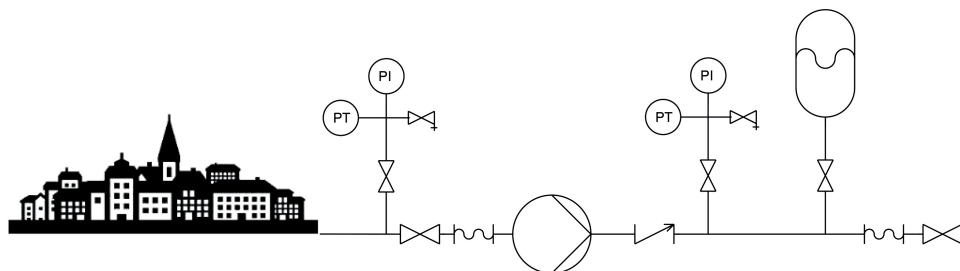


Fig. 3: M = Inlet side of pressure booster system connected to the municipal water supply, suction head operation

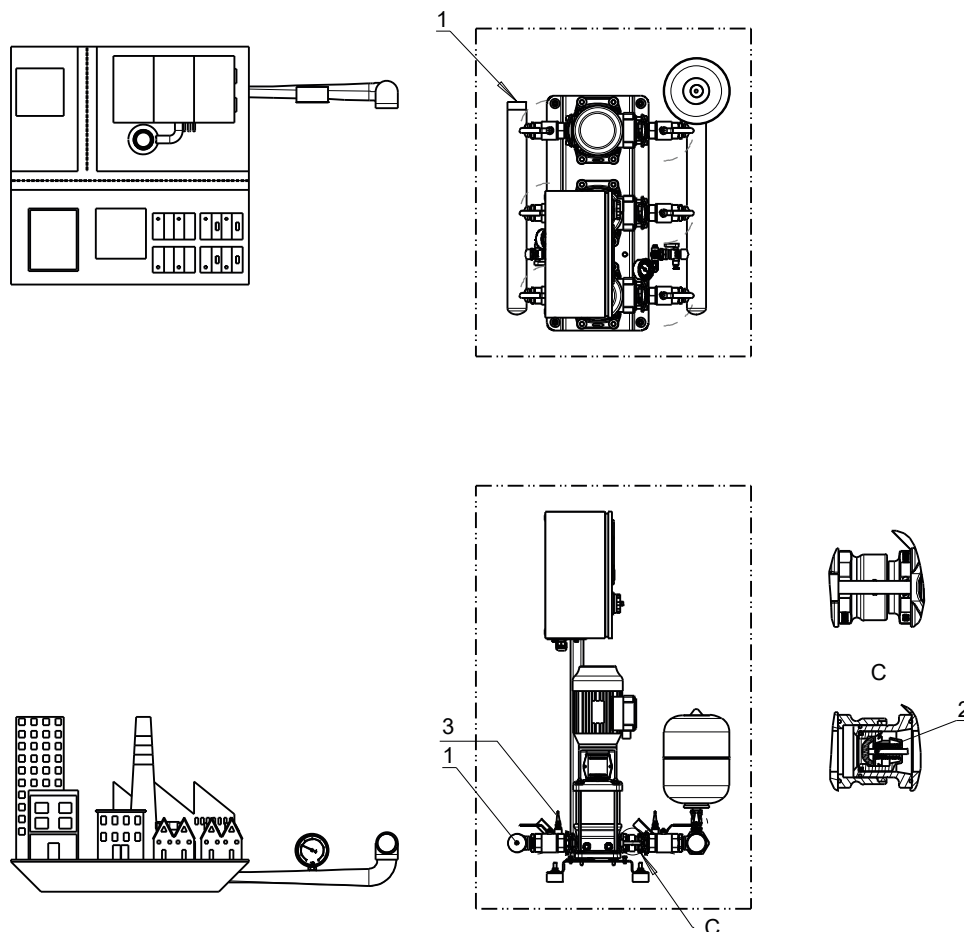
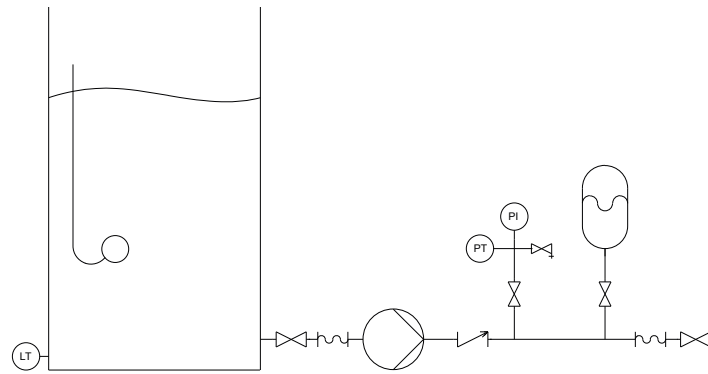


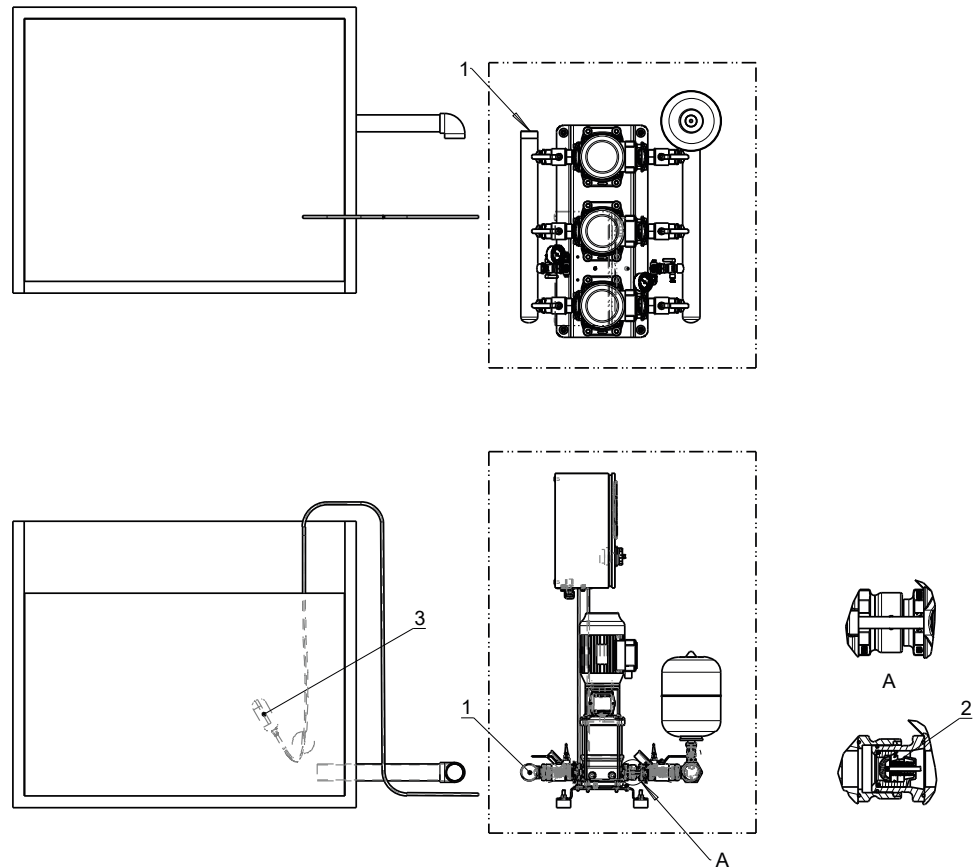
Fig. 4: Scope of supply for version M

1	Suction line (included in KSB's scope of supply)
2	Lift check valve (included in KSB's scope of supply)
3	Dry running protection (included in KSB's scope of supply)

4.8.2 Inlet conditions, version F



**Fig. 5:** F = Pressure booster system with break tank arranged on same level as pump, suction head operation

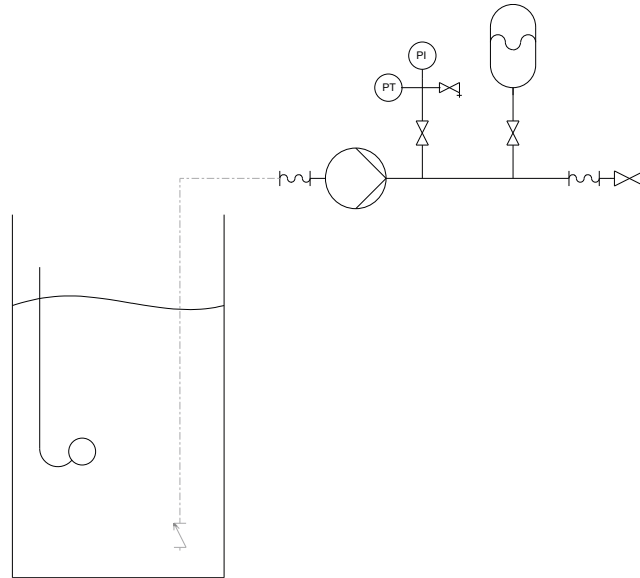


**Fig. 6:** Scope of supply, version F

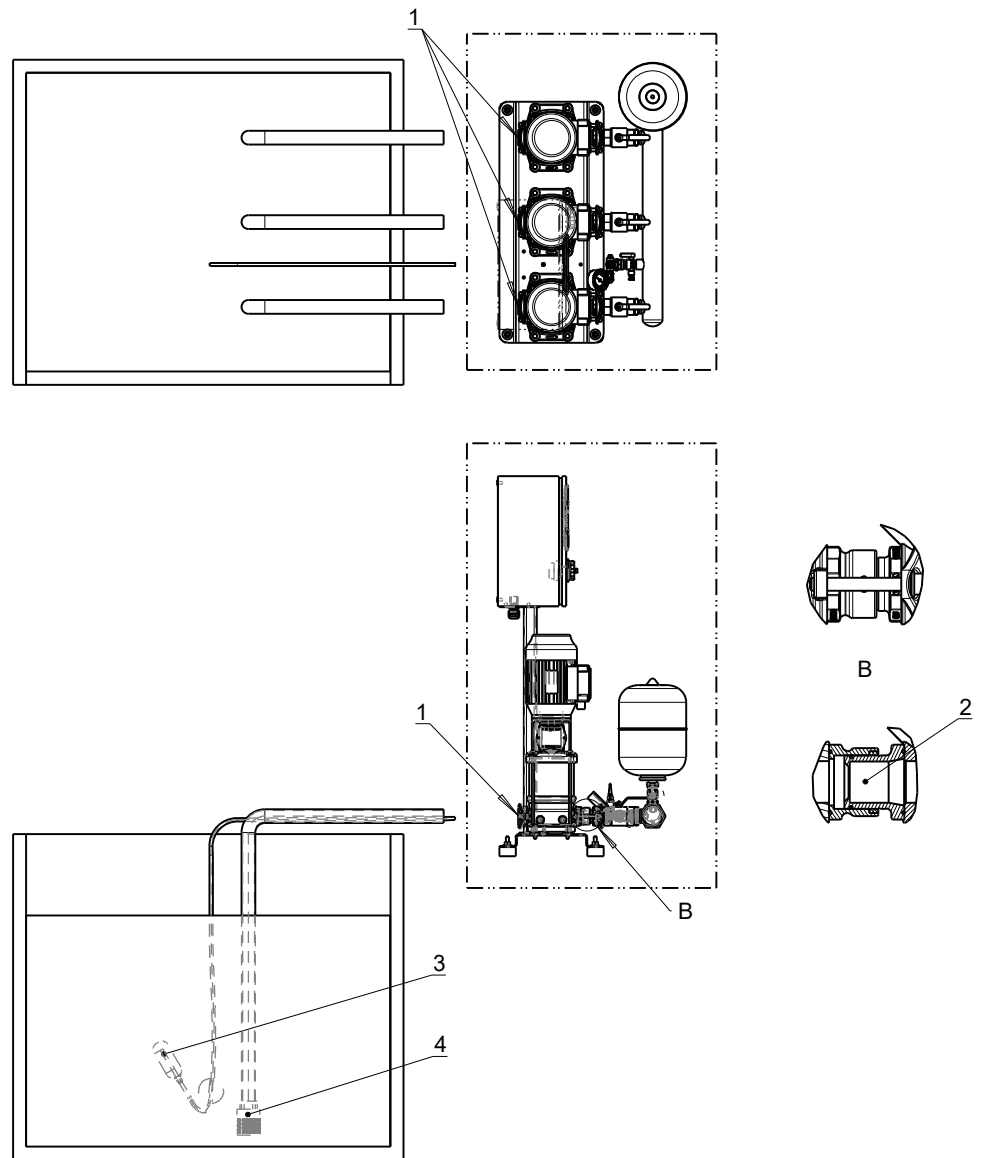
1	Suction line (included in KSB's scope of supply)
2	Lift check valve (included in KSB's scope of supply)
3	Dry running protection (not included in KSB's scope of supply)



4.8.3 Inlet conditions, version L



**Fig. 7:** L = Pressure booster system with break tank arranged at a lower level, suction lift operation



**Fig. 8:** Scope of supply, version L

1	Suction line (not included in KSB's scope of supply)
2	Lift check valve (not included in KSB's scope of supply)
3	Dry running protection (not included in KSB's scope of supply)
4	Foot valve (not included in KSB's scope of supply)

#### 4.9 Dimensions and weights

For dimensions and weights refer to the outline drawing.

#### 4.10 Terminal wiring diagram

For the terminal assignment refer to the circuit diagram.

#### 4.11 Potential equalisation

A terminal marked with the earth symbol is provided at the power connection for connecting a PE conductor.

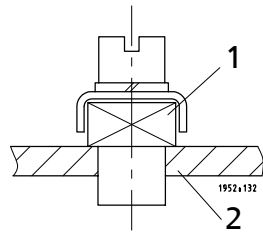


Fig. 9: PE connection

1	Earthing terminal	2	Location of power connection
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## 5 Installation at Site

### 5.1 Installation

	<p><b>⚠ WARNING</b></p>
	<p><b>Installation on a mounting surface which is unsecured and cannot support the load</b>          Personal injury and damage to property!</p> <ul style="list-style-type: none"> <li>▷ Use a concrete of compressive strength class C12/15 which meets the requirements of exposure class X0 to EN 206 .</li> <li>▷ The mounting surface must be set, even, and level.</li> <li>▷ Observe the weights indicated.</li> </ul>
	<p><b>NOTE</b></p>
	<p>Do not install pressure booster systems next to sleeping or living quarters.</p>
	<p><b>NOTE</b></p>
	<p>The anti-vibration mounts provide adequate insulation against solid-borne noise.</p>

Before beginning with the installation check the following:

- All structural work required has been checked and prepared in accordance with the dimensions in the outline drawing.
- The pressure booster system can be operated on the power supply network in accordance with the data on the name plate.
- The place of installation is frost-free.
- The place of installation can be locked.
- The place of installation is well-ventilated.
- A suitably dimensioned drain connection (e.g. leading to a sewer) is available.
- If expansion joints are used, take note of their creep resistance. Expansion joints must be easily replaceable.

The pressure booster system is designed for a maximum ambient temperature of 0 °C to +40 °C<sup>3)</sup> at a relative humidity of 50 %.

### 5.2 Installing the pressure booster system

	<p><b>⚠ WARNING</b></p>
	<p><b>Top-heavy pressure booster system</b>          Risk of personal injury by pressure booster system tipping over!</p> <ul style="list-style-type: none"> <li>▷ Pressure booster systems awaiting final installation must be secured against tipping over.</li> <li>▷ Firmly anchor the pressure booster system.</li> </ul>

<sup>3</sup> KSB Delta Primo VC: +30 °C

	<b>NOTE</b>
	<p>To prevent the transmission of piping forces and solid-borne noise, installing expansion joints with length-limiters is recommended.</p>

- ✓ The pressure booster system's packaging has been removed.
- ✓ A suitable installation site has been selected that meets the requirements.
- ✓ Sufficient clearance in all directions is provided for servicing work.
  1. Make sure that there is sufficient space for the pressure booster system.
  2. Place the pressure booster system in its correct installation position.

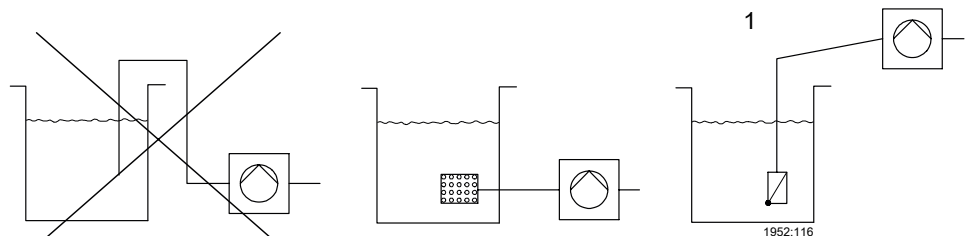
### 5.3 Mounting the accumulator

	<b>CAUTION</b>
	<p><b>Dirt in the pressure booster system</b> Damage to the pump sets!</p> <ul style="list-style-type: none"> <li>▷ Clean the accumulator before filling it.</li> </ul>

- ✓ The original operating manual of the pressure booster system is on hand.
  1. Mechanically and electrically connect the accumulator in accordance with the original operating manual supplied.

### 5.4 Connecting the piping

	<b>CAUTION</b>
	<p><b>Air pockets in suction line</b> Pressure booster system cannot prime!</p> <ul style="list-style-type: none"> <li>▷ Lay the pipe with a continuously rising slope.</li> </ul>



**Fig. 10:** Correct piping connection

1	Suction lift operation
---	------------------------

1. Mechanically support the suction head line on site to provide for absorption of mechanical forces.
2. Install the piping without transmitting any stresses and strains.
3. Connect the piping to the distribution lines on the inlet side and discharge side.

#### 5.4.1 Fitting an expansion joint (optional)

	<b>⚠ DANGER</b>
	<p><b>Sparks and radiant heat</b> Fire hazard!</p> <ul style="list-style-type: none"> <li>▷ Take suitable precautions to protect the expansion joint if any welding work is carried out.</li> </ul>

	<b>CAUTION</b>
	<p><b>Leaking expansion joint</b> Flooding of installation room!</p> <ul style="list-style-type: none"> <li>▷ Never use the expansion joint to compensate for misalignment or mismatch of the piping.</li> <li>▷ Do not apply any paint to the expansion joint.</li> <li>▷ Keep the expansion joint clean.</li> <li>▷ Regularly check for cracks or blisters, exposed fabric or other defects.</li> </ul>

- ✓ Sufficient clearance in all directions is provided for checking the expansion joint.
- ✓ The expansion joint is not insulated along with the pipeline insulation.
  1. Sufficient clearance in all directions is provided for checking the expansion joint.
  2. Install the expansion joint in the piping free of twist or distortion.
  3. Evenly tighten the bolts crosswise. The ends of the bolts must not protrude from the flange.

**5.4.2 Fitting the pressure reducer (optional)**

	<b>NOTE</b>
	<p>A pipe length of approximately 600 mm must be provided on the inlet side to accommodate a pressure reducer, if necessary.</p>

	<b>NOTE</b>
	<p>A pressure reducer must be installed if the inlet pressure fluctuation is too high for the pressure booster system to operate as intended or if the total pressure (inlet pressure and shut-off head) exceeds the design pressure.</p>

The inlet pressure ( $p_{in}$ ) varies between 4 and 8 bar. A minimum pressure gradient of 5 m is required for the pressure reducer to function properly. This means that the pressure reducer must be mounted 5 m higher than the pressure booster system. The pressure drops by about 0.1 bar per metre of height difference. Alternatively, the pressure reducer can be subjected to a pressure of 0.5 bar.

**Example**  $p_{in} = 4$  bar

Minimum pressure gradient = 5 m  $\pm$  0.5 bar




Downstream pressure: 4 bar - 0.5 bar = 3.5 bar.

- ✓ A minimum pressure gradient of 5 m is available.
  1. Install the pressure reducer in the pipe on the inlet side.

**5.5 Electrical connection**

	<b>⚠ DANGER</b>
	<p><b>Electrical connection work by unqualified personnel</b> Danger of death from electric shock!</p> <ul style="list-style-type: none"> <li>▷ Always have the electrical connections installed by a trained and qualified electrician.</li> <li>▷ Observe regulations IEC 60364 .</li> </ul>

1983.81 1/05-EN

	<p><b>⚠ WARNING</b></p> <p><b>Incorrect connection to the mains</b>            Damage to the power supply network, short circuit!</p> <p>▷ Observe the technical specifications of the local energy supply companies.</p>
	<p><b>NOTE</b></p> <p>Installing a motor protection device is recommended.</p>
	<p><b>NOTE</b></p> <p>If a residual current device is installed, observe the operating manual for the frequency inverter.</p>

**Lightning protection**

- Electrical installations must be protected against overvoltage (binding since 14 December 2018) (see DIN VDE 0100-443 (IEC 60364-4-44:2007/A1:2015, modified) and DIN VDE 0100-534 (IEC 60364-5-53:2001/A2:2015, modified)). Whenever modifications are made to existing installations, retrofitting a surge protective device (SPD) in accordance with VDE is mandatory.
- A maximum cable length of 10 metres should not be exceeded between the surge protective device (usually type 1, internal lightning protection) installed at the service entrance and the equipment to be protected. For longer cables, additional surge protective devices (type 2) must be provided in the sub-distribution board upstream of the equipment to be protected or directly in the equipment itself.
- The associated lightning protection concept must be provided by the operator or by a suitable provider commissioned by the operator. Surge protective devices can be offered for the control units on request.

**Wiring diagram**

The wiring diagrams are located in the control cabinet, which is where they must be stored.

The product literature of the switchgear and controlgear assembly supplied with the system includes a list of the electrical components installed. When ordering spare parts for electrical components, always indicate the number of the wiring diagram.

**Terminal assignment**

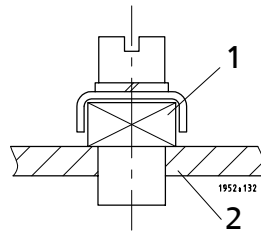
For the terminal assignment refer to the wiring diagram.

**5.5.1 Sizing the power cable**

Determine the cross-section of the power cable based on the total rated power required.

**5.5.2 Connecting the pressure booster system**

- ✓ The pressure booster system can be operated on the power supply network in accordance with the data on the name plate.
- ✓ The wiring diagram is available.
  1. Connect terminals L1, L2, L3, PE and N in accordance with the wiring plan.
  2. Connect the potential equalisation conductor on the baseplate to the terminal with the earthing symbol.



**Fig. 11:** Connecting the potential equalisation conductor

1	Earthing terminal	2	Baseplate
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3. Connect the remote ON/OFF input. (⇒ Section 5.5.3, Page 28)
4. Connect the dry running protection device. (⇒ Section 5.5.4, Page 28)
5. Connect the fire alert. (⇒ Section 5.5.5, Page 28)
6. Ambient temperature monitoring device (optional) (⇒ Section 5.5.6, Page 28) and/or connecting the digital inputs.

### 5.5.3 Connecting the remote ON/OFF input

1. Establish the connection in accordance with the wiring diagram.

### 5.5.4 Connecting the dry running protection device

- ✓ The original operating manual of the dry running protection device is on hand.
1. Fit the dry running protection device in accordance with the supplied original operating manual. Connect it in the control unit in accordance with the supplied original operating manual.

### 5.5.5 Connecting the fire alert

1. Establish the connection in accordance with the wiring diagram.

### 5.5.6 Connecting the ambient temperature monitoring device (optional)

- ✓ The original operating manual of the Pt1000 temperature sensor is on hand.
1. Fit temperature sensor Pt1000 in a suitable place in the installation room in accordance with the original operating manual.
  2. Establish the connection in accordance with the wiring diagram.



## 6 Commissioning/Start-up/Shutdown

### 6.1 Commissioning/Start-up

#### 6.1.1 Prerequisites for commissioning/start-up

	<b>CAUTION</b>
	<p><b>Pump set running dry</b>            Damage to the pump set/pressure booster system!</p> <ul style="list-style-type: none"> <li>▷ Use dry running protection. If the dry running protection terminal is disabled by means of a bridge, the operator shall assume responsibility for any dry running that might occur.</li> </ul>

Ensure that the following requirements are met prior to commissioning/start-up :

- The pressure booster system has been flushed and disinfected in accordance with local requirements.
- The pressure booster system has been properly connected to the electric power supply and is equipped with all protection devices.
- All relevant VDE standards and/or regulations applicable in the country of use are complied with.
- The dry running protection device has been installed. (⇒ Section 5.5.4, Page 28)

#### 6.1.2 Priming and venting the pressure booster system

	<b>CAUTION</b>
	<p><b>Foreign matter in the piping</b>            Damage to the pump / pressure booster system!</p> <ul style="list-style-type: none"> <li>▷ Before commissioning/starting up or functional check running the pressure booster system, make sure that there is no foreign matter in the pressure booster system or piping.</li> </ul>

	<b>CAUTION</b>
	<p><b>Operation without the fluid to be handled</b>            Damage to the pump sets!</p> <ul style="list-style-type: none"> <li>▷ Prime the pressure booster system with the fluid to be handled.</li> </ul>

	<b>NOTE</b>
	<p>Prior to its delivery, the pressure booster system will be tested hydraulically with water and then drained again. For technical reasons the presence of some residual water is unavoidable.</p> <p>Prior to commissioning/start-up observe EN 806. After prolonged standstill periods, flushing or professional disinfection is recommended. For extensive or branched piping systems, flushing the pressure booster system can be restricted to a limited area.</p>

	<b>NOTE</b>
	<p>Minor leakage of the mechanical seals during commissioning is normal and will cease after a short period of operation.</p>

Have commissioning carried out by specialist KSB staff.

- ✓ The original operating manual of the pump set is on hand.
- ✓ The pipe unions between the pump set and the piping have been re-tightened.
- ✓ Flange connections have been firmly tightened.
- ✓ The cooling air inlet openings and cooling air outlet openings at the motor are unobstructed.
- ✓ All shut-off valves are open.
- ✓ The pre-charge pressure of the accumulator has been checked.  
(⇒ Section 8.2.4, Page 44)
- ✓ The minimum flow rate has been observed. (⇒ Section 6.2.5, Page 33)
  1. Set the master switch to 0; unlock all motor protection switches (if applicable).
  2. Provide connection to power supply.
  3. Open the vent plugs at the pump set in accordance with the supplied original operating manual of the pump set.
  4. Slowly open the inlet-side shut-off valve and prime the pressure booster system until the fluid to be handled escapes through the vent holes.
  5. Close and slightly tighten the pump vent plugs.
  6. Switch on all motor protection switches.
  7. If fitted, set the manual-0-automatic selector switches to “automatic”.
  8. Switch on the master switch.
  9. Open the discharge-side valve.
  10. When all pump sets have been run once, loosen the vent plugs again to let any remaining air escape while the pump is switched off.
  11. Close the vent plug.
  12. Check that the pump sets are running smoothly.
  13. Close the discharge-side valve in order to verify whether the pump sets reach the maximum shut-off head.
  14. Open the discharge-side valve.
  15. Set the dry running protection device.


### 6.1.3 Dry running protection

Pressure booster systems are fitted with a pressure transmitter as dry running protection device.

A float switch whose volt-free contact closes the circuit in upper float position can be connected to the control system as dry running protection. Follow the float switch manufacturer's instructions on how to set the float switch levels.

### 6.1.4 Switching on the pressure booster system

- ✓ The pressure booster system has been primed and vented.  
(⇒ Section 6.1.2, Page 29)
    1. Switch on the master switch.
- ⇒ The green LED lights up and signals the system's readiness for operation.

	<b>CAUTION</b>
	<p><b>Pressure booster system not set to requirements</b> Damage to the pump/pressure booster system!</p> <ul style="list-style-type: none"> <li>▷ Adjust the settings of the pressure booster system to the pressure conditions at the site.</li> <li>▷ Set the functions as required.</li> </ul>

6.1.5 Checklist for commissioning/start-up

Table 10: Checklist

Actions	Done
1 Read the operating manual.	
2 Verify the power supply against the name plate data.	
3 Check the earthing system (taking measurements).	
4 Check the mechanical connection to the water mains. Re-tighten the flange bolting and pipe unions.	
5 Prime and vent the pressure booster system from the inlet side.	
6 Check the inlet pressure.	
7 Check whether all cables are still firmly connected to the terminals inside the control unit.	
8 Compare the set values of the motor protection switches with the name plate data; if required, readjust.	
9 Briefly start up one pump after the other in manual mode and compare the direction of rotation at the fanwheel with the arrow indicating the direction of rotation.	
10 Check the start and stop pressure; re-adjust if necessary.	
11 Check that the dry running protection equipment is working properly.	
12 Vent the pumps for a second time after they have been running for 5 to 10 minutes.	
13 Check the pre-charge pressure of the (membrane-type) accumulator.	
14 Record all system conditions that do not correspond to our specifications or to the purchase order in the commissioning report (i.e. no dry running protection or inlet pressure + max. pressure of pressure booster system higher than 16 bar).	
15 Complete the commissioning report together with the operator/user and instruct the operator/user as to the function of the unit.	

### 6.2 Operating limits

	<b>⚠ DANGER</b>
	<p><b>Non-compliance with operating limits</b> Damage to the pump set!</p> <ul style="list-style-type: none"> <li>▷ Comply with the operating data indicated in the data sheet.</li> <li>▷ Avoid operation against a closed shut-off element.</li> <li>▷ Never operate the pump set outside the limits specified below.</li> </ul>
	<b>⚠ DANGER</b>
	<p><b>Non-compliance with operating limits for the fluid handled</b> Explosion hazard!</p> <ul style="list-style-type: none"> <li>▷ Never use the pump to handle different fluids which might react chemically with each other.</li> <li>▷ Never use the pump to handle a flammable fluid with a fluid temperature above the ignition temperature.</li> </ul>

#### 6.2.1 Frequency of starts

To prevent high temperature increases in the motor and impermissible loads on the pump, motor, seals and bearings, do not exceed a certain number of starts per hour. See original operating manual of the pump sets.

#### 6.2.2 Ambient conditions

Observe the following parameters and values during operation:

**Table 11:** Permissible ambient conditions

Ambient condition	Value
Ambient temperature	0 °C to +40 °C <sup>4)</sup>
Relative humidity	50 % maximum

#### 6.2.3 Maximum operating pressure

	<b>CAUTION</b>
	<p><b>Permissible operating pressure exceeded</b> Damage to connections and seals!</p> <ul style="list-style-type: none"> <li>▷ Never exceed the operating pressure specified in the data sheet.</li> </ul>

The maximum operating pressure equals 16, 25 or 40 bar, depending on the design variant. See name plate.

#### 6.2.4 Fluid handled

##### 6.2.4.1 Permissible fluids to be handled

- Clean fluids not chemically or mechanically aggressive to the pump materials
- Drinking water
- Service water
- Cooling water

<sup>4</sup> VC: Maximum ambient temperature 30°C

### 6.2.4.2 Fluid temperature

**Table 12:** Temperature limits of the fluid handled

Permissible fluid temperature	Value
Maximum	+60 °C +25 °C to DIN 1988 (DVGW) <sup>5</sup>
Minimum	0 °C

### 6.2.5 Minimum flow rate

**Table 13:** Minimum flow rate per pump in manual mode

Size	Minimum flow rate per pump
	[l/h]
Movitec 2B	200
Movitec 4B	400
Movitec 6B	600
Movitec 10B	1100
Movitec 15C	1900
Movitec 25B	2800
Movitec 40B	4600
Movitec 60B	6100
Movitec 90B	8500
Movitec 125B	12500

## 6.3 Shutdown

### 6.3.1 Shutdown

#### Standard design

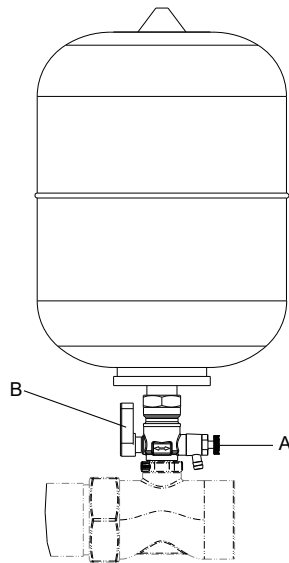
1. Set the master switch to 0.

#### Additional instruments

1. Set manual-0-automatic selector switch to 0.

<sup>5</sup> Applies to the handling of drinking water (Germany and the Netherlands only)

6.3.2 Measures to be taken for shutdown



**Fig. 12:** Venting and draining the accumulator

A	Vent plug
B	Ball valve lever

- ✓ The pressure booster system has been switched off. (⇒ Section 6.3.1, Page 33)
  1. Turn the ball valve lever B by 45 degrees.
  2. Open vent plug A at the accumulator.
    - ⇒ The pressure booster system is being vented and drained.
  3. Close vent plug A at the accumulator.
  4. Turn the ball valve lever B back into open position (upwards).

## 7 Operation

### 7.1 Control panel

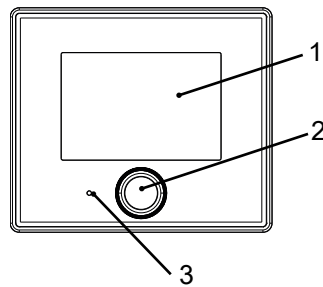


Fig. 13: Control panel

1	Screen (⇒ Section 7.1.1, Page 35)
2	Turn/push button (⇒ Section 7.1.2, Page 35)
3	Status LED (⇒ Section 7.1.3, Page 35)

#### 7.1.1 Screen

To save power the screen is turned off automatically.

To turn on the screen push or turn the turn/push button arranged below the screen.

If a message is active, the screen also lights up and displays the current message ID as well as the system status.

#### 7.1.2 Turn/push button

The turn/push button serves to make a selection on the screen. The initial movement of the turn/push button activates its function. The symbol selected on the screen flashes briefly.

**Starting point** The starting symbol is always the lock/unlock symbol.

**Turning the turn/push button** Turning the turn/push button makes all selectable symbols flash one after the other in a specific sequence, depending on the system configuration.

After the flashing cycle of all selectable symbols has been completed, the selection returns to the lock/unlock symbol.

To increase a value turn the turn/push button clockwise. To decrease a value turn the turn/push button anti-clockwise.

**Pressing the turn/push button** A selected symbol can be confirmed by pressing the turn/push button.

Depending on the symbol, a setting is displayed or a selection can be made.

#### 7.1.3 Status LED

When the screen is not lit, the status LED shows that the system is energised and that the control unit is in operation. The LED is only lit when the screen is not. Based on a traffic light system, the colour indicates the system status.

Table 14: Explanation of the status LED

Colour of the status LED		Description
	Green (flashing)	System in operation, no messages are active.
	Green (continuous)	One or more information messages are active.

Colour of the status LED	Description
	Yellow (continuous) One or more warning messages are active (as well as any messages of a lower priority).
	Red (continuous) One or more alert messages are active (as well as any messages of a lower priority).

### 7.2 Symbols on the screen

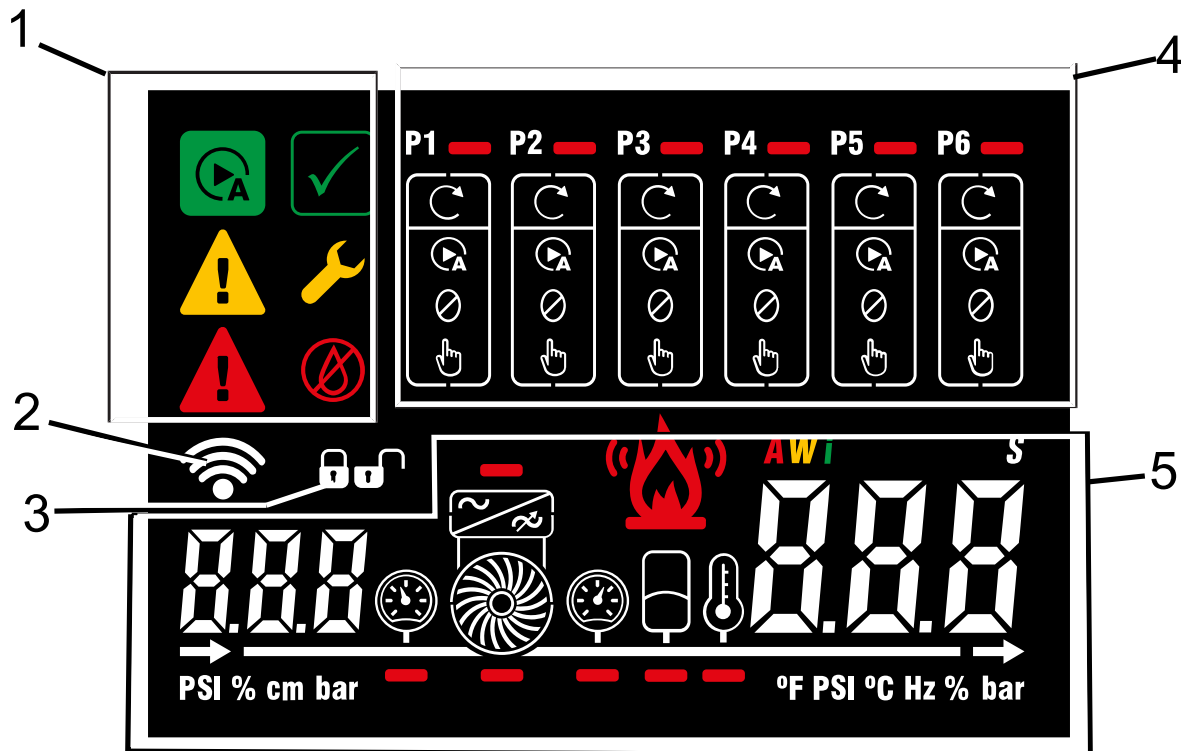


Fig. 14: Overview of all symbols on the screen

1	Operating status of the system (⇒ Section 7.2.1, Page 36)	2	Status of the Bluetooth connection
3	Locking/unlocking the screen	4	Operating status of the pump
5	Information on the system		

#### 7.2.1 Operating status of the system

Table 15: Symbols for the operating status of the system

Symbol	Description
	Status OK No warning messages or alert messages are active. Information messages may be present. The system is running without any problems.
	Warning One or more warning messages are active (as well as any messages of a lower priority).



Symbol		Description
	Alert	One or more alert messages are active (as well as any messages of a lower priority).
	Manual reset possible	A message is active, waiting to be manually reset by the operator. To manually reset the message, unlock the display and select this symbol.
	Servicing required	The service interval timer has detected that the control unit has not been serviced within the defined interval.
	Lack of water	Lack of water has been detected. For more information see Section 11, list of messages, message 800.

### 7.2.2 Bluetooth connection

Table 16: Bluetooth connection status symbols

Symbol		Description
 Flashing	Looking for Bluetooth connection	The control unit has activated the wireless connection and is waiting for a request for connection.
 Continuous	Connected to the Bluetooth connection of a smartphone or tablet	The control unit is currently connected.
	Bluetooth connection disabled	The Bluetooth connection has been disabled. To activate it, press the turn/push button for five seconds.

### 7.2.3 Locking/unlocking the screen

Table 17: Symbols for locking/unlocking the screen

Symbol		Description
	Screen settings locked	No settings can be made but information can still be displayed, e.g. pump load. Error messages are limited to the selected part.
	Screen settings unlocked	Changes can be made on the screen.

### 7.2.4 Operating status of the pump

The following symbols are displayed per pump set in the system. E.g. for a system with four pump sets, P1, P2, P3 and P4 are displayed.

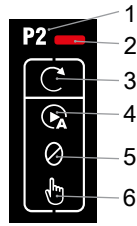


Fig. 15: Operating status of pump set P2

Table 18: Pump operating status symbols

Position	Refers to	Description
1	Pump set in the system	Symbols for a specific pump set (in this example pump set 2)
2	Active messages	One or more warning messages or alert messages are active for pump set 2.
3	Pump set running	Indicates whether the pump set is currently running. This symbol is extinguishes when the pump set has been stopped or is in idle state.
4	Automatic mode	The pump set is started up and stopped via the control unit (F system) or via a frequency inverter (VC and SVP systems).
5	Manual OFF	Pump start-up is locked. If a pump set is running, it will be stopped.
6	Manual ON	The pump set is started up manually. In the case of an F system, the pump is started up. In the case of a VC or SVP system, the pump starts running at a fixed frequency (fixed speed). The fixed frequency can be configured.

7.2.5 Information on the system

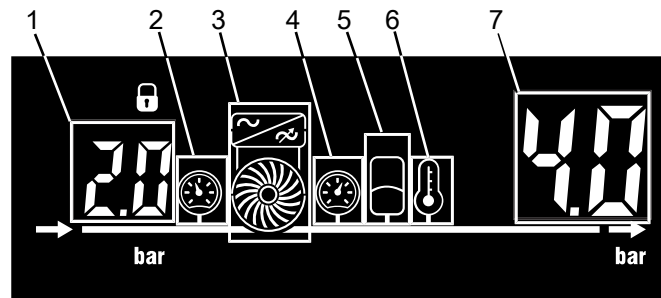


Fig. 16: Information on the system

Table 19: Symbols for information on the system

Position	Refers to	Description
1	Display for suction-side sensors	Depending on the connected sensors the following values are displayed: <ul style="list-style-type: none"> <li>▪ <b>Version with pressure gauge:</b> Displays the pressure at the inlet of the pressure booster system.</li> <li>▪ <b>Version with pressure switch / float switch / flow monitor:</b> Displays the digital input signal Hi or Lo.</li> </ul> If several sensors are used, the values are displayed alternately. <ul style="list-style-type: none"> <li>▪ PIN display <ul style="list-style-type: none"> <li>– For connecting the control unit to the mobile device. (The complete PIN is composed of this PIN and the PIN in position 7.)</li> </ul> </li> <li>▪ Display of the firmware version (The total firmware version is composed of the numbers in this position and in position 7.)</li> </ul>
2	Suction-side sensor	The corresponding values are shown in position 1. The corresponding messages are shown in position 7.

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Position	Refers to	Description
3	Display for the pump(s)	<p>If applicable, a frequency inverter is displayed in the upper area.</p> <ul style="list-style-type: none"> <li>The corresponding messages are shown in position 7.</li> </ul> <p>The pump is displayed in the lower area. The impeller vanes of the pump displayed rotate when one or several pump sets in the system are running.</p> <ul style="list-style-type: none"> <li>The corresponding messages are shown in position 7.</li> </ul>
4	Discharge-side sensor	The corresponding values and messages are shown in position 7.
5	Accumulator	The corresponding messages are shown in position 7.
6	Temperature measurement	The corresponding values and messages are shown in position 7.
7	Display for the discharge side	<ul style="list-style-type: none"> <li>Displays information on the selected pump set <ul style="list-style-type: none"> <li>Pump load</li> <li>Pump speed</li> <li>Pump-specific messages</li> </ul> </li> <li>Displays information on the pressure booster system <ul style="list-style-type: none"> <li>Discharge-side pressure</li> <li>Temperature</li> <li>Messages</li> </ul> </li> <li>PIN display <ul style="list-style-type: none"> <li>For connecting the control unit to the mobile device. (The complete PIN is composed of this PIN and the PIN in position 1.)</li> <li>When the screen is unlocked</li> </ul> </li> <li>Display of the firmware version. (The complete firmware version is composed of this number and the number in position 1)</li> </ul>

### 7.3 Operating the device via the control panel


The following functions are available on the control panel of the control unit:

- Unlocking the screen (⇒ Section 7.3.1, Page 39)
- Changing the operating mode (⇒ Section 7.3.2, Page 40)
- Resetting messages (⇒ Section 7.3.3, Page 40)
- Setting the setpoint (⇒ Section 7.3.4, Page 40)
- Activating the Bluetooth connection (⇒ Section 7.3.5, Page 40)
- Displaying the firmware version (⇒ Section 7.3.6, Page 41)

#### 7.3.1 Unlocking the screen

When the screen is locked, no settings can be made. In this state, only information can be displayed.

- Turn the turn/push button to select the *Locking/unlocking the screen* symbol. Then press the turn/push button.
  - ⇒ The symbol flashes.
- Turn the turn/push button to select the *Open padlock* symbol. Then press the turn/push button.
- Set the password to unlock the screen in the bottom right of the display. To do so, turn the turn/push button to select the required number for each digit. Press the turn/push button to confirm.

	<b>NOTE</b>
	The factory default password for unlocking the screen is 100. It can be changed via the app.

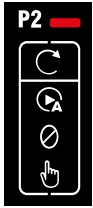


Fig. 17: Information on the pump

### 7.3.2 Changing the operating mode

- ✓ The screen has been unlocked. (⇒ Section 7.3.1, Page 39)
  1. Select the symbol of the required pump, e.g. *Pump 1*. Press the turn/push button.
    - ⇒ The symbol of the current operating mode of this pump set starts flashing.
  2. Turn the turn/push button to select the symbol of the required operating mode.
  3. Press the turn/push button to confirm your selection.

### 7.3.3 Resetting messages

If a message is active for a part of the pressure booster system, a red bar is displayed next to the corresponding symbol.

If a message is active, the corresponding ID is displayed at the bottom right. (⇒ Section 10.3, Page 81) If several messages are active, the corresponding IDs are displayed alternately.

All messages can be reset at once via the control unit.

If individual messages need to be reset, this can only be done via the app.

- ✓ The screen has been unlocked. (⇒ Section 7.3.1, Page 39)
  1. Select the *Manual reset possible* symbol. Press the turn/push button.
    - ⇒ All active messages are reset.

Messages that need to be reset manually can only be reset when their cause has been eliminated.



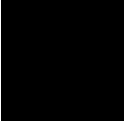
### 7.3.4 Setting the setpoint

The setpoint serves to select the required discharge-side pressure. The setpoint has to be set at the discharge-side sensor. (⇒ Section 7.2.5, Page 38)

- ✓ The screen has been unlocked. (⇒ Section 7.3.1, Page 39)
  1. Select the *Discharge-side sensor* symbol. Press the turn/push button.
    - ⇒ Position 7 flashes and displays an S as well as the current setpoint.
  2. Turn the turn/push button to adjust the displayed setpoint in increments of 0.1.
  3. Press the turn/push button to confirm the displayed setpoint.

### 7.3.5 Activating the Bluetooth connection

Table 20: Bluetooth connection status symbols

Symbol	Description	Description
 Flashing	Looking for Bluetooth connection	The control unit has activated the wireless connection and is waiting for a request for connection.
 Continuous	Connected to the Bluetooth connection of a smartphone or tablet	The control unit is currently connected.
	Bluetooth connection disabled	The Bluetooth connection has been disabled. To activate it, press the turn/push button for five seconds.

1. Press the turn/push button for a minimum of 5 seconds.
  - ⇒ The *Bluetooth connection* symbol flashes. (⇒ Section 7.2.2, Page 37)

While the *Bluetooth connection* symbol flashes, the control unit can be connected to a wireless device.

An existing connection is displayed by a continuously lit *Bluetooth connection* symbol on the screen.

If no connection is established, the flashing *Bluetooth connection* symbol extinguishes after some time.

#### 7.3.6 Displaying the firmware version

To display the firmware version (⇒ Section 7.2.5, Page 38) , proceed as follows.

1. Turn the turn/push button to select the *Locking/unlocking the screen* symbol. Then press the turn/push button.
  - ⇒ The symbol flashes.
2. Turn the turn/push button to select the *Servicing required* symbol.
  - ⇒ The firmware version is displayed on the bottom left and bottom right.





#### 7.4 Operation via the app

Further configurations can only be made via the KSB Delta FlowManager app.

The app is available in the App Store or Google Play.

## 8 Servicing/Maintenance

### 8.1 General information/safety regulations

	<p><b>⚠ DANGER</b></p> <p><b>Unintentional start-up of pressure booster system</b>            Danger to life!</p> <ul style="list-style-type: none"> <li>▷ De-energise the pressure booster system for any repair work or servicing work.</li> <li>▷ Ensure that the pressure booster system cannot be re-energised unintentionally.</li> </ul>
	<p><b>⚠ WARNING</b></p> <p><b>Improper lifting/moving of heavy assemblies or components</b>            Personal injury and damage to property!</p> <ul style="list-style-type: none"> <li>▷ Use suitable transport devices, lifting equipment and lifting tackle to move heavy assemblies or components.</li> </ul>
	<p><b>⚠ WARNING</b></p> <p><b>Unqualified personnel performing work on the pressure booster system</b>            Risk of personal injury!</p> <ul style="list-style-type: none"> <li>▷ Always have repair and maintenance work performed by specially trained, qualified personnel.</li> </ul>
	<p><b>CAUTION</b></p> <p><b>Incorrectly serviced pressure booster system</b>            Function of pressure booster system not guaranteed!</p> <ul style="list-style-type: none"> <li>▷ Regularly service the pressure booster system.</li> <li>▷ Prepare a maintenance schedule for the pressure booster system, with special emphasis on lubricants, shaft seals and pump couplings.</li> </ul>

The operator ensures that maintenance, inspection and installation are performed by authorised, qualified specialist personnel who are thoroughly familiar with the manual.

- Observe the safety instructions and information.
- For any work on the pump (set) observe the operating manual of the pump (set).
- In the event of damage you can always contact KSB Service.
- A regular maintenance schedule will help avoid expensive repairs and contribute to trouble-free, reliable operation with a minimum of maintenance expenditure and work.
- Never use force when dismantling and reassembling the equipment.

#### 8.1.1 Inspection contract

For inspection work and servicing work we recommend the KSB inspection contract. Contact your service partner for details.

## 8.2 Servicing/inspection

### 8.2.1 Supervision of operation

	<b>CAUTION</b>
	<p><b>Increased wear due to dry running</b>            Damage to the pump set!</p> <ul style="list-style-type: none"> <li>▷ Never operate the pump set without liquid fill.</li> <li>▷ Never close the shut-off element in the suction line and/or supply line during pump operation.</li> </ul>
	<b>CAUTION</b>
	<p><b>Impermissibly high temperature of fluid handled</b>            Damage to the pump!</p> <ul style="list-style-type: none"> <li>▷ Prolonged operation against a closed shut-off element is not permitted (heating up of the fluid).</li> <li>▷ Observe the temperature limits in the data sheet and in the section on operating limits.</li> </ul>

While the pump is in operation, observe and check the following:

- If activated, check the functional check run.
- Measure the actual start-up pressure and stop pressure of the pump sets with a pressure gauge. Compare the values with the specifications on the name plate.
- Compare the pre-charge pressure of the accumulator with the recommended data. (⇒ Section 8.2.4, Page 44)
- Check the rolling element bearings for running noises.  
 Vibrations, noise and an increase in current input occurring during unchanged operating conditions indicate wear.
- Monitor the functions of auxiliary connections, if any.

### 8.2.2 Checklist for inspection work

In the event that you decide to conduct your own inspections, proceed according to the following checklist at least once a year:

1. Check the pump and drive for smooth running and the mechanical seal for integrity.
2. Check the shut-off, drain and check valves for proper functioning and tightness.
3. Clean the strainer in the pressure reducer (if applicable).
4. Check the expansion joints (if any) for wear.
5. Verify the pre-charge pressure and, if required, check the accumulator for integrity. (⇒ Section 8.2.4, Page 44)
6. Check the automatic switching functionality.
7. Check the start and stop points of the pressure booster system.
8. Check the water inflow, lack-of-water monitoring and pressure reducer.



### 8.2.3 Maintenance schedule

**Table 21:** Overview of maintenance work

Maintenance interval	Servicing/maintenance work
At least once a year	Check the pump sets for smooth running and the mechanical seal for integrity.
	Check the shut-off elements, drain valves and check valves for proper functioning and tightness.
	If fitted, clean the strainer in the pressure reducer.

Maintenance interval	Servicing/maintenance work
At least once a year	If fitted, check the expansion joints for any wear.
	Verify the pre-charge pressure. Check the accumulator for integrity. (⇒ Section 8.2.4, Page 44)
	Check the automatic switching functionality.
	Check the cut-in levels and cut-out levels.
	Check the inflow, inlet pressure, dry running protection, flow monitoring and pressure reducer.

### 8.2.4 Setting the pre-charge pressure

	<b>! WARNING</b>
	<b>Wrong gas</b> Danger of poisoning! ▷ Use only nitrogen as cushion gas of the membrane-type accumulator.
	<b>CAUTION</b>
	<b>Pre-charge pressure too high</b> Damage to the accumulator! ▷ Observe the manufacturer's product literature (see name plate or operating manual of the accumulator).

The accumulator's pre-charge pressure ( $p$ ) must be lower than the set start-up pressure ( $p_E$ ) of the pressure booster system.

The best storage volumes are achieved with the following settings (mean value):

- Value 0.9 at start-up pressure > 3 bar
- Value 0.8 at start-up pressure < 3 bar

**Example 1**  $p_E = 5$  bar

$$5 \text{ bar} \times 0.9 = 4.5 \text{ bar}$$

With a start-up pressure of 5 bar the pre-charge pressure of the accumulator must be 4.5 bar.

**Example 2**  $p_E = 2$  bar

$$2 \text{ bar} \times 0.8 = 1.6 \text{ bar}$$

With a start-up pressure of 2 bar the pre-charge pressure of the accumulator must be 1.6 bar.

#### Checking the pre-charge pressure



1. Close the shut-off elements fitted underneath the membrane-type accumulator.
2. Drain the membrane-type accumulator via the drain valve.
3. Remove and store the protective cap of the membrane-type accumulator valve.
4. Check the pre-charge pressure using suitable equipment (e.g. tyre pressure gauge).
5. Fit the protective cap of the membrane-type accumulator valve.

#### Filling the membrane-type accumulator

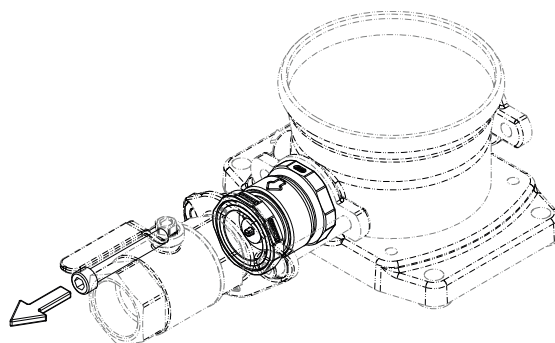
1. Remove and store the protective cap of the membrane-type accumulator valve.
2. Add nitrogen through the valve.
3. Fit the protective cap of the membrane-type accumulator valve.



8.2.5 Replacing the non-return valve

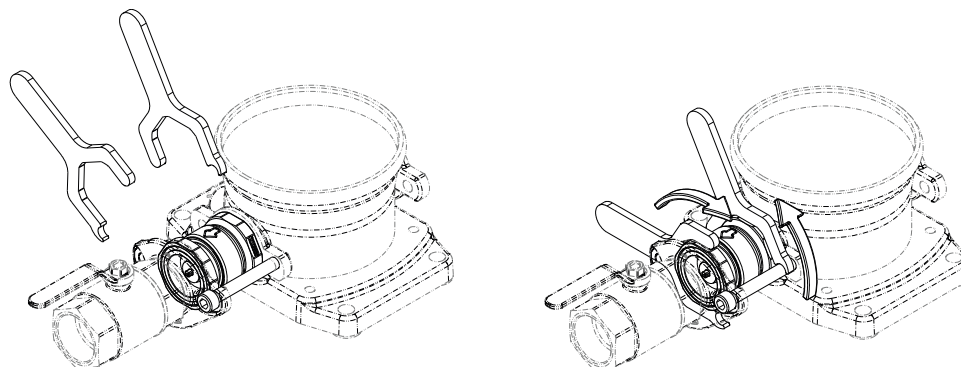
	 <b>DANGER</b>
	<p><b>Voltage at the pressure booster system</b>            Danger to life!</p> <p>▸ Prior to opening the device, wait at least 10 minutes for any residual voltage to dissipate.</p>

1. De-energise the pump set and secure it against unintentional start-up. Comply with the local regulations.
2. Close the shut-off valve of the pump.
3. Place a suitable container under the drain connection.
4. Open the drain connections. To do so, observe the pump's operating manual.



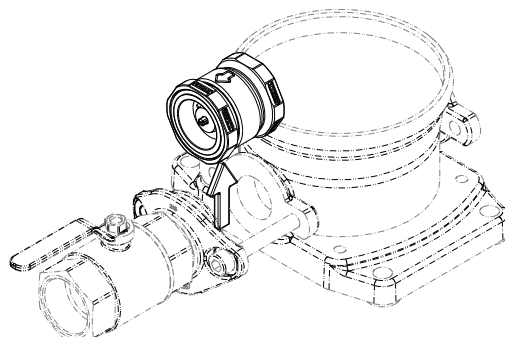
**Fig. 18:** Removing the screw

5. Remove the screw.



**Fig. 19:** Screwing the valve's body parts into each other

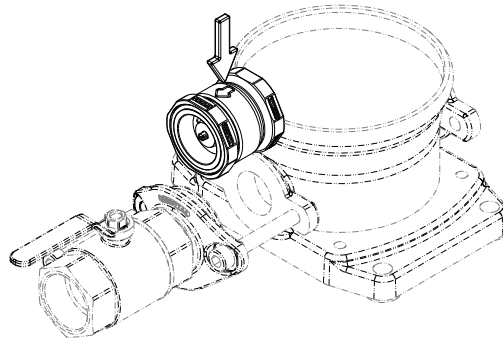
6. Use a suitable tool to screw the body parts of the non-return valve into each other to shorten the length of the body.



**Fig. 20:** Removing the body

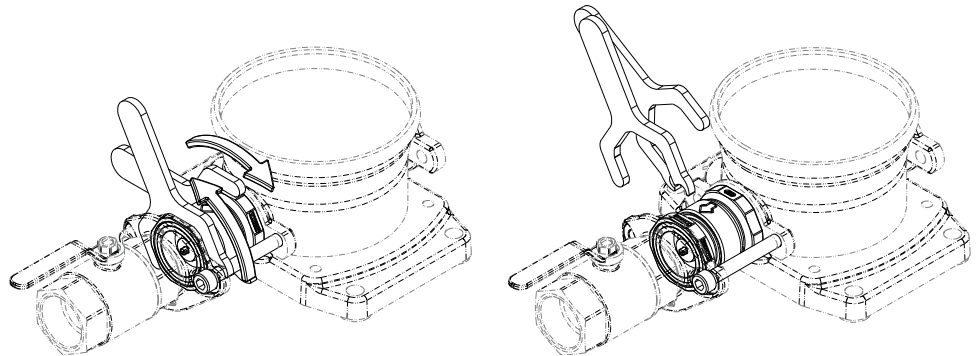
7. Remove the body of the non-return valve.
8. Remove the insert check valve including O-rings.
9. Remove excessive contamination or deposits with a clean cloth.

10. Re-insert the insert check valve into the body. Apply lubricant to new O-rings. See table below.



**Fig. 21: Mounting the body**

11. Mount the body of the non-return valve.



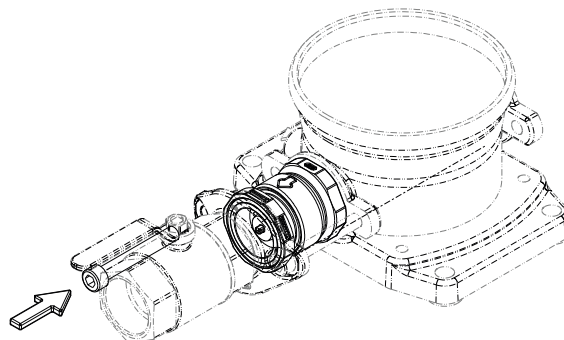
**Fig. 22: Loosening the screwed connection of the body parts**

12. Use a suitable tool to loosen the screwed connection of the body parts of the non-return valve to extend the body length.



**Fig. 23: Verifying the alignment**

13. Verify the correct alignment.



**Fig. 24: Fitting the screw**

14. Fit and tighten the screw.
15. Close the drain plugs of the pump. Properly dispose of the fluid collected.
16. Slowly open the shut-off valve and check for any leakage.

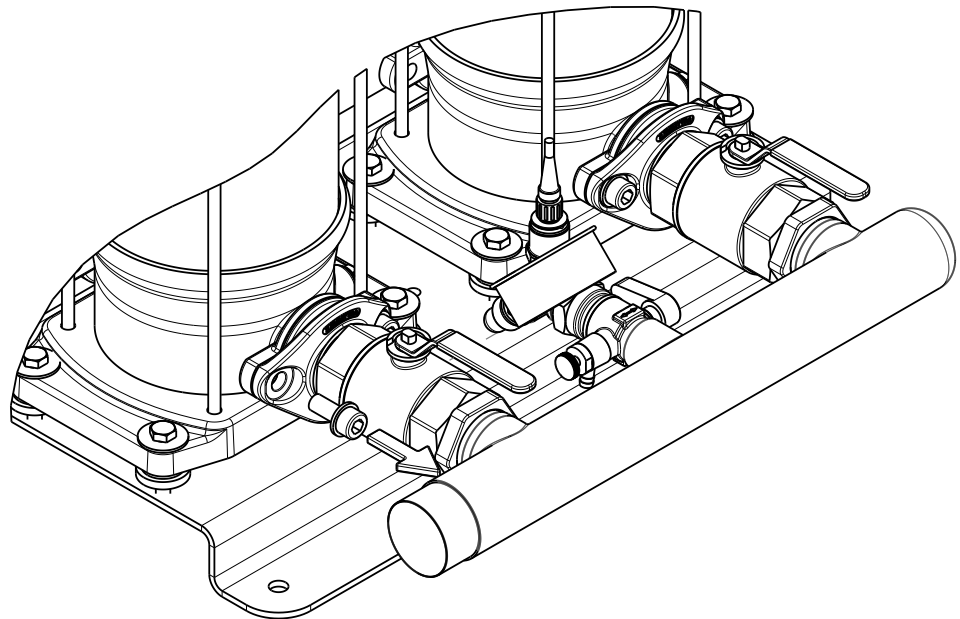
**Table 22:** Spare parts for servicing non-return valves, per pump

Material number	Description	Non-return valve	O-rings	O-ring lubricant (non-water soluble)
71630405	ER non-return valve DN 32	Watts Industries IN 032 DN 32	1x Eriks 12711456 2x Eriks 12711457	Molykote® G-5511 <sup>6)</sup>
71630410	ER non-return valve DN 50	Watts Industries IN 050 DN 50	1x Eriks 12192264 2x Eriks 12711459	

**8.2.6 Mounting the manifold in a mirrored position**

	<b>DANGER</b>
	<p><b>Voltage at the pressure booster system</b>                  Danger to life!</p> <p>▸ Prior to opening the device, wait at least 10 minutes for any residual voltage to dissipate.</p>

1. De-energise the pump set and secure it against unintentional start-up. Comply with the local regulations.
2. Close the shut-off valves in the discharge line and suction line of the pressure booster system.
3. Place a suitable container under the drain connections.
4. Open the drain connections. To do so, observe the pump's operating manual.



**Fig. 25:** Removing the bolts

5. Remove the tie bolts between the two oval flanges and the pumps.

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<sup>6)</sup> Sealant for taps

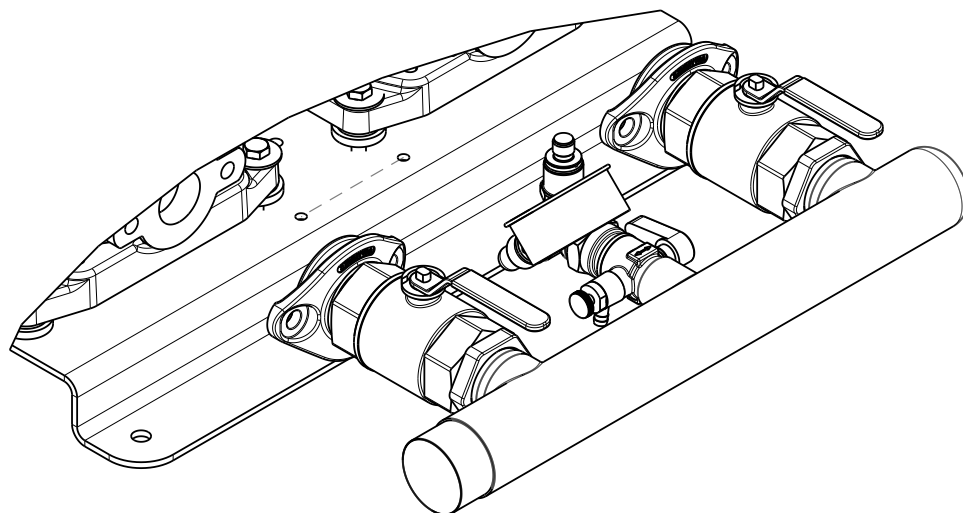


Fig. 26: Removing the manifold

6. Remove the entire manifold (with shut-off valves).

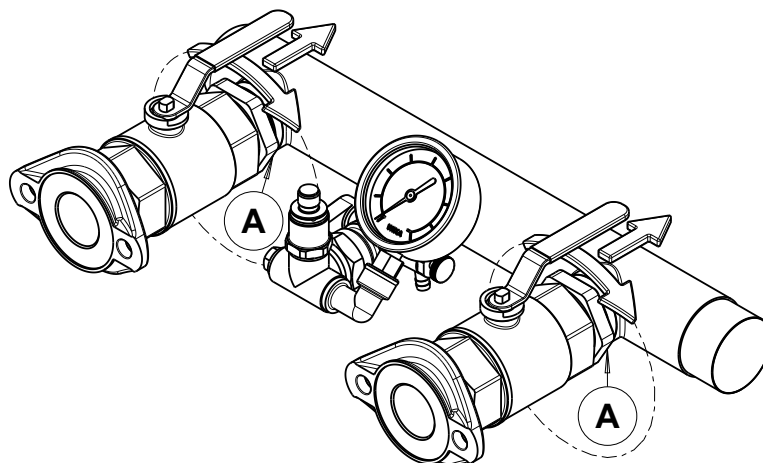


Fig. 27: Loosening the EF locknut

A	EF locknut
---	------------

7. Undo the EF locknut at both shut-off valves by half a turn. The O-ring is now exposed.

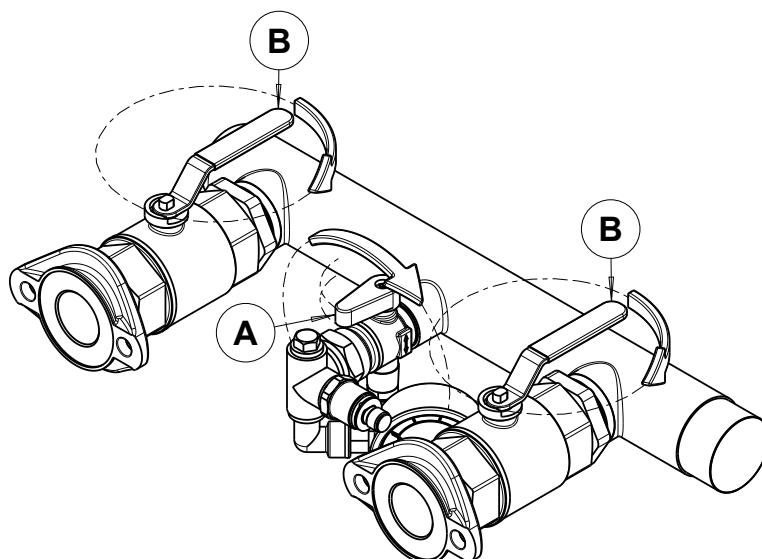


Fig. 28: Turning the pressure measuring set

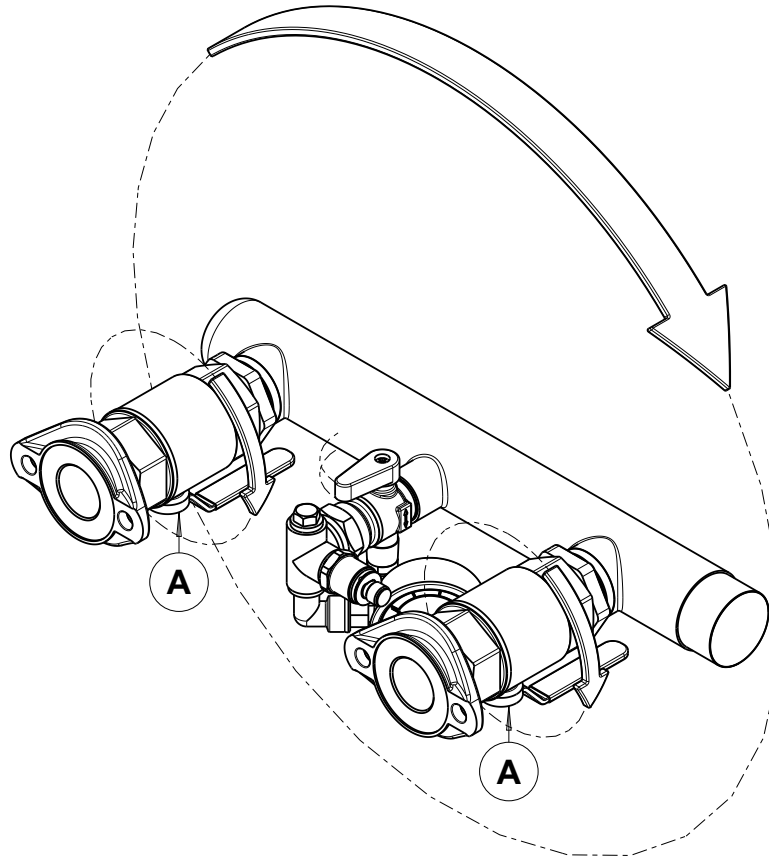
A	Pressure measuring set
B	Lever of the shut-off valve

8. Close the lever of the shut-off valve about half way to enable the 180° turn required in the next step.
9. Turn the pressure measuring set by 90°.



**NOTE**

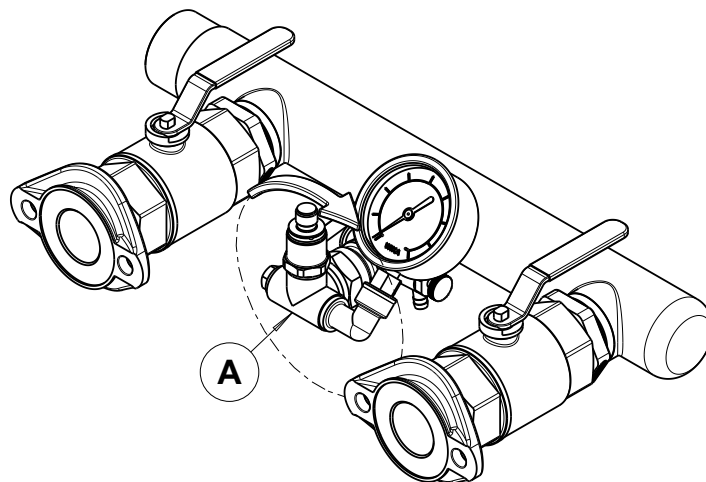
For some variants, the pressure gauge or a pressure sensor need to be removed to be able to turn the pressure measuring set.



**Fig. 29:** Turning the shut-off valves

A	Shut-off valve
---	----------------

10. Turn the shut-off valves by 180°. Then turn the manifold with shut-off valves by 180°.



**Fig. 30:** Turning the pressure measuring set

A	Pressure measuring set
---	------------------------

11. Turn the pressure measuring set by a last 90°.
12. If the pressure gauge and/or pressure sensors have been removed, connect them again.
  - ⇒ The manifold is now fitted in a mirrored position.
13. Tighten the EF locknuts of the shut-off valves again.

## 9 Trouble-shooting

	<p><b>⚠ WARNING</b></p>
	<p><b>Improper work to remedy faults</b> Risk of injury!</p> <p>▷ For any work performed to remedy faults, observe the relevant information given in this operating manual and/or in the product literature provided by the accessories manufacturer.</p>
	<p><b>NOTE</b></p>
	<p>Please contact KSB Service before carrying out any work on the pump's internal parts during the warranty period. Non-compliance will lead to forfeiture of warranty cover and of any and all rights to claims for damages.</p>

If problems occur that are not described in the following table, consultation with the KSB service is required.

- A Pumps fail to start in automatic mode or cut out shortly after start-up. Lack of water is indicated.
- B Pressure booster system does not start up.
- C Pumps running but not delivering water.
- D Insufficient delivery of pressure booster system.
- E Discharge-side pressure too low.
- F Discharge-side pressure too high.
- G Leakage at mechanical seal.
- H One/several pumps/motors overheated.
- I Motor protection switch(es) triggered. Warning LED lit.
- J Pump(s) do(es) not stop.
- K Pumps start too often (more than 30 starts per pump and hour).
- L One/several pumps/motors overheated.

**Table 23:** Trouble-shooting

A	B	C	D	E	F	G	H	I	J	K	L	Possible cause	Remedy <sup>7)</sup>
-	-	X	X	-	-	-	X	-	X	-	-	Pumps and/or piping are not completely vented or primed.	Vent and/or prime.
X	X	X	X	X	-	-	X	-	-	X	-	Shut-off valves (partially) closed	Check, open as necessary.
X	-	-	X	X	-	-	-	-	X	X	-	Strainer clogged (inlet-side pressure reducer)	Clean.
X	-	-	X	X	X	-	-	-	X	X	-	Inlet-side pressure reducer set incorrectly	Check, adjust as necessary.
-	-	X	X	X	-	-	X	X	X	X	-	Check valve in bypass line defective	Replace.
X	X	-	-	-	-	-	-	-	-	-	-	Inlet-side shut-off valve closed	Check, open as necessary.
-	X	-	-	-	-	-	X	-	X	-	-	Discharge-side shut-off valve closed or defective	Check, open as necessary.
X	-	-	X	X	-	-	X	-	X	X	-	Inlet pressure lower than stated in the purchase order	Contact KSB.
-	X	-	-	-	X	-	-	-	-	-	-	Inlet pressure higher than stated in the purchase order	Contact KSB.
X	-	-	X	X	-	-	-	-	X	-	-	Start-up pressure set too high	Check setting.

<sup>7)</sup> The pump pressure must be released before attempting to remedy faults on parts which are subjected to pressure. Disconnect the pump from the power supply!

A	B	C	D	E	F	G	H	I	J	K	L	Possible cause	Remedy <sup>7)</sup>
-	X	-	-	X	X	-	X	-	X	-	X	Pressure transmitter set incorrectly or defective	Check setting.
-	-	-	-	-	-	-	X	-	-	X	X	Pre-charge pressure of the accumulator too low	Restore nitrogen cushion.
-	-	-	-	-	-	-	X	-	-	X	X	Defective accumulator	Check integrity/replace, if necessary.
-	-	-	-	-	-	X	-	-	-	-	-	Defective mechanical seal	Replace.
X	-	-	-	-	-	-	X	-	X	-	-	Suction-side pressure switch set incorrectly or defective	Check setting.
-	-	X	X	X	-	-	X	X	X	X	-	Defective check valve in the pressure booster system	Check, replace sealing element as necessary.
-	-	-	-	X	-	-	-	X	X	-	X	Water extraction higher than stated in the purchase order	Contact KSB.
-	X	-	-	-	-	-	-	X	-	-	X	Motor protection switch triggered or set incorrectly, or pump seized	Compare setting with the motor's rating plate data.
-	-	-	-	-	-	-	-	-	-	X	-	Delay setting too short	Check setting.
-	X	-	-	-	-	-	-	-	-	-	-	Mains supply interrupted	Check and remedy defect/check fuse.
-	X	-	-	-	-	-	-	-	-	-	-	Control current fuse tripped (control cabinet)	Determine cause and reset.
-	X	-	-	-	-	-	-	X	-	-	-	Main fuse on (owner-supplied) distribution board loose or blown; fuses possibly too small or too fast	Check fuses and replace as necessary. Measure the motor current.
-	-	-	-	-	-	-	-	X	-	-	-	Intermittent voltage fluctuations	Press reset and fault acknowledgement key.
-	X	-	-	-	-	-	-	-	-	-	-	Phase failure	Check individual phases; replace fuse, if necessary.
X	-	-	-	-	-	-	-	-	-	-	-	Inlet tank empty or float switch defective / disconnected	Check and remedy defect.



## 10 Related Documents

### 10.1 General assembly drawings/exploded views with list of components

#### 10.1.1 DeltaPrimo F

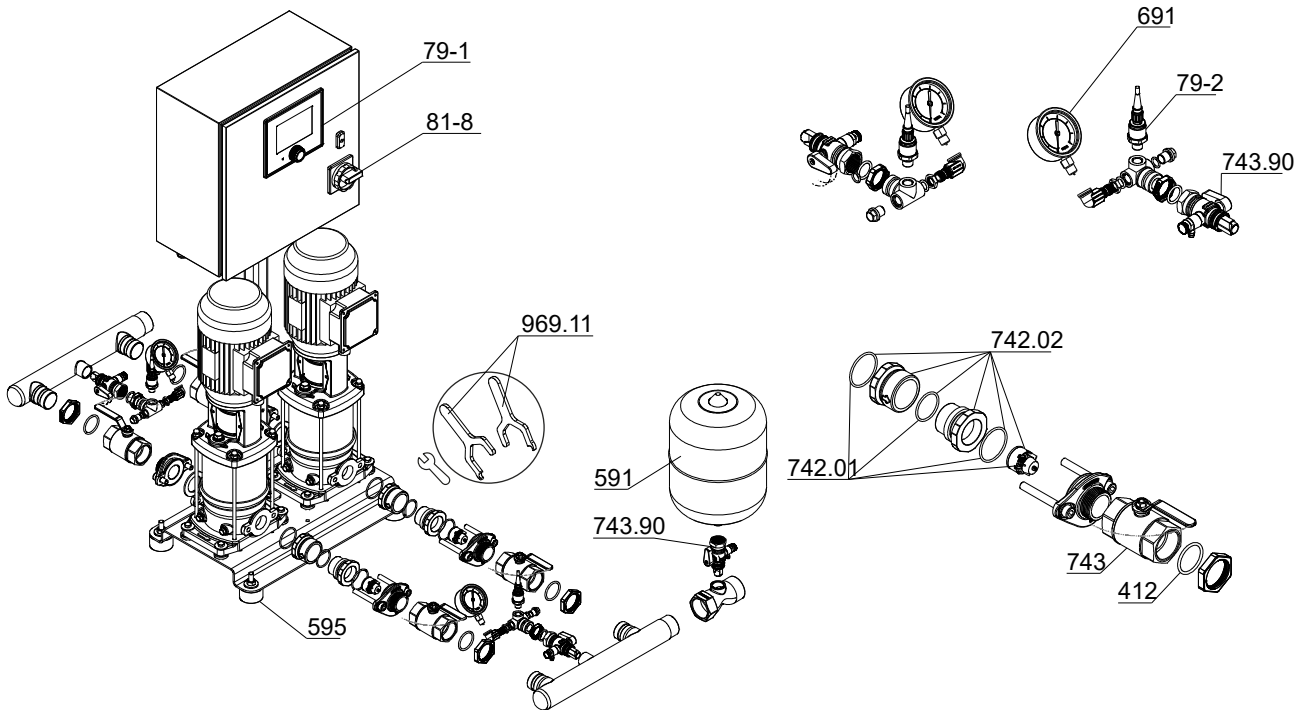


Fig. 31: DeltaPrimo F

Table 24: List of components

Part No.	Description	Part No.	Description
79-1	Automatic control unit	595	Anti-vibration pad
79-2	Measuring transducer	691	Pressure gauge
81-8	Kit-Master switch	742.01/02	Lift check valve
412	O-ring	743/743.90	Ball valve
591	Membrane-type accumulator	969.11	Tool

The individual parts of the pump set are shown in the product literature of the pump set.

10.1.2 DeltaPrimo VC

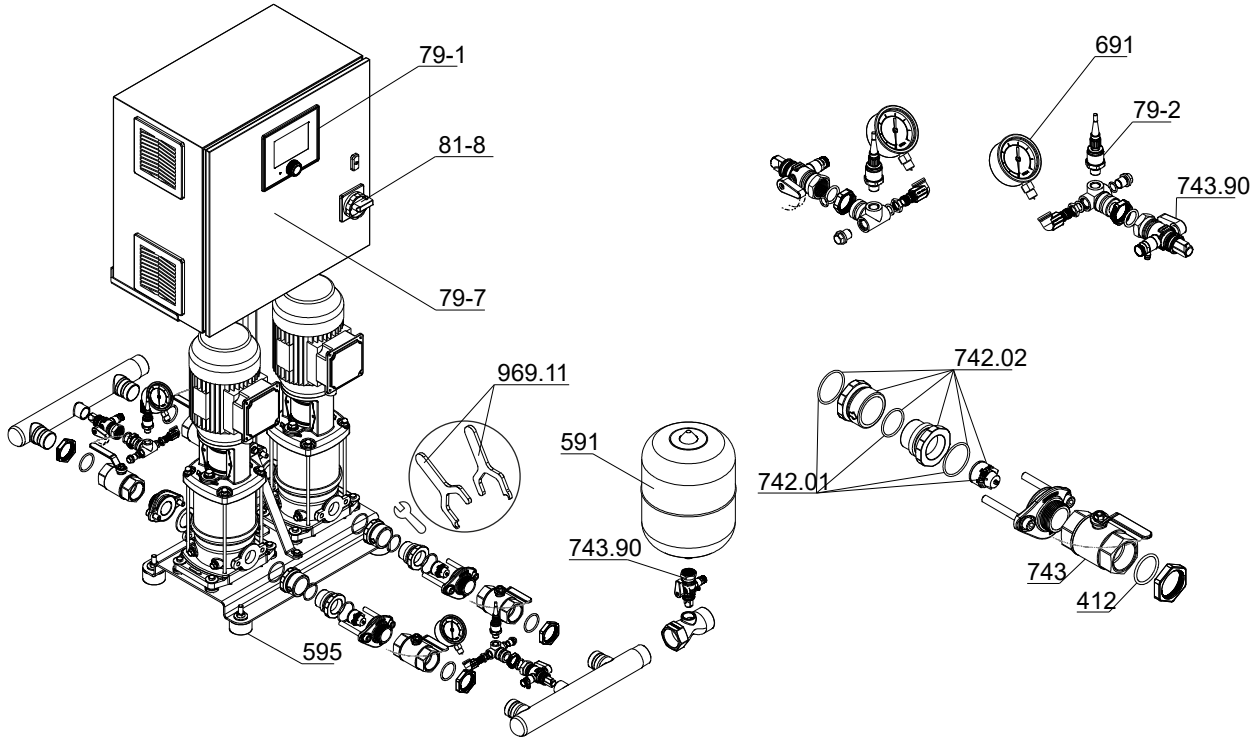


Fig. 32: DeltaPrimo VC

Table 25: List of components

Part No.	Description	Part No.	Description
79-1	Automatic control unit	595	Anti-vibration pad
79-2	Measuring transducer	691	Pressure gauge
79-7	Display for Danfoss frequency inverter (* in control cabinet, only for DeltaPrimo VC)	742.01/02	Lift check valve
81-8	Kit-Master switch	743/743.90	Ball valve
412	O-ring	969.11	Tool
591	Membrane-type accumulator		

The individual parts of the pump set are shown in the product literature of the pump set.

10.1.3 DeltaPrimo SVP

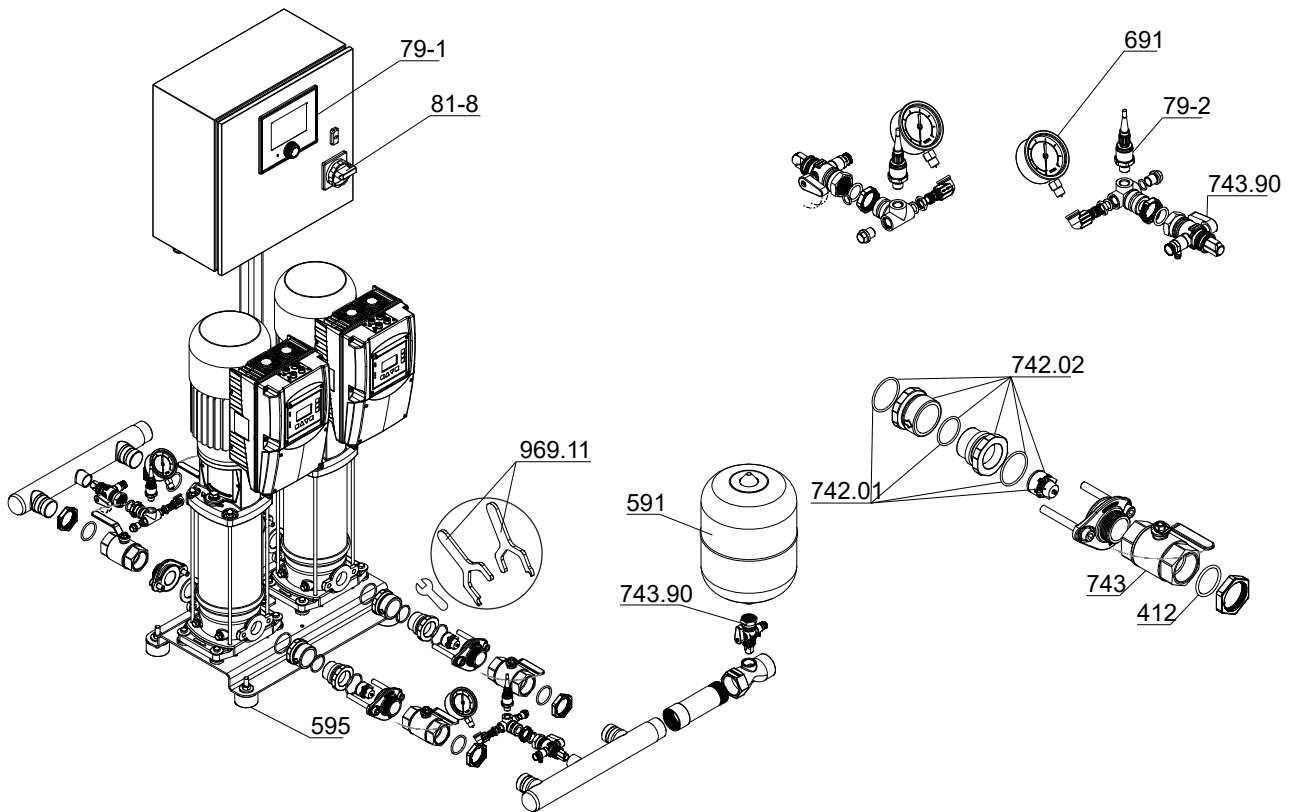


Fig. 33: DeltaPrimo SVP

Table 26: List of components

Part No.	Description	Part No.	Description
79-1	Automatic control unit	595	Anti-vibration pad
79-2	Measuring transducer	691	Pressure gauge
81-8	Kit-Master switch	742.01/02	Lift check valve
412	O-ring	743/743.90	Ball valve
591	Membrane-type accumulator	969.11	Tool

The individual parts of the pump set are shown in the product literature of the pump set.

## 10.2 Parameter Lists

### 10.2.1 Configuration

#### 10.2.1.1 System settings

Table 27: Parameter

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
1	Configuration	-	-	Everybody	Nobody	-
1-1	System	-	-	Everybody	Nobody	-
1-1-1	Information	-	-	Everybody	Nobody	-
1-1-1-1	Order number	Full text (max. 18 characters)	<empty>	Everybody	Service	-
1-1-1-2	Type series	Full text (max. 30 characters)	<empty>	Everybody	Service	-
1-1-1-3	Production number	Full text (max. 18 characters)	<empty>	Everybody	Service	-
1-1-1-4	System name (for Bluetooth)	Full text (max. 30 characters)	BOOSTERCONTROL	Everybody	Service	-
1-1-2	General	-	-	-	-	-
1-1-2-3	Operating mode	Operation on a frequency inverter Mains operation	Frequency driven	Everybody	Service	Y
1-1-2-4	Frequency inverter type	KSB PumpDrive2 (Eco) DP Var(+) Danfoss MicroDrive Danfoss MidiDrive Danfoss AquaDrive	PumpDrive2	Everybody	Service	Y
1-1-2-5	Frequency control type	Multiple pump configuration Single-pump configuration	Multi-pump operation	Everybody	Service	Y
1-1-2-6	Pump groups	Pump-group control Pump-group and jockey-pump control Base-load and peak-load pump control	Base-load pump control	Everybody	Service	Y
1-1-3	Number of pumps	-	-	Everybody	Nobody	-
1-1-3-1	Total number of pumps	1 ... 6	3	Everybody	Service	Y
1-1-3-2	Number of base load pumps	1 ... (number of pumps - number of peak-load pumps) if pump groups = base-load and peak-load pump control	Number of pumps	Everybody	Nobody	Y

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
1-1-3-2	Number of base load pumps	1 ... (number of pumps - number of jockey pumps) if pump groups = jockey-pump control	Number of pumps	Everybody	Nobody	Y
1-1-3-3	Number of peak load pumps	0 ... (number of pumps - number of base load pumps)	0	Everybody	Service	Y
1-1-4	Maximum system load	-	-	Everybody	Nobody	-
1-1-4-1	Maximum number of pumps	0 ... number of all pumps	Number of all pumps	Everybody	Service	-
1-1-5	Manual-0-automatic mode	-	-	-	-	-
1-1-5-1	Manual-0-automatic mode of pumps	Internal via display	Internal via display	Everybody	Service	-
1-1-6	Fire alarm	-	-	-	-	-
1-1-6-1	Fire alarm mode	Disabled Enabled	Disabled	Everybody	Service	-
1-1-7	External On/Off	-	-	-	-	-
1-1-7-1	External On/Off mode	Disabled Enabled	Disabled	Everybody	Service	-
1-1-8	Membrane rupture detection	-	-	-	-	-
1-1-8-1	Membrane rupture detection	Disabled	Disabled	Everybody	Service	-
1-1-8-2	Digital input	-	-	Everybody	Nobody	-
1-1-8-3	Source	Water detection integrated Membrane rupture detection by external device	Water-detection on-board	Everybody	Service	-
1-1-8-4	Delay time membrane rupture detection	0 ... 99 s	10 s	Everybody	Service	-
1-1-8-5	Delay time reset	0 ... 99 s	2 s	Everybody	Service	-

### 10.2.1.2 Pump settings

Table 28: Pump settings parameters

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
1-2	Pumps	-		Everybody	Nobody	-
1-2-1	Base load pump	-		Everybody	Nobody	-
1-2-1-1	Pump data	-		Everybody	Nobody	-

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
1-2-1-1-5	Head 0	-	Pump data	Everybody	Service	-
1-2-1-1-6	Head 1	-	Pump data	Everybody	Service	-
1-2-1-1-7	Head 2	-	Pump data	Everybody	Service	-
1-2-1-1-8	Head 3	-	Pump data	Everybody	Service	-
1-2-1-1-9	Head 4	-	Pump data	Everybody	Service	-
1-2-1-1-10	Head 5	-	Pump data	Everybody	Service	-
1-2-1-1-11	Head 6	-	Pump data	Everybody	Service	-
1-2-1-1-12	Flow rate 0	-	Pump data	Everybody	Service	-
1-2-1-1-13	Flow rate 1	-	Pump data	Everybody	Service	-
1-2-1-1-14	Flow rate 2	-	Pump data	Everybody	Service	-
1-2-1-1-15	Flow rate 3	-	Pump data	Everybody	Service	-
1-2-1-1-16	Flow rate 4	-	Pump data	Everybody	Service	-
1-2-1-1-17	Flow rate 5	-	Pump data	Everybody	Service	-
1-2-1-1-18	Flow rate 6	-	Pump data	Everybody	Service	-
1-2-1-1-19	Power 0	-	Pump data	Everybody	Service	-
1-2-1-1-20	Power 1	-	Pump data	Everybody	Service	-
1-2-1-1-21	Power 2	-	Pump data	Everybody	Service	-
1-2-1-1-22	Power 3	-	Pump data	Everybody	Service	-
1-2-1-1-23	Power 4	-	Pump data	Everybody	Service	-
1-2-1-1-24	Power 5	-	Pump data	Everybody	Service	-
1-2-1-1-25	Power 6	-	Pump data	Everybody	Service	-
1-2-1-1-26	NPSH 0	-	Pump data	Everybody	Service	-
1-2-1-1-27	NPSH 1	-	Pump data	Everybody	Service	-
1-2-1-1-28	NPSH 2	-	Pump data	Everybody	Service	-
1-2-1-1-29	NPSH 3	-	Pump data	Everybody	Service	-
1-2-1-1-30	NPSH 4	-	Pump data	Everybody	Service	-
1-2-1-1-31	NPSH 5	-	Pump data	Everybody	Service	-
1-2-1-1-32	NPSH 6	-	Pump data	Everybody	Service	-
1-2-1-1-33	Optimal flow rate	-	Pump data	Everybody	Service	-
1-2-1-1-34	Low-flow limit rate percentage	-	Pump data	Everybody	Service	-
1-2-1-2	Motor drive data	-		Everybody	Nobody	-

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
	To change a value the pumps must be set to 'Manual Off' (parameter 2-2)	-				-
1-2-1-2-1	Nominal power	-	Motor data	Everybody	Service	-
1-2-1-2-2	Nominal voltage	-	Motor data	Everybody	Service	-
1-2-1-2-3	Nominal frequency	-	Motor data	Everybody	Service	-
1-2-1-2-4	Nominal current	-	Motor data	Everybody	Service	-
1-2-1-2-5	Nominal speed	-	Motor data	Everybody	Service	-
1-2-1-2-6	Nominal cos phi	-	Motor data	Everybody	Service	-
1-2-1-2-7	Slip compensation	-	Motor data	Everybody	Service	-
1-2-1-2-8	Minimum speed for function at stop	-	Motor data	Everybody	Service	-
1-2-1-2-9	Minimum motor speed	-	Motor data	Everybody	Service	-
1-2-1-2-10	Maximum motor speed	-	Motor data	Everybody	Service	-
1-2-1-2-11	Jog speed	-	Motor data	Everybody	Service	-
1-2-1-2-12	Ramp up time	-	Motor data	Everybody	Service	-
1-2-1-2-13	Ramp down time	-	Motor data	Everybody	Service	-
1-2-1-2-14	Jog ramp time	-	Motor data	Everybody	Service	-
1-2-1-2-15	Operating ramp time	-	Motor data	Everybody	Service	-
1-2-1-2-16	Minimum speed	-	Motor data	Everybody	Service	-
1-2-1-2-17	Maximum speed	-	Motor data	Everybody	Service	-
1-2-1-2-18	Torque limit	-	Motor data	Everybody	Service	-
1-2-1-2-19	Torque characteristics	[0] Constant torque [1] Variable torque [2] Auto energy optim. CT [3] Auto energy optim. VT	Motor data	Everybody	Service	-
1-2-1-2-20	Digital input 1	No function Control digital bit 0	Motor data	Everybody	Service	-
1-2-1-2-21	Digital input 2	No function Control digital bit 1	Motor data	Everybody	Service	-
1-2-1-2-22	Function input 1	[0] No operation [1] Reset [10] Reversing	Motor data	Everybody	Service	-

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
1-2-1-2-23	Function input 2	[0] No operation	Motor data	Everybody	Service	-
		[1] Reset				
		[2] Coast inverse				
1-2-1-2-24	Function input 3	[0] No operation	Motor data	Everybody	Service	-
		[14] Jog				
1-2-1-2-25	Function input 4	[0] No operation	Motor data	Everybody	Service	-
		[2] Coast inverse				
		[16] Preset bit 0				
1-2-1-2-26	Function Relay 1	[0] No operation	Motor data	Everybody	Service	-
		[1] Control ready				
		[2] Drive ready				
		[4] Enable / no warning				
		[5] VLT running				
		[6] Running / no warning				
		[9] Alarm				
		[10] Alarm or warning				
1-2-1-2-27	Function Relay 2	[0] No operation	Motor data	Everybody	Service	-
		[1] Control ready				
		[2] Drive ready				
		[4] Enable / no warning				
		[5] VLT running				
		[6] Running / no warning				
		[9] Alarm				
		[10] Alarm or warning				
1-2-1-2-28	Control site	[0] Digital and control word	Motor data	Everybody	Service	-
		[1] Digital only				
		[2] Control word only				
1-2-1-2-29	Control timeout function	[0] Off	Motor data	Everybody	Service	-
		[1] Freeze output				
		[2] Stop				
		[3] Jogging				
		[4] Max. speed				
		[5] Stop and trip				



Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
1-2-1-2-30	Coasting select	[0] Digital input	Motor data	Everybody	Service	-
		[1] Bus				
		[2] Digital input and bus				
		[3] Digital input or bus				
1-2-1-2-31	Start select	[0] Digital input	Motor data	Everybody	Service	-
		[1] Bus				
		[2] Digital input and bus				
		[3] Digital input or bus				
1-2-1-2-32	Reset mode	[0] Manual reset	Motor data	Everybody	Service	-
		[3] Automatic reset (max. 3 times)				
1-2-1-2-33	Motor speed unit	[0] RPM	Motor data	Everybody	Service	-
		[1] Hz				
1-2-1-2-34	Operating keys require login	OFF	ON	Everybody	Service	-
		ON				
1-2-1-2-35	Motor-PTC data analysis	OFF	ON	Everybody	Service	-
		ON				
1-2-1-2-36	Motor direction of rotation	Clockwise	Anti-clockwise	Everybody	Service	-
		Anti-clockwise				
1-2-1-2-37	Motor control method	[0] Asynchronous motor V/f control	SuPremE vector control	Everybody	Service	-
		[1] Asynchronous motor vector control				
		[4] SuPremE vector control				
1-2-1-2-38	Max. motor current in % of nominal motor current	-	OFF	Everybody	Service	-
1-2-1-2-39	$I^2t$ Stop speed	-	OFF	Everybody	Service	-
1-2-1-2-40	$I^2t$ Threshold value	-	OFF	Everybody	Service	-
1-2-1-2-41	Type of control	OFF (open-loop control)	OFF	Everybody	Service	-
1-2-1-2-42	Control point	Local	OFF	Everybody	Service	-
		Fieldbus				

## 10.2.1.3 Input / outputs

Table 29: Parameter

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
1-3	Inputs/outputs	-	-	Everybody	Nobody	-
1-3-1	Analog inputs Note: To change a function, the function first has to be removed by changing it to 'No function'. To set a function all pumps have to be set to "Manual OFF" (2-2).	-	-	Everybody	Nobody	-
1-3-1-1	Input 1	No function	None	Everybody	Service	-
1-3-1-2	Input 2	Pressure sensor on suction side				
1-3-1-3	Input 3 (extension board)	Pressure sensor on discharge side				
		Setpoint				
1-3-2	Analog outputs Note: To change a function, the function first has to be removed by changing it to 'No function'. To set a function all pumps have to be set to "Manual OFF" (2-2).	-	-	Everybody	Nobody	-
1-3-2-1	Output 1	None	None	Everybody	Service	-
1-3-2-2	Output 2	Pump speed				
		Suction-side pressure				
		Discharge-side pressure				
		Tank-filling proportional valve				
		Tank-filling additional proportional valve				
	Tank level height					
1-3-3	Digital inputs Note: To change a function, the function first has to be removed by changing it to 'No function'. To set a function all pumps have to be set to "Manual OFF" (2-2).	-	-	Everybody	Nobody	-

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
1-3-3-1	Input 1	No function	None	Everybody	Service	-
1-3-3-2	Input 2	Pressure switch				
1-3-3-3	Input 3	Float switch				
1-3-3-4	Input 4	Flow monitor				
1-3-3-5	Input 5	Failure motor circuit breaker pump 1				
1-3-3-6	Input 6	Failure motor circuit breaker pump 2				
1-3-3-7	Input 7	Failure motor circuit breaker pump 3				
1-3-3-8	Input 8	Failure motor circuit breaker pump 4				
1-3-3-9	Input 9	Failure motor circuit breaker pump 5				
1-3-3-10	Input 10	Failure motor circuit breaker pump 6				
1-3-3-16	Input 16 (extension board)	Manual mode at M-0-A switch pump 1				
1-3-3-17	Input 17 (extension board)	Manual mode at M-0-A switch pump 2				
1-3-3-18	Input 18 (extension board)	Manual mode at M-0-A switch pump 3				
		Manual mode at M-0-A switch pump 4				
		Manual mode at M-0-A switch pump 5				
		Manual mode at M-0-A switch pump 6				
		Automatic mode at M-0-A switch pump 1				
		Automatic mode at M-0-A switch pump 2				
		Automatic mode at M-0-A switch pump 3				
		Automatic mode at M-0-A switch pump 4				
		Automatic mode at M-0-A switch pump 5				
		Automatic mode at M-0-A switch pump 6				
		Over-temperature motor pump 1				
		Over-temperature motor pump 2				
		Over-temperature motor pump 3				
		Over-temperature motor pump 4				
		Over-temperature motor pump 5				
		Over-temperature motor pump 6				

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
1-3-3-1	Input 1	Failure motor-circuit breaker rainwater pump 1	None	Everybody	Service	-
1-3-3-2	Input 2					
1-3-3-3	Input 3	Failure motor-circuit breaker rainwater pump 2				
1-3-3-4	Input 4	Manual-mode at M-0-A-switch rainwater pump 1				
1-3-3-5	Input 5	Manual-mode at M-0-A-switch rainwater pump 2				
1-3-3-6	Input 6	Automatic-mode at M-0-A-switch rainwater pump 1				
1-3-3-7	Input 7	Automatic-mode at M-0-A-switch rainwater pump 2				
1-3-3-8	Input 8					
1-3-3-9	Input 9					
1-3-3-10	Input 10					
1-3-3-16	Input 16 (extension board)	Float switch in rainwater tank				
1-3-3-17	Input 17 (extension board)	External On/Off				
1-3-3-18	Input 18 (extension board)	Fire alarm				
		Acknowledge all				
		Alternative setpoint				
		Triggered check run				
		Emergency power operation				
		Forced flushing				
		Module water quality sensor/ monitoring				
		Membrane rupture detection				
		Leakage-detection by external device				
		Failure supply-valve				
		Failure additional supply-valve				
		Redundant system				
1-3-4	Digital outputs Note: To change a function, the function first has to be removed by changing it to 'No function'. To set a function all pumps have to be set to "Manual OFF" (2-2).	-	-	Everybody	Nobody	-

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
1-3-4-1	Output 1	No function	None	Everybody	Service	-
1-3-4-2	Output 2	Start/stop pump 1				
1-3-4-3	Output 3	Start/stop pump 2				
1-3-4-5	Output 5 (extension board)	Start/stop pump 3				
1-3-4-6	Output 6 (extension board)	Start/stop pump 4				
1-3-4-7	Output 7 (extension board)	Start/stop pump 5				
1-3-4-8	Output 8 (extension board)	Start/stop pump 6				
1-3-4-9	Output 9 (extension board)	Pump running pump 1				
1-3-4-10	Output 10 (extension board)	Pump running pump 2				
1-3-4-11	Output 11 (extension board)	Pump running pump 3				
1-3-4-12	Output 12 (extension board)	Pump running pump 4				
		Pump running pump 5				
		Pump running pump 6				
		Pump fault pump 1				
		Pump fault pump 2				
		Pump fault pump 3				
		Pump fault pump 4				
		Pump fault pump 5				
		Pump fault pump 6				
		Tank filling solenoid valve				
		Tank filling additional solenoid valve				
		Flushing valve				
		Dry running protection active				
		Start/stop rainwater pump 1				
		Start/stop rainwater pump 2				
		Redundant system				
		Leakage detected				
		Tank level too high				
1-3-5	Analog input temperature	-	-	-	-	-
1-3-5-1	Analog input Pt100/Pt1000	Disabled	Disabled	Everybody	Service	-
		Enabled				
1-3-5-2	Selection of thermometer resistance	Pt100	Pt100	Everybody	Service	-
		Pt1000				

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
1-3-5-3	Selection of thermometer function	Ambient temperature	Ambient temperature	Everybody	Service	-
		Water temperature				
1-3-7	Calibration	-	-	-	-	-
1-3-7-1	Sensors	-	-	-	-	-
1-3-7-1-1	Pressure sensor on suction side	-	-	-	-	-
1-3-7-1-1-1	Value at 4 mA	0 ... value at 20 mA	0	Everybody	Service	-
1-3-7-1-1-2	Value at 20 mA	Value at 0/4 mA ... 100 bar	10 bar	Everybody	Service	-
1-3-7-1-2	Pressure sensor on discharge side	-	-	-	-	-
1-3-7-1-2-1	Value at 4 mA	0 ... value at 20 mA	0	Everybody	Service	-
1-3-7-1-2-2	Value at 20 mA	Value at 0/4 mA ... 100 bar	16 bar	Everybody	Service	-
1-3-7-1-3	Pressure sensor at tank	-	-	-	-	-
1-3-7-1-3-1	Value at 4 mA	0 ... value at 20 mA	0	Everybody	Service	-
1-3-7-1-3-2	Value at 20 mA	Value at 0/4 mA ... 10 bar	0.306 bar	Everybody	Service	-
1-3-7-1-4	Setpoint	-	-	-	-	-
1-3-7-1-4-1	Value at 4 mA	0 ... value at 20 mA	0	Everybody	Service	-
1-3-7-1-4-2	Value at 20 mA	Value at 0/4 mA ... 100 bar	16 bar	Everybody	Service	-
1-3-7-2	Output signal	-	-	-	-	-
1-3-7-2-1	Suction-side pressure	-	-	-	-	-
1-3-7-2-1-1	Selection of output current range	0 ... 20 mA	4 mA ... 20 mA	Everybody	Service	-
		4 mA ... 20 mA				
1-3-7-2-1-2	Value at 0/4 mA	If selection ... = 0 mA ... 20 mA	0 ... value at 20 mA	Everybody	Service	-
1-3-7-2-1-3	Value at 20 mA	-	Value at 0/4 mA ... 100 bar	Everybody	Service	-
1-3-7-2-2	Discharge-side pressure	-	-	-	-	-
1-3-7-2-2-1	Selection of output current range	0 ... 20 mA	4 mA ... 20 mA	Everybody	Service	-
		4 mA ... 20 mA				
1-3-7-2-2-2	Value at 0/4 mA	If selection ... = 0 mA ... 20 mA	0 ... value at 20 mA	Everybody	Service	-
1-3-7-2-2-3	Value at 20 mA	-	-	Everybody	Service	-
1-3-7-2-4	Tank fill level	-	-	-	-	-
1-3-7-2-4-1	Selection of output current range	0 ... 20 mA	4 mA ... 20 mA	Everybody	Service	-
		4 mA ... 20 mA				

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
1-3-7-2-4-2	Value at 0/4 mA	If selection ... = 0 mA ... 20 mA	0 ... value at 20 mA	Everybody	Service	-
1-3-7-2-4-3	Value at 20 mA	-	Value at 0/4 mA ... 100 bar	Everybody	Service	-

#### 10.2.1.4 Further configuration settings

Table 30: Parameter

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
1-4	Field bus	-	-	Everybody	Nobody	-
1-4-1	Modbus RTU	Disabled	Disabled	Everybody	Service	Y
		Enabled				
1-4-2	Slave address	1 ... 247	247	Everybody	Service	Y
1-4-3	Baud rate	9600 kBit/s	115200 kBit/s	Everybody	Service	Y
		19200 kBit/s				
		38400 kBit/s				
		57600 kBit/s				
		115200 kBit/s				
1-4-4	Parity	None	Odd	Everybody	Service	Y
		Odd				
		Even				
1-5	Bluetooth	-	-	-	-	-
1-5-1	Time for login	0 ... 600 s	150 s	Everybody	Service	-
1-6	Display	-	-	Everybody	Nobody	-
1-6-1	Time-out lighting	-	-	Everybody	Nobody	-
1-6-1-1	Time-out display	0 ... 24 h	10 min	Everybody	Service	-
1-6-1-2	Time-out display when message active	0 ... 60 min	10 sec	Everybody	Service	-
1-6-1-3	Screen lock time	0 ... 24 h	10 min	Everybody	Service	-
1-6-2	Units displayed	-	-	Everybody	Nobody	-
1-6-2-1	Pressure	bar	bar	Everybody	Service	-
		PSI				
1-6-2-2	Height	cm	cm	Everybody	Service	-

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
1-6-2-2	Height	%	cm	Everybody	Service	-
1-6-2-3	Temperature	°C	°C	Everybody	Service	-
		°F				
1-7	Time and date	-	-	Everybody	Nobody	-
1-7-1	Time	-	-	Everybody	Nobody	-
1-7-1-1	Hours	0 ... 23	0	Everybody	Service	-
1-7-1-2	Minutes	0 ... 59	0	Everybody	Service	-
1-7-1-3	Seconds	0 ... 59	0	Everybody	Service	-
1-7-2-1	Year	2019 ... 2099	0	Everybody	Service	-
1-7-2-2	Month	1 ... 12	1	Everybody	Service	-
1-7-2-3	Day	1 ... 31	1	Everybody	Service	-
1-7-2-4	Day of week	0 ... 6	0	Everybody	Service	-
1-8	Service required	-	-	Everybody	Nobody	-
1-8-1	Service interval	Disabled	Enabled	Everybody	Service	-
		Enabled				
1-8-3	Time interval for service required	0 ... 3650 d	540 d	Everybody	Service	-
		Enabled				
1-8-4	Reminder time for service interval expired	0 ... 3650 d	540 d	Everybody	Service	-
1-9	VFD bus	-	-	-	-	-
1-9-1	Baud rate	9600 kBit/s	38400 kBit/s	Everybody	Service	Y
		19200 kBit/s				
		38400 kBit/s				
		57600 kBit/s				
		115200 kBit/s				
1-9-2	Parity	None	Even	Everybody	Service	Y
		Odd				
		Even				



## 10.2.2 Settings

### 10.2.2.1 Pressure settings

**Table 31:** Pressure settings parameters

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
2	Settings	-	-	Everybody	Nobody	-
2-1	Pressure	-	-	-	-	-
2-1-1	Setpoint	0 ... 99 bar	2 bar	Everybody	Display/Customer	-
2-1-2	Bandwidth	0 ... 99 bar	0.05 bar	Everybody	Customer	-
2-1-3	Alternative setpoint	0 ... 99 bar	2.5 bar	Everybody	Customer	-
2-1-4	Alternative setpoint selection	Disabled Time enabled Digital input enabled	Disabled	Everybody	Customer	-
2-1-5	Alternative set-point start time (hours)	0 ... 24 h	0	Everybody	Customer	-
2-1-6	Alternative set-point start time (minutes)	0 ... 60 min	0	Everybody	Customer	-
2-1-7	Alternative set-point stop time (hours)	0 ... 24 h	0	Everybody	Customer	-
2-1-8	Alternative set-point stop time (minutes)	0 ... 60 min	0	Everybody	Customer	-
2-1-9	Additional setpoint increase	0 ... 1 bar	0.3 bar	Everybody	Customer	-
2-1-10	Minimum set-point	0 ... 99 bar	0 bar	Everybody	Service	-
2-1-11	Maximum set-point	0 ... 99 bar	99 bar	Everybody	Service	-

### 10.2.2.2 Pump operating mode

**Table 32:** Pump operating mode parameters

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
2-2	Pumps	-	-	Everybody	Nobody	-
2-2-1	Pump operating mode	-	-	Everybody	Nobody	-
2-2-1-1	Pump 1	Automatic Manual-Off Manual-On	Manual-Off	Everybody	Display/Customer	-

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
2-2-1-2	Pump 2	Automatic	Manual-Off	Everybody	Display/Customer	-
		Manual-Off				
		Manual-On				
2-2-1-3	Pump 3	Automatic	Manual-Off	Everybody	Display/Customer	-
		Manual-Off	Manual-Off			
		Manual-On				
2-2-1-4	Pump 4	Automatic	Manual-Off	Everybody	Display/Customer	-
		Manual-Off				
		Manual-On				
2-2-1-5	Pump 5	Automatic	Manual-Off	Everybody	Display/Customer	-
		Manual-Off				
		Manual-On				
2-2-1-6	Pump 6	Automatic	Manual-Off	Everybody	Display/Customer	-
		Manual-Off				
		Manual-On				
2-2-2	Rainwater operating mode	-	-	Everybody	Nobody	-
2-2-2-1	Rainwater pump 1	Automatic	Manual-Off	Everybody	Customer	-
		Manual-Off				
		Manual-On				
2-2-2-2	Rainwater pump 2	Automatic	Manual-Off	Everybody	Customer	-
		Manual-Off				
		Manual-On				

### 10.2.2.3 Timers

**Table 33:** Timers parameters

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
2-3	Timer	-	-	Everybody	Nobody	-
2-3-1	Start delay time	0 ... 99.9 s	3 s	Everybody	Service	-
2-3-2	Stop delay time	0 ... 99.9 s	3 s	Everybody	Service	-
2-3-3	Minimum runtime	0 ... 999 s	180 s	Everybody	Service	-
2-3-4	Minimum runtime correction step	0 ... 99 s (calculated due to operating mode)	10 s	Everybody	Service	-

## 10.2.2.4 Pump protection

Table 34: Pump protection parameters

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
2-4	Pump protection	-	-	Everybody	Nobody	-
2-4-1	General	-	-	-	-	-
2-4-1-1	Minimum frequency	0 ... maximum frequency	60 Hz	Everybody	Service	-
2-4-1-2	Maximum frequency	Minimum frequency ... 150 Hz	100 Hz	Everybody	Service	-
2-4-1-4	Pump response to pressure sensor failure	Stop all pumps	Stop all pumps	Everybody	Service	-
		Freeze number of pumps running and speed				
		Run one pump at fixed speed				
		Run two pumps at fixed speed				
		Run three pumps at fixed speed				
		Run four pumps at fixed speed				
		Run five pumps at fixed speed				
		Run six pumps at fixed speed				
2-4-1-5	Pump response to pressure sensor failure	Stop all pumps	Stop all pumps	Everybody	Service	-
		Freeze number of pumps running				
		Run one pump				
		Run two pumps				
		Run three pumps				
		Run four pumps				
		Run five pumps				
		Run six pumps				
2-4-1-6	Pump speed on pressure sensor failure	0 ... 100 %	0	Everybody	Service	-
2-4-2	Changeover within pump group	-	-	-	-	-
2-4-2-1	Changeover within pump group	Disabled	Enabled	Everybody	Service	-
		Enabled				
2-4-2-2	Maximum runtime	1 s ... 24 h	24 h/number of pumps	Everybody	Service	-
2-4-2-3	Over-/undersupply	Oversupply	Oversupply	Everybody	Service	-
		Undersupply				
2-4-2-4	Time of over-/undersupply	0 ... 60 s	0	Everybody	Service	-

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
2-4-2-5	Ramp up time	0 ... 60 s	0	Everybody	Service	-
2-4-2-6	Ramp down time	0 ... 60 s	0	Everybody	Service	-
2-4-3	Changeover from jockey pump to base load pumps	-	-	Everybody	Service	-
2-4-3-1	Over-/undersupply	Oversupply Undersupply	Oversupply	Everybody	Service	-
2-4-3-2	Time of over-/undersupply	0 ... 60 s	10 s	Everybody	Service	-
2-4-4	Check run	-	-	-	-	-
2-4-4-1	Check run	Disabled Enabled	Enabled	Everybody	Service	-
2-4-4-2	Function	Idle time dependent Time-of-day configured Triggered check run	Time-dependable	Everybody	Service	-
2-4-4-3	Duration	0 ... 600 s	10 s	Everybody	Service	-
2-4-4-4	Standstill time	0: 00: 00: 00 ... 7: 00: 00: 00 d: hh: mm: ss	24 h	Everybody	Service	-
2-4-4-5	Time stamp for activation (hours)	Day of week, time	Mo, 12: 00: 00	Everybody	Service	-
2-4-4-6	Time stamp for execution (minutes)	Day of week, time	Mo, 12: 00: 00	Everybody	Service	-
2-4-5	Short pressure deviations	-	-	-	-	-
2-4-5-2	Delay time for pump start	0 ... 60 s	0	Everybody	Service	-
2-4-5-3	Delay time for pump stop	0 ... 60 s	0	Everybody	Service	-
2-4-6	No-flow detection	-	-	Everybody	Service	-
2-4-6-1	Pump speed for activation	0 % ... 100 %	1	Everybody	Service	-
2-4-6-2	Time within bandwidth	0 ... 600 s	15 s	Everybody	Service	-
2-4-6-3	Step interval	0 ... 600 s	15 s	Everybody	Service	-
2-4-6-4	Step height of speed	1 % ... 50 %	0,03	Everybody	Service	-
2-4-6-5	Bandwidth	0 ... bandwidth	0.05 bar	Everybody	Service	-
2-4-6-6	Speed for stopping last pump	0 % ... 100 %	0	Everybody	Service	-
2-4-7	Dynamic pressure setpoint compensation	-	-	-	-	-
2-4-7-1	Dynamic pressure setpoint compensation	Disabled Enabled	Disabled	Everybody	Service	-

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
2-4-7-2	Maximum discharge-side pressure deviation	-10 bar ... 10 bar	0	Everybody	Service	-
2-4-8	Motor circuit breaker	-	-	-	-	-
2-4-8-1	Trigger active high/low	Active high Active low	1: Active low	Everybody	Service	-
2-4-8-2	Trigger delay	0 ... 99 s	1 s	Everybody	Service	-

### 10.2.2.5 System protection

Table 35: System protection parameters

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
2-5	System protection	-	-	Everybody	Nobody	-
2-5-1	Dry running protection	-	-	Everybody	Nobody	-
2-5-1-1	Source	-	-	-	-	-
2-5-1-1-1	Source	No function Pressure sensor on suction side Pressure sensor at tank Pressure switch Float switch Flow switch	None	Everybody	Service	-
2-5-1-1-2	Delay time for system stop	0 ... 99 s	10 s	Everybody	Service	-
2-5-1-1-3	Delay time reset	0 ... 99 s	2 s	Everybody	Service	-
2-5-1-1-4	Maximum number of dry running protection events per hour	1 ... 10	3	Everybody	Service	-
2-5-1-1-5	Dry running protection stop delay	1 ... 5 s	1 s	Everybody	Service	-
2-5-1-2	Additional source	-	-	-	-	-
2-5-1-2-1	Additional source	No function Pressure sensor on suction side Pressure sensor at tank Pressure switch Float switch	None	Everybody	Service	-

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
2-5-1-2-1	Additional source	Flow switch	None	Everybody	Service	-
2-5-1-2-2	Delay time for system stop	0 ... 99 s	10 s	Everybody	Service	-
2-5-1-2-3	Delay time reset	0 ... 99 s	2 s	Everybody	Service	-
2-5-1-3	Pressure sensor on suction side	-	-	Everybody	Nobody	-
2-5-1-3-1	Minimum suction-side pressure for system stop	0 ... maximum pressure sensor range	1 bar	Everybody	Service	-
2-5-1-3-2	Minimum suction-side pressure for reset	Minimum suction-side pressure for stop ... Maximum pressure sensor range	1.5 bar	Everybody	Service	-
2-5-1-6	Flow switch	-	-	-	-	-
2-5-1-6-2	Discharge pressure deviation	0 ... 10 bar	1 bar	Everybody	Service	-
2-5-2	Leakage detection	-	-	-	-	-
2-5-2-1	Leakage detection	Disabled	Disabled	Everybody	Service	-
		Enabled				
2-5-2-2	Source	Water detection integrated	Water-detection on-board	Everybody	Service	-
		Leakage-detection by external device				
2-5-2-4	Position	Leakage of pump system	Leakage of pump-system	Everybody	Service	-
		Overflow of tank				
2-5-2-5	Response	Message only	Message only	Everybody	Service	-
		Message and stop all pumps				
		Message and close inlet valve				
		Message, close inlet valve and stop pumps				
2-5-2-6	Delay time leakage detection	0 ... 99 s	10 s	Everybody	Service	-
2-5-2-7	Delay time reset	0 ... 99 s	2 s	Everybody	Service	-
2-5-3	Hygienic functions	-	-	-	-	-
2-5-3-1	General	-	-	-	-	-
2-5-3-1-1	Hygienic functions	Disabled	Disabled	Everybody	Service	-
		Enabled				
2-5-3-2	Temperature monitoring	-	-	-	-	-
2-5-3-2-1	Temperature monitoring	Disabled	Disabled	Everybody	Service	-
		Enabled				
2-5-3-2-2	Maximum temperature	0 ... 70 °C	25 °C	Everybody	Service	-
2-5-3-2-3	Minimum temperature	0 ... 70 °C	5 °C	Everybody	Service	-

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
2-5-3-2-4	Response	Message	Message	Everybody	Service	-
		Flushing				
2-5-3-3	Water stagnation monitoring	-	-	-	-	-
2-5-3-3-1	Water stagnation monitoring	Disabled	Disabled	Everybody	Service	-
		Enabled				
2-5-3-3-2	Source	Flow sensor	-	Everybody	Service	-
		Flow switch				
		Flow estimation (VFD)				
2-5-3-3-3	Time of stagnation	0 ... 7 d	24 h	Everybody	Service	-
2-5-3-3-4	Response	Message	Message	Everybody	Service	-
		Flushing with check run				
2-5-3-4	Forced flushing	-	-	-	-	-
2-5-3-4-1	Forced flushing	Disabled	Disabled	Everybody	Service	-
		Enabled				
2-5-3-5	Flushing function	-	-	Everybody	Nobody	-
2-5-3-5-2	Minimum flushing time	0 ... maximum flushing time	10 s	Everybody	Service	-
2-5-3-5-3	Maximum flushing time	Minimum flushing time ... 999 s	60 s	Everybody	Service	-
2-5-3-5-4	Maximum flushing attempts in 24 hours	0 ... 10	5	Everybody	Service	-
2-5-3-5-5	Stop temperature for flushing	0 ... maximum temperature	20 °C	Everybody	Service	-
2-5-3-5-6	Flushing time for each pump	0 ... 999 s	10 s	Everybody	Service	-
2-5-4	Emergency power operation	-	-	Everybody	Nobody	-
2-5-4-2	Maximum system load	1 ... maximum number of pumps	1	Everybody	Service	-
2-5-4-3	Stop delay enabled/disabled	Disabled	Enabled	Everybody	Service	-
		Enabled				
2-5-5	Discharge pressure monitoring	-	-	Everybody	Nobody	-
2-5-5-1	High pressure alarm	-	-	Everybody	Nobody	-
2-5-5-1-1	Maximum discharge pressure	0 ... maximum pump head	Maximum pump discharge head	Everybody	Service	-
2-5-5-1-2	Delay time	0 ... 60 s	10 s	Everybody	Service	-
2-5-5-1-3	Selection of pump response	Message	Message	Everybody	Service	-
		Message and stop all pumps				
2-5-5-2	Low pressure alarm	-	-	Everybody	Nobody	-

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
2-5-5-2-1	Minimum discharge pressure	0 ... maximum pump head	0	Everybody	Service	-
2-5-5-2-2	Delay time	0 ... 60 s	10 s	Everybody	Service	-
2-5-5-2-3	Selection of pump response	Message	Message	Everybody	Service	-
		Message and stop all pumps				
2-5-6	Pipe filling function	-	-	-	-	-
2-5-6-1	Pipe filling function	Disabled	Disabled	Everybody	Service	-
		Enabled				
2-5-6-2	Deviation from set-point	0 ... set-point	10	Everybody	Service	-
2-5-6-3	Ramp-step for increasing set-point	0 ... 10 bar	0.1 bar	Everybody	Service	-
2-5-6-4	Maximum time on ramp-step	0 ... 600 s	60 s	Everybody	Service	-
2-5-6-5	Maximum number of attempts	1 ... 10	3	Everybody	Service	-
2-5-7	Redundant system	-	-	-	-	-
2-5-7-1	Redundant system role	Master	Master	Everybody	Service	-
		Slave				
2-5-7-2	Redundant system scheduler	Disabled	Disabled	Everybody	Service	-
		Enabled				
2-5-7-3	Redundant system scheduler - start time hours	0 ... 24 h	0	Everybody	Service	-
2-5-7-4	Redundant system scheduler - start time minutes	0 ... 60 min	0	Everybody	Service	-
2-5-7-5	Redundant system scheduler - stop time hours	0 ... 24 h	0	Everybody	Service	-
2-5-7-6	Redundant system scheduler - stop time minutes	0 ... 60 min	0	Everybody	Service	-

### 10.2.2.6 Accumulator

**Table 36:** Accumulator parameters

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
2-6	Membrane-type accumulator	-	-	-	-	-
2-6-1	Pressure-vessel accumulation	Disabled	Disabled	Everybody	Customer	-
		Enabled				



## 10.2.2.7 Tank

Table 37: Parameter

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
2-7	Tank	-	-	Everybody	Nobody	-
2-7-1	Drinking water	-	-	-	-	-
2-7-1-1	Drinking water filling	-	-	-	-	-
2-7-1-1-1	Drinking water filling	Disabled	Disabled	Everybody	Service	-
		Enabled				
2-7-1-2	Tank level	-	-	-	-	-
2-7-1-2-4	Absolute height at 0 %	0 ... absolute height at 100 %	Position of sensor above tank bottom	Everybody	Service	-
2-7-1-2-5	Absolute height at 100 %	Absolute height at 0 % ... 2000 cm	200 cm	Everybody	Service	-
2-7-1-2-6	Position of sensor above tank bottom	0 ... level at 20 mA	20 cm	Everybody	Service	-
2-7-1-2-7	Low-water level	0 ... low-water reset level	0,1	Everybody	Service	-
2-7-1-2-8	Low-water reset level	Low-water level ... critical water level	0,15	Everybody	Service	-
2-7-1-2-9	Critical water level	Low-water level ... high-water level	0,3	Everybody	Service	-
2-7	Tank	-	-	Everybody	Nobody	-
2-7-1	Drinking water	-	-	-	-	-
2-7-1-1	Drinking water filling	-	-	-	-	-
2-7-1-1-1	Drinking water filling	Disabled	Disabled	Everybody	Service	-
		Enabled				
2-7-1-2	Tank level	-	-	-	-	-
2-7-1-2-4	Absolute height at 0 %	0 ... absolute height at 100 %	Position of sensor above tank bottom	Everybody	Service	-
2-7-1-2-5	Absolute height at 100 %	Absolute height at 0 % ... 2000 cm	200 cm	Everybody	Service	-
2-7-1-2-6	Position of sensor above tank bottom	0 ... level at 20 mA	20 cm	Everybody	Service	-
2-7-1-2-7	Low-water level	0 ... low-water reset level	0,1	Everybody	Service	-
2-7-1-2-8	Low-water reset level	Low-water level ... critical water level	0,15	Everybody	Service	-
2-7-1-2-9	Critical water level	Low-water level ... high-water level	0,3	Everybody	Service	-
2-7-1-2-10	Level for reset critical water level	Critical water level ... high-water level	0,35	Everybody	Service	-
2-7-1-2-11	Start tank filling level	Low level ... stop tank filling level	0,5	Everybody	Service	-
2-7-1-2-12	Additional start tank filling level	Low level ... start tank filling level	0,4	Everybody	Service	-

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
2-7-1-2-13	Additional stop tank filling level	Start tank filling level ... stop tank filling level	0,9	Everybody	Service	-
2-7-1-2-14	Stop tank filling level	Start tank filling level ... high-water level	1	Everybody	Service	-
2-7-1-2-15	Level for reset high-water level	Stop tank filling level ... high-water level	1,2	Everybody	Service	-
2-7-1-2-16	High-water level	Stop tank filling level ... according to sensor type or level at 20 mA	1,25	Everybody	Service	-
2-7-1-3	Tank filling	-	-	-	-	-
2-7-1-3-1	Inlet valve type	Tank filling on/off valve	Tank-filling on/off valve	Everybody	Service	-
		Tank filling proportional valve				
2-7-1-3-2	Minimum opening angle of valve	0 ... 100 %	0,1	Everybody	Service	-
2-7-1-3-3	Step width for valve actuation	0 ... 100 %	0,1	Everybody	Service	-
2-7-1-4	Additional tank filling	-	-	-	-	-
2-7-1-4-1	Additional tank filling	Disabled	Disabled	Everybody	Service	-
2-7-1-4-2	Inlet valve type	Tank filling additional solenoid valve	Additional tank-filling solenoid valve	Everybody	Service	-
		Tank filling proportional valve				
2-7-1-4-3	Minimum opening angle of valve	0 ... 100 %	0,1	Everybody	Service	-
2-7-1-4-4	Step width for valve actuation	0 ... 100 %	0,1	Everybody	Service	-
2-7-1-5	Drinking water protection	-	-	-	-	-
2-7-1-5-1	Drinking water protection	Disabled	Enabled	Everybody	Service	-
		Enabled				
2-7-1-5-2	Maximum time between usage of drinking water	0... 31 d	168 h	Everybody	Service	-
2-7-1-5-3	Response	Message only	0: Message only	Everybody	Service	-
		Message and flushing of inlet line				
2-7-1-5-4	Time for flushing drinking water supply	0 ... 600 s	10 s	Everybody	Service	-
2-7-1-5-5	Overflow if high-water level is exceeded	Not allowed	Allowed without message	Everybody	Service	-
		Allowed with message				
		Allowed without message				
2-7-2	Rainwater	-	-	-	-	-

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
2-7-2-1	Rainwater filling	-	-	-	-	-
2-7-2-1-1	Rainwater filling	Disabled	Disabled	Everybody	Service	-
		Enabled				
2-7-2-2	Rainwater pumps	-	-	Everybody	Nobody	-
2-7-2-2-1	Source for dry running protection of rainwater pump	No function	None	Everybody	Service	-
		Float switch at rainwater tank				
2-7-2-2-3	Delay time for stop	0 ... 99 s	1 s	Everybody	Service	-
2-7-2-2-4	Delay time reset	0 ... 99 s	1 s	Everybody	Service	-
2-7-2-2-5	Number of rainwater pumps	1 ... 2	0	Everybody	Service	-
2-7-2-2-8	Maximum runtime	0 ... 3600 s	60 s	Everybody	Service	-
2-7-2-2-9	Changeover delay	0 ... 60 s	1 s	Everybody	Service	-
2-7-2-2-10	Maximum number of pump starts per hour	1/h ... 20/h	20/h	Everybody	Service	-
2-7-2-3	Tank level	-	-	Everybody	Nobody	-
2-7-2-3-1	Start level for rainwater tank filling	Start tank filling level drinking water ... stop tank filling level rainwater	0,6	Everybody	Service	-
2-7-2-3-2	Stop level for rainwater tank filling	Start tank filling level rainwater ... high-water level	1	Everybody	Service	-

### 10.2.2.8 Control algorithms

Table 38: Control algorithms parameters

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
2-8	Control algorithms	-	-	Service	Nobody	-
2-8-1	PID controller	-	-	-	-	-
2-8-1-1	Proportional constant	Value range according to controller	5	Service	Service	-
2-8-1-2	Integral constant	Value range according to controller	0	Service	Service	-
2-8-1-3	Differential constant	Value range according to controller	0	Service	Service	-
2-8-2	Input signals	-	-	Service	Nobody	-
2-8-2-1	Damping factor	Value range according to controller	TBD	Service	Service	-
2-8-3	System start-up time delay	-	-	-	-	-
2-8-3-1	System start-up time delay	0 ... 60 s	10 s	Service	Service	-

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
2-8-4	Multi-pump operation	-	-	-	-	-
2-8-4-1	Start flow rate	0 .. 100 %	0,95	Service	Service	-
2-8-4-2	Speed on percent	0 .. 140 %	1	Service	Service	-
2-8-4-3	Speed off percent	0 .. 90 %	0,5	Service	Service	-
2-8-4-4	Pump dynamic control	1 .. 100 %	0,3	Service	Service	-

### 10.2.2.9 Display

Table 39: Display parameters

Parameter	Description	Value range and dependencies	Factory setting	Access level Read	Access level Write	Re-start required
2-10	Access	-	-	Everybody	Nobody	-
2-10-1	Display	-	-	Everybody	Nobody	-
2-10-1-1	Set password	000 ... 999	100	Service	Service	-
2-10-1-2	Max. login attempts	000 ... 255	3	Service	Service	-
2-10-1-3	Login cooldown	000 ... 1440	10	Service	Service	-

### 10.3 Messages

The following tables contain an overview of messages displayed by the control unit in alternation with the current system status in the bottom right corner of the screen.

Some messages have to be reset manually.

#### 10.3.1 Messages for specific pumps

In the range from 100 to 699 the first digit stands for the pump number. The pump number can be between 1 and 6.

A message with the number 359, for example, indicates overload of the frequency inverter of pump 3.

**Table 40:** Messages for specific pumps

ID message	Parameter	Description	Status	Reset mode (factory setting)
100	2-9-1-1	Failure motor circuit breaker pump 1	Warning	Manual
101	2-9-1-2	Manual ON pump 1	Warning	Auto
102	2-9-1-3	Manual OFF pump 1	Warning	Auto
103	2-9-1-4	Over temperature motor pump 1	Alert	Manual
150	2-9-2-1	Fault motor circuit breaker frequency inverter pump 1	Warning	Manual
151	2-9-2-2	Fault frequency inverter pump 1	Alert	Auto
152	2-9-2-3	Communication error frequency inverter pump 1	Alert	Auto
153	2-9-2-4	Incorrect check sum frequency inverter pump 1	Alert	Auto
154	2-9-2-5	Internal fault frequency inverter pump 1	Alert	Auto
155	2-9-2-6	Mains fault frequency inverter pump 1	Alert	Manual
156	2-9-2-7	Phase failure frequency inverter pump 1	Alert	Manual
157	2-9-2-8	Overvoltage frequency inverter pump 1	Alert	Auto
158	2-9-2-9	Undervoltage frequency inverter pump 1	Alert	Auto
159	2-9-2-10	Overload frequency inverter pump 1	Alert	Manual
160	2-9-2-11	Brake resistor frequency inverter pump 1	Alert	Manual
161	2-9-2-12	Temperature fault frequency inverter pump 1	Alert	Manual
162	2-9-2-13	AMA fault frequency inverter pump 1	Alert	Manual
163	2-9-2-14	Short circuit frequency inverter pump 1	Alert	Manual
164	2-9-2-15	Safety stop frequency inverter pump 1	Alert	Manual
165	2-9-2-16	Configuration invalid frequency inverter pump 1	Alert	Manual
200	2-9-3-1	Failure motor-circuit breaker pump 2	Warning	Manual
201	2-9-3-2	Manual ON pump 2	Warning	Auto
202	2-9-3-3	Manual OFF pump 2	Warning	Auto
203	2-9-3-4	Excessive temperature motor pump 2	Alert	Manual
250	2-9-4-1	Fault motor circuit breaker frequency inverter pump 2	Warning	Manual
251	2-9-4-2	Fault frequency inverter pump 2	Alert	Auto
252	2-9-4-3	Communication error frequency inverter pump 2	Alert	Auto
253	2-9-4-4	Incorrect check sum frequency inverter pump 2	Alert	Auto
254	2-9-4-5	Internal fault frequency inverter pump 2	Alert	Auto
255	2-9-4-6	Mains fault frequency inverter pump 2	Alert	Manual
256	2-9-4-7	Phase failure frequency inverter pump 2	Alert	Manual
257	2-9-4-8	Overvoltage frequency inverter pump 2	Alert	Auto
258	2-9-4-9	Undervoltage frequency inverter pump 2	Alert	Auto
259	2-9-4-10	Overload frequency inverter pump 2	Alert	Manual
260	2-9-4-11	Brake resistor frequency inverter pump 2	Alert	Manual
261	2-9-4-12	Temperature fault frequency inverter pump 2	Alert	Manual
262	2-9-4-13	AMA fault frequency inverter pump 2	Alert	Manual

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ID message	Parameter	Description	Status	Reset mode (factory setting)
263	2-9-4-14	Short circuit frequency inverter pump 2	Alert	Manual
264	2-9-4-15	Safety stop frequency inverter pump 2	Alert	Manual
265	2-9-4-16	Configuration invalid frequency inverter pump 2	Alert	Manual
300	2-9-5-1	Failure motor-circuit breaker pump 3	Warning	Manual
301	2-9-5-2	Manual ON pump 3	Warning	Auto
302	2-9-5-3	Manual OFF pump 3	Warning	Auto
303	2-9-5-4	Excessive temperature motor pump 3	Alert	Manual
350	2-9-6-1	Fault motor circuit breaker frequency inverter pump 3	Warning	Manual
351	2-9-6-2	Fault frequency inverter pump 3	Alert	Auto
352	2-9-6-3	Communication error frequency inverter pump 3	Alert	Auto
353	2-9-6-4	Incorrect check sum frequency inverter pump 3	Alert	Auto
354	2-9-6-5	Internal fault frequency inverter pump 3	Alert	Auto
355	2-9-6-6	Mains fault frequency inverter pump 3	Alert	Manual
356	2-9-6-7	Phase failure frequency inverter pump 3	Alert	Manual
357	2-9-6-8	Overvoltage frequency inverter pump 3	Alert	Auto
358	2-9-6-9	Undervoltage frequency inverter pump 3	Alert	Auto
359	2-9-6-10	Overload frequency inverter pump 3	Alert	Manual
360	2-9-6-11	Brake resistor frequency inverter pump 3	Alert	Manual
361	2-9-6-12	Temperature fault frequency inverter pump 3	Alert	Manual
362	2-9-6-13	AMA fault frequency inverter pump 3	Alert	Manual
363	2-9-6-14	Short circuit frequency inverter pump 3	Alert	Manual
364	2-9-6-15	Safety stop frequency inverter pump 3	Alert	Manual
365	2-9-6-16	Configuration invalid frequency inverter pump 3	Alert	Manual
400	2-9-7-1	Failure motor-circuit breaker pump 4	Warning	Manual
401	2-9-7-2	Manual ON pump 4	Warning	Auto
402	2-9-7-3	Manual OFF pump 4	Warning	Auto
403	2-9-7-4	Excessive temperature motor pump 4	Alert	Manual
450	2-9-8-1	Fault motor circuit breaker frequency inverter pump 4	Warning	Manual
451	2-9-8-2	Fault frequency inverter pump 4	Alert	Auto
452	2-9-8-3	Communication error frequency inverter pump 4	Alert	Auto
453	2-9-8-4	Incorrect check sum frequency inverter pump 4	Alert	Auto
454	2-9-8-5	Internal fault frequency inverter pump 4	Alert	Auto
455	2-9-8-6	Mains fault frequency inverter pump 4	Alert	Manual
456	2-9-8-7	Phase failure frequency inverter pump 4	Alert	Manual
457	2-9-8-8	Overvoltage frequency inverter pump 4	Alert	Auto
458	2-9-8-9	Undervoltage frequency inverter pump 4	Alert	Auto
459	2-9-8-10	Overload frequency inverter pump 4	Alert	Manual
460	2-9-8-11	Brake resistor frequency inverter pump 4	Alert	Manual
461	2-9-8-12	Temperature fault frequency inverter pump 4	Alert	Manual
462	2-9-8-13	AMA fault frequency inverter pump 4	Alert	Manual
463	2-9-8-14	Short circuit frequency inverter pump 4	Alert	Manual
464	2-9-8-15	Safety stop frequency inverter pump 4	Alert	Manual
465	2-9-8-16	Configuration invalid frequency inverter pump 4	Alert	Manual
500	2-9-9-1	Failure motor-circuit breaker pump 5	Warning	Manual
501	2-9-9-2	Manual ON pump 5	Warning	Auto
502	2-9-9-3	Manual OFF pump 5	Warning	Auto
503	2-9-9-4	Excessive temperature motor pump 5	Alert	Manual
550	2-9-10-1	Fault motor circuit breaker frequency inverter pump 5	Warning	Manual

ID message	Parameter	Description	Status	Reset mode (factory setting)
551	2-9-10-2	Fault frequency inverter pump 5	Alert	Auto
552	2-9-10-3	Communication error frequency inverter pump 5	Alert	Auto
553	2-9-10-4	Incorrect check sum frequency inverter pump 5	Alert	Auto
554	2-9-10-5	Internal fault frequency inverter pump 5	Alert	Auto
555	2-9-10-6	Mains fault frequency inverter pump 5	Alert	Manual
556	2-9-10-7	Phase failure frequency inverter pump 5	Alert	Manual
557	2-9-10-8	Overvoltage frequency inverter pump 5	Alert	Auto
558	2-9-10-9	Undervoltage frequency inverter pump 5	Alert	Auto
559	2-9-10-10	Overload frequency inverter pump 5	Alert	Manual
560	2-9-10-11	Brake resistor frequency inverter pump 5	Alert	Manual
561	2-9-10-12	Temperature fault frequency inverter pump 5	Alert	Manual
562	2-9-10-13	AMA fault frequency inverter pump 5	Alert	Manual
563	2-9-10-14	Short circuit frequency inverter pump 5	Alert	Manual
564	2-9-10-15	Safety stop frequency inverter pump 5	Alert	Manual
565	2-9-10-16	Configuration invalid frequency inverter pump 5	Alert	Manual
600	2-9-11-1	Failure motor-circuit breaker pump 6	Warning	Manual
601	2-9-11-2	Manual ON pump 6	Warning	Auto
602	2-9-11-3	Manual OFF pump 6	Warning	Auto
603	2-9-11-4	Excessive temperature motor pump 6	Alert	Manual
650	2-9-12-1	Fault motor circuit breaker frequency inverter pump 6	Warning	Manual
651	2-9-12-2	Fault frequency inverter pump 6	Alert	Auto
652	2-9-12-3	Communication error frequency inverter pump 6	Alert	Auto
653	2-9-12-4	Incorrect check sum frequency inverter pump 6	Alert	Auto
654	2-9-12-5	Internal fault frequency inverter pump 6	Alert	Auto
655	2-9-12-6	Mains fault frequency inverter pump 6	Alert	Manual
656	2-9-12-7	Phase failure frequency inverter pump 6	Alert	Manual
657	2-9-12-8	Overvoltage frequency inverter pump 6	Alert	Auto
658	2-9-12-9	Undervoltage frequency inverter pump 6	Alert	Auto
659	2-9-12-10	Overload frequency inverter pump 6	Alert	Manual
660	2-9-12-11	Brake resistor frequency inverter pump 6	Alert	Manual
661	2-9-12-12	Temperature fault frequency inverter pump 6	Alert	Manual
662	2-9-12-13	AMA fault frequency inverter pump 6	Alert	Manual
663	2-9-12-14	Short circuit frequency inverter pump 6	Alert	Manual
664	2-9-12-15	Safety stop frequency inverter pump 6	Alert	Manual
665	2-9-12-16	Configuration invalid frequency inverter pump 6	Alert	Manual

10.3.2 Messages for additional devices

Table 41: Messages for additional devices

ID message	Parameter	Description	Status	Reset mode (factory setting)
700	2-9-13-1	Suction-side pressure too low	Alert	Manual
701	2-9-13-2	Suction-side pressure too high	Alert	Manual
702	2-9-13-3	Fault pressure sensor suction side	Alert	Manual
703	2-9-13-3	Broken wire pressure sensor suction side	Alert	Manual
704	2-9-13-4	Short circuit pressure sensor suction side	Alert	Manual
720	2-9-14-1	Discharge-side pressure too low	Alert	Manual
721	2-9-14-2	Discharge-side pressure too high	Alert	Manual

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ID message	Parameter	Description	Status	Reset mode (factory setting)
722	2-9-14-3	Fault pressure sensor discharge side	Alert	Manual
723	2-9-14-4	Broken wire pressure sensor discharge side	Alert	Manual
724	2-9-14-5	Broken wire pressure sensor discharge side	Alert	Manual
725	2-9-14-6	Discharge-side pressure too low too often	Information	Auto
726	2-9-14-7	Discharge-side pressure too high too often	Information	Auto
740	2-9-15-1	Fault pressure sensor at tank	Alert	Manual
741	2-9-15-2	Broken wire pressure sensor at tank	Alert	Manual
742	2-9-15-3	Short-circuit pressure sensor at tank	Alert	Manual
750	2-9-16-1	Fault pressure sensor at tank	Alert	Auto
751	2-9-16-2	Broken wire pressure sensor at tank	Alert	Auto
752	2-9-16-3	Short-circuit pressure sensor at tank	Alert	Auto
760	2-9-17-1	Fault temperature sensor	Alert	Auto
761	2-9-17-2	Temperature too high	Alert	Manual
762	2-9-17-3	Temperature too low	Alert	Manual
770	2-9-18-1	Leakage of pump system	Alert	Manual

### 10.3.3 Messages for specific functions

Table 42: Messages for additional devices

ID message	Parameter	Description	Status	Reset mode (factory setting)
800	2-9-19-1	Lack of water	Alert	Manual
801	2-9-19-2	Dry running protection too often within time frame	Information	Auto
810	2-9-20-1	Fault rainwater pump 1	Alert	Manual
811	2-9-20-2	Starts per hour exceeded rainwater pump 1	Warning	Auto
812	2-9-20-3	Manual OFF rainwater pump 1	Warning	Auto
813	2-9-20-4	Manual ON rainwater pump 1	Warning	Auto
814	2-9-20-5	Fault rainwater pump 2	Alert	Manual
815	2-9-20-6	Starts per hour exceeded rainwater pump 2	Warning	Auto
816	2-9-20-7	Manual OFF rainwater pump 2	Warning	Auto
817	2-9-20-8	Manual ON rainwater pump 2	Warning	Auto
818	2-9-20-9	All rainwater pumps OFF	Alert	Auto
819	2-9-20-10	Lack of rainwater	Warning	Auto
820	2-9-20-11	Use of drinking water	Information	Auto
830	2-9-21-1	Tank fill level too low	Alert	Auto
831	2-9-21-2	Tank fill level critical	Warning	Auto
832	2-9-21-3	Tank fill level too high	Alert	Auto
833	2-9-21-4	Overflow of tank	Alert	Manual
835	2-9-21-5	Flushing of inlet line	Information	Auto
837	2-9-21-6	Flushing of inlet line incomplete	Warning	Manual
838	2-9-21-7	Fault inlet valve	Alert	Manual
839	2-9-21-8	Fault additional inlet valve	Alert	Manual
850	2-9-22-1	Water stagnation	Warning	Manual
851	2-9-22-2	Flushing	Information	Auto
852	2-9-22-3	Flushing too often	Warning	Manual
860	2-9-23-1	Pipe filling active	Information	Auto
861	2-9-23-2	Maximum pipe filling attempts exceeded	Warning	Auto
862	2-9-23-3	Pipe filling failed	Alert	Auto



ID message	Parameter	Description	Status	Reset mode (factory setting)
870	2-9-24-1	Membrane rupture detection	Alert	Manual
900	2-9-25-1	Several pumps OFF	Alert	Auto
901	2-9-25-2	External OFF	Alert	Auto
902	2-9-25-3	Fire alarm	Warning	Auto
903	2-9-25-4	Emergency power supply	Warning	Auto
904	2-9-25-5	Redundant system availability	Information	Auto
920	2-9-26-1	System flow estimation failed	Warning	Auto
950	2-9-27-1	Service required	Warning	Manual
960	2-9-28-1	Too many failed login attempts	Information	Auto
970	-	Database invalid	Alert	Manual
971	-	Database not compatible	Alert	Manual
972	2-9-29-1	Extension board not available	Alert	Manual
973	2-9-29-2	Overcurrent detected	Alert	Manual
974	2-9-29-3	Power failure	Information	Auto
975	2-9-25-4	Failure of real-time clock	Information	Auto
976	2-9-25-5	Display failure	Information	Auto

## 11 EU Declaration of Conformity

Manufacturer: **KSB Manufacturing Netherlands B.V.**  
**Kalkovenweg 13**  
**2401 LJ Alphen aan den Rijn (The Netherlands)**

This EU Declaration of Conformity is issued under the sole responsibility of the manufacturer.

The manufacturer herewith declares that **the product:**

### **DeltaPrimo F/VC/SVP**

**From serial number: 45/2022 1000000-1**

- is in conformity with the provisions of the following directives / regulations as amended from time to time:
  - Pump set: 2006/42/EC Machinery Directive
  - Electrical components<sup>8)</sup>: 2011/65/EU Restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)
  - 2014/30/EU: Electromagnetic Compatibility (EMC)

The manufacturer also declares that

- the following harmonised international standards have been applied:
  - ISO 12100
  - EN 809
  - EN 60204-1
  - EN 806-2

Person authorised to compile the technical file:

Ron Bijman  
Manager Competence Centre Products  
KSB Manufacturing Netherlands B.V.  
Kalkovenweg 13  
2401 LJ Alphen aan den Rijn (The Netherlands)

The EU Declaration of Conformity was issued in/on:

Alphen aan den Rijn, 1 July 2022



Ron Bijman  
Manager Competence Centre Products  
KSB Manufacturing Netherlands B.V.  
Kalkovenweg 13  
2401 LJ Alphen aan den Rijn

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<sup>8</sup> Where applicable

## 12 Certificate of Decontamination

Type: .....  
 Order number /  
 Order item number<sup>9)</sup>: .....  
 Delivery date: .....  
 Application: .....  
 Fluid handled<sup>9)</sup>: .....

Please tick where applicable<sup>9)</sup>:




Corrosive




Oxidising




Flammable




Explosive




Hazardous to health




Seriously hazardous to health




Toxic




Radioactive




Bio-hazardous




Safe

Reason for return<sup>9)</sup>: .....

Comments: .....  
 .....

The product / accessories have been carefully drained, cleaned and decontaminated inside and outside prior to dispatch / placing at your disposal.

We herewith declare that this product is free from hazardous chemicals and biological and radioactive substances.

For mag-drive pumps, the inner rotor unit (impeller, casing cover, bearing ring carrier, plain bearing, inner rotor) has been removed from the pump and cleaned. In cases of containment shroud leakage, the outer rotor, bearing bracket lantern, leakage barrier and bearing bracket or intermediate piece have also been cleaned.

For canned motor pumps, the rotor and plain bearing have been removed from the pump for cleaning. In cases of leakage at the stator can, the stator space has been examined for fluid leakage; if fluid handled has penetrated the stator space, it has been removed.

- No special safety precautions are required for further handling.
- The following safety precautions are required for flushing fluids, fluid residues and disposal:

.....  
 .....

We confirm that the above data and information are correct and complete and that dispatch is effected in accordance with the relevant legal provisions.

.....  
 Place, date and signature

.....  
 Address

.....  
 Company stamp

<sup>9</sup> Required field

### 13 Commissioning Report

The pressure booster system specified below has been commissioned today by the undersigned, authorised KSB Service who created this report.

**Pressure booster system details**

Type series .....  
 Size .....  
 Serial number .....  
 Order No. ....

**Purchaser/place of installation**

<b>Purchaser</b>	<b>Place of installation</b>
Name .....	.....
Address .....	.....
.....	.....

**Operating data** For further details please refer to the circuit diagram.

Start-up pressure  $p_{start}$  bar .....

Setpoint  $\Delta p$  .....

Minimum runtime .....

Inlet pressure monitoring  $p_{inl} - x$  .....  
 (setting of inlet pressure switch)

Stop pressure  $p_{stop}$  bar .....

Inlet pressure  $p_{inl}$  [bar] .....

Pre-charge pressure of accumulator  $p_{pre-charge}$  [bar] .....

The operator or operator’s representative herewith confirms to have received instructions on how to operate and service the pressure booster system. The relevant circuit diagrams and operating instructions have been handed over.

<b>Non-conformities found during commissioning</b>	<b>Deadline for remedial action</b>
Non-conformity 1.....	.....
.....	.....
.....	.....
.....	.....

Name of KSB representative .....	Name of purchaser or representative .....
Place .....	Date .....

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**KSB Manufacturing Netherlands B.V.**  
Kalkovenweg 13  
2401 LJ Alphen aan den Rijn (Netherlands)  
[www.ksb.com](http://www.ksb.com)