

Installation/Operating Manual

dp-control III(+)



Legal information/Copyright

Original operating manual dp-control III(+)

All rights reserved. The contents provided herein must neither be distributed, copied, reproduced, edited or processed for any other purpose, nor otherwise transmitted, published or made available to a third party without the manufacturer's express written consent.

Subject to technical modification without prior notice.

© Duijvelaar Pompen B.V., Alphen aan den Rijn, Netherlands 2023-06-26

Contents

| | | |
|----------|--|-----------|
| 1 | General..... | 6 |
| 1.1 | Principles | 6 |
| 1.2 | Target group | 6 |
| 1.3 | Other applicable documents | 6 |
| 1.4 | Symbols | 6 |
| 1.5 | Key to safety symbols/markings | 7 |
| 2 | Safety | 8 |
| 2.1 | General | 8 |
| 2.2 | Intended use | 8 |
| 2.3 | Personnel qualification and training | 8 |
| 2.4 | Consequences and risks caused by non-compliance with this operating manual | 8 |
| 2.5 | Safety awareness | 9 |
| 2.6 | Safety information for the user/operator | 9 |
| 2.7 | Safety information for maintenance, inspection and installation | 9 |
| 2.8 | Unauthorised modes of operation | 9 |
| 2.9 | Software changes | 9 |
| 3 | Transport/Storage/Disposal..... | 10 |
| 3.1 | Checking the condition upon delivery | 10 |
| 3.2 | Transport..... | 10 |
| 3.3 | Storage | 10 |
| 3.4 | Disposal | 10 |
| 4 | Description | 12 |
| 4.1 | General description..... | 12 |
| 4.2 | Product information as per Regulation No. 1907/2006 (REACH)..... | 12 |
| 4.3 | Designation | 12 |
| 4.4 | Name plate | 12 |
| 4.5 | Functions | 12 |
| 4.6 | Technical data | 13 |
| 4.7 | Combination options | 15 |
| 4.8 | Scope of supply | 15 |
| 4.9 | Dimensions and weight..... | 15 |
| 5 | Installation at Site | 17 |
| 5.1 | Safety regulations | 17 |
| 5.2 | Checking ambient conditions | 17 |
| 5.3 | Installing the control unit | 17 |
| 5.4 | Electrical connection | 18 |
| 5.4.1 | Electrical connections..... | 19 |
| 5.4.2 | Connecting to power supply | 22 |
| 5.4.3 | Using a motor contactor (for F systems only)..... | 22 |
| 5.4.4 | Motor protection switches..... | 22 |
| 5.5 | Connecting the frequency inverter | 22 |
| 6 | Operation | 23 |
| 6.1 | Control panel | 23 |
| 6.1.1 | Screen | 23 |
| 6.1.2 | Turn/push button | 23 |
| 6.1.3 | Status LED | 23 |
| 6.2 | Symbols on the screen | 24 |



| | | |
|----------|---|-----------|
| 6.2.1 | Operating status of the system..... | 25 |
| 6.2.2 | Bluetooth connection..... | 25 |
| 6.2.3 | Locking/unlocking the screen..... | 26 |
| 6.2.4 | Operating status of the pump..... | 26 |
| 6.2.5 | Information on the system..... | 26 |
| 6.3 | Operating the device via the control panel..... | 27 |
| 6.3.1 | Unlocking the screen..... | 28 |
| 6.3.2 | Changing the operating mode..... | 28 |
| 6.3.3 | Resetting messages..... | 28 |
| 6.3.4 | Setting the setpoint..... | 28 |
| 6.3.5 | Activating the Bluetooth connection..... | 29 |
| 6.3.6 | Displaying the firmware version..... | 29 |
| 6.4 | Operation via the app..... | 29 |
| 7 | Commissioning/Start-up/Shutdown..... | 30 |
| 7.1 | Ambient conditions for commissioning and operation..... | 30 |
| 7.2 | Commissioning..... | 30 |
| 7.2.1 | Starting up the system..... | 30 |
| 7.2.2 | Configuring parameters..... | 30 |
| 7.2.3 | Selecting the language..... | 30 |
| 7.2.4 | Setting the time/date..... | 30 |
| 8 | Basic Configurations of the Pressure Booster System..... | 31 |
| 8.1 | F system..... | 31 |
| 8.2 | VC system..... | 31 |
| 8.3 | SVP system..... | 32 |
| 8.4 | General settings..... | 32 |
| 8.4.1 | Setpoint, bandwidth..... | 32 |
| 8.4.2 | Alternative setpoint..... | 32 |
| 8.4.3 | Additional setpoint increase..... | 32 |
| 8.4.4 | Dynamic pressure setpoint compensation..... | 32 |
| 8.4.5 | Pump operating mode..... | 33 |
| 8.4.6 | Operating frequency range..... | 33 |
| 8.4.7 | Units displayed..... | 33 |
| 8.4.8 | Saving/loading settings..... | 33 |
| 8.5 | Pump protection..... | 33 |
| 8.5.1 | Start delay and stop delay..... | 33 |
| 8.5.2 | Minimum runtime..... | 33 |
| 8.5.3 | Pump changeover..... | 33 |
| 8.5.4 | Functional check run..... | 34 |
| 8.6 | System protection..... | 34 |
| 8.6.1 | Dry running protection..... | 34 |
| 8.6.2 | Response to pressure sensor failure..... | 34 |
| 8.6.3 | Discharge pressure monitoring..... | 35 |
| 8.6.4 | Short pressure deviations..... | 35 |
| 8.6.5 | Leakage detection..... | 35 |
| 8.6.6 | Pipe filling function..... | 35 |
| 8.6.7 | Membrane rupture detection..... | 35 |
| 8.7 | Hygiene functions and special functions..... | 36 |
| 8.7.1 | Temperature monitoring..... | 36 |
| 8.8 | Special functions..... | 36 |
| 8.8.1 | Emergency power operation..... | 36 |
| 8.8.2 | Fire alarm..... | 36 |
| 8.8.3 | External On/Off mode..... | 36 |
| 8.9 | Tank filling function..... | 36 |
| 8.9.1 | Tank control..... | 36 |
| 8.9.2 | Tank monitoring..... | 36 |

| | | |
|-----------|--|-----------|
| 8.9.3 | Tank filling | 37 |
| 8.9.4 | Drinking water protection..... | 37 |
| 8.9.5 | Rainwater filling | 37 |
| 8.10 | Special operating modes | 37 |
| 8.10.1 | Jockey pump system..... | 37 |
| 8.11 | Field bus | 38 |
| 9 | Servicing/inspection..... | 39 |
| 9.1 | Safety regulations | 39 |
| 9.2 | Servicing/inspection..... | 39 |
| 9.2.1 | Supervision of operation..... | 39 |
| 9.2.2 | Handling messages..... | 39 |
| 10 | Parameter Lists | 40 |
| 10.1 | Configuration | 40 |
| 10.1.1 | System settings..... | 40 |
| 10.1.2 | Pump settings..... | 41 |
| 10.1.3 | Input / outputs..... | 46 |
| 10.1.4 | Further configuration settings..... | 51 |
| 10.2 | Settings..... | 52 |
| 10.2.1 | Pressure settings..... | 52 |
| 10.2.2 | Pump operating mode..... | 53 |
| 10.2.3 | Timers | 54 |
| 10.2.4 | Pump protection | 54 |
| 10.2.5 | System protection..... | 57 |
| 10.2.6 | Accumulator | 60 |
| 10.2.7 | Tank | 60 |
| 10.2.8 | Control algorithms | 65 |
| 10.2.9 | Display..... | 66 |
| 10.3 | Modbus | 66 |
| 11 | Messages..... | 70 |
| 11.1 | Messages for specific pumps | 70 |
| 11.2 | Messages for additional devices..... | 72 |
| 11.3 | Messages for specific functions | 73 |
| 12 | Related Documents | 75 |
| 12.1 | Checklist for commissioning and inspection | 75 |
| 13 | EU Declaration of Conformity..... | 76 |
| | Index..... | 77 |



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 Duijvelaar Pompen B.V. service facility to maintain the right to claim under warranty.

1.2 Target group

This operating manual is aimed at the target group of trained and qualified specialist technical personnel.

1.3 Other applicable documents


Table 1: Overview of other applicable documents

| Document | Contents |
|-----------------|--|
| Circuit diagram | Description of electrical connections and performance data |

For accessories and/or integrated machinery components, observe the relevant manufacturer's product literature.







1.4 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 |

1.5 Key to safety symbols/markings

Table 3: Definition of safety symbols/markings

| Symbol | Description |
|--|---|
|  DANGER | DANGER This signal word indicates a high-risk hazard which, if not avoided, will result in death or serious injury. |
|  WARNING | WARNING This signal word indicates a medium-risk hazard which, if not avoided, could result in death or serious injury. |
|  CAUTION | CAUTION This signal word indicates a hazard which, if not avoided, could result in damage to the machine and its functions. |
|  | General hazard In conjunction with one of the signal words this symbol indicates a hazard which will or could result in death or serious injury. |
|  | Electrical hazard In conjunction with one of the signal words this symbol indicates a hazard involving electrical voltage and identifies information about protection against electrical voltage. |
|  | Machine damage 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:
 - Markings for connections
 - Name plate
- The operator is responsible for ensuring compliance with all local regulations not taken into account.

2.2 Intended use

This product must only be operated within the limit values specified in the technical product literature for the mains voltage, mains frequency, ambient temperature, and in compliance with any other instructions provided in the operating manual or other applicable documents.

- The product must not be used in potentially explosive atmospheres.

2.3 Personnel qualification and 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 product must always be supervised by specialist technical personnel.

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

- Non-compliance with this operating manual 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

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 legislation (e.g. EN 50110-1)

2.6 Safety information for the user/operator

- 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.
- Provide the personnel with protective equipment and make sure it is used.
- Eliminate all electrical hazards. (In this respect refer to the applicable national safety regulations and/or regulations issued by the local energy supply companies.)

2.7 Safety information for maintenance, inspection and installation

- Modifications or alterations of the pump (set) are only permitted with the manufacturer's prior consent.
- Use only original spare parts or parts/components authorised by the manufacturer. The use of other parts/components 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.
- Any work on the product shall only be performed when it has been disconnected from the power supply (de-energised).
- Carry out work on the product during standstill only.
- As soon as the work has been completed, re-install and re-activate any safety-relevant devices and protective devices. Before returning the product to service, observe all instructions on commissioning.

2.8 Unauthorised modes of operation

Never operate the product outside the limits stated in the data sheet and in this manual.

The warranty relating to the operating reliability and safety of the product supplied is only valid if the product is used in accordance with its intended use.

2.9 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 Duijvelaar Pompen B.V..

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 Duijvelaar Pompen B.V. or the supplying dealer and the insurer about the damage in writing immediately.

3.2 Transport

- Transport the device in its original packaging.
- Observe the transport instructions on the original packaging.
- Keep the original packaging for future transport and storage.

3.3 Storage

If the ambient conditions for storage are met, the function of the control unit is safeguarded even after a prolonged period of storage.



CAUTION

Damage during storage due to humidity, dirt or vermin

Corrosion/contamination of the control unit!

- For outdoor storage cover the (packed or unpacked) control unit and accessories with water-proof material.

Table 4: Ambient conditions for storage

| Ambient condition | Value |
|---------------------|-----------------------|
| Relative humidity | Min. 5 % to max. 90 % |
| Ambient temperature | -10 °C to + 70 °C |

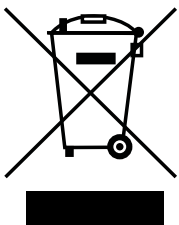
- Store the control unit in dry, vibration-free conditions and, if possible, in its original packaging.
- Store the control unit in a dry room where the level of atmospheric humidity is as constant as possible.
- Prevent excessive fluctuations in atmospheric humidity. [⇒ Table 4]

3.4 Disposal

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.



The product is classified as special waste due to several installed components:

1. Dismantle the product.
2. Separate and sort the materials,
e.g. by:
 - Aluminium
 - Plastic cover (recyclable plastic)
3. Dispose of materials in accordance with local regulations or in another controlled manner.
PCBs, power electronics, capacitors and electronic components are all special waste.

The requirements pertaining to RoHs 2002/95/EC are fulfilled.

4 Description

4.1 General description

- Control unit for pressure booster systems
- 2 to 6 pump sets can be started, stopped and controlled as a function of pressure.

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

For information as per chemicals Regulation (EC) No. 1907/2006 (REACH), see <http://www.dp.nl/reach>.

4.3 Designation

Example: F: 4p (6p) VC/SVP:6p

Table 5: Designation key

| Code | Description | |
|------|---------------------------------------|--|
| F | Pump operating mode | |
| | F | Fixed speed |
| | VC | Speed-controlled by cabinet-mounted frequency inverter |
| | SVP | Speed-controlled by motor-mounted frequency inverter |
| 4p | Number of pumps that can be connected | |

4.4 Name plate



Fig. 1: Name plate (example)

| | | | |
|---|---|---|----------------------|
| 1 | Type series | 2 | Size |
| 3 | Serial number | 4 | Year of construction |
| 5 | Input voltage - mains frequency - power input | 6 | Enclosure |

4.5 Functions

Control Control of 2 to 6 pump sets as a function of pressure

The following functions, among others, are possible:

- Even distribution of operating hours among the pumps connected
- Automatic pump changeover
 - as a function of operating hours
 - in the case of a pump fault
- Pump starting and stopping in line with demand
- Functional check run

- Control of an inlet tank valve (with corresponding system configuration)
- Inlet tank level control (with corresponding system configuration)
- Energy-saving operation
- Dynamic pressure setpoint compensation
- Control of base load pump(s)
- Control of jockey pump and base load pump(s)

Monitoring Monitoring of external conditions via digital and analog inputs

The following monitoring functions can be used:

- General fault (warning and alert)
- Thermal monitoring of pump motors
- Sensor fault/broken wire
- Fault/warning per pump
- Monitoring of service interval
- Dry running detection via pressure switch, pressure sensor or flow monitor
- Operational availability, indicated via LEDs and display
- Level monitoring
- Fire alert recognition (with corresponding system configuration)
- Monitoring of the inlet tank valve (with corresponding system configuration)
- Dry running protection
- Leakage detection
- External stop
- Monitoring of the water temperature or ambient temperature

Communication Communication with field bus systems via the following interfaces:

- Modbus RTU- RS485
- Profibus DP (optional)
- Bacnet MSTP (optional)

Bus communication is possible with frequency inverters of the following manufacturers:

- DP Var+ / DP Var
- Danfoss Microdrive FC 51
- Danfoss Aquadrive FC 202
- Danfoss Mididrive FC280

4.6 Technical data

Table 6: Technical data

| Characteristic | Value | dp-control | |
|---------------------------|-----------------------------------|------------|------|
| | | III | III+ |
| Power supply | | | |
| Rated voltage | 24 V AC (min. -10 %, max. +20 %) | X | X |
| Maximum fuse size | 0,5 A | X | X |
| Mains frequency | 50/60 Hz (min. 49 Hz, max. 61 Hz) | X | X |
| Insulation voltage | 500 V AC | X | X |
| Max. input current | 850 mA | X | X |
| Max. power | 20 W (36 VA) | X | X |
| Ambient conditions | | | |
| Operating temperature | 0 °C to +60 °C | X | X |

| Characteristic | Value | dp-control | |
|--|---|------------|------|
| | | III | III+ |
| Storage temperature | -10 °C to +70 °C | X | X |
| Relative humidity | 5 % to 90 %, non-condensing | X | X |
| Maximum height above sea level | 2000 m | X | X |
| Type of protection / enclosure | | | |
| Display | LCD segment display | X | X |
| Button | Turn/push button | X | X |
| Housing | IP20 | X | X |
| If mounted in a control cabinet meeting IP55 requirements | IP55 | X | X |
| Communication | | | |
| RS485 1 (galvanically isolated) | Modbus RTU– RS485 for building management system | X | X |
| RS485 2 | Modbus RTU– RS485 for optional IoT device | X | X |
| RS485 3 | Modbus RTU– RS485 for variable frequency drives | X | X |
| Max. length of electric cable | 30 m | X | X |
| Digital inputs | | | |
| Parameterisable digital inputs 1 - 12 | 24 V DC | X | X |
| Parameterisable digital inputs 13 - 18 (galvanically isolated) | 24 V DC | - | X |
| Max. length of electric cable | 30 m | X | X |
| Digital outputs | | | |
| Parameterisable digital outputs 1 - 4 | <ul style="list-style-type: none"> – Max. 250 V AC, max. 3 A – Volt-free output – NO (normally open contact) | X | X |
| Parameterisable digital outputs 5 - 12 | <ul style="list-style-type: none"> – Max. 250 V AC, max. 3 A – Volt-free output – NO (normally open contact) | - | X |
| External warning and alert | <ul style="list-style-type: none"> – Max. 250 V AC, max. 3 A – Volt-free output – NC/NO (SPDT) | X | X |
| Max. length of electric cable | 30 m | X | X |
| Analog inputs | | | |
| Parameterisable analog inputs 1 - 2 | 4 - 20 mA, input impedance < 850 Ohm | X | X |
| Parameterisable analog input 3 (galvanically isolated) | 4 - 20 mA, input impedance < 500 Ohm | - | X |
| Resolution of analog inputs 1 - 3 | 12 bit | X | X |
| < 2 mA: Monitoring for broken wires | (>3 mA: Resetting broken wire monitoring) | X | X |
| > 22 mA: Short circuit detection | (< 21 mA: Resetting short circuit detection) | X | X |
| Temperature sensor | Pt100/Pt1000 | - | X |
| Leakage detection | Two-piece screwed connection | X | X |
| Max. length of electric cable | 30 m | X | X |
| Analog outputs | | | |
| Parameterisable analog outputs 1 - 2 | 0 / 4 - 20 mA | - | X |
| Leakage detection | | | |
| Conductivity (microsiemens) | Drinking water | X | X |
| Max. length of electric cable | 30 m | X | X |
| Temperature sensor (Pt100/Pt1000) | | | |
| Temperature range | -10 °C to +80 °C | X | X |
| Resolution | 0.1 °C | X | X |
| Max. length of electric cable | 30 m | X | X |

4.7 Combination options

Not every frequency inverter can be used for every operating mode. Internal bus communication forms the basis for this purpose.

The following combinations of frequency inverter and operating mode are recommended by Duijvelaar Pompen B.V. :

Table 7: Combinations of frequency inverters and operating modes

| Operating mode | Frequency inverter |
|----------------|--|
| F system | Without frequency inverter (mains operation) |
| VC system | Danfoss MicroDrive (FC51) |
| | Danfoss MidiDrive (FC280) |
| | Danfoss AquaDrive (FC202) |
| SVP system | DP Var+ |
| | DP Var |

4.8 Scope of supply

- Control unit with installed software

4.9 Dimensions and weight

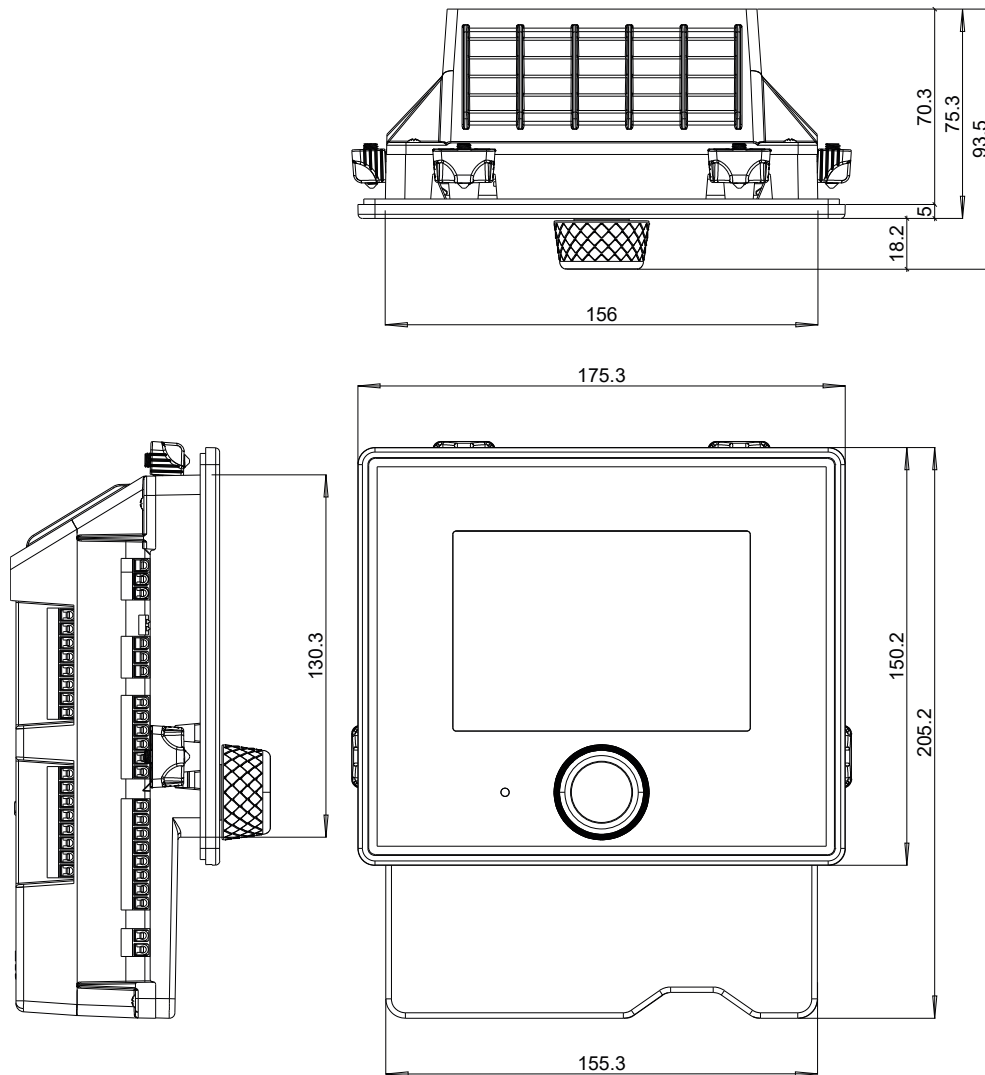



Fig. 2: Dimensions

Table 8: Weight

| Design | Gewicht |
|-----------------|---------|
| | [kg] |
| dp-control III | 0,50 |
| dp-control III+ | 0,62 |

5 Installation at Site

5.1 Safety regulations

| | |
|---|---|
|  | <p>⚠ DANGER Incorrect installation Danger to life!</p> <ul style="list-style-type: none">▸ Install the control unit in a flood-proof location.▸ Never use the control unit in potentially explosive atmospheres. |
|---|---|

5.2 Checking ambient conditions

1. Check and safeguard ambient conditions.
2. Contact the manufacturer if the device is to be used under ambient conditions other than indicated.
3. Verify that the place of installation meets the following requirements:
 - Sufficient space for installation/removal and proper ventilation
 - No direct sunlight
 - Protected against freezing
 - Flood-proof

5.3 Installing the control unit



Fig. 3: Installing the control unit in the control cabinet

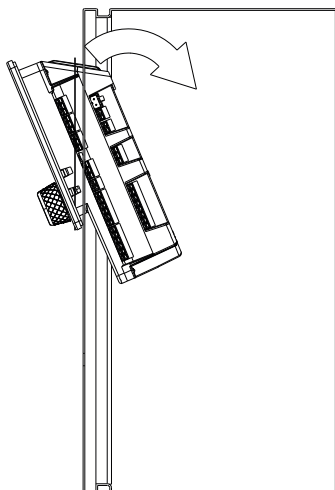


Fig. 4: Inserting the control unit

1. Tilt the control unit to insert it into the opening provided.
2. Check that the sealing foam is positioned correctly after the control unit has been turned into its final vertical installation position.

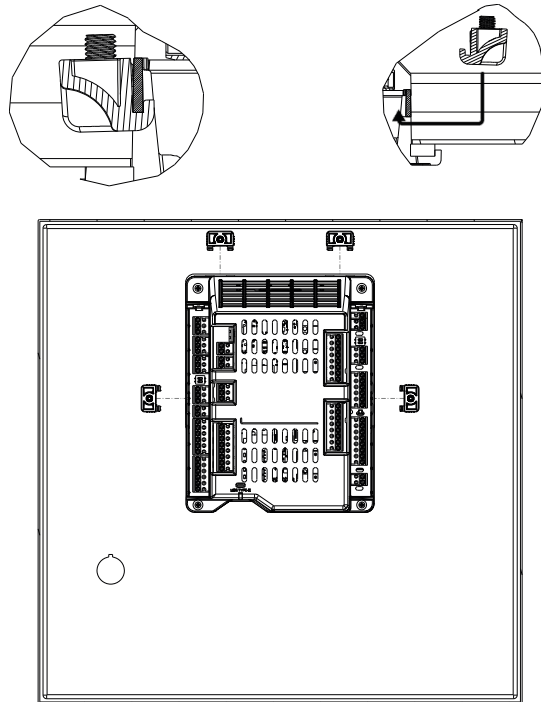


Fig. 5: Position of mounting pads

3. Fit the four mounting pads in the grooves above (2x) and to the left (1x) and right (1x) of the control unit.
4. Tighten the grub screws on the mounting pads (from the rear) with a 2.5 mm Allen key to a torque of 0.2 Nm max. Take care to only tighten the grub screws until the sealing foam is compressed and the plastic housing touches the control cabinet.

5.4 Electrical connection



⚠ DANGER

Incorrect electrical installation

Danger of death from electric shock!

- Any work on the electrical system shall be undertaken by a trained electrician only (DIN VDE 0105 - Part 1/07.83).
- Before commencing any work on the electrical installations, de-energise the system and make sure it cannot be re-started unintentionally. Ensure staff safety by PELV¹:
- Only motor protection devices with safe isolation to EN 50178 (VDE 0160) may be connected directly.



CAUTION

Improper electrical connection

Damage to property!

- All connections shall be made in accordance with the technical specifications issued by the local energy supply companies.
- Check the type of current and voltage of the mains.

¹ PELV = Protective Extra Low Voltage. The inputs for the thermal circuit breakers (TCBs) are not galvanically isolated from the PELV circuits of the control inputs, 24 V digital outputs and service interface.

5.4.1 Electrical connections

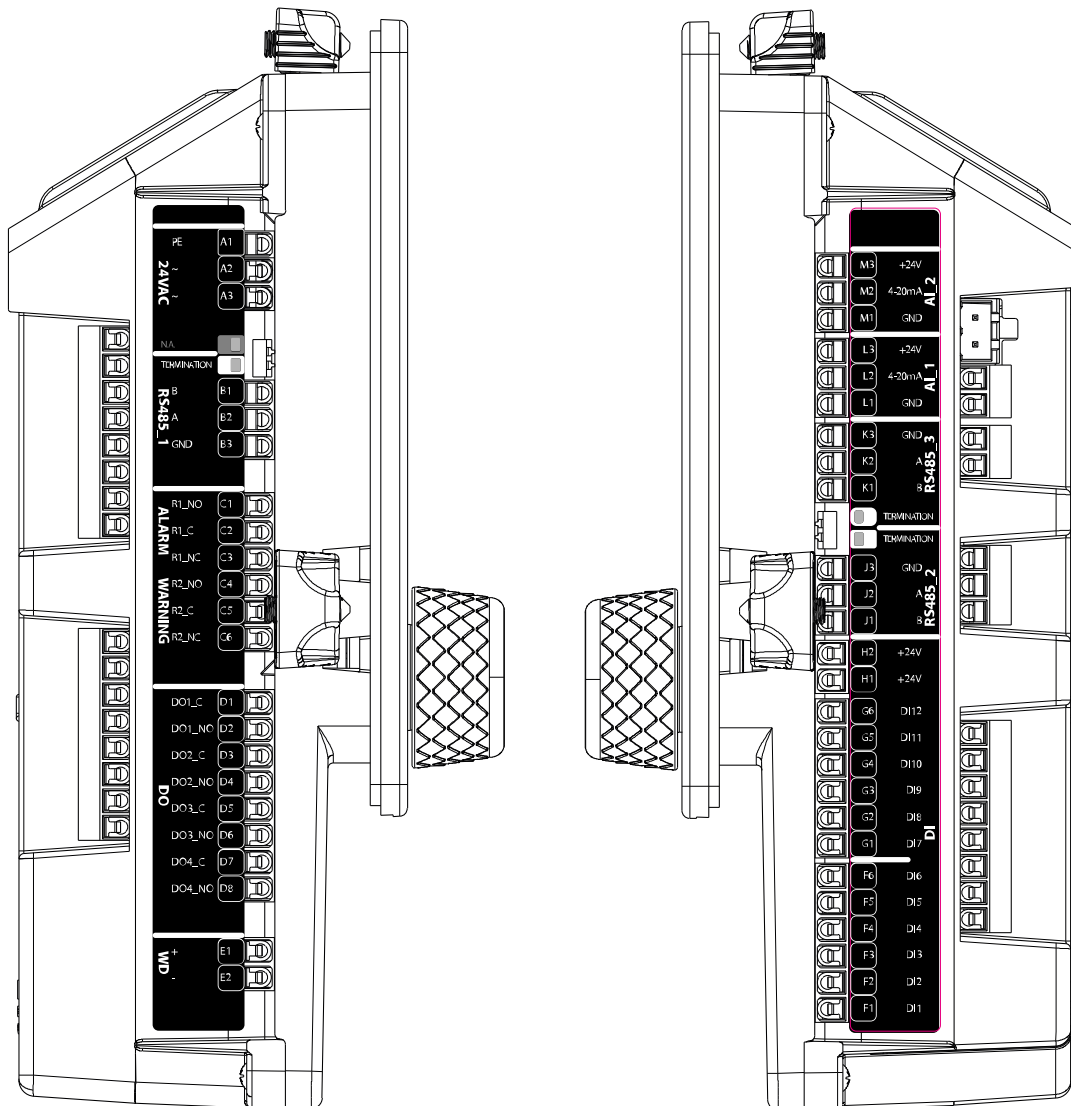


Fig. 6: Terminal strip, mainboard

Table 9: Mainboard connections

| Code | Designation | Description |
|------|-------------|--|
| A1 | PE | Potential equalisation |
| A2 | ~ | 24 V AC power supply |
| A3 | ~ | |
| B1 | B | RS485_1 communication cable. A terminating resistor located next to this connection has to be set to ON if it is the end of the communication cable. |
| B2 | A | |
| B3 | GND | |
| C1 | R1_NO | Switching relay Alert. |
| C2 | R1_C | Normally open when one or several alert messages are present or when the control unit is off. |
| C3 | R1_NC | |
| C4 | R2_NO | |
| C5 | R2_C | Normally open when one or several warning messages are present or when the control unit is off. |
| C6 | R2_NC | |
| D1 | DO1_C | Digital outputs 1 to 4. Pre-configured for starting up pumps 1 to 4. |

| Code | Designation | Description |
|------|-------------|---|
| D2 | DO1_NO | |
| D3 | DO2_C | |
| D4 | DO2_NO | |
| D5 | DO3_C | |
| D6 | DO3_NO | |
| D7 | DO4_C | |
| D8 | DO4_NC | |
| E1 | + | |
| E2 | - | |
| F1 | DI1 | Digital inputs 1 to 12, configuration depending on system requirements |
| F2 | DI2 | |
| F3 | DI3 | |
| F4 | DI4 | |
| F5 | DI5 | |
| F6 | DI6 | |
| G1 | DI7 | |
| G2 | DI8 | |
| G3 | DI9 | |
| G4 | DI10 | |
| G5 | DI11 | |
| G6 | DI12 | |
| H1 | +24V | +24 V connections for digital inputs 1 to 12 |
| H2 | +24V | |
| J1 | B | RS485_2 communication cable. |
| J2 | A | A terminating resistor located next to this connection has to be set to ON if it is the end of the communication cable. |
| J3 | GND | |
| K1 | B | RS485_3 communication cable. |
| K2 | A | A terminating resistor located next to this connection has to be set to ON if it is the end of the communication cable. |
| K3 | GND | |
| L1 | GND | Analog input 1, configurable function |
| L2 | 4-20 mA | |
| L3 | +24V | |
| M1 | GND | Analog input 2, factory-set as discharge pressure sensor |
| M2 | 4-20 mA | |
| M3 | +24V | |

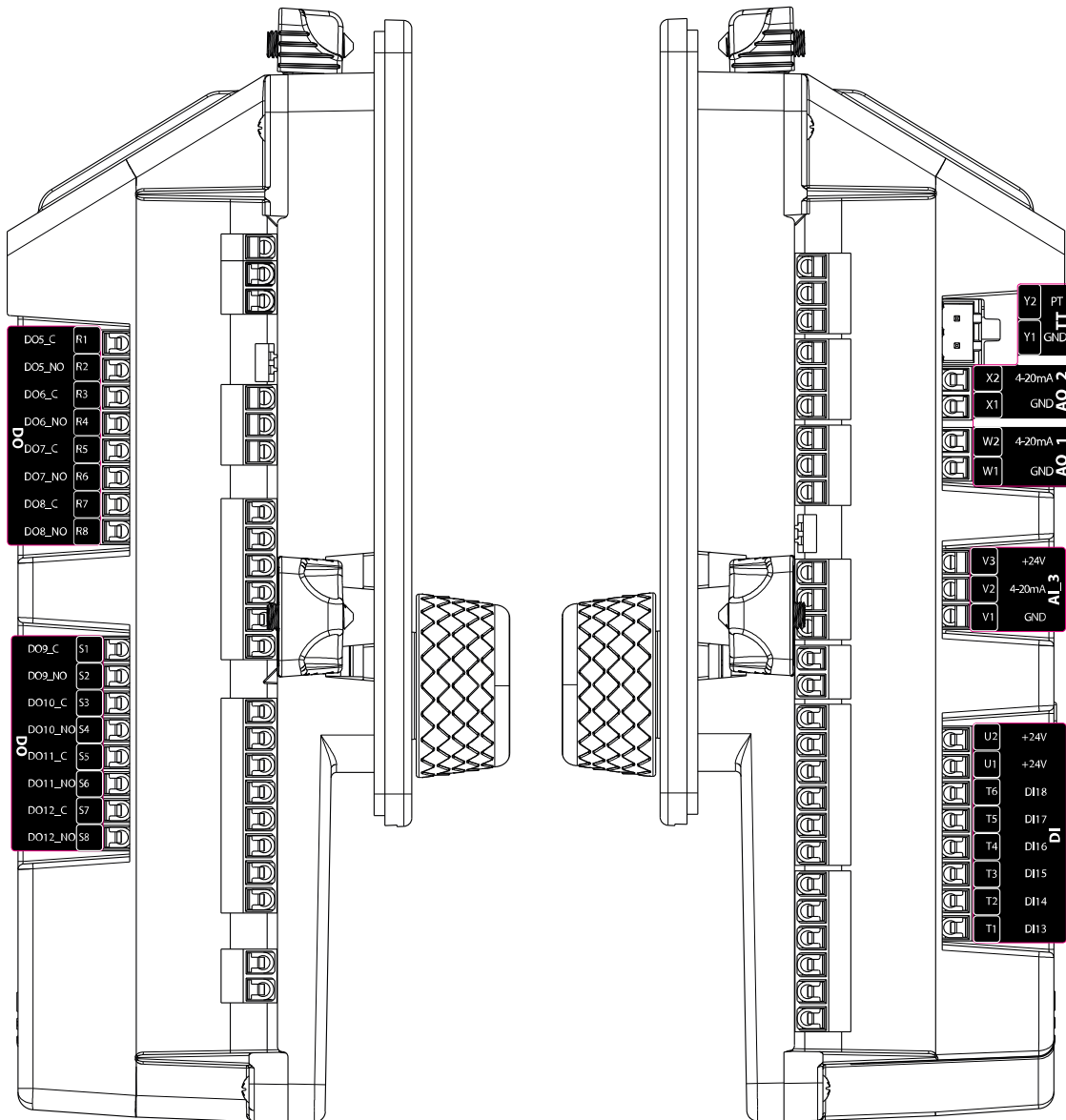


Fig. 7: Terminal strips on extension board

Table 10: Connections of the extension board

| Code | Designation | Description |
|------|-------------|--|
| R1 | DO5_C | Digital outputs 5 to 12 with configurable function |
| R2 | DO5_NO | |
| R3 | DO6_C | |
| R4 | DO6_NO | |
| R5 | DO7_C | |
| R6 | DO7_NO | |
| R7 | DO8_C | |
| R8 | DO8_NC | |
| S1 | DO9_C | |
| S2 | DO9_NO | |
| S3 | DO10_C | |
| S4 | DO10_NO | |
| S5 | DO11_C | |
| S6 | DO11_NO | |



| Code | Designation | Description |
|------|-------------|---|
| S7 | DO12_C | |
| S8 | DO12_NC | |
| T1 | DI13 | Digital inputs 13 to 18, configuration depending on system requirements |
| T2 | DI14 | |
| T3 | DI15 | |
| T4 | DI16 | |
| T5 | DI17 | |
| T6 | DI18 | |
| U1 | +24V | +24 V connections for digital inputs 13 to 18 |
| U2 | +24V | |
| V1 | GND | Analog input 3, configurable function |
| V2 | 4-20 mA | |
| V3 | +24V | |
| W1 | GND | Analog output 1, configurable function |
| W2 | 4-20 mA | |
| X1 | GND | Analog output 2, configurable function |
| X2 | 4-20 mA | |
| Y1 | GND | Pressure transmitter connection for Pt100 or Pt1000 |
| Y2 | PT | |

5.4.2 Connecting to power supply

1. Connect the control unit to a power supply system suitable for its technical data.

5.4.3 Using a motor contactor (for F systems only)

Duijvelaar Pompen B.V. recommends using motor contactors for switching the pump sets on and off.

The motor contactors used have to correspond with the pump set input power.

5.4.4 Motor protection switches

Duijvelaar Pompen B.V. recommends using motor protection switches to electrically protect the pump sets.

The motor protection switches used have to correspond with the pump set input power.

5.5 Connecting the frequency inverter

Communication with the frequency inverters is effected via Modbus protocol.

When connecting the frequency inverter, observe the electrical connections of the control unit. [⇒ Section 5.4.1, Page 19]

Comply with the frequency inverter manufacturer's documentation.

6 Operation

6.1 Control panel

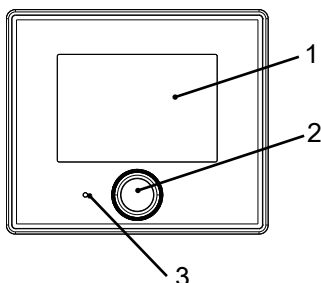


Fig. 8: Control panel

| | |
|---|---|
| 1 | Screen [⇒ Section 6.1.1, Page 23] |
| 2 | Turn/push button [⇒ Section 6.1.2, Page 23] |
| 3 | Status LED [⇒ Section 6.1.3, Page 23] |

6.1.1 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.

6.1.2 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.

6.1.3 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 11: 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. |
|  | 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). |

6.2 Symbols on the screen

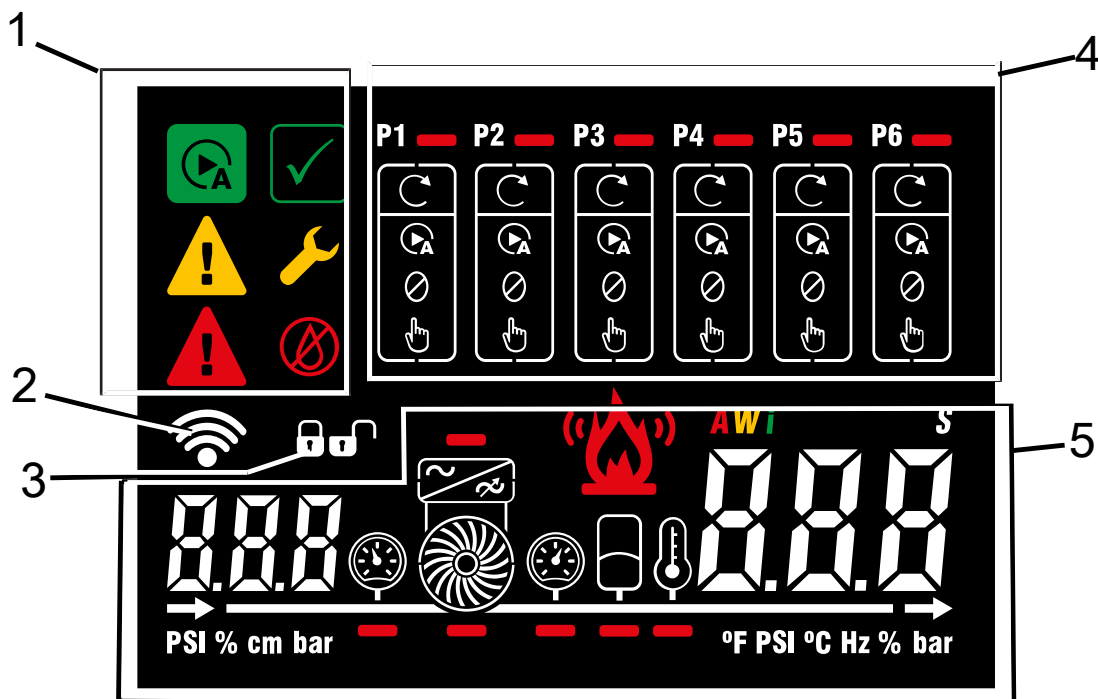








Fig. 9: Overview of all symbols on the screen

| | | | | |
|---------|---|---|---|------------------------------------|
| 24 / 80 | 1 | Operating status of the system [⇒ Section 6.2.1, Page 25] | 2 | Status of the Bluetooth connection |
| | 3 | Locking/unlocking the screen | 4 | Operating status of the pump |
| | 5 | Information on the system | | |
| | | | | |
| | | | | |



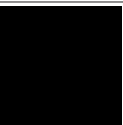
6.2.1 Operating status of the system

Table 12: 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). |
|  | 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. |



6.2.2 Bluetooth connection

Table 13: Bluetooth connection status symbols

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

6.2.3 Locking/unlocking the screen

Table 14: 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. |

6.2.4 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.

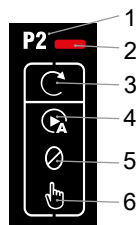


Fig. 10: Operating status of pump set P2

Table 15: 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. |

6.2.5 Information on the system

26 / 80

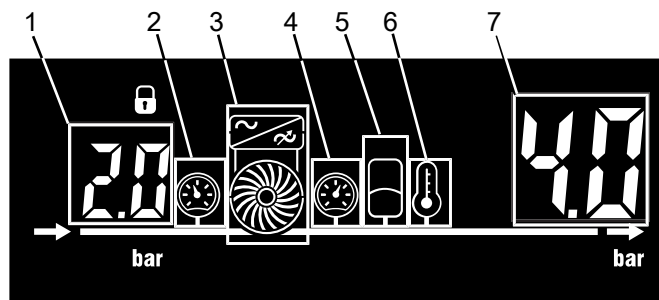


Fig. 11: Information on the system

Table 16: Symbols for information on the system

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

6.3 Operating the device via the control panel

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

- Unlocking the screen [⇒ Section 6.3.1, Page 28]
- Changing the operating mode [⇒ Section 6.3.2, Page 28]
- Resetting messages [⇒ Section 6.3.3, Page 28]
- Setting the setpoint [⇒ Section 6.3.4, Page 28]
- Activating the Bluetooth connection [⇒ Section 6.3.5, Page 29]
- Displaying the firmware version [⇒ Section 6.3.6, Page 29]

6.3.1 Unlocking the screen

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

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 *Open padlock* symbol. Then press the turn/push button.
3. 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.



NOTE

The factory default password for unlocking the screen is 100. It can be changed via the app.

6.3.2 Changing the operating mode

- ✓ The screen has been unlocked. [⇒ Section 6.3.1, Page 28]
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.



Fig. 12: Information on the pump

6.3.3 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 11, Page 70] 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 6.3.1, Page 28]
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.



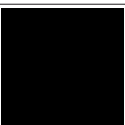
6.3.4 Setting the setpoint

The setpoint serves to select the required discharge-side pressure. The setpoint has to be set at the discharge-side sensor. [⇒ Section 6.2.5, Page 26]

- ✓ The screen has been unlocked. [⇒ Section 6.3.1, Page 28]
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.

6.3.5 Activating the Bluetooth connection

Table 17: 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. |

1. Press the turn/push button for a minimum of 5 seconds.

⇒ The *Bluetooth connection* symbol flashes. [⇒ Section 6.2.2, Page 25]

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.

6.3.6 Displaying the firmware version

Every time the pressure booster system is re-started the firmware version is displayed for a short time. [⇒ Section 6.2.5, Page 26]

To have the firmware version displayed without re-starting the pressure booster system, 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.

6.4 Operation via the app

Further configurations can only be made via the DP-Control app.

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

7 Commissioning/Start-up/Shutdown

7.1 Ambient conditions for commissioning and operation

Table 18: Ambient conditions for operation

| Condition | Value |
|-----------------------|--|
| Ambient temperature | 0 ... 60 °C |
| Relative humidity | Min. 5 % to max. 90 % Non-condensing |
| Installation altitude | Max. 2000 m above MSL (higher installation altitudes are subject to a reduction factor) |

7.2 Commissioning

A checklist can be used for commissioning. [⇒ Section 12.1, Page 75]

7.2.1 Starting up the system

See system documentation.

7.2.2 Configuring parameters

Observe the general configuration instructions.

1. Press the turn/push button of the control unit for five seconds until the symbol for wireless connection starts flashing.
2. Open the app.
3. Establish a connection between the app and the control unit.
4. Tap the *spanner* symbol to access the Service level.
5. Tap the second symbol to configure the parameters.

If 15 minutes pass without the app being used, the connection ends automatically. If the control unit does not receive any signals via the wireless connection for 2 minutes, it ends the connection automatically (factor setting).

7.2.3 Selecting the language

When the app is opened for the first time, a language has to be selected.

1. Click on the globe symbol on the first page of the app.
2. Select the required language.

7.2.4 Setting the time/date

The control unit does not automatically adjust to daylight saving time.

1. To set the time of day, select parameter 1-7-1.
2. To set the date, select parameter 1-7-2.

8 Basic Configurations of the Pressure Booster System

The control unit controls several pump sets according to the configured setpoint and bandwidth.

Pump sets are started up and stopped to keep the current discharge pressure within the bandwidth arranged symmetrically below and above the setpoint. When none of the pump sets of the pressure booster system are running, the first pump set is started up immediately as soon as the current discharge pressure sinks below the setpoint minus half the bandwidth. Further pump sets are started up as soon as this criterion is met again. Only one further pump set is started up at a time. If a pump set is to be started up and the time since its last start-up is shorter than the start delay time, the pump set will only start up after the delay time.

Pump sets are stopped when the current discharge pressure exceeds the setpoint plus half the bandwidth. Further pump sets are stopped as soon as this criterion is met again. If a pump set is to be stopped and the time since its last stop is shorter than the stop delay time, the pump set will only stop after the delay time. The last pump set is stopped according to the same criterion. A pump set operated on a frequency inverter may not exceed the setpoint plus half the bandwidth as the speed is reduced by the pressure control system to meet the setpoint. In this case, a special function will take over, checking whether water is still required.

When the pump set speed is below the Pump Speed for Activation (parameter 2-4-6-1) and the current discharge pressure is within the flow detection Bandwidth (parameter 2-4-6-5) for the Time within Bandwidth (parameter 2-4-6-2), the pump set speed is reduced by the Step Height of Speed (parameter 2-4-6-4) for the corresponding Step Interval (parameter 2-4-6-3). If flow continues to be present, the discharge pressure falls below the bandwidth and flow detection is deactivated. If this is not the case, the last pump set will be stopped when the Speed for Stopping Last Pump (parameter 2-4-6-6) is reached.

8.1 F system

F system The F system controls several pump sets running at the nominal speed required for the setpoint.

The pump sets on duty run at full nominal speed. As the pump sets of this system are not speed-controlled, the discharge pressure during normal operation is located in a range around the setpoint, i.e. between the setpoint minus half the bandwidth and the setpoint plus half the bandwidth.

During the start-up process and stop process, the discharge pressure may deviate more for a short period of time. The Operating Mode (parameter 1-1-2-3) has to be set to "Mains operation". Pump Groups (parameter 1-1-2-6) has to be set to "Pump-group control".

8.2 VC system

VC system In speed-controlled systems the pump sets are controlled in such a way that the discharge pressure is maintained at the setpoint.

Pump sets are started up and stopped when the bandwidth limits around the setpoint are exceeded. A smaller bandwidth around the setpoint can therefore be set.

If only one pump is running, the next pump set is started up when the first pump set runs at maximum speed and the current discharge pressure falls below the setpoint minus half the bandwidth. The first pump set will keep running at full speed; only the newly started pump set is speed-controlled in accordance with the setpoint. When the speed-controlled pump set is running at minimum speed and the current discharge pressure exceeds the setpoint plus half the bandwidth, the pump set will be stopped that has been running the longest at maximum speed. The last pump set is stopped by the No-flow Detection function.

The Operating Mode (parameter 1-1-2-3) has to be set to *Operation on frequency inverter* and the Frequency Control Type (parameter 1-1-2-5) has to be set to *Single-pump operation*. Pump Groups (parameter 1-1-2-6) has to be set to *Pump-group control*. The Frequency Inverter Type (parameter 1-1-2-4) has to be selected.

8.3 SVP system

SVP system This speed-controlled system controls the pump sets in such a way that the discharge pressure is maintained at the setpoint. Pump sets are started up and stopped when the bandwidth limits around the setpoint are exceeded. A smaller bandwidth around the setpoint can therefore be set.

If only one pump is running, another pump set is started up when the first pump set runs at maximum speed and the current discharge pressure falls below the setpoint minus half the bandwidth. The first pump set will keep running at full speed; only the newly started pump set is speed-controlled in accordance with the setpoint. When the speed-controlled pump set is running at minimum speed and the current discharge pressure exceeds the setpoint plus half the bandwidth, the pump set will be stopped that has been running the longest at maximum speed. The last pump set is stopped by the No-flow Detection function. The Operating Mode (parameter 1-1-2-3) has to be set to *Operation on frequency inverter* and the Frequency Control Type (parameter 1-1-2-5) has to be set to *Single-pump operation*. Pump Groups (parameter 1-1-2-6) has to be set to *Pump-group control*. The Frequency Inverter Type (parameter 1-1-2-4) has to be selected.

8.4 General settings

8.4.1 Setpoint, bandwidth

Setpoint, bandwidth The pressure booster system starts up and stops the pump sets and controls the speed of the pump sets in such a way that the discharge pressure corresponds with the configured Setpoint (parameter 2-1-1) and is within the configured Bandwidth (parameter 2-1-2).

Pump sets are started up or stopped when the discharge pressure deviates from the setpoint by plus or minus half the bandwidth.

8.4.2 Alternative setpoint

Alternative setpoint An Alternative Setpoint (parameter 2-1-3) can be activated either timer-controlled or via a digital input by configuring the Alternative Setpoint Selection (parameter 2-1-4) accordingly. The Alternative Setpoint Start Time (parameters 2-1-5 and 2-1-6) and Alternative Setpoint Stop Time (parameters 2-1-7 and 2-1-8) for activating the alternative setpoint have to be set accordingly. If a digital input is to be used for activating the alternative setpoint, a digital input has to be assigned to the alternative setpoint (one of parameters 1-3-3-1 to 1-3-3-18).

8.4.3 Additional setpoint increase

Additional setpoint increase For pressure booster systems operated on a frequency inverter, Additional Setpoint Increase (parameter 2-1-9) can be used to increase the setpoint immediately before the last pump set is stopped to fill an accumulator with a higher pressure.

8.4.4 Dynamic pressure setpoint compensation

Dynamic pressure setpoint compensation To compensate any pressure losses in the piping Dynamic Pressure Setpoint Compensation can be Enabled (parameter 2-4-7-1). The Maximum Discharge-side Pressure Deviation (parameter 2-4-7-2) added to the setpoint is reached at Maximum System Load (parameter 1-1-4). Starting from a pump load of "zero" the current setpoint is increased quadratically until the setpoint plus maximum discharge pressure deviation at maximum system load is reached.

8.4.5 Pump operating mode

Pump operating mode The operating mode (manual-0-automatic) can be selected on the screen or via an external switch. The source has to be configured (parameter 1-1-5-1). The pump operating mode for each pump set can then be separately set to "Manual-ON", "Manual-OFF" and "Automatic". Mains-operated pump sets that have been started manually run at full nominal speed; pump sets that are operated on a frequency inverter and have been started up manually run at a configured fixed speed (parameter 1-2-1-2-11). In "Manual-OFF" operating mode pumps are not available for operation. In "Automatic" operating mode pump sets can be started up in line with pressure control.

8.4.6 Operating frequency range

Operating frequency range For pump sets operated on a frequency inverter, a Minimum Speed (parameters 1-2-1-2-16 and 1-2-1-2-9) and a Maximum Speed (parameters 1-2-1-2-17 and 1-2-1-2-10) can be configured for the frequency range of the frequency inverters. In addition, the ranges of frequency and pump load to be displayed on the screen and in the app has to be configured (parameters 2-4-1-1 and 2-4-1-2).

8.4.7 Units displayed

Units displayed On the display, values can be shown in different units. The units can be set for the values of Pressure (parameter 1-6-2-1), Height (parameter 1-6-2-2) and Temperature (parameter 1-6-2-3).

8.4.8 Saving/loading settings

Saving/loading settings The pressure booster system is supplied with a saved factory setting. This factory setting can be reset. The settings made during commissioning can also be saved and reset. [⇒ Section 6.4, Page 29]

8.5 Pump protection

8.5.1 Start delay and stop delay

Start delay and stop delay Having several pump sets start up at the same time can be prevented by configuring a Start Delay (parameter 2-3-1) or Stop Delay (parameter 2-3-2).

8.5.2 Minimum runtime

Minimum runtime When a pump set is started up, it can only be stopped again after the Minimum Runtime (parameter 2-3-3) has been reached. Every time the number of actual pump starts exceeds the maximum number of pump starts (parameters 1-2-1-2-9 and 1-2-2-2-9), the actual minimum runtime is extended by the Minimum Runtime Correction Step (parameter 2-3-4). When the pump set is then started less frequently again, the actual minimum runtime is shortened by the Minimum Runtime Correction Step (parameter 2-3-4) again. A reduction by more than the minimum runtime is not possible.

8.5.3 Pump changeover

Pump changeover When the operating time of the pump set exceeds the configured Maximum Runtime (parameter 2-4-2-2), a Changeover within Pump Group can be triggered (parameter 2-4-2-1). Another available pump set then takes over as the duty pump. For pressure booster systems in nominal speed operation, Over-/Undersupply can be selected for a changeover between the two pumps (parameter 2-4-2-3). A Time of Over-/Undersupply (parameter 2-4-2-4) can be configured for the pump changeover. In speed-controlled pressure booster systems the transition is smooth with a handshake between the two pumps. A duration for the Ramp-up Time (parameter 2-4-2-5) for starting up the pump and a duration for the Ramp-down Time (parameter 2-4-2-6) for stopping the pump can be configured.

8.5.4 Functional check run

Functional check run A Check Run can be activated for the pump set (parameter 2-4-4-1), so the pump set starts up regularly if it has not been operated for a defined period of time. The Function can be triggered by different sources (parameter 2-4-4-2). When the function is configured based on idle time and a pump set has not been operated for a configurable Standstill Time (parameter 2-4-4-4), the pump set will be started up and operated for a defined Duration (parameter 2-4-4-3). When a Time Stamp for Activation has been set (parameters 2-4-4-5 and 2-4-4-6) and the function has been configured for a time of day, all pump sets that are not in operation and have got the same time stamp are started up for a check run, one after the other. When the function is configured for a Triggered Check Run, the check run takes place when the digital input level is high. For this purpose, the check run must be assigned a digital input (one of parameters 1-3-3-1 to 1-3-3-18).

8.6 System protection

8.6.1 Dry running protection

Dry running protection To prevent dry running of the pump sets the control unit monitors the suction side of the pressure booster system for lack of water. The availability of water can be monitored with different devices.

Lack of water has to be detected for a defined period of time (Delay Time for System Stop) (parameter 2-5-1-1-2) before the message is triggered. If a lack of water is detected, all pumps are stopped automatically with a Dry Running Protection Stop Delay (parameter 2-5-1-1-5) between the stops of the individual pump sets.

If no lack of water is detected any more, a defined Delay Time Reset (parameter 2-5-1-1-3) has to pass before the lack-of-water message can be reset.

The suction-side pressure can be monitored by a pressure sensor. For calibrating the sensor range the pressure Value at 4 mA (parameter 1-3-7-1-1-1) and the pressure Value at 20 mA (parameter 1-3-7-1-1-2) can be used. The *suction-side Pressure sensor* has to be selected as the Source (parameter 2-5-1-1-1). Further to be set are the Minimum Suction-side Pressure for System Stop (parameter 2-5-1-3-1) before a dry running condition is detected, and the Minimum Suction-side Pressure for Reset (parameter 2-5-1-3-2) when the lack of water condition is no longer present. When using a pressure switch, *Pressure switch* has to be selected as the Source (parameter 2-5-1-1-1). Dry running protection is then effected in accordance with the corresponding digital input for the pressure switch (parameters 1-3-3-1 to 1-3-3-18). A dry running event is detected when the input signal level is low. A float switch can also be used, provided an inlet tank is installed upstream of the pressure booster system. In this case, *Float switch* has to be selected (parameter 2-5-1-1-1) and the float switch has to be assigned as digital input (parameters 1-3-3-1 to 1-3-3-18). A dry running event is detected when the input signal level is low. For pressure booster systems with an upstream inlet tank whose fill is also monitored by the control unit, a pressure sensor installed at the tank that measures the tank fill level can also be used for dry running protection. In this case, *Pressure sensor at tank* has to be selected as the Source (parameter 2-5-1-1-1). The Low-water Level (parameter 2-7-1-2-7) and the Low-water Reset Level (parameter 2-7-1-2-8) of the tank correspond with the general lack-of-water levels. An Additional Source can also be set (parameter 2-5-1-2-1). In this case, two sources that are independent of each other are used for monitoring the lack of water. Different types of monitoring can be used in this way. The Delay Time for System Stop and Delay Time Reset can be set separately for each monitoring source (parameter 2-5-1-2-2 and parameter 2-5-1-2-3). In particular, a Maximum Number of Dry Running Protection Events per Hour can be configured (parameter 2-5-1-1-4) to monitor the number of lack of water events that have occurred. If this number is exceeded, an information message is output.

8.6.2 Response to pressure sensor failure

Pressure sensor failure In the event of a pressure sensor failure on the discharge side, a pump set response can be selected to ensure a specific water supply. Pump response to pressure sensor failure is selected separately for pump sets in mains operation (parameter 2-4-1-5) and pump sets

operated on frequency inverters (parameter 2-4-1-4). The Options are *Stop all pumps*, *Freeze number of pumps running and speed* or *Run a specific number of pump sets at fixed speed* (parameter 2-4-1-6).

8.6.3 Discharge pressure monitoring

Discharge pressure monitoring

The current discharge pressure is monitored continuously. When the pressure falls below the configured Maximum Discharge Pressure (parameter 2-5-5-1-1) or exceeds the configured Minimum Discharge Pressure (parameter 2-5-5-2-1), a message is output after a Delay Time (parameter 2-5-5-1-2 resp. parameter 2-5-5-2-2) or the pump sets are stopped in addition, depending on the configured Selection of Pump Response (parameter 2-5-5-1-1 resp. parameter 2-5-5-2-3).

8.6.4 Short pressure deviations

Short pressure deviations

Short deviations of the discharge-side pressure from the setpoint that meet the criterion of starting up and stopping pumps can be prevented from starting up and stopping pumps by a Delay Time for Pump Start (parameter 2-4-5-2) and a Delay Time for Pump Stop (parameter 2-4-5-3). In this case, pumps will only be started up or stopped if the pressure deviations continue after the delay times.

8.6.5 Leakage detection

Leakage detection

If leakage detection is to be used, Leakage Detection has to be set to Enabled (parameter 2-5-2-1). As a detection signal Source *Water detection integrated* or *Leakage detection by external device* (parameter 2-5-2-2) can be selected.

For signalling by an external device, Leakage detection by external device has to be assigned a digital input (one of parameters 1-3-3-1 to 1-3-3-18). Leakage detection can monitor the Leakage of pump system or Overflow of tank, which can be selected via the Position (parameter 2-5-2-4). The Response to any leakage being detected can be configured (parameter 2-5-2-5). In the event of leakage at the pump system options are either Message only or Message and stop all pumps. In the event of a tank overflow, the options available are Message only, Message and close inlet valve, and Message, close inlet valve and stop pumps, referring to the rainwater pumps. Settings can also be made for the Delay Time Leakage Detection (parameter 2-5-2-6) and for the Delay Time Reset (parameter 2-5-2-7).

8.6.6 Pipe filling function

Pipe filling function

The Pipe Filling Function can be Enabled (parameter 2-5-6-1) and will then check prior to every start-up of the first pump set of the pressure booster system whether the deviation of the current discharge pressure from the setpoint is higher than the value programmed as Deviation from Setpoint (parameter 2-5-6-2). The function will then start with the current discharge pressure as the new current setpoint and increases the setpoint by the Ramp Step for Increasing Setpoint (parameter 2-5-6-3) every time the ramp step is reached within the Maximum Time for Ramp Step (parameter 2-5-6-4). If the ramp step could not be reached after the Maximum Number of Attempts (parameter 2-5-6-5), the function is cancelled and a message is output. If the configured setpoint is reached, the function ends.

8.6.7 Membrane rupture detection

Membrane rupture detection

Membrane Rupture Detection can be activated for accumulators (parameter 1-1-8-1). Two different Sources can be used to trigger the detection (parameter 1-1-8-3). For signalling by an external device, Membrane Rupture Detection has to be assigned a digital input (one of parameters 1-3-3-1 to 1-3-3-18). A delay can be set for the corresponding message (Delay Time Membrane Rupture Detection) and resetting of that message (Delay Time Reset) (parameters 1-1-8-4 and 1-1-8-5).

8.7 Hygiene functions and special functions

8.7.1 Temperature monitoring

Temperature monitoring

When Temperature Monitoring is Enabled (parameter 2-5-3-2-1), the temperature is measured by a thermometer. The temperature measurement input has to be configured for this purpose (parameter 1-3-5). The Response to the temperature exceeding the Maximum Temperature (parameter 2-5-3-2-2) or falling below the Minimum Temperature (parameter 2-5-3-2-3) can be selected as only a Message or, in addition, Flushing of the pressure booster system (parameter 2-5-3-2-4).

8.8 Special functions

8.8.1 Emergency power operation

Emergency power operation

When a digital input has been assigned to emergency power operation, this function is enabled. When the input signal level is high, the system load is limited to the Maximum System Load (parameter 2-5-4-2). Stop Delay Enabled/Disabled (parameter 2-5-4-3) serves to select whether pumps running above maximum load are to be stopped immediately or stopped one after the other after a stop delay as is the standard procedure.

8.8.2 Fire alarm

Fire alarm

The Fire Alarm mode starts up all pump sets at full speed, regardless of the pressure control system. This function has to be activated (parameter 1-1-6-1). The Fire Alarm mode must be assigned a digital input (one of parameters 1-3-3-1 to 1-3-3-18).

8.8.3 External On/Off mode

External On/Off mode

The External On/Off mode can be used to stop all pumps or to activate the pressure control system. This function has to be Enabled (parameter 1-1-7-1). The External On/Off mode must be assigned a digital input (one of parameters 1-3-3-1 to 1-3-3-18).

8.9 Tank filling function

8.9.1 Tank control

Tank control

For pressure booster systems with an inlet tank, filling of this tank can be controlled by the control unit. To do so, Drinking Water Filling must be activated (parameter 2-7-1-1-1). For filling the tank the Inlet Valve Type has to be selected (parameter 2-7-1-3-1). When *Tank filling on/off valve* is selected, no further settings are required. For the selection of *Tank filling proportional valve* the Minimum Opening Angle of Valve (parameter 2-7-1-3-2) and Step Width for Valve Actuation (parameter 2-7-1-3-3) also have to be configured. Additional Tank Filling (parameter 2-7-1-4-1) can be configured with separate settings. 2-7-1-4-2, 2-7-1-4-3 and 2-7-1-4-4 have to be configured accordingly.

8.9.2 Tank monitoring

Tank monitoring

For measuring the tank fill level and setting several tank fill levels in percent, the Absolute Height at 0 % (parameter 2-7-1-2-4) and Absolute Height at 100 % (parameter 2-7-1-2-5) have to be configured as well as the Position of Sensor above Tank Bottom (parameter 2-7-1-2-6). This serves to set the measured tank fill level with reference to the tank bottom.

Different fill levels can be configured for different actions and for triggering messages at specific tank fill levels. With Low-water Level (parameter 2-7-1-2-7) and Low-water Reset Level (parameter 2-7-1-2-8) the dry running protection can be configured. A hysteresis can be set between the fill levels for triggering and resetting. As a warning for a possible upcoming lack of water, Critical Water Level (parameter 2-7-1-2-9) and Level for Reset

Critical Water Level (parameter 2-7-1-2-10) can be set. With High-water Level (parameter 2-7-1-2-16) and Level for Reset High-water Level (parameter 2-7-1-2-15) a warning for a possible tank overflow can be set.

8.9.3 Tank filling

Tank filling Tank filling is controlled by the two fill levels Start Tank Filling Level (parameter 2-7-1-2-11) and Stop Tank Filling Level (parameter 2-7-1-2-14). These fill levels lead to opening and closing of the tank filling valve. The opening of the proportional valve between these two fill levels is controlled in a linear manner. At the Stop Tank Filling Level the valve is fully closed. Below this filling level the valve remains closed until the fill level required for the minimum opening angle is reached. The valve then opens up to its minimum opening angle. When the fill level falls further, the valve opens in a linear manner. At the Start Tank Filling Level the valve is fully open. When the valve closes, it reaches its fully closed condition at the Stop Tank Filling Level. The proportional valve is always opened and closed in increments in accordance with the set Step Width for Valve Actuation (parameter 2-7-1-3-3). The step width is scaled to the range between the Start Tank Filling Level and the Stop Tank Filling Level. The Additional Start Tank Filling Level (parameter 2-7-1-2-12) and Additional Stop Tank Filling Level (parameter 2-7-1-2-13) are the corresponding fill levels for an additional inlet valve.

8.9.4 Drinking water protection

Drinking water protection Drinking Water Protection of the inlet line can be activated to meet hygiene requirements (parameter 2-7-1-5-1). When the Maximum Time between Usage of Drinking Water (parameter 2-7-1-5-2) is exceeded, the Response (parameter 2-7-1-5-3) will be either a Message only or a Message and flushing of inlet line, depending on the configuration. For the latter, the drinking water inlet valve will be opened for the Time for Flushing Drinking Water Supply (parameter 2-7-1-5-4). Whether flushing is to be stopped in the event that the overflow level is exceeded can be configured under Overflow if High-water Level is Exceeded (parameter 2-7-1-5-5).

8.9.5 Rainwater filling

Rainwater filling If the tank is to be filled with rainwater instead of drinking water, Rainwater Filling can be Enabled (parameter 2-7-2-1-1) as an additional tank control function.

In this case, 1 or 2 Rainwater Pumps (parameter 2-7-2-2-5) are started up to pump rainwater from a rainwater tank into the water storage tank. Dry running protection for the rainwater pumps can be configured by selecting the Source for Dry Running Protection of Rainwater Pump (parameter 2-7-2-2-1). The float switch in the rainwater tank must be assigned a digital input (one of parameters 1-3-3-1 to 1-3-3-18). A Delay Time for Stop (parameter 2-7-2-2-3) and Delay Time for Reset (parameter 2-7-2-2-4) have to be set. Rainwater pumps only run for the configured Maximum Runtime (parameter 2-7-2-2-8). If two pump sets are available, a pump changeover takes place after the Changeover Delay (parameter 2-7-2-2-9). If a rainwater pump exceeds the Maximum Number of Pump Starts per Hour (parameter 2-7-2-2-10), the rainwater pump is only started up again when the number falls below the limit. Start Level for Rainwater Tank Filling and Stop Level for Rainwater Tank Filling (parameters 2-7-1-2-17 and 2-7-1-2-18) have to be configured in addition to the values for drinking water fill levels.

37 / 80

8.10 Special operating modes

8.10.1 Jockey pump system

Jockey pump system For pressure booster systems required to handle a low water demand in addition to the normal water demand, jockey-pump control can be used. First, a small jockey pump is started up. When this pump no longer supplies enough water, a base load pump group takes over the water supply. The jockey pump stops. It is only started again when the pressure booster system has been stopped completely. The pump sets of both pump groups are always pumps sets in mains operation. The Operating Mode (parameter 1-1-2-3) has to



be set to Mains operation. Pump Groups (parameter 1-1-2-6) has to be set to *Pump-group and jockey-pump control* . For switching between jockey pump and base load pump group Over-/Undersupply (parameter 2-4-3-1) can be selected and the Time of Over-/Undersupply (parameter 2-4-3-2) can be set. For the jockey pump a separate Minimum Runtime Jockey Pump (parameter 2-3-5) can be set.

8.11 Field bus

Field bus A field bus Modbus RTU module with galvanically isolated RS-485 interface is integrated. Modbus RTU communication has to be activated (parameter 1-4-1). The corresponding Slave Address (parameter 1-4-2), Baud Rate (parameter 1-4-3) and Parity (parameter 1-4-4) have to be set. Diverse parameters and the status of all messages can be read. Some parameters, e.g. the setpoint can also be written. [⇒ Section 10.3, Page 66]

9 Servicing/inspection

9.1 Safety regulations

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



DANGER

Unintentional start-up

Danger of death from electric shock!

- ▷ Disconnect the device from the mains before carrying out any maintenance and installation work.
- ▷ Prevent the device from being re-started unintentionally when carrying out any maintenance and installation work.



NOTE

All maintenance work, service work and installation work can be carried out by Duijvelaar Pompen B.V. Service or authorised workshops.

9.2 Servicing/inspection

9.2.1 Supervision of operation

- Ensure sufficient cooling of the control unit.
- Regularly check the control unit for any messages present. [⇒ Section 9.2.2, Page 39]

9.2.2 Handling messages

Some messages have to be reset manually. These messages are displayed with a symbol.

There are different messages [⇒ Section 11, Page 70] .

Each message is assigned a specific status at the factory:

- Information
- Warning
- Alert

Each message is assigned a reset type at the factory:

- Manual reset
- Automatic reset

Each message is assigned a relay function at the factory:

- Deactivated
- Activated

These factory settings can be changed by the customer using the app.

10 Parameter Lists

10.1 Configuration

10.1.1 System settings

Table 19: 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 |
|-----------|---------------------------------------|---|--------------------------|-------------------|--------------------|-------------------|
| | Number of base load pumps | 1 ... (number of pumps - number of jockey pumps) if pump groups = jockey-pump control | Number of pumps | Everybody | Nobody | |
| 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 | - |

10.1.2 Pump settings

Table 20: 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 | - |
| 1-2-1-1-5 | Head 0 | - | Pump data | Everybody | Service | - |



| Parameter | Description | Value range and dependencies | Factory setting | Access level Read | Access level Write | Re-start required |
|------------|---|------------------------------|-----------------|-------------------|--------------------|-------------------|
| 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 | - |
| | 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 | - |

| Parameter | Description | Value range and dependencies | Factory setting | Access level Read | Access level Write | Re-start required |
|------------|------------------------------------|--|-----------------|-------------------|--------------------|-------------------|
| 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 | - |
| 1-2-1-2-23 | Function input 2 | [0] No operation [1] Reset [2] Coast inverse | Motor data | Everybody | Service | - |
| 1-2-1-2-24 | Function input 3 | [0] No operation [14] Jog | Motor data | Everybody | Service | - |



| Parameter | Description | Value range and dependencies | Factory setting | Access level Read | Access level Write | Re-start required |
|------------|--------------------------|------------------------------|-----------------|-------------------|--------------------|-------------------|
| 1-2-1-2-25 | 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 | | | | |
| 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 | - |

| Parameter | Description | Value range and dependencies | Factory setting | Access level Read | Access level Write | Re-start required |
|------------|--|---------------------------------------|------------------------|-------------------|--------------------|-------------------|
| | Start select | [1] Bus | Motor data | Everybody | Service | |
| | | [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 _{pt} Stop speed | - | OFF | Everybody | Service | - |
| 1-2-1-2-40 | I _{pt} 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 | | | | |



10.1.3 Input / outputs

Table 21: 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 | | | | |
| | | Pressure sensor at tank | | | | |
| | | 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 | | | | |
| | | Failure motor-circuit breaker rainwater pump 1 | | | | |
| | | Failure motor-circuit breaker rainwater pump 2 | | | | |
| | | Manual-mode at M-0-A-switch rainwater pump 1 | | | | |



| Parameter | Description | Value range and dependencies | Factory setting | Access level Read | Access level Write | Re-start required |
|-----------|--|---|-----------------|-------------------|--------------------|-------------------|
| | Input 1 | Manual-mode at M-0-A-switch rainwater pump 2 | None | Everybody | Service | |
| | Input 2 | | | | | |
| | Input 3 | Automatic-mode at M-0-A-switch rainwater pump 1 | | | | |
| | Input 4 | Automatic-mode at M-0-A-switch rainwater pump 2 | | | | |
| | Input 5 | | | | | |
| | Input 6 | Float switch in rainwater tank | | | | |
| | Input 7 | External On/Off | | | | |
| | Input 8 | Fire alarm | | | | |
| | Input 9 | Acknowledge all | | | | |
| | Input 10 | Alternative setpoint | | | | |
| | Input 16 (extension board) | Triggered check run | | | | |
| | Input 17 (extension board) | Emergency power operation | | | | |
| | Input 18 (extension board) | 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 | | | | |
| 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 | - |

10.1.4 Further configuration settings

Table 22: Further configuration settings parameters

| Parameter | Description | Value range and dependencies | Factory setting | Access level Read | Access level Write | Re-start re-quired |
|-----------|--------------------------------------|------------------------------|-----------------|-------------------|--------------------|--------------------|
| 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 | Display 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 | - |
| | | % | | | | |
| 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 | - |



| Parameter | Description | Value range and dependencies | Factory setting | Access level Read | Access level Write | Re-start required |
|-----------|--|------------------------------|-----------------|-------------------|--------------------|-------------------|
| 1-7-1-3 | Seconds | 0 ... 59 | 0 | Everybody | Service | - |
| 1-7-2 | Date | - | - | Everybody | Nobody | - |
| 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 | - |
| 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 Settings

10.2.1 Pressure settings

Table 23: 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 | - |

| Parameter | Description | Value range and dependencies | Factory setting | Access level Read | Access level Write | Re-start required |
|-----------|--|------------------------------|-----------------|-------------------|--------------------|-------------------|
| 2-1-3 | Alternative setpoint | 0 ... 99 bar | 2.5 bar | Everybody | Customer | - |
| 2-1-4 | Alternative setpoint selection | Disabled | Disabled | Everybody | Customer | - |
| | | Time enabled | | | | |
| | | Digital input enabled | | | | |
| 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 Pump operating mode

Table 24: 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 | Everybody | Display/Customer | - |
| | | Manual-Off | | | | |
| | | Manual-On | | | | |
| 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 | - |



| Parameter | Description | Value range and dependencies | Factory setting | Access level Read | Access level Write | Re-start required |
|-----------|--------------------------|------------------------------|-----------------|-------------------|--------------------|-------------------|
| | Pump 5 | Manual-Off | Manual-Off | Everybody | Display/Customer | |
| | | 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 | | | | |

10.2.3 Timers

Table 25: 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 | - |

10.2.4 Pump protection

Table 26: 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 | - |

| Parameter | Description | Value range and dependencies | Factory setting | Access level Read | Access level Write | Re-start required |
|-----------|--|--|----------------------|-------------------|--------------------|-------------------|
| 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 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 | - |
| 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 | Oversupply | Everybody | Service | - |
| | | Undersupply | | | | |
| 2-4-3-2 | Time of over-/undersupply | 0 ... 60 s | 10 s | Everybody | Service | - |
| 2-4-4 | Check run | - | - | - | - | - |



| Parameter | Description | Value range and dependencies | Factory setting | Access level Read | Access level Write | Re-start required |
|-----------|---|---|-----------------|-------------------|--------------------|-------------------|
| 2-4-4-1 | Check run | Disabled | Enabled | Everybody | Service | - |
| | | Enabled | | | | |
| 2-4-4-2 | Function | Idle time dependent | Time-dependable | Everybody | Service | - |
| | | Time-of-day configured | | | | |
| | | Triggered check run | | | | |
| 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 | Disabled | Everybody | Service | - |
| | | Enabled | | | | |
| 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 | 1: Active low | Everybody | Service | - |
| | | Active low | | | | |
| 2-4-8-2 | Trigger delay | 0 ... 99 s | 1 s | Everybody | Service | - |

10.2.5 System protection

Table 27: 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 | None | Everybody | Service | - |
| | | Pressure sensor on suction side | | | | |
| | | Pressure sensor at tank | | | | |
| | | Pressure switch | | | | |
| | | Float switch | | | | |
| | | Flow switch | | | | |
| 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 | None | Everybody | Service | - |
| | | Pressure sensor on suction side | | | | |
| | | Pressure sensor at tank | | | | |
| | | Pressure switch | | | | |
| | | Float switch | | | | |
| | | Flow switch | | | | |
| 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 | - | - | - | - | - |



| Parameter | Description | Value range and dependencies | Factory setting | Access level Read | Access level Write | Re-start required |
|-----------|------------------------------|---|--------------------------|-------------------|--------------------|-------------------|
| 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 | - |
| 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 | - | - | - | - | - |

| Parameter | Description | Value range and dependencies | Factory setting | Access level Read | Access level Write | Re-start required |
|-----------|---------------------------------------|---------------------------------|-----------------------------|-------------------|--------------------|-------------------|
| 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 | - |
| 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 | - |



| Parameter | Description | Value range and dependencies | Factory setting | Access level Read | Access level Write | Re-start required |
|-----------|---|------------------------------|-----------------|-------------------|--------------------|-------------------|
| | Redundant system role | Slave | Master | Everybody | Service | |
| 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 | - |

10.2.6 Accumulator

Table 28: 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 | | | | |

10.2.7 Tank

Table 29: Parameter

| Parameter | Description | Value range and dependencies | Factory setting | Access level Read | Access level Write | Re-start required |
|-----------|-------------|------------------------------|-----------------|-------------------|--------------------|-------------------|
| | | | | | | |

Table 30: Tank parameters

| 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 | - |

| Parameter | Description | Value range and dependencies | Factory setting | Access level Read | Access level Write | Re-start required |
|------------|--|---|--|-------------------|--------------------|-------------------|
| | Drinking water filling | Enabled | Disabled | Everybody | Service | |
| 2-7-1-2 | Tank fill 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 | - |
| 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 proportional valve | Tank-filling on/off valve | Everybody | Service | - |
| 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 Enabled | Disabled | Everybody | Service | - |
| 2-7-1-4-2 | Inlet valve type | Tank filling additional solenoid valve Tank filling proportional valve | Additional tank-filling solenoid valve | Everybody | Service | - |
| 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 | Enabled | Everybody | Service | - |
| 2-7-1-5-2 | Maximum time between usage of drinking water | 0... 31 d | 168 h | Everybody | Service | - |



| Parameter | Description | Value range and dependencies | Factory setting | Access level Read | Access level Write | Re-start required |
|------------|---|---|-------------------------|-------------------|--------------------|-------------------|
| 2-7-1-5-3 | Response | Message only | 0: Only message | 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 | - | - | - | - | - |
| 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 | - |
| 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 | - | - | - | - | - |

| Parameter | Description | Value range and dependencies | Factory setting | Access level Read | Access level Write | Re-start required |
|-----------|--------------------------------------|--|--------------------------------------|-------------------|--------------------|-------------------|
| 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 | - |

Table 31: Tank parameters

| 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 | - |
| 2-7-1-2-10 | 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 | - |
| 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 | - | - | - | - | - |



| Parameter | Description | Value range and dependencies | Factory setting | Access level Read | Access level Write | Re-start required |
|-----------|---|--|--|-------------------|--------------------|-------------------|
| 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 | - |
| | | Enabled | | | | |
| 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: Only message | 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 | - | - | - | - | - |
| 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 | - |

| Parameter | Description | Value range and dependencies | Factory setting | Access level Read | Access level Write | Re-start required |
|------------|--|---|--------------------------------------|-------------------|--------------------|-------------------|
| 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 | - |
| 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 | - |

10.2.8 Control algorithms

Table 32: 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 | - |



| Parameter | Description | Value range and dependencies | Factory setting | Access level Read | Access level Write | Re-start required |
|-----------|----------------------------|-------------------------------------|-----------------|-------------------|--------------------|-------------------|
| 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 | - |
| 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 | - |

10.2.9 Display

Table 33: 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 Modbus

| Modbus register | Description | Value range | Type | Decimal | Read/write |
|-----------------|----------------------------|---------------|--------|---------|------------|
| 47001 | Reset all current messages | 1: Reset all | uint16 | - | w |
| 47002 | Setpoint | 0 ... 99 bar | uint16 | 2 | rw |
| 47003 | Alternative setpoint | 0 ... 99 bar | uint16 | 2 | rw |
| 47004 | Hours | 0 ... 23 | uint16 | - | rw |
| 47005 | Minutes | 0 ... 59 | uint16 | - | rw |
| 47006 | Seconds | 0 ... 59 | uint16 | - | rw |
| 47007 | Year | 2019 ... 2099 | uint16 | - | rw |
| 47008 | Month | 1 ... 12 | uint16 | - | rw |
| 47009 | Day | 1 ... 31 | uint16 | - | rw |
| 47010 | Day of week | 0 ... 6 | uint16 | - | rw |

| Modbus register | Description | Value range | Type | Decimal | Read/write |
|-----------------|---|---|--------|---------|------------|
| 47031 | Current suction-side pressure | kPa | uint16 | 2 | r |
| 47032 | Level water tank - relative fill level | cm | int16 | - | r |
| 47033 | Level water tank - absolute fill level | cm | uint16 | 2 | r |
| 47034 | Status opening solenoid valve | % | uint16 | - | r |
| 47035 | Status opening alternative solenoid valve | % | uint16 | - | r |
| 47036 | Rainwater pump load P1 | % | uint16 | - | r |
| 47037 | Rainwater pump load P2 | % | uint16 | - | r |
| 47038 | Operating mode, rainwater pump 1 | 0: AUTOMATIC 1: MANUAL-OFF 2: MANUAL-ON | uint16 | - | r |
| 47039 | Operating mode, rainwater pump 2 | 0: AUTOMATIC 1: MANUAL-OFF 2: MANUAL-ON | uint16 | - | r |
| 47040 | Status, rainwater pump 1 | 0: IDLE 1: STARTING 2: RUNNING 3: STOPPING | uint16 | - | r |
| 47041 | Status, rainwater pump 2 | 0: IDLE 1: STARTING 2: RUNNING 3: STOPPING | uint16 | - | r |
| 47042 | Pump load P1 | % | uint16 | - | r |
| 47043 | Pump load P2 | % | uint16 | - | r |
| 47044 | Pump load P3 | % | uint16 | - | r |
| 47045 | Pump load P4 | % | uint16 | - | r |
| 47046 | Pump load P5 | % | uint16 | - | r |
| 47047 | Pump load P6 | % | uint16 | - | r |
| 47048 | Operating mode, pump 1 | 0:AUTOMATIC 1:OFF 2:MANUAL | uint16 | - | r |
| 47049 | Operating mode, pump 2 | 0:AUTOMATIC 1:OFF 2:MANUAL | uint16 | - | r |
| 47050 | Operating mode, pump 3 | 0:AUTOMATIC 1:OFF 2:MANUAL | uint16 | - | r |



| Modbus register | Description | Value range | Type | Decimal | Read/write |
|-----------------|------------------------|---|--------|---------|------------|
| 47051 | Operating mode, pump 4 | 0:AUTOMATIC 1:OFF 2:MANUAL | uint16 | - | r |
| 47052 | Operating mode, pump 5 | 0:AUTOMATIC 1:OFF 2:MANUAL | uint16 | - | r |
| 47053 | Operating mode, pump 6 | 0:AUTOMATIC 1:OFF 2:MANUAL | uint16 | - | r |
| 47054 | Status, pump 1 | 0: IDLE 1: STARTING 2: RUNNING 3: STOPPING | uint16 | - | r |
| 47055 | Status, pump 2 | 0: IDLE 1: STARTING 2: RUNNING 3: STOPPING | uint16 | - | r |
| 47056 | Status, pump 3 | 0: IDLE 1: STARTING 2: RUNNING 3: STOPPING | uint16 | - | r |
| 47057 | Status, pump 4 | 0: IDLE 1: STARTING 2: RUNNING 3: STOPPING | uint16 | - | r |
| 47058 | Status, pump 5 | 0: IDLE 1: STARTING 2: RUNNING 3: STOPPING | uint16 | - | r |
| 47059 | Status, pump 6 | 0: IDLE 1: STARTING 2: RUNNING 3: STOPPING | uint16 | - | r |
| 47060 | Frequency, pump 1 | Hz | uint16 | - | r |
| 47061 | Frequency, pump 2 | Hz | uint16 | 2 | r |
| 47062 | Frequency, pump 3 | Hz | uint16 | 2 | r |
| 47063 | Frequency, pump 4 | Hz | uint16 | 2 | r |
| 47064 | Frequency, pump 5 | Hz | uint16 | 2 | r |
| 47065 | Frequency, pump 6 | Hz | uint16 | 2 | r |

| Modbus register | Description | Value range | Type | Decimal | Read/write |
|-----------------|---|---------------|--------|---------|------------|
| 47066 | Current discharge-side pressure | kPa | uint16 | 2 | r |
| 47067 | Current setpoint | kPa | uint16 | 3 | r |
| 47068 | Temperature | °C | int16 | 1 | r |
| 47098 | Operating hours, system | 0...136 years | uint32 | - | r |
| 47100 | Operating hours P1 | 0...136 years | uint32 | - | r |
| 47102 | Operating hours P2 | 0...136 years | uint32 | - | r |
| 47104 | Operating hours P3 | 0...136 years | uint32 | - | r |
| 47106 | Operating hours P4 | 0...136 years | uint32 | - | r |
| 47108 | Operating hours P5 | 0...136 years | uint32 | - | r |
| 47110 | Operating hours P6 | 0...136 years | uint32 | - | r |
| 47112 | Number of pump starts P1 | - | uint32 | - | r |
| 47114 | Number of pump starts P2 | - | uint32 | - | r |
| 47116 | Number of pump starts P3 | - | uint32 | - | r |
| 47118 | Number of pump starts P4 | - | uint32 | - | r |
| 47120 | Number of pump starts P5 | - | uint32 | - | r |
| 47122 | Number of pump starts P6 | - | uint32 | - | r |
| 47124 | Operating hours, rainwater pump 1 | 0...136 years | uint32 | - | r |
| 47126 | Operating hours, rainwater pump 2 | 0...136 years | uint32 | - | r |
| 47128 | Number of pump starts, rainwater pump 1 | - | uint32 | - | r |
| 47130 | Number of pump starts, rainwater pump 2 | - | uint32 | - | r |



11 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. [⇒ Section 9.2.2, Page 39]

11.1 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 34: Messages for specific pumps

| ID mes- sage | Para- meter | Description | Status | Reset mode (factory set- ting) |
|-----------------|----------------|---|---------|--------------------------------------|
| 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 |

| ID mes- sage | Para- meter | Description | Status | Reset mode (factory set- ting) |
|-----------------|----------------|---|---------|--------------------------------------|
| 262 | 2-9-4-13 | AMA fault frequency inverter pump 2 | Alert | Manual |
| 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 |
| 551 | 2-9-10-2 | Fault frequency inverter pump 5 | Alert | Auto |



| ID mes- sage | Para- meter | Description | Status | Reset mode (factory set- ting) |
|-----------------|----------------|---|---------|--------------------------------------|
| 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 |

11.2 Messages for additional devices

Table 35: Messages for additional devices

72 / 80

| ID mes- sage | Para- meter | Description | Status | Reset mode (factory set- ting) |
|-----------------|----------------|--|--------|--------------------------------------|
| 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 |
| 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 |

| ID mes- sage | Para- meter | Description | Status | Reset mode (factory set- ting) |
|-----------------|----------------|--|-------------|--------------------------------------|
| 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 |

11.3 Messages for specific functions

Table 36: Messages for additional devices

| ID mes- sage | Para- meter | Description | Status | Reset mode (factory set- ting) |
|-----------------|----------------|--|-------------|--------------------------------------|
| 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 |
| 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 |



| ID mes- sage | Para- meter | Description | Status | Reset mode (factory set- ting) |
|-------------------------|------------------------|--------------------------------|---------------|---|
| 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 |

12 Related Documents

12.1 Checklist for commissioning and inspection

Table 37: Checklist for commissioning and inspection

| Action | OK |
|--|--------------------------|
| Read the operating instructions. | <input type="checkbox"/> |
| Check power supply. | <input type="checkbox"/> |
| Compare the power supply data against the name plate data. | <input type="checkbox"/> |
| Carry out tests to DIN VDE 0100-610. | <input type="checkbox"/> |
| Check the direction of rotation. | <input type="checkbox"/> |
| Check automatic switching: | |
| - Pump changeover | <input type="checkbox"/> |
| - Additional start-up of the stand-by pump at peak load | <input type="checkbox"/> |
| - Start-up of the stand-by pump should the duty pump fail | <input type="checkbox"/> |
| If available: Check settings on motor protection relay. | <input type="checkbox"/> |
| Check the current input of the pump. | <input type="checkbox"/> |
| Check the changeover time from star to delta: required = approx. 3 seconds up to 22 kW power. | <input type="checkbox"/> |
| Thermal circuit breaker connection: | <input type="checkbox"/> |
| - Ensure that inputs/outputs and serial interface are galvanically isolated from the thermal circuit breaker inputs. | |
| - If the thermal circuit breaker has no safe isolation from the low-voltage mains, decouple the signals via coupler modules (accessories). | |
| Check correct assignment to pump. | <input type="checkbox"/> |
| Re-tighten the pump terminals. | <input type="checkbox"/> |
| Check the switching mechanisms. | <input type="checkbox"/> |
| Check the start and stop levels. | <input type="checkbox"/> |
| Check messages for correct function and effect. | <input type="checkbox"/> |
| Determine the spare parts requirements, if any. | <input type="checkbox"/> |
| Train operating personnel. | <input type="checkbox"/> |
| Provide new operating manual if necessary. | <input type="checkbox"/> |

13 EU Declaration of Conformity

Manufacturer:

Duijvelaar Pompen
DP Pumps
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**:

dp-controll III (SPBB10079121)
dp-controll III+ (SPBB10079122)

- is in conformity with the provisions of the following directives / regulations as amended from time to time:
 - 2014/53/EU: Radio Equipment Directive

The manufacturer also declares that

- the following harmonised international standards have been applied:
- the following *designated standards* have been applied:
 - EN 62368-1:2014 +A1:2017
 - EN 301 489-1 v2.2.3, EN 301 489- 17 v3.2.4
 - IEC 61000-6-2:2019; EN 61000-6-3:2007 + A1:2011
 - EN 62479:2010
 - EN 300 328 v2.2.2: 2019

The notified body Telefication B.V. (560) verified the technical design in accordance with module B and module C and issued the following EU type test certificate: 192140475/AA/01

The EU Declaration of Conformity was issued in/on:

Alphen aan den Rijn, 1 July 2022



Ron Bijman

Manager Competence Centre Products

Duijvelaar Pompen B.V.
Kalkovenweg 13

2401 LJ Alphen aan den Rijn (The Netherlands)

Index

A

| | |
|------------------------------|----|
| Accumulator | 60 |
| Additional setpoint increase | 32 |
| Alternative setpoint | 32 |
| Ambient conditions | 30 |

B

| | |
|----------------------|--------|
| Bandwidth | 32 |
| Bluetooth connection | 25, 29 |

C

| | |
|--|----|
| Checklist for commissioning and inspection | 75 |
| Control algorithms | 65 |
| Control panel | 23 |

D

| | |
|--|----|
| Designation | 12 |
| Discharge pressure monitoring | 35 |
| Display | 66 |
| Drinking water protection | 37 |
| Dry running protection | 34 |
| Dynamic pressure setpoint compensation | 32 |

E

| | |
|---------------------------|----|
| Emergency power operation | 36 |
| Event of damage | 6 |
| External On/Off mode | 36 |

F

| | |
|--------------------------------|----|
| F system | 31 |
| Field bus | 38 |
| Fire alert | 36 |
| Functional check run | 34 |
| Functions | 27 |
| Funktionen | |
| Kommunikation | 13 |
| Steuerung | 12 |
| Überwachung | 13 |
| Further configuration settings | 51 |

I

| | |
|---------------------------|----|
| Information on the system | 27 |
| Intended use | 8 |

J

| | |
|--------------------|----|
| Jockey pump system | 38 |
|--------------------|----|

K

| | |
|--------------------------------|---|
| Key to safety symbols/markings | 7 |
|--------------------------------|---|

L

| | |
|------------------------------|----|
| Leakage detection | 35 |
| Locking/unlocking the screen | 26 |

M

| | |
|----------------------------|----|
| Mainboard connections | 19 |
| Membrane rupture detection | 35 |
| Messages | |
| Additional devices | 72 |
| Functions | 73 |
| Pumps | 70 |
| Minimum runtime | 33 |
| Motoranschlussleitung | 17 |

N

| | |
|------------|----|
| Name plate | 12 |
|------------|----|

O

| | |
|--------------------------------|----|
| Operating frequency range | 33 |
| Operating mode | 28 |
| Operating status of the pump | 26 |
| Operating status of the system | 25 |
| Other applicable documents | 6 |

P

| | |
|--------------------------------|--------|
| Parameter | |
| Accumulator | 60 |
| Control algorithms | 65 |
| Display | 66 |
| Further configuration settings | 51 |
| Pressure settings | 52 |
| Pump operating mode | 53 |
| Pump protection | 54 |
| Pump settings | 41 |
| System protection | 57 |
| Tank | 60, 63 |
| Timers | 54 |
| Personnel | 8 |
| Pipe filling function | 35 |
| Pressure settings | 52 |
| Pump changeover | 33 |
| Pump operating mode | 33, 53 |
| Pump protection | 54 |
| Pump settings | 41 |

Q

| | |
|---------------|---|
| Qualification | 8 |
|---------------|---|

R

| | |
|-------------------------------------|----|
| Rainwater filling | 37 |
| Response to pressure sensor failure | 35 |

S

| | |
|----------------------------|----|
| Safety | 8 |
| Safety awareness | 9 |
| Saving/loading settings | 33 |
| Setpoint | 32 |
| Short pressure deviations | 35 |
| Specialist personnel | 8 |
| Start delay and stop delay | 33 |
| Status LED | 24 |
| Storage | 10 |
| Supervision of operation | 39 |
| SVP system | 32 |
| Symbols on the screen | 24 |
| System protection | 57 |

T

| | |
|------------------------|--------|
| Tank | 60, 63 |
| Tank control | 36 |
| Tank monitoring | 37 |
| Technical data | 13 |
| Temperature monitoring | 36 |
| Timers | 54 |
| Training | 8 |
| Transport | 10 |

U

| | |
|----------------------|----|
| Umgebungsbedingungen | |
| Lagerung | 10 |
| Units displayed | 33 |

V

| | |
|-----------|----|
| VC system | 31 |
|-----------|----|

W

| | |
|-----------------|---|
| Warnings | 7 |
| Warranty claims | 6 |

duijvelaar pompen
dp pumps

Kalkovenweg 13
2401 LJ Alphen aan den Rijn (NL)

☎ +31 72 48 83 88

www.dp.nl

2023-06-26

BE00001402 (4043.811/02-EN)

