

BoosterControl Advanced

Installation/Operating Manual



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Installation/Operating Manual BoosterControl Advanced

Original operating manual

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1 General

1.1 Principles

This manual is supplied as an integral part of the type series indicated on the front cover. The manual describes the proper and safe use of this equipment in all phases of operation.

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

In the event of damage, immediately contact your nearest KSB service centre 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
Logic 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



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 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.

2.2 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.

The safety information in all sections of this manual must be complied with.

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 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 in this operating manual.

2.3 Intended use

This product must not be operated beyond the values specified in the technical product literature for the mains voltage, mains frequency, and ambient temperature, or be used in any manner that is not compliant with the instructions provided in the operating manual and in other, applicable documents.

The product must not be used in potentially explosive atmospheres.

2.4 Personnel qualification and training

All personnel involved must be fully qualified to transport, install, operate, maintain and inspect the product this manual refers to. The responsibilities, competence and supervision of all personnel involved in 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.

2.5 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

2.6 Safety awareness

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

- Accident prevention, health and safety regulations
- Explosion protection regulations
- Safety regulations for handling hazardous substances
- Applicable standards and legislation (e.g. EN 50110-1)

2.7 Safety information for the user/operator

- Fit contact guards supplied by the operator for hot, cold or moving parts, and check that the guards function properly.
- Do not remove any 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.)

2.8 Safety information for maintenance, inspection and installation work

- Modifications or alterations are only permitted with the manufacturer's prior consent.
- Use only original spare parts or parts authorised by the manufacturer. The use of other parts can invalidate any liability of the manufacturer for resulting damage.
- The operator ensures that all maintenance, inspection and installation work is 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/or re-activate any safety-relevant and protective devices. Before returning the product to service, observe all instructions on commissioning.

2.9 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.

2.10 Software Changes

The software has been specially created for this product and thoroughly tested. It is impermissible to make any changes or additions to the software or parts of the software. Software updates supplied by KSB are excluded from this rule.

2.11 Electromagnetic compatibility

EMC Directive 2004/108/EC ("Electromagnetic Compatibility") sets out the requirements concerning the interference immunity and interference emissions of electric and electronic equipment.

3 Transport/Temporary Storage/Disposal

3.1 Checking the condition upon delivery

1. On transfer of goods, check each packaging unit for damage.
2. In the event of in-transit damage, assess the exact damage, document it and notify KSB or the supplying dealer (as applicable) 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
	<p>Damage during storage by humidity, dirt or vermin Corrosion/contamination of the control unit!</p> <ul style="list-style-type: none"> ▸ 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	85 % max. (non-condensing)
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 (see table on ambient conditions for storage).

3.4 Disposal

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

With BoosterControl Advanced, up to 3 or 6 pump sets can be started, stopped and controlled as a function of pressure.

4.2 Designation

Example: BCA 6

Table 5: Key to the designation

Code	Description
BCA	BoosterControl Advanced
6	Number of pumps that can be connected

4.3 Name plate

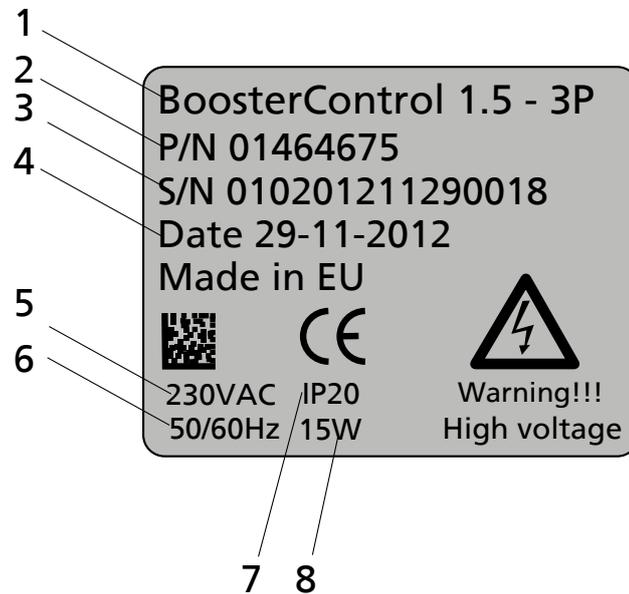


Fig. 1: Name plate (example)

1	Type series, size	2	Ident. number
3	Series number	4	Year of construction
5	Input voltage	6	Mains frequency
7	Enclosure	8	Power input

4.4 Functions

Control system Control of up to 3 or 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 (for corresponding system configuration)

- Inlet tank control (for corresponding system configuration)
 - Energy-saving operation
 - Dynamic pressure setpoint compensation
 - Base-load or peak-load pump operation (jockey function)
- Monitoring** Monitoring of external conditions via digital and analog inputs
- The following monitoring functions can be used:
- General fault message
 - Individual fault messages (lack of water)
 - Thermal monitoring of pump motors
 - Sensor fault/broken wire
 - Fault/warning per pump
 - Monitoring of service interval
 - Dry running detection via pressure switch or pressure sensor
 - 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)
 - Water flow detection (water flow detector), including temperature monitoring
 - Dry running protection

You can also assign up to 3 inputs with freely configurable statuses or signals as an option.

Communication Communication with field bus systems via the following interfaces:

- Profibus
- Modbus RTU– RS485

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

- KSB PumpDrive
- Danfoss VLT 2800
- Danfoss Microdrive FC 51
- Danfoss Aquadrive FC 200

4.5 Technical data

Table 6: Technical data

Characteristic	Value
Power supply	
Rated voltage	1~ 230 V AC ±10 %
Mains frequency	50/60 Hz
Rated insulation voltage	500 V AC
Standby current input	~ 35 mA
Standby power	7,5 W
Enclosure	
Housing	IP20
For control cabinet installation	IP55
Digital inputs	
Motor protection	24 V DC
Pressure switch	24 V DC
Water flow detector	24 V DC
Fault reporting relay of frequency inverter	24 V DC

Characteristic	Value
Fault reporting relay of inlet tank valve	24 V DC
External OFF switch	24 V DC
Fire alert	24 V DC
Parameterisable digital inputs	24 V DC
Digital outputs	
Contact control per pump	250 V AC, 8 A
External warning	Volt-free switching contact NO/NC function
External alert	Volt-free switching contact NO/NC function
Starting the floating frequency inverter	24 V DC
Starting frequency inverter 1 - 6	24 V DC
Inlet tank valve	24 V DC or 0/4-20 mA Input impedance 200 ohms
Parameterisable digital outputs	250 V AC, 8 A
Analog inputs	
2 pressure sensors	4-20 mA, input impedance 200 Ω
	< 3.5 mA: broken wire detection
	> 20.5 mA: short circuit detection
Temperature sensor	PT1000
Analog outputs	
Proportional inlet tank valve	0-20 mA
Setpoint transmitter for frequency inverter	0-20 mA

4.5.1 Parameterisable inputs/outputs

It is possible to freely program up to 3 inputs/outputs.

The number of outputs (P4, P5, P6) varies in accordance with the operating mode set in addition to the actual number of pumps connected.

Example:

In a system with 4 pumps, only 2 freely parameterisable outputs can be made available for technical reasons. The pump output relays are used for this purpose.

The required function is assigned by setting the respective parameters.

Signals such as "dry running protection" can be transmitted as an output message, for example.

4.6 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 KSB:

Table 7: Combinations of frequency inverters and operating modes

Cascade operating mode	Power	Frequency inverter
Floating frequency inverter ("V" operating mode)	≤ 7,5 kW	Danfoss MicroDrive (FC51)
	11...18,5 kW	Danfoss VLT 2800
	22 kW	Danfoss AquaDrive (FC200)
Motor-mounted frequency inverter per pump ("VP" operating mode)	0,75 kW...22 kW	KSB PumpDrive
Control cabinet-mounted frequency inverter per pump ("Eco VP" operating mode)	≤ 7,5 kW	Danfoss MicroDrive (FC51)

4.7 Options

The following options are available:

Water flow detection

- Water flow detector as 4-20 mA signal
- PT1000 temperature sensor
- Water flow detector as digital signal
- Expansion of digital signal inputs/outputs (freely parameterisable/assignable)

Field bus modules

- Profibus
- Modbus

4.8 Software scope of supply

The following software is provided or can be downloaded from the KSB web site at www.ksb.com:

- KSB PC software "KSB ServiceTool PactWare for BoosterControl"

Also on request:

- USB RS232 connection cable
- WIBU key (dongle, a physical security device preventing unauthorised access to data)

4.9 Dimensions and weight

Table 8: Dimensions and weight

Characteristic	Value
Dimensions (H x W x D)	306,5x187x72,5
Weight	Approx. 1 kg

5 Installation at Site

5.1 Safety regulations

	 DANGER
	<p>Incorrect installation Danger to life!</p> <ul style="list-style-type: none"> ▷ Install BoosterControl Advanced in a flood-proof location. ▷ Never use BoosterControl Advanced in potentially explosive atmospheres.

5.2 Checking ambient conditions

1. Check and safeguard ambient conditions. (⇒ Section 8.1, Page 34)
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 BoosterControl Advanced

Install BoosterControl Advanced while referring to the outline drawing.

5.4 Electrical connection

	 DANGER
	<p>Incorrect electrical installation Danger of death from electric shock!</p> <ul style="list-style-type: none"> ▷ 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
	<p>Improper electrical connection Damage to property</p> <ul style="list-style-type: none"> ▷ 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.

5.4.1 Electrical connections

All electrical connections of BoosterControl Advanced to the power relays or contactors must always have circuit protection.

If more than two apparatuses are controlled in a control cabinet, always provide for a separate control voltage supply in the control cabinet (as per EN 60204).

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.

Electrical connections of mainboard (maximum of 3 pumps)

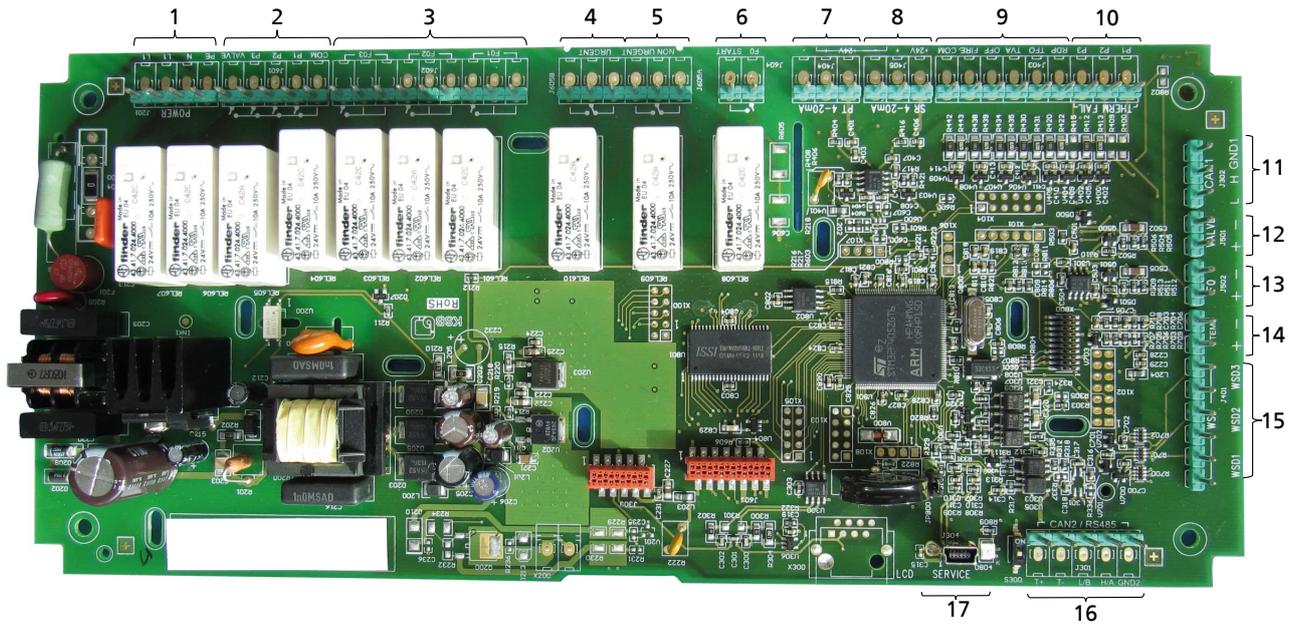


Fig. 2: Mainboard

Table 9: Connections on the mainboard

Terminal strip	Terminal	Description	
1	J201	Power supply	
		L1	Power supply Phase 1
		L1	Power supply Phase 1
		N	Power supply, neutral
	PE	PE power supply - earth	
2	J601	Pump contactors and inlet tank valve	
		COM	Pump contactors - earth
		P1	Contactor of pump 1
		P2	Contactor of pump 2
		P3	Contactor of pump 3
VALVE	Inlet tank valve		
3	J602	Activation of frequency inverters	
		F01	Start, frequency inverter 1
		F02	Start, frequency inverter 2
	F03	Start, frequency inverter 3	
4	J605 B	Output of alerts	
		URGENT	Output for alerts
5	J605 A	Output of warnings	
		NON URGENT	Output for warnings
6	J604	Activation of frequency inverter	
		F0 START	Start, floating frequency inverter
7	J404	Actual-value signal of pressure on discharge side	
		PT dis 24 V	Pressure sensor, discharge side
		PT dis +	
	PT dis -		
8	J405	Actual-value signal of pressure on suction side	
		PT inl 24 V	Pressure sensor, suction side

Terminal strip		Terminal	Description
8	J405	PT inl +	Pressure sensor, suction side
		PT inl -	
9	J403	Digital inputs	
		RDP	Pressure switch for dry running protection
		TFO	Fault reporting relay of frequency inverter
		TVA	Fault reporting relay of valve
		OFF	External OFF switch
		FIRE	Fire alert
		COM	Digital inputs - 24 V DC supply
10		Fault input, pump set	
		P1	Motor protection/thermal overload, pump 1
		P2	Motor protection/thermal overload, pump 2
		P3	Motor protection/thermal overload, pump 3
11	J302	Can bus (RS 485)	
		B	RS485 bus for frequency inverter
		A	
		GND	
12	J501	Proportional valve for inlet tank	
		+	Proportional valve for inlet tank
		-	
13	J502	Setpoint signal, analog	
		+	Setpoint for floating frequency inverter
		-	
14	J401	Temperature sensor for water flow detection	
		PT1000 -	Temperature sensor - earth
		PT1000 +	Temperature sensor - signal
15		Water flow detector for detecting water flow	
		WSD1	Water flow detector sensor 1 Parameterisable input 1
		WSD2	Water flow detector sensor 2 Parameterisable input 2
		WSD3	Water flow detector sensor 3 Parameterisable input 3
16	J301	CAN-Open	
		GND	CAN bus
		H	
		L	
		T-	
		T+	

Connections on the expansion board (maximum of 6 pumps)

The BoosterControl Advanced version for 6 pumps is equipped with additional terminals in the centre area at the rear of the control system (cannot be retrofitted; factory-set).

Terminals P4 - P6 are used to connect the freely parameterisable outputs.

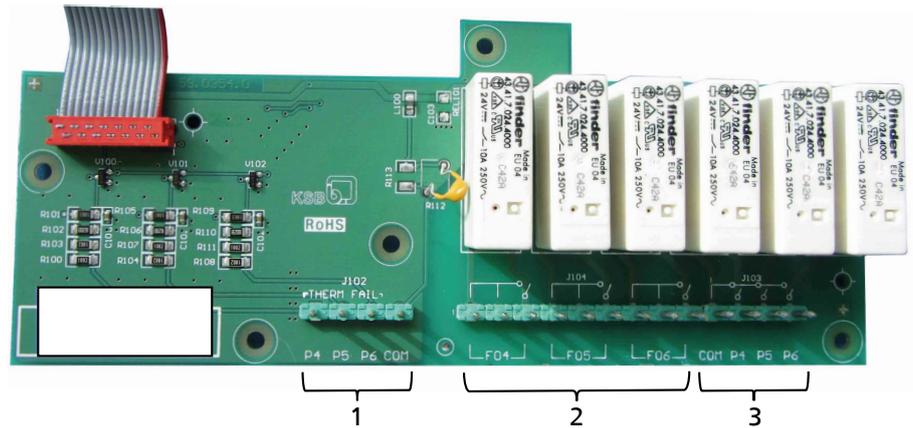


Fig. 3: Expansion board

Table 10: Additional connections on the expansion board for 6 pumps with parameterisable outputs

Terminal strip	Terminal	Description
1	J102	Fault input, pump set
	P4	Motor protection/thermal overload, pump 4
	P5	Motor protection/thermal overload, pump 5
	P6	Motor protection/thermal overload, pump 6
	COM	Digital inputs - 24 V DC supply
2	J104	Activation of frequency inverters 4 - 6
	F04	Start, frequency inverter 4
	F05	Start, frequency inverter 5
	F06	Start, frequency inverter 6
3	J103	Pump contactors 4 - 6
	COM	Pump contactors - earth
	P4	Contactors of pump 4 Parameterisable output 1
	P5	Contactors of pump 5 Parameterisable output 2
	P6	Contactors of pump 6 Parameterisable output 3

5.4.2 Connection to power supply

1. Observe the terminal assignments on the printed circuit board.
(⇒ Section 5.4.1, Page 14)
2. Connect to power supply:
 - Terminal strip J201, terminals L1, N and PE

5.4.3 Connecting/bridging the motor protection device

Connect motor protection device with safe isolation in acc. with EN 50178.

Use the following terminals on the printed circuit board:

- Terminal strip J403, terminals P1, P2, P3 and COM

For more than 3 pumps, also use the following terminals:

- Terminal strip J102, terminals P4 - P6 and COM

Connect/bridge the thermal circuit breaker.

- Motors with thermal circuit breakers:**
- Motors with thermal circuit breakers:**
1. Ensure that the inputs/outputs are galvanically isolated from the thermal circuit breaker inputs.
 2. If thermal circuit breakers have not been safely isolated from the low-voltage mains, decouple the signals using coupler modules.
 3. Connect the thermal circuit breaker to BoosterControl Advanced.

- Motors without thermal circuit breakers:**
- Motors without thermal circuit breakers**
1. Bridge the thermal circuit breaker connection on BoosterControl Advanced. Observe terminal wiring diagram.

5.4.4 Connecting the pump contactors

The last two terminals can also be used as outputs for signal relays.

1. Observe the terminal assignments on the printed circuit board. (⇒ Section 5.4.1, Page 14)
2. Connect to power supply:
 - External 24 V to terminal strip J601, COM terminal
 - or
 - 230 V from L1 terminal to terminal strip J601, COM terminal
3. Connect pump contactors:
 - Terminal strip J601, terminals P1, P2, P3
4. For 6 pumps also use the following additional terminals:
 - Terminal strip J103, terminals P4, P5, P6

5.4.5 Connecting the pressure sensor

1. Observe the terminal assignments on the printed circuit board. (⇒ Section 5.4.1, Page 14)
2. If a 2-wire sensor is to be used:
 - Terminal strip J404, terminals 24 V and +
3. If a 3-wire sensor is to be used:
 - Terminal strip J404, terminals 24 V, + and -

5.4.6 Connecting the dry running protection device

Dry running protection can be effected by means of a pressure sensor or pressure switch fitted on the suction side.

1. Connect the pressure sensor, if any:
 - Terminal strip J405, terminals + and -
2. If available, connect pressure switch:
 - Terminal strip J403, terminals RDP and COM
3. If no pressure switch is used, bridge the pressure switch terminal:
 - Terminal strip J403, terminals RDP and COM

5.4.7 Other connections required depending on the operating mode

Cascade control

No further connections required.

Cascade operation with jockey pump

Ensure that the jockey pump is sized to act as a base-load pump and not as a peak-load pump.

Floating frequency inverter

Only possible when the frequency inverter is integrated in the control cabinet.

1. Observe the logic diagram (see other applicable documents).
2. Connect frequency inverter start signal:
Terminal strip J604, terminal FO START

Fixed frequency inverter

1. Connect frequency inverter start signal to the frequency inverter of the pump to be controlled:
- Terminal strip J604, terminal FO START, frequency inverter per pump

	CAUTION
	<p>Use of different types of frequency inverter Damage to property!</p> <p>▷ Only use frequency inverters of the same type within a system!</p>

1. Connect frequency inverter start signal:
- Terminal strip J602, terminals F01 - F03
2. For 6 pumps also use the following additional terminals:
- Terminal strip J104, terminals F04 - F06

5.4.8 Making optional connections

Some terminals must be bridged if not in use.

Bridge the following terminals if not in use:

- Fault reporting relay of frequency inverter: terminal strip J403, terminal TFR with COM
- Fault reporting relay of valve: terminal strip J403, terminal TVA with COM
- External Off switch: terminal strip J403, terminal OFF with COM
- Fire alert: terminal strip J403, terminal FIRE with COM

The following connections can be made.

External signalling devices

The external signalling device can be powered via the BoosterControl Advanced control unit if necessary.

1. Bridge the following connections to power the external signalling device:
Terminal strip J201, terminal L1, with terminal strip J605A or J605B, left pin
2. Connecting external signalling devices:
- For warnings, terminal strip J605A, NON URGENT terminal
- For alerts, terminal strip J605B, URGENT terminal

Water flow detection (WSD)

Up to 3 water flow detectors can be connected.

1. Connect existing water flow detector:
- Terminal strip J401, terminals WS1, WS2 and WS3
2. Connect a PT1000 temperature sensor, if any:
- Terminal strip J401, terminals PT1000 - and PT1000 +

Additional information on function and configuration

Connections for inlet tank

- ✓ Pump inlet pressure < 0.5 bar
- 1. Connect pressure sensor for level monitoring:
 - Observe logic diagram (refer to other applicable documents)
 - Terminal strip J405, terminals +, - and 24 V
- 2. If a gate valve is to be used as an inlet tank valve, connect gate valve:
 - Terminal strip J601, terminals VALVE and COM
- 3. If a proportional valve is to be used as an inlet tank valve, connect proportional valve:
 - Terminal strip J501, terminals + and -
- 4. If available, connect fault reporting relay of inlet tank valve:
 - Terminal strip J403, terminals TVA and COM

Fault reporting relay of frequency inverter

- 1. Connect fault reporting relay:
 - Terminal strip J403, terminals TFR and COM

External OFF switch

- 1. Connect external Off switch:
 - Terminal strip J403, terminals OFF and COM

Fire alert

In case of a fire alert, BoosterControl Advanced starts **all** connected pumps at their maximum speed.

A fire alert has absolute priority. The system cannot be stopped via the external OFF switch.

- 1. Connect fire alert:
 - Terminal strip J403, connect signal relay to FIRE and COM terminals

On BoosterControl Advanced, the last two terminals for pump contactors can be used as outputs for signal relays.

- 1. Connect signal relay for BoosterControl Advanced version for up to 6 pumps:
 - Terminal strip J103, terminals P5, P6 and COM

6 Operation

6.1 Control panel

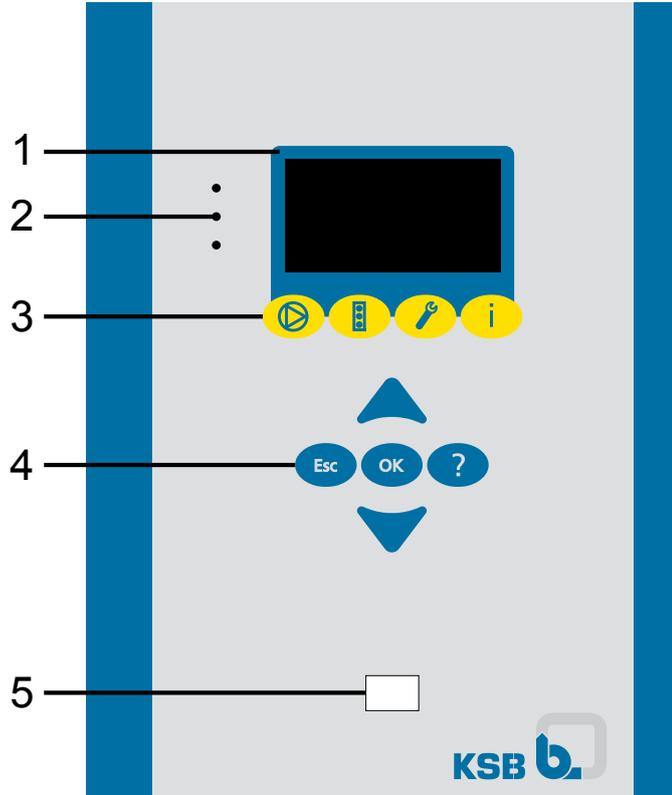


Fig. 4: Control panel

Table 11: Description of control panel

Item	Description	Function
1	Graphical display	Displays information on BoosterControl Advanced operation
2	"Traffic light" LEDs	The traffic light function provides information about the pump system's operating status.
3	Menu keys	Change to the elements of the first menu level
4	Navigation keys	Navigation and parameter setting
5	Service interface	Configuring and parameterising BoosterControl Advanced using a PC/notebook

6.1.1 "Traffic light" LEDs

The "traffic light" LEDs provide information about the operating status of BoosterControl Advanced.

Table 12: LED description

LED	Description
● Red	One or several alerts are active
● Amber	One or several warnings are active
● Green	Steady light: trouble-free operation

6.1.2 Graphical display

The graphical display breaks down into 6 areas.

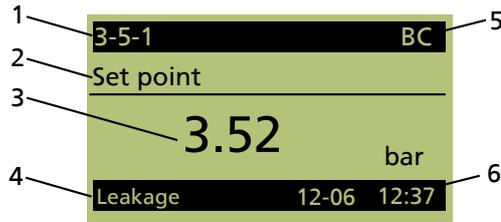


Fig. 5: Graphical display (example)

Table 13: Description of graphical display

Item	Description	Description
1	Parameter	Shows the parameter selected
2	Parameter name	Displays the name of the parameter selected
3	Current display	Displays the current values for the parameter selected
4	Messages/alerts	Displays current warning and fault messages
5	Model	Displays model
		BC = BoosterControl
6	Date/time	Displays current date and time

6.1.3 Menu keys

You can use the menu keys to access the elements at the first menu level directly.

Table 14: Assignment of menu keys

Key	Menu
	Operation
	Diagnosis
	Settings
	Information

6.1.3.1 Menu: Operation

The Operation section contains all information required for operating the machine and the process. This includes important process data (pressure, flow rate, etc.) as well as current process states (input/output states).

The decision regarding which parameters are displayed on the main screen can be influenced by a user who has the appropriate authorisation. The parameters to be displayed on the main screen can be selected in the Settings menu.

6.1.3.1.1 Operating values in the start menu

A start menu can be called from the start screen following the boot procedure.

Press "OK" key when on the start screen.

The following parameters are displayed:

Table 15: Parameters in start menu (depending on operating mode; here, Cascade operating mode)

Parameter	Value
3-2-1-1	PIN
3-5-1	Setpoint
3-5-3	Bandwidth

Parameter	Value
3-5-10	Delta p
3-5-11	High pressure alarm
3-5-13	Low pressure alarm
3-6-2	Minimum run time
3-6-5	Start delay
3-6-6	Stop delay
3-6-8	RDP delay
3-6-9	High/low alarm delay

6.1.3.2 Menu: Diagnosis

In the "Diagnosis" section, the user is provided with information about faults and warnings that pertain to the pump set or process. This can be done with BoosterControl Advanced in fault (system standstill) or warning (system operational) status. The user can also find previous messages in the history.

Messages

All monitoring and protective functions trigger warnings or alerts. These are signalled via the amber or red LED. A flashing message is output in the last line of the control panel display. If more than one message is output, the last one is displayed. Alerts have priority over warnings.

To display all warnings and alerts, choose the Diagnosis menu and then Active Messages (2- 1-1). The general fault message is output via the relay outputs. .

Alert history

The alert history can be viewed under 2-1-2 after pressing the "Diagnosis" menu key. The last 100 alerts are listed here. You can use the **arrow keys** and the **OK** key to select an entry from the list. Information about when the alert has come and gone is then displayed.

Acknowledging and resetting alerts

	NOTE
	Depending on the combination of settings, the system could conceivably restart automatically after acknowledgement/reset or when the cause of failure has been eliminated.

Acknowledgement You can acknowledge the alert once the cause has been rectified. Alerts can be acknowledged individually in the alerts list in the Diagnosis menu under (2-1-3).

Reset All alerts are acknowledged at the same time during a reset. The reset can be carried out via the control panel using the **OK** key (only possible in the start menu). You may therefore have to press the **ESC** key several times to return to the start menu. The reset can also be carried out via a digital input. Digital input 4 is defaulted for this purpose.

Automatic reset

Alerts can also be reset automatically (3-9). Alerts and fault messages can be configured to be reset automatically (3-9). This is only possible from the "Service" access level.

6.1.3.2.1 Messages

All monitoring and protective functions trigger messages. BoosterControl Advanced assigns a priority status to each message. The priority status of each message is signalled via the amber or red LED.

If there are several messages, they are listed in order of priority.

Up to 100 messages are stored.

To display current, active messages:

1. Select parameter 2-1-1.

To see more information about a message:

1. Select the message and press "OK" to confirm.
 - ⇒ The status of the message is displayed (came, acknowledged, gone)

6.1.3.2.2 Displaying the alert history

The alert history is saved for future reference, even in the event of a power failure. The alert history provides the user with a chronological log of alerts that have either been acknowledged or gone automatically.

1. To display the alert history:
Select parameter 2-1-2.
2. For more information on an alert:
 - Select the required alert using the arrow keys.
 - Press "OK" to display more information.

The following information is given for every message:

- Date
- Time
- Alert
- Status

6.1.3.2.3 Overview of warnings and alerts

Alerts, warnings and the set fault function can be assigned manually. All warnings and alerts are listed for fault analysis.

6.1.3.3 Menu: Settings

General settings can be made or the settings for the process optimised in the Settings section. All aspects that have to do with the operative function or availability of the pump set can also be found here.

6.1.3.3.1 Display language

The following display languages can be toggled:

- German
- French
- English
- Dutch
- Turkish

Table 16: Language parameter

Parameter	Description	Possible setting	Access	Factory setting
3-1-1-1	Display language	German French English Dutch Turkish	Customer	English

6.1.3.3.2 Access levels

Four access levels have been defined to prevent accidental or unauthorised access to BoosterControl Advanced parameters:

Table 17: Access levels

Access level	Description
Standard (no login)	Access without password entry.
Customer	Access level for the expert user with access to all parameters required for commissioning.
Service	Access level for service personnel.

If a parameter's access level is not explicitly specified, the parameter is always assigned the customer access level.

Table 18: Access level parameter

Parameter	Description	Possible setting	Access level required	Factory setting
3-2-1-1	Enter customer password for access	0000...9999	Standard	0000
	Enter service password for access	0000...9999	Service	-
	Change customer access level password	0000...9999	Customer	-
	Password-protected access level for customer parameter	Disabled Enabled	Customer	Disabled

Entering the password

Customer access level You must enter the password under (3-2-1-1) Login to gain access. The password can be changed under Customer Password after entering "7353" (factory password). If password protection is deactivated via parameter 3-2-1-2, the customer access level becomes the standard access level. This applies to the factory settings.

Service access level You must enter a password under Service Login.

	NOTE
	If no keys are pressed for ten minutes, the system will automatically return to the standard access level.

6.1.3.3.3 Displaying and changing parameters

The parameter numbers contain the navigation path, which helps you find a particular parameter quickly and easily. The first digit of the parameter number indicates the first menu level, which is called up directly via the four menu keys.

Table 19: Assignment of menu keys

Key	Menu
	Operation
	Diagnosis
	Settings
	Information

Subsequent steps are carried out via the navigation keys.

Example Parameter 3-5-1 Setpoint

1. First digit of parameter number: 3-5-1
Press the "Settings" menu key.
⇒ 3-1 appears in the top left of the screen.
2. Second digit of parameter number: 3-5-1
Press the **arrow key** to change the display 3-1 on the screen (upper left) to 3-5.

3. Press **OK** to confirm the selection.
 - ⇒ 3-5-1 appears in the top left of the screen.
4. Press **OK** to confirm the selection.
 - ⇒ You have called up the required parameter.

Changing the parameter value

1. Press **OK**.
 - ⇒ The bar above the entry displays the value currently being entered.
2. Use the **arrow keys** to increase or decrease the value displayed.
3. Confirm the selected value by pressing **OK**.
 - ⇒ The cursor moves to the next position (second position from the left).
4. Make the settings as described for the subsequent positions.
5. Press the **OK** key to save the new parameter value.

6.1.3.3.4 Access levels

Table 20: Access levels

Access level	Code displayed	Properties
Standard	-	No login required Restricted access to parameters
Customer	C	Login required Access to main customer parameters
Service	S	Login required Access to all service-relevant parameters
Factory	F	Login required Access to all parameters

6.1.3.4 Menu: Information

All direct information about PumpDrive is provided in the Information section. Important details regarding the firmware version are listed here.

6.1.4 Navigation keys

The navigation keys are used for navigating in the menus and for confirming settings.

Table 21: Assignment of navigation keys

Key	Function
	Arrow keys: <ul style="list-style-type: none"> ▪ Move up/down in the menu options. ▪ Increase/decrease a numerical value.
	Escape key: <ul style="list-style-type: none"> ▪ Delete/reset entry (the entry is not saved). ▪ Move up one menu level.

Key	Function
	OK key: <ul style="list-style-type: none"> ▪ Confirm settings. ▪ Confirm menu selection. ▪ Move to the next digit when entering numerals. ▪ Alert reset
	Help key: <ul style="list-style-type: none"> ▪ Displays a help text for each selected menu option.

6.2 Operating the device via the service interface

Connection to the service interface can be established in two ways:

- Via a connector at the rear
- Via a connector on the control panel



Fig. 6: Service interface at the rear

For details, please refer to the user manual of the "ServiceTool for BoosterControl" Advanced.

	CAUTION
	<p>Improper use of service interface Damage to connected laptop/PC! ▶ Only use the connection cable offered by KSB (USB - RS232).</p>

The service interface allows a PC/notebook to be connected via a special cable (USB - RS232).

The following actions can be taken:

- Configuring and parameterising BoosterControl Advanced using the KSB service software
- Software update
- Saving and documenting set parameters

The hardware protection (dongle) must be connected to enable the authorisation level. Observe the service tool instructions.

6.3 Operating the device via the control panel

6.3.1 Displaying and changing parameters

The parameter number also serves as the navigation path.

The first digit of the parameter number indicates one of the following menus:

- 1-Operation
- 2-Diagnosis
- 3-Settings
- 4-Information

The menus are called up directly via the four function keys.

Subsequent steps are carried out via the navigation keys.

If you press one of the function keys while editing a parameter, the display will return to the first menu level without saving the parameter.

Log in to BoosterControl Advanced. (⇒ Section 6.6, Page 31)

Selecting a parameter (example: 3-5-1)

1. Select menu 3 (3-5-1):

1. Press the "Settings" function key.

⇒ The menu options of menu 3 are displayed.

The first menu option is highlighted and displayed as menu level 3-1 in the top left of the screen.

2. Select menu level 3-5 (3-5-1):

1. Select 3-5 by pressing the arrow keys.
2. Press "OK" to confirm.

⇒ The menu options of menu level 3-5 are displayed.

The first menu option is highlighted and displayed as menu level 3-5-1 in the top left of the screen.

3. Select menu level 3-5-1 (3-5-1):

1. Select 3-5-1 by pressing the arrow keys.
2. Press "OK" to confirm.

⇒ The menu options of menu level 3-5-1 are displayed.

The first menu option is highlighted and displayed as menu level 3-5-1 in the top left of the screen.

Setting parameters

The bar above the entry displays the current value in relation to the value range.

1. Press "OK".
2. Use the arrow keys to set the parameter value required.
3. To move one digit to the right, press "OK".
4. To move one digit to the left, press "Esc".

Saving the parameter value

1. To leave the parameter without saving its value, press "Esc" several times.
2. To save the parameter value, press "OK".

6.4 General functions

6.4.1 Setting the physical units

1. Select parameter 3-1-1-3.
2. Set the physical unit.

6.4.2 Saving/loading customer settings

Possible from customer access level.

All parameter settings can be saved/loaded.

1. To save the active set of parameters, select parameter 3-2-2-4.
 2. To load a saved set of parameters, select parameter 3-2-2-3.
- ⇒ BoosterControl Advanced reboots.

6.4.3 Saving/loading factory settings

Possible from customer access level (load only), possible from factory access level (load and save).

All parameter settings can be saved/loaded.

1. To save the active set of parameters, select parameter 3-2-2-5.
 2. To load a saved set of parameters, select parameter 3-2-2-1.
- ⇒ BoosterControl Advanced reboots.

6.4.4 Resetting to default settings

Only possible from service access level.

All default parameter settings can be loaded.

1. To load this parameter set, in the selection window, after selecting parameter 3-2-2-6, select the correct target configuration.
- ⇒ BoosterControl Advanced reboots.

6.4.5 Enabling/disabling the password

When the password has been disabled, BoosterControl Advanced always boots at customer access level.

- ✓ The user has logged in.
 1. Select parameter 3-2-1-2.
 2. To enable the password:
Select "Yes".
 3. To disable the password:
Select "No".
 4. Press "OK" to confirm.

6.4.6 Displaying general information

The following parameters can be used to display general information about BoosterControl Advanced:

Parameter description

Table 22: Displaying general information

Parameter	Description
4-1-1	Serial number of control module
4-1-2 ²⁾	Parameter set of control module (XML)
4-2-2	Firmware version of control module (I/O)
4-2-3	Firmware version of control module (I/O)
4-3-2	Firmware version of control module (HMI)
4-3-3	Firmware version of control module (HMI)
4-4-1	Firmware version of Profibus (if available)
4-4-2	Firmware version of Profibus (if available)
4-5-1	Firmware version of Modbus (if available)
4-5-2	Firmware version of Modbus (if available)

2) Displayed at factory access level only.

6.4.7 Displaying status information

Measured values are updated every second. Measurements are taken more rapidly, however.

Displaying general information

General information on operation is displayed at the top menu level.

Select parameter 1-1.

The following information can be displayed:

Table 23: Status information 1

Parameter	Description	Possible values
1-1-1	Actual system pressure measured by BoosterControl Advanced	0 ... 10000 kPa
1-1-2	Display system load (all pumps in operation)	0 ... 100 %
1-1-3	RDP switch (dry running protection)	Available Not available
1-1-4	Inlet pressure	-100 ... 10000 kPa
1-1-5	Level in inlet tank	0 ... 100 %
1-1-6	Level in inlet tank	0 ... 9999 cm
1-1-7	If temperature sensor available: Display of measured ambient temperature	0 ... 100 °C
1-1-8	Display of status of digital inputs (only from service access level)	0 enabled 1 disabled
1-1-9	Position of supply valve	Open Closed

Displaying information on pumps connected

Select parameter 1-2.

The following information can be displayed:

Table 24: Status information 2

Parameter	Description	Possible values
1-2-1	Operating status of a pump	Automatic Manual ON (10 s fixed) Manual OFF
1-2-2	Pump load	0 ... 100 %
1-2-3	Motor protection	0 not tripped 1 tripped
1-2-4	Pump operating hours	Days Hours: Minutes
1-2-5	Number of pump starts per pump:	Pump: Starts

Displaying statistics

Select parameter 1-3.

The following information can be displayed:

Parameter description

Table 25: Status information 3

Parameter	Description
1-3-1	Operating hours of system (hours:minutes)
1-3-2	Time to next service
1-3-3	Actual min. runtime of pump

Displaying information on the start screen

Parameters indicating a system status can be displayed continuously on the start screen.

1. Select parameter 3-10-1 (root menu).
2. Select the parameter to be displayed on the start screen.

6.5 General information on parameterisation

	CAUTION
	<p>Incorrect parameter settings Damage to property!</p> <p>▸ Before changing a parameter, ensure that the new parameter is within the system's operating limits.</p>

Restart/reset BoosterControl Advanced reboots automatically (RESET) after the following parameters have been changed:

- 3-3-1
- 3-3-2
- 3-3-3
- 3-3-6
- 3-3-7
- 3-12-1

When a parameter is being set, a bar illustrates the parameter's value range, so the user can see how far the current value can be changed.

6.6 User login

The user must log in to the device before settings can be made.

1. Select parameter 3-2-1-1.
2. Enter access level and associated password:
 - Customer: 7353

Users logged in to BoosterControl Advanced are automatically logged off after 15 minutes of inactivity.

7 Quick Start Instructions

	<div style="background-color: #e67e22; color: white; padding: 5px;">⚠ DANGER</div> <p>Incorrect electrical installation Danger of death from electric shock!</p> <ul style="list-style-type: none"> ▷ 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 PELV³⁾: ▷ Only motor protection devices with safe isolation to EN 50178 (VDE 0160) may be connected directly.
	<div style="background-color: #f1c40f; padding: 5px;">CAUTION</div> <p>Improper electrical connection Damage to property</p> <ul style="list-style-type: none"> ▷ 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.

These quick-start instructions are designed to enable you to use the device immediately. They are not meant to be comprehensive and are, therefore, not a substitute for the step-by-step instructions given in the operating manual. These quick-start instructions describe the procedure in chronological fashion. To this end, the operating modes are covered in sequential order.

- ✓ The setpoint for the system pressure has been factory-set to 400 kPa. Setting or converting to other units is possible at any time.
(⇒ Section 6.4.1, Page 28)
- ✓ Note the ambient conditions. (⇒ Section 8.1, Page 34)
- ✓ Observe the terminal assignments on the printed circuit board.
(⇒ Section 5.4.1, Page 14)
 1. Mount/install BoosterControl Advanced.
 2. Connect the power supply.
 3. Connect/bridge motor protection or fire alert or external ON/OFF.
 4. Connect the pump contactors.
 5. Connect the pressure sensor/pressure switch.
 6. Log in to BoosterControl Advanced at service or factory access level.
(⇒ Section 6.6, Page 31)
 7. For cascade operating mode: Set parameter 3-2-2-6 to Hyamat K.
 8. For floating frequency inverter operating mode: Integrate and connect frequency inverter in control cabinet.
 9. For frequency inverter per pump operating mode: Connect frequency inverter.
 10. Set the motor data.
For this purpose, proceed as follows, depending on the frequency inverter:
 - Via the control panel of the frequency converter (refer to manufacturer's instructions)
 - Via the service software for the frequency inverter (refer to manufacturer's instructions)
 11. Set the following parameters on BoosterControl Advanced:

3) 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.

Table 26: Quick start – Parameter settings

Parameter	Value
3-1-1-1	Display language
3-7-1	Date
3-7-2	Time
3-3-3	For floating frequency inverter operating mode: Hyamat V For frequency inverter per pump operating mode: Hyamat VP BoosterControl Advanced then reboots.
3-3-1	Number of pumps connected BoosterControl Advanced then reboots.

8 Commissioning/Start-up/Shutdown

8.1 Ambient conditions for commissioning and operation

Table 27: Ambient conditions for operation

Condition	Value
Ambient temperature	0 ... 50 °C
Relative humidity	50 % (non-condensing)
Installation altitude	Max. 1,000 m above MSL (higher installation altitudes are subject to a reduction factor)

8.2 Commissioning

A checklist can be used for commissioning. (⇒ Section 12.1, Page 81)

8.2.1 Starting up the system

See system documentation.

8.3 Setting BoosterControl Advanced

Note the general operating instructions. (⇒ Section 6, Page 21)

1. Select parameter 3-2-1-1.
2. Enter access level and associated password:
- Customer: 7353

Users logged in to BoosterControl Advanced are automatically logged off after 15 minutes of inactivity.

8.3.1 Setting the display language

1. Select parameter 3-1-1-1.
2. Select the language required and press "OK" to confirm.

8.3.2 Setting the time/date

BoosterControl Advanced does not automatically change between summer and winter time.

1. To set the date, select parameter 3-7-1.
2. To set the time of day, select parameter 3-7-2.

8.4 Basic configurations of the pressure booster system

BoosterControl Advanced can be used for various operating modes of pressure booster systems.

A set of preset parameters can be loaded for every operating mode.

The following operating modes are possible:

Table 28: Operating modes for pressure booster systems

Operating mode	Description	Section
Cascade control	BoosterControl Advanced starts and stops additional pumps as a function of pressure.	(⇒ Section 8.4.1, Page 36)
Cascade control with base load/ peak-load pump (jockey operation)	In the operating mode with jockey pump, the jockey pump is operated as a base-load pump at first. If insufficient pressure is built up, one or more peak-load pumps are added in cascading fashion. The jockey pumps are switched off as the larger pumps are cut in.	(⇒ Section 8.4.2, Page 37)
Control with a floating frequency inverter	BoosterControl Advanced controls one of the pumps via a frequency inverter as a function of pressure. Further pumps are started and stopped directly via the mains. Before every system start-up, the control system defines the pump with the least operating hours as the pump to be controlled by the frequency inverter. If the frequency inverter fails, BoosterControl Advanced switches to cascade control or switches off the system.	(⇒ Section 8.4.3, Page 38)
Control with one frequency inverter per pump (sequential) (VP)	BoosterControl Advanced controls all pumps via frequency inverters as a function of pressure. After the first frequency inverter-controlled pump has reached its maximum output and a start time has lapsed, the next frequency inverter-controlled pump is cut in (pump with the fewest operating hours). Deactivation also occurs sequentially.	(⇒ Section 8.4.4, Page 41)
Control with one frequency inverter per pump	BoosterControl Advanced controls all pumps via frequency inverters as a function of pressure. After the first frequency inverter-controlled pump has been started and has reached its maximum output, the next pump is cut in, and the pump already running is simultaneously reduced in output by x percent (configurable) to avoid pressure surges. The output of the second pump approaches that of the first until both generate the same output, etc. Then both pumps run synchronously at the same speed in parallel operation until the output limit is reached and the next pump is cut in or out. During the switching procedure, the remaining pumps are adapted in their output.	(⇒ Section 8.4.5, Page 42)

8.4.1 Cascade control

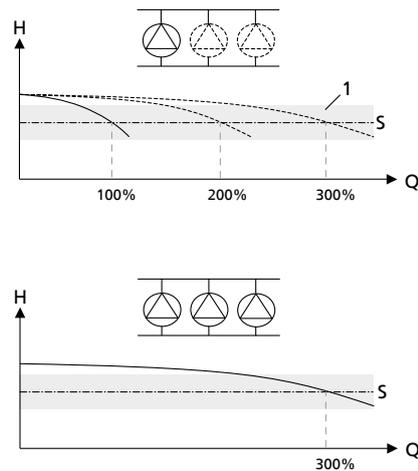


Fig. 7: Cascade control

1	Bandwidth
H	Head
Q	Flow rate
S	Setpoint

Parameter settings can only be made at the service or factory access level.

- ✓ The system is operational.
- ✓ BoosterControl Advanced has been connected correctly.
- ✓ Date and time have been set. (⇒ Section 8.3.2, Page 34)
 1. Log in to BoosterControl Advanced at service or factory access level. (⇒ Section 6.6, Page 31)
 2. Set the parameters for the suction side. (⇒ Section 8.5.1, Page 45)
 3. Set the frequency inverter parameters. (⇒ Section 8.4.6, Page 44)
 4. Note dry running protection settings. (⇒ Section 8.5.1, Page 45)
 5. Set the following parameters:

Table 29: Parameter settings for cascade control

Parameter	Description	Possible values
3-2-2-6	Select Hyamat K operating mode	Hyamat K
3-3-1	Number of pumps connected BoosterControl Advanced reboots; observe notes	1 ... 6
3-3-3	Configuration, discharge side BoosterControl Advanced reboots; observe notes	Cascade (without frequency inverter)
3-4-2-3	Number of pumps started up in the event of a sensor failure on the discharge side	0 ... 6
3-4-2-4	Limitation of the maximum system load	Number of pumps in operation × 100 %
3-5-1	System pressure setpoint	0 ... x kPa ⁴⁾
3-5-3	Bandwidth: range above and below the setpoint where pumps are not stopped or started	0 ... 1000 kPa
3-5-5	Maximum setpoint	0 ... x kPa ⁴⁾
3-6-2	Limit for minimum runtime of pump	0 ... 999 s

4) x depends on the maximum value of the pressure sensor used.

Parameter	Description	Possible values
3-6-4	Maximum pump runtime. After this period, BoosterControl Advanced starts the pump with the least operating hours	0 ... 604 800 s (corresponds to 7 days)
3-6-5	When one pump is running: start delay of each pump that cuts in	0 ... 999 s
3-6-6	When more than one pump is running: stop delay of the pumps	0 ... 999 s

8.4.2 Cascade control - with jockey pump

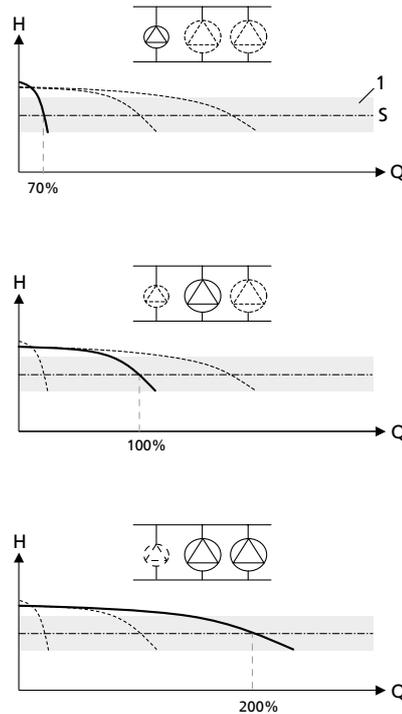


Fig. 8: Cascade control with jockey pump

1	Bandwidth
H	Head
Q	Flow rate
S	Setpoint

Parameter settings can only be made at the service or factory access level. In the operating mode with jockey pump, the jockey pump is operated as a base-load pump at first. If the pressure generated is insufficient, the jockey pump is also started up again as the last pump.

- ✓ The system is operational.
- ✓ BoosterControl Advanced has been connected correctly.
- ✓ The jockey pump has been sufficiently sized for base-load conditions.
- ✓ Date and time have been set. (⇒ Section 8.3.2, Page 34)
 1. Log in to BoosterControl Advanced at service or factory access level. (⇒ Section 6.6, Page 31)
 2. Set the parameters for the suction side. (⇒ Section 8.5.1, Page 45)
 3. Set the frequency inverter parameters. (⇒ Section 8.4.6, Page 44)
 4. Note dry running protection settings. (⇒ Section 8.5.1, Page 45)
 5. Set the following parameters:

Table 30: Parameter settings for cascade control – with jockey pump

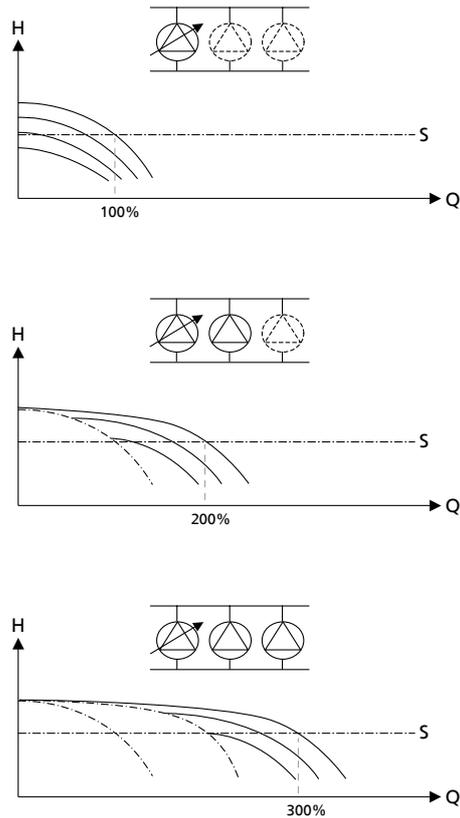
Parameter	Description	Possible values
3-2-2-6	Operating mode	Hyamat K
3-3-1	Number of pumps connected BoosterControl Advanced reboots; observe notes	1 ... 6
3-3-3	Configuration, discharge side BoosterControl Advanced reboots; observe notes	1 x jockey pump 2 x jockey pump
3-4-2-3	Number of pumps started up in the event of a sensor failure on the discharge side	0 ... 6
3-4-2-4	Limitation of the maximum system load	Number of pumps in operation × 100 %
3-5-1	System pressure setpoint	0 ... x kPa ⁵⁾
3-5-3	Bandwidth: range above and below the setpoint where pumps are not stopped or started	0 ... 1000 kPa
3-5-5	Maximum setpoint	0 ... x kPa ⁵⁾
3-6-2	Limit for minimum runtime of pump	0 ... 999 s
3-6-4	Maximum pump runtime. After this period, BoosterControl Advanced starts the pump with the least operating hours	0 ... 356400 s
3-6-5	When one pump is running: start delay of each pump that cuts in	0 ... 999 s
3-6-6	When more than one pump is running: stop delay of the pumps	0 ... 999 s

8.4.3 Control with one frequency inverter (per system)

The operating mode must be set depending on the frequency inverter used. One frequency inverter can be firmly assigned to a specific pump or used consecutively for several pumps (depending on the electrical connection).

Parameter settings can only be made at the service or factory access level.

5) x depends on the maximum value of the pressure sensor used.


Fig. 9: Control with floating frequency inverter

H	Head
Q	Flow rate
S	Setpoint

- ✓ The system is operational.
- ✓ BoosterControl Advanced has been connected correctly.
- ✓ Date and time have been set. (⇒ Section 8.3.2, Page 34)
 1. Log in to BoosterControl Advanced at service or factory access level. (⇒ Section 6.6, Page 31)
 2. Set the parameters for the suction side. (⇒ Section 8.5.1, Page 45)
 3. Set the frequency inverter parameters. (⇒ Section 8.4.6, Page 44)
 4. Note dry running protection settings. (⇒ Section 8.5.1, Page 45)
 5. Set the following parameters:

Table 31: Parameter settings for control with one frequency inverter

Parameter	Description	Possible values
3-2-2-6	Operating mode	Hyamat V
3-3-1	Number of pumps connected BoosterControl Advanced reboots; observe notes	1 ... 6
3-3-3	Configuration, discharge side BoosterControl Advanced reboots; observe notes	Floating frequency inverter ⁶⁾
3-4-2-3	Number of pumps started up in the event of a sensor failure on the discharge side	0 ... 6
3-4-2-4	Limitation of the maximum system load	Number of pumps in operation × 100 %

6) A frequency inverter must be installed in the control cabinet and wired so that it can control any of the pumps. BoosterControl Advanced switches the frequency inverter to another pump after each operation cycle.

Parameter	Description	Possible values
3-4-3-5	Enable/disable flow detection and accuracy of flow detection	0 deactivated 1.. Measuring interval = 20 s Permissible load change = ± 2 % ...9 Measuring interval = 4 s Permissible load change = ± 18 %
3-4-3-5-1	Activate flow detection: Flow bandwidth	0-0,5 bar
3-4-3-5-2	Interval for flow measurement ("0" deactivates the function)	0-60 s
3-4-3-5-3	Step height for detecting the zero flow	1..100%
3-4-3-4-4	Define maximum pump load ("0" deactivates the function)	0.100%
3-5-1	System pressure setpoint	0 ... x kPa ⁷⁾
3-5-3	Pressure bandwidth: range above and below the setpoint where pumps are not stopped or started. Permissible symmetrical deviation from the setpoint.	0 ... 1000 kPa
3-5-5	Maximum setpoint	0 ... x kPa ⁷⁾
3-6-2	Limit for minimum runtime of pump	0 ... 999 s
3-6-4	Maximum pump runtime. After this period, BoosterControl Advanced starts the pump with the least operating hours	0 ... 356400 s
3-6-5	When one pump is running: start delay of each pump that cuts in	0 ... 999 s
3-6-6	When more than one pump is running: stop delay of the pumps	0 ... 999 s
3-12	Fault behaviour: specifies how the control system should behave in the event of a fault	Cascade Deactivation

7) x depends on the maximum value of the pressure sensor used.

8.4.4 Control with one frequency inverter per pump (sequential starting/stopping of pumps)

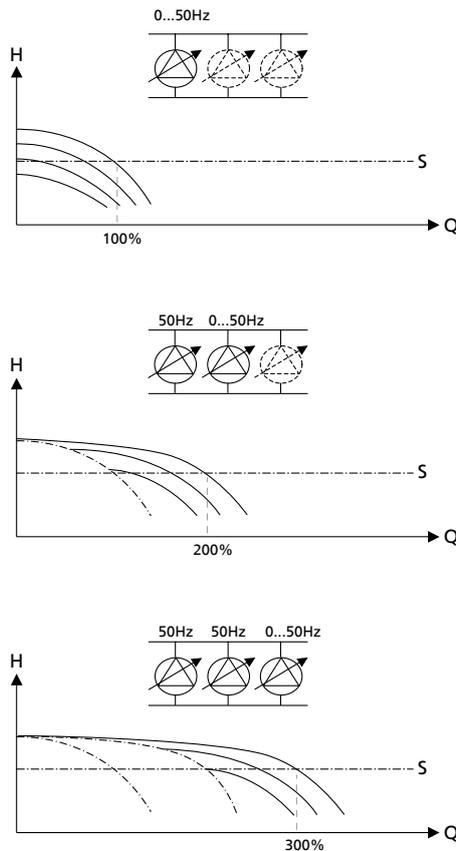


Fig. 10: Control with one frequency inverter per pump

H	Head
Q	Flow rate
S	Setpoint

Parameter settings can only be made at the service or factory access level.

- ✓ The system is operational.
- ✓ BoosterControl Advanced has been connected correctly.
- ✓ Date and time have been set. (⇒ Section 8.3.2, Page 34)
 1. Log in to BoosterControl Advanced at service or factory access level. (⇒ Section 6.6, Page 31)
 2. Set the parameters for the suction side. (⇒ Section 8.5.1, Page 45)
 3. Set the frequency inverter parameters. (⇒ Section 8.4.6, Page 44)
 4. Note dry running protection settings. (⇒ Section 8.5.1, Page 45)
 5. Set the following parameters:

Table 32: Parameter settings for control with several frequency inverters

Parameter	Description	Possible values
3-2-2-6	Operating mode	Motor-mounted frequency inverter, Hyamat VP Control cabinet-mounted frequency inverter, Hya-Eco VP
3-3-1	Number of pumps connected BoosterControl Advanced reboots; observe notes	1 ... 6
3-4-2-3	Number of pumps started up in the event of a sensor failure on the discharge side	1 ... 6

Parameter	Description	Possible values
3-4-2-4	Limitation of the maximum system load	Number of pumps in operation × ^a 100 %
3-4-3-5	Enable/disable flow detection and accuracy of flow detection	0 deactivated 1.. Measuring interval = 20 s Permissible load change = ±2 % ...9 Measuring interval = 4 s Permissible load change = ±18 %
3-4-3-5-1	Activate flow detection: Flow bandwidth	0-0,5 bar
3-4-3-5-2	Interval for flow measurement ("0" deactivates the function)	0-60 s
3-4-3-5-3	Step height for detecting the zero flow	1..100%
3-4-3-4-4	Define maximum pump load ("0" deactivates the function)	0.100%
3-5-1	System pressure setpoint	0 ... x kPa ⁸⁾⁹⁾
3-5-3	Pressure bandwidth: range above and below the setpoint where pumps are not stopped or started. Permissible symmetrical deviation from the setpoint.	0 ... 1000 kPa
3-5-5	Maximum setpoint	0 ... x kPa ⁸⁾⁹⁾
3-6-4	Maximum pump runtime. After this period, BoosterControl Advanced starts the pump with the least operating hours	0 ... 356400 s
3-6-5	When one pump is running: start delay of each pump that cuts in	0 ... 999 s
3-6-6	When more than one pump is running: stop delay of the pumps	0 ... 999 s

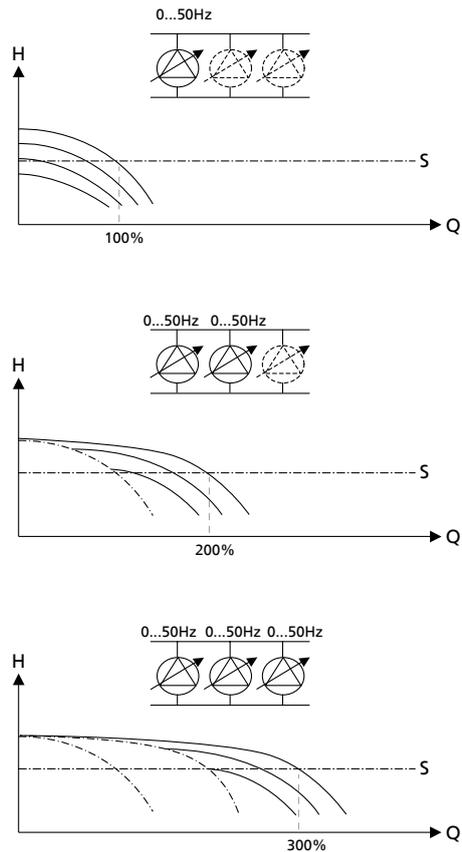
8.4.5 Control with one frequency inverter per pump (synchronous operation of pumps), multiple pump operation

After the first frequency inverter-controlled pump is started and has reached 100 percent, the next pump is started. In the process, the pump already running is reduced in output to avoid pressure surges. The next pump with the least operating hours is started until all pumps have the same output.

Then both pumps continue to run synchronously at the same speed and in parallel until the next switching limit is reached and the next pump is started or stopped.

During the switching procedure, the remaining pumps are adapted in their output.

8) Depending on the frequency inverter used (Hyamat VP with PumpDrive, HyaEco VP with Danfoss MicroDrive)
9) x depends on the maximum value of the pressure sensor used.


Fig. 11: Control with one frequency inverter per pump (synchronous)

H	Head
Q	Flow rate
S	Setpoint

Parameter settings can only be made at the service or factory access level.

- ✓ The system is operational.
- ✓ BoosterControl Advanced has been connected correctly.
- ✓ Date and time have been set. (⇒ Section 8.3.2, Page 34)
 1. Log in to BoosterControl Advanced at service or factory access level. (⇒ Section 6.6, Page 31)
 2. Set the parameters for the suction side. (⇒ Section 8.5.1, Page 45)
 3. Set the frequency inverter parameters. (⇒ Section 8.4.6, Page 44)
 4. Note dry running protection settings. (⇒ Section 8.5.1, Page 45)
 5. Set the following parameters:

Table 33: Parameter settings for control with several frequency inverters

Parameter	Description	Possible values
	MPO = multiple pump operation	
3-2-2-1	Select Hyamat VP operating mode	Hyamat VP
3-3-1	Number of pumps connected BoosterControl Advanced reboots; observe notes	1 ... 6
3-3-6	Switch on MPO function	
3-4-2-4	Limitation of the maximum system load	Number of pumps in operation × 100 %
3-4-3-4-4	Define maximum pump load ("0" deactivates the function)	0.100%
3-4-3-5-1	Activate flow detection: flow bandwidth	0-0,5 bar

Parameter	Description	Possible values
	MPO = multiple pump operation	
3-4-3-5-2	Interval for flow measurement ("0" deactivates the function)	0-60 s
3-4-3-5-3	Step height for detecting the zero flow	1..100%
3-4-3-5-4	Measuring interval	1...99 s
3-4-5-1	High load profile	Linear Cubic
3-4-5-2	Rated frequency	45...50 Hz
3-4-5-3	Start frequency	Note 31 ... 50 Hz (3-4-3-12)
3-4-5-4	Stop frequency	Note 30 ... 49 Hz 31 ... 50 Hz (3-4-3-11)
3-4-5-5-1	Start power	0...100 kW
3-4-5-5-2	Stop power	0...100 kW
3-4-5-7-1	Rated motor power	0...110
3-4-5-7-2	Rated motor speed	300...3600
3-4-5-7-3	Rated frequency	45 ... 50 Hz (note parameter 3-4-3-12)
3-4-5-7-4	Rated current	0,1...999 A
3-4-5-7-5	Rated cosine phi	0,1...0,99
3-4-5-8-1	Rated pump speed	300...3600
3-5-1	System pressure setpoint	0 ... x kPa ¹⁰⁾¹¹⁾
3-5-3	Pressure bandwidth: range above and below the setpoint where pumps are not stopped or started. Permissible symmetrical deviation from the setpoint.	0 ... 1000 kPa
3-5-5	Maximum setpoint	0 ... x kPa ¹⁰⁾¹¹⁾
3-6-4	Maximum pump runtime. After this period, BoosterControl Advanced starts the pump with the least operating hours	0 ... 356400 s
3-6-5	Time window in which the next pump may be started up after the previous pump is started up.	0 ... 999 s
3-6-6	Time window in which the next pump may be stopped after the previous pump is stopped.	0 ... 999 s

8.4.6 Setting the frequency inverter parameters

Parameter settings can only be made at the service or factory access level.

Log in to BoosterControl Advanced at service or factory access level.
(⇒ Section 6.6, Page 31)

The menu at parameter 3-4-3 only appears if an operating mode with frequency inverter has been selected at parameter 3-3-3.

The fault reporting relay of the frequency inverter(s) to has been connected correctly to BoosterControl Advanced.

Setting the bus addresses for the frequency inverters (does not apply to "floating frequency inverter" operating mode)

If the frequency inverter does not support any bus protocol, please refer to the manufacturer's instructions. If more than one frequency inverter is used, the bus addresses must be assigned manually.

Observe the documentation provided by the manufacturer of the frequency inverter.

Setting additional frequency inverter parameters

Set the following parameters:

10) x depends on the maximum value of the pressure sensor used.

11) Dependent on the frequency inverter used (Hyamat VP with PumpDrive)

Table 34: Frequency inverter parameter settings for control with one frequency inverter

Parameter	Description	Possible values
3-4-3-1	Communication protocol of frequency inverter	None Analog 0 - 20 mA Analog 4 - 20 mA PumpDrive Danfoss MicroDrive Danfoss VLT2800 Danfoss AquaDrive
3-4-3-2	Proportional constant of PID controller	0...100
3-4-3-3	Integral constant of PID controller	0...60 s
3-4-3-4	Differential constant of PID controller ¹²⁾	0...99 s
3-4-3-9	Start ramp of frequency inverters	0 ... 999 s
3-4-3-10	Stop ramp of frequency inverters	0 ... 999 s
3-4-3-11	Minimum frequency of frequency inverters	0 ... 50 Hz
3-4-3-12	Maximum frequency of frequency inverters	0 ... 50 Hz (60 Hz for Danfoss MicroDrive)
3-4-3-15	Nominal frequency of frequency inverters	0 ... 50 Hz

8.5 Application functions

BoosterControl Advanced has many useful features that are described in this section:

8.5.1 Setting the parameters for dry running protection

Table 35: Parameter settings for dry running protection

Parameter	Description	Default	Possible values
3-3-2	Configuration of suction side BoosterControl Advanced reboots; observe notes Setting of suction-side pressure transmitter	-	Pressure switch Pressure sensor Flow monitoring
3-4-1-1	Calibrate suction-side pressure sensor at 4 mA	0 kPa	-1 ... 99,99 Bar
3-4-1-2	Calibrate suction-side pressure sensor at 20 mA	1000 kPa	0 ... 99,99 Bar
3-4-2-1	Calibrate discharge-side pressure sensor at 4 mA	-	-1...99,99 Bar
3-4-2-2	Calibrate discharge-side pressure sensor at 20 mA	-	0...99,99 Bar
3-5-15	Minimum pressure before dry running protection is activated	-	0 ... 1000 kPa
3-5-16	Minimum pressure before system restarts after having been tripped by dry running protection device	-	0 ... 1000 kPa
3-6-8	Stop delay for system tripped by dry running protection device	-	0 ... 10 s
3-9	Deactivate the "No water" message in the field list (then the fault is self-acknowledging)	-	-

If a pressure switch is used as a dry running protection device, also set the following parameters.

8.5.2 Setting an alternative setpoint

If a second setpoint is required at certain times, an alternative setpoint can be set.

The alternative setpoint can be activated either once a day or once a week. Non-relevant parameters are automatically hidden.

12) The differential constant is always zero.

The alternative setpoint can be activated via the time function (service tool/3-7-8) as well as a digital input (WSD 1-3). If the switching points for On/Off are specified as 00:00, a transition to the following day is possible.

8.5.2.1 Setting an alternative setpoint via an external signal

If the signal for alternative setpoint switchover is to be provided by a control station, for example, a WSD1 to WSD3 input can be used. The WSD input used must still be assigned to the setpoint event in the control system. (Observe parameter set.)

Log in to BoosterControl Advanced at service or factory access level.

Table 36: Parameter settings for external switchover of alternative setpoint

Parameter	Description	Possible values
3-5-9	Alternative setpoint	0 ... 9999 kPa
3-8-1	Programming of digital parameterisable inputs	DI1..3 (WSD 1..3)
3-8-1-1	Parameterisable input DI 1 (WSD1)	Emergency power, fire alert, alternative setpoint, etc.
3-8-1-2	Parameterisable input DI 2 (WSD2)	Emergency power, fire alert, alternative setpoint, etc.
3-8-1-3	Parameterisable input DI 3 (WSD3)	Emergency power, fire alert, alternative setpoint, etc.

8.5.2.2 Setting alternative setpoint using a timer

Log in to BoosterControl Advanced at service or factory access level.
(⇒ Section 6.6, Page 31)

Table 37: Parameter settings for alternative setpoint

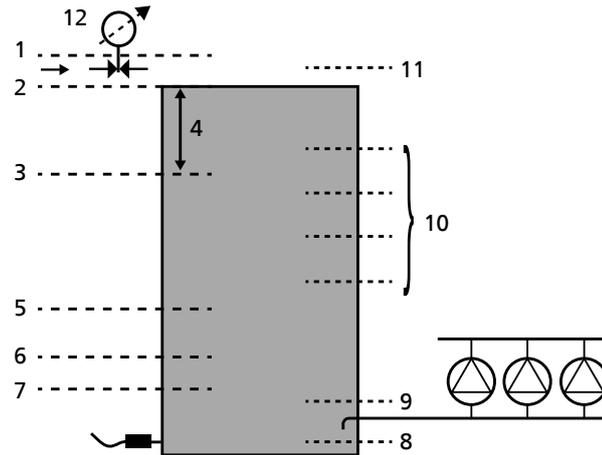
Parameter	Description	Possible values
3-7-8-1	Activate/deactivate setpoint of external input	Off Activated once daily Activated once weekly
3-5-9	Alternative setpoint	0 ... 9999 kPa
3-7-8-2	Only if parameter 3-7-8-1 is set to "daily":	0 ... 24 h
	Time of day when the alternative setpoint is to be activated/deactivated	0 ... 60 min
3-7-8-3	Day on which the alternative setpoint is to be activated	Sunday - Saturday
3-7-8-4	Only if parameter 3-7-8-1 is set to "weekly":	0 ... 24 h
	Time of day when the alternative setpoint is to be activated/deactivated	0 ... 60 min

8.5.3 Parameterisation of inlet tank function

BoosterControl Advanced can open and close an inlet tank proportional valve as a function of the filling level in the inlet tank.

Several possibilities for level detection are available:

- Via an analog (4 - 20 mA) level transmitter (float switch, electrode set)
- Via a pressure sensor (4 - 20 mA)
- Capacitive proximity sensors (with analog output 4 - 20 mA)


Fig. 12: Fill level control of inlet tank with proportional valve

1	Maximum level	2	Level at which valve closes
3	Level at which valve opens	4	Permissible water level (operating range)
5	Critical fill level	6	Bottom fill level, reset
7	Fill level, system stop	8	Sensor level
9	0 % level	10	Configurable refill levels
11	100 % level	12	Proportional valve

8.5.3.1 Level control via proportional valve

If a proportional valve is used.

Valve has been connected. (⇒ Section 5.4.7, Page 18)

Log in to BoosterControl Advanced at service or factory access level.

(⇒ Section 6.6, Page 31)

Set the following parameters

Table 38: Level control via proportional valve

Parameter	Description	Default	Possible values
3-4-1-4-10-1	Level in the inlet tank up to which the proportional valve is to remain open	80 %	0 ... 100 %

The following values are preset and can be adapted as required:

Table 39: Optional settings for the proportional valve

Parameter	Description	Default	Possible values
3-4-1-4-10-3	Hysteresis with proportional valve fully open	15 %	0 ... 100 %
3-4-1-4-10-4	Measuring cycle for the proportional valve	10 s	0 ... 99 s
3-4-1-4-10-5	Calibration of analog output	-	0..20mA 4..20mA

8.5.3.2 Setting an alternative level

If a second level is required at certain times. Set the following parameters:

Table 40: Parameter settings for alternative level

Parameter	Description	Default	Possible values
3-4-1-4-9-3	Alternative level in the inlet tank when the gate valve is to open	40 %	0 ... 100 %
3-4-1-4-9-4	Alternative level in the inlet tank when the gate valve is to close	60 %	0 ... 100 %
3-4-1-4-10-2	Level (timer-controlled) in the inlet tank at which the proportional valve is to open	40 %	0 ... 100 %
3-7-9	Month and day when the alternative level is enabled	Off	Off January - December 0 ... 31
3-7-10	Month and day when the alternative level is disabled	Off	Off January - December 0 ... 31

8.5.3.3 Level detection via pressure sensor

✓ Pressure sensor has been connected.

1. Log in to BoosterControl Advanced at service or factory access level.
(⇒ Section 6.6, Page 31)

Set the following parameters:

Table 41: Level detection via pressure sensor

Parameter	Description	Default	Possible values
3-3-2	Settings for the suction side BoosterControl Advanced reboots; observe notes	Inlet tank with gate valve	Inlet tank with gate valve Inlet tank with proportional valve
3-4-1-4-1	Min. permissible water level in the inlet tank, from upper edge of inlet nozzle	0 cm	0 ... 99 cm
3-4-1-4-2	Max. permissible water level in the inlet tank, from upper edge of inlet nozzle	200 cm	0 ... 999 cm
3-4-1-4-3	Sensor level above tank floor	0 cm	0 ... 1000 cm
3-9	Deactivate the "No water" message in the field list (then the fault is self-acknowledging)	Activated	Activated or deactivated

8.5.3.4 Setting the pressure sensor

Log in to BoosterControl Advanced at service or factory access level.
(⇒ Section 6.6, Page 31)

Set the following parameters:

Table 42: Parameter settings for pressure sensor

Parameter	Description	Default	Possible values
3-4-1-1	Suction side: Measured value of pressure sensor at 4 mA	0 kPa	0 ... 1000 kPa
3-4-1-2	Suction side: Measured value of pressure sensor at 20 mA	1000 kPa	0 ... 10000 kPa

8.5.3.5 Setting levels for messages

Levels triggering warnings and alerts are pre-set and can be adapted as required.
Log in to BoosterControl Advanced at service or factory access level.
(⇒ Section 6.6, Page 31)

If necessary, adapt parameters as follows:

Table 43: Optional parameter settings for inlet tank

Parameter	Description	Default	Possible values
3-4-1-4-4	Level for dry running condition; BoosterControl Advanced stops all pumps	10 %	0 ... 99 %
3-4-1-4-5	Only visible if "no water" message has been deactivated in parameter 3-9. Level at which the dry running alert is reset and all pumps are started again	15 %	0 ... 99 %
3-4-1-4-6	Critical water level	30 %	0 ... 99 %
3-4-1-4-7	High water level	105 %	0 ... 199 %

Further settings depend on the inlet tank valve used.

BoosterControl Advanced can control the following valves:

- Motorised gate valve (⇒ Section 8.5.3.6, Page 49)
- Proportional valve (⇒ Section 8.5.3.1, Page 47)

8.5.3.6 Level control via motorised gate valve

If a motorised gate valve is used.

Log in to BoosterControl Advanced at service or factory access level.
(⇒ Section 6.6, Page 31)

Set the following parameters:

Table 44: Level control via motorised gate valve

Parameter	Description	Default	Possible values
3-4-1-4-9-1	Level in the inlet tank at which the motorised gate valve is to open	70 %	0 ... 100 %
3-4-1-4-9-2	Level in the inlet tank at which the motorised gate valve is to close	90 %	0 ... 100 %

8.5.4 Parameterising the accumulator function (frequency-controlled systems only)

Before the system stops, an accumulator can be pressurised up to a certain limit value. As the last pump is running, a check is periodically carried out while gradually reducing pump output to determine if the switch-off point was reached. When this switch-off point is reached, an accumulator can be charged to an increased pressure before the system is stopped.

Subsequently tapped small quantities of water are then supplied from the accumulator first before the system starts up again (energy-saving mode).

Log in to BoosterControl Advanced at service or factory access level.
(⇒ Section 6.6, Page 31)

Table 45: Parameter settings for accumulator function

Parameter	Description	Default	Possible values
3-5-4	Accumulator offset: Difference between setpoint and minimum pressure in the accumulator before BoosterControl Advanced stops the system	30 kPa	0 ... 999 kPa

8.5.5 Water flow detection (WSD)

The water flow detection function can be implemented by means of an accumulator installed on the discharge side. If used, the set-up is as follows:

- Connect the water flow detector to inputs WSD1 to WSD3 (DI 1 - 3) as required.
- Connect the temperature sensor (PT1000) to terminal J401.

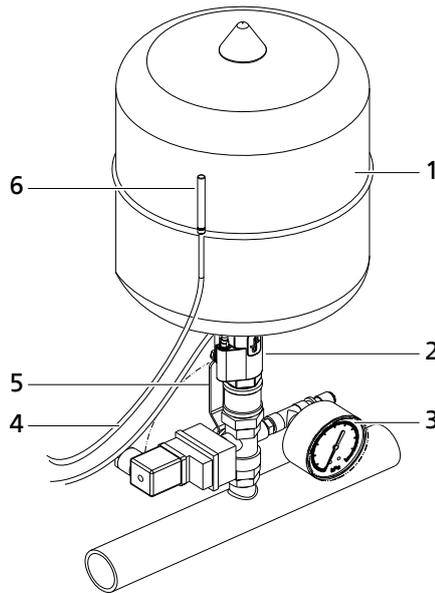


Fig. 13: Water flow detection set-up

1	Accumulator	2	Water flow detector
3	Pressure indicator	4	Sensor cables
5	Shut-off element	6	Temperature sensor

The water flow detector responds every time water is added to and withdrawn from the accumulator. At the same time, a temperature sensor measures the ambient temperature. If no water has been added to or withdrawn from the accumulator for a prolonged period of time, and/or the ambient temperature is too high, BoosterControl Advanced outputs a message. The limit values are parameterisable.

To issue warnings and alerts if the ambient temperature limit is exceeded or the required number of water replacements is not reached.

- ✓ The water flow detector has been connected to BoosterControl Advanced.
- ✓ If applicable: The temperature sensor has been connected to BoosterControl Advanced.

1. To activate the water flow detector, select parameter 3-3-4 and configure it as follows, depending on the set-up of the system:
Log in to BoosterControl Advanced at the service or factory access level.
(⇒ Section 6.6, Page 31)

Table 46: Activating the water flow detector

Possible values	System configuration
1 tank	One to three accumulators
2 tanks	
3 tanks	
1 tank + temp.	One to three accumulators with temperature sensor
2 tanks + temp.	
3 tanks + temp.	
Temperature	Temperature sensor only

The following values are pre-set and can be adapted as required:

Log in to BoosterControl Advanced at service or factory access level.
(⇒ Section 6.6, Page 31)

Table 47: Optional settings for the water flow detector

Parameter	Description	Default	Possible values
3-4-4-1	Number of water replacement cycles	30	1 ... 99
3-4-4-2	Period of water replacement cycles	24 h	0 ... 24 h
3-4-4-3	Average ambient temperature	25 °C	0 ... 99 °C
3-4-4-4	Measuring period for ambient temperature	24 h	0 ... 24 h
3-6-10	Pulse length of water flow detector 1	0 s	Refer to table on pulse lengths for water flow detector
3-6-11	Pulse length of water flow detector 2	4 s	
3-6-12	Pulse length of water flow detector 3	4 s	

KSB recommends the following pulse length values for a water flow detector:

Table 48: Pulse lengths for water flow detector

Accumulator size	Pulse length
0 ... 50 l	0 s
50 ... 100 l	1 s
> 100 l	4 s

8.5.6 Fire-fighting function

Higher volume flow rates and pressures must be provided by the pressure booster system in the event of a fire. When the "Fire" (J403) input is switched, all pumps start up immediately, regardless of the protection devices fitted.

All warnings and messages output by the pump are ignored in this operating status. (A fire alert has absolute priority.)

When the "Fire" input is restored to the original state the pumps return to their previous operating status in line with their stop delay periods. All protective devices and facilities then resume their operative effect.

8.5.7 Emergency power function (limitation of number of pumps)

If a building is equipped with an emergency power supply system, only a specific number of pumps may frequently be operated simultaneously due to the limited power supply available. This can be parameterised correspondingly in percent. Emergency power is detected at one of inputs WSD1 to WSD3 (J 401). This is freely configurable or can be assigned via parameter settings. When the original power supply is restored, the pumps return to their previous operating status in line with their start delay periods.

No automatic pump changeover is carried out as long as this function is active.

Log in to BoosterControl Advanced at service or factory access level.

(⇒ Section 6.6, Page 31)

Table 49: Emergency power function (limitation of number of pumps)

Parameter	Description	Default	Possible values
3-4-2-5	Emergency power restriction, system load limit in %	600	0...600 %
3-8-1	Programming of digital parameterisable inputs	DI1..3 (WSD 1..3)	
3-8-1-1	Parameterisable input DI 1 (WSD1)	Off	Emergency power, fire alert, alternative setpoint, etc.
3-8-1-2	Parameterisable input DI 2 (WSD2)	Off	Emergency power, fire alert, alternative setpoint, etc.
3-8-1-3	Parameterisable input DI 3 (WSD3)	Off	Emergency power, fire alert, alternative setpoint, etc.

8.5.8 Automatic setpoint reduction in case of inlet pressure drop (ASR)

A drop in inlet pressure below a set threshold value immediately causes the discharge-side setpoint to be reduced. The reduction is maintained until the suction-side inlet pressure has reached an appropriate threshold value again. A corresponding warning is output. If the inlet pressure drops below the switch-off point specified in 3-4-1-5-4, the system stops.

Log in to BoosterControl Advanced at service or factory access level.
(⇒ Section 6.6, Page 31)

Table 50: Automatic setpoint reduction (dynamic inlet pressure monitoring)

Parameter	Description	Default	Possible values
3-4-1-5-1	Automatic setpoint reduction in case of inlet pressure drop	0	Off, On
3-4-1-5-2	Re-start point	200	100.. 400
3-4-1-5-3	Enter minimum inlet pressure setpoint	100	0.. 400
3-4-1-5-4	Switch-off point	90	0.. 100
3-4-1-5-5	Proportional constant of PID controller	3	0.. 10
3-4-1-5-6	Integral constant of PID controller	1	0.. 60
3-4-1-5-7	Differential constant of PID controller	0	0.. 99,99
3-4-1-5-9	Time to pump start	5	0.. 60
3-4-1-5-10	Time to pump stop	5	0.. 60

8.5.9 Configuring the functional check run

To prevent the pumps from seizing up after prolonged idle periods, BoosterControl Advanced can briefly start up and stop the pumps that did not run in the last interval at defined intervals. The associated start levels need not be attained.

There are 3 options for functional check run parameterisation:

- Interval (periodic)
- Fixed time (date)
- External signal

For external configuration, a signal is transmitted to inputs WSD1 to WSD3 (J 401) as required. This must then be parameterised in the control system.

Log in to BoosterControl Advanced at service or factory access level.
(⇒ Section 6.6, Page 31)

Table 51: Functional check run

Parameter	Description	Possible values
3-7-3	Enable/disable functional check and set the time of day	Off Digital input Interval Day-based Week-based
3-7-4	Interval after which the functional check run is to be carried out	0 ... 1000000 s
3-7-5	Time when the functional check run is to be carried out is only displayed if 3-7-3 is set to "Day-based"	-
3-7-6	Day and time when the functional check run is to be carried out are only displayed if 3-7-3 is set to "Week-based"	-
3-7-7	Duration of functional check run	0 ... 999 s

8.5.10 Dynamic pressure compensation (DFS)

For physical reasons, the piping loss increases quadratically to the increasing flow rate.

This is why in a pressure booster system, long pipelines will cause the pressure to fall below the required setpoint directly at the consumer installation.

The BoosterControl Advanced control system dynamically adapts the discharge pressure (at the discharge header) based on the increasing flow rate so that the required pressure is present at the consumer installation.

Log in to BoosterControl Advanced at service or factory access level.
(⇒ Section 6.6, Page 31)

Table 52: Dynamic pressure setpoint compensation (DFS)

Parameter	Description	Possible values
3-5-10	Activate DFS (enter piping loss value)	E.g. -9.99 ... 999 bar 0 = deactivates the function

8.5.11 Setting freely parameterisable inputs

BoosterControl Advanced offers the option of processing remote signals. To this end, hardware inputs WSD1 to WSD3 (J 401) must be connected properly to the remote control signalling device.

The control system settings must then be made in accordance with the parameter list using the service tool. (⇒ Section 8.5.7, Page 51)

Table 53: Freely parameterisable inputs

Inputs WSD1 to WSD3	Action	Note
Functional check run	Activates a functional check run	To activate a functional check run via an external signal, in addition to the internally programmable functional check run. The "digital input" must be previously selected in parameter 3-7-3.
Setpoint changeover	Changeover to an alternative setpoint	To activate an alternative setpoint via an external signal, in addition to the internally programmable setpoint.
Leakage monitoring	Creates a display message	Must be set in the control system (inlet pressure monitoring with pressure switch)
Acknowledgement	Remote acknowledgement of message	
Bypass valve	Input for water flow detector	For bypass control systems with water flow detector
Emergency power function (limitation of number of pumps)	Reduces system output to a defined value	Only a defined number of pumps are operated when emergency power is supplied

8.5.12 Setting freely configurable outputs

BoosterControl Advanced offers the option of outputting remote signals. To this end, hardware outputs P4 to P6 (J 104) of a BoosterControl Advanced for 6 pumps must be connected to the remote control signalling device accordingly. The control system settings must then be made in accordance with the parameter list using the service tool. The number of freely parameterisable outputs is reduced in relation to the number of pumps. For example, a 5-pump system only has one output (P6) unassigned (in this example, 5 are reserved for controlling the pumps).

Table 54: Freely parameterisable outputs

Output (P4 - P6)	Action	Note
Inlet tank filling	Actuates an additional valve	If the standard filling routine for a tank is insufficient for the inlet tank filling function, up to 2 additional valves can be (⇒ Section 8.5.3, Page 46) actuated.
Inlet tank filling via motorised gate valve	Activate "Supply level" menu item	Actuates the motorised gate valve (⇒ Section 8.5.3, Page 46)

Output (P4 - P6)	Action	Note
Bypass valve	Actuating a bypass valve	A bypass valve can be actuated during the functional check run (only configurable if at least one pump is running).
Dry running protection (RDP), lack of water	RDP message to the remote control station	Output is switched if dry running protection is active. (message)

8.5.13 Configuration example

Table 55: Example for configuration of dry running protection

Parameter	Settings
3-9	Manually
3-5-15	0,8 bar
3-5-16	1,4 bar
3-6-8	10 s

If the dry running protection settings are made as shown above (table, "Example for configuration of dry running protection"), the system will operate as follows:

- The system will be stopped by the dry running protection device when the system pressure has dropped below 0.8 bar for at least 10 seconds.
- When the system has been stopped by the dry running protection device, the lack of water fault is displayed at parameter 2-1-1.
- When the system pressure has increased to more than 1.4 bar, the fault can be acknowledged manually. The system then starts again.

8.5.14 Setting alternative setpoint using a timer

Log in to BoosterControl Advanced at service or factory access level.
(⇒ Section 6.6, Page 31)

Table 56: Parameter settings for alternative setpoint

Parameter	Description	Possible values
3-7-8-1	Activate/deactivate setpoint of external input	Off Activated once daily Activated once weekly
3-5-9	Alternative setpoint	0 ... 9999 kPa
3-7-8-2	Only if parameter 3-7-8-1 is set to "daily":	0 ... 24 h
	Time of day when the alternative setpoint is to be activated/deactivated	0 ... 60 min
3-7-8-3	Day on which the alternative setpoint is to be activated	Sunday - Saturday
3-7-8-4	Only if parameter 3-7-8-1 is set to "weekly":	0 ... 24 h
	Time of day when the alternative setpoint is to be activated/deactivated	0 ... 60 min

9 Servicing/Inspection

9.1 Safety regulations

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

	<div style="background-color: #e67e22; color: white; padding: 5px;">⚠ DANGER</div> <p>Unintentional start-up Danger of death from electric shock!</p> <ul style="list-style-type: none"> ▷ Disconnect BoosterControl Advanced from the mains before carrying out any maintenance and installation work. ▷ Prevent BoosterControl Advanced from being re-started unintentionally when carrying out any maintenance and installation work.
	<div style="background-color: #2980b9; color: white; padding: 5px;">NOTE</div> <p>All maintenance, service and installation work can be carried out by KSB Service or authorised workshops. Find your contact in the attached "Addresses" booklet or on the Internet at "www.ksb.com/contact".</p>

9.2 Servicing/Inspection

9.2.1 Supervision of operation

Ensure sufficient cooling for BoosterControl Advanced.

10 Parameter list

Table 57: Overview of parameters

Parameter	Description	Factory setting	Possible settings	min. value	max. value	Read access right	Write access right
1	Operation <i>Display of operating mode</i>	-	-	-	-	Everybody	Nobody
1-1	System <i>General operating status indicators</i>	-	-	-	-	Everybody	Nobody
1-1-1	System pressure <i>Displaying the measured system pressure</i>	-	-	-	-	Everybody	Nobody
1-1-2	System load % <i>Displaying the total pump load in percent</i>	-	-	-	-	Everybody	Nobody
1-1-3	RDP switch <i>Detection of dry running protection via pressure switch is activated/deactivated</i>	-	Not available, available	-	-	Everybody	Nobody
1-1-4	Inlet pressure <i>Displaying the suction-side pressure</i>	-	-	-	-	Everybody	Nobody
1-1-5	Level content in % <i>Displaying the water level in inlet tank in percent</i>	-	-	-	-	Everybody	Nobody
1-1-6	Level height <i>Displaying the water level in the inlet tank</i>	-	-	-	-	Everybody	Nobody
1-1-7	Ambient temp. (WSD) <i>Displaying the measured ambient temperature if water flow detection is available</i>	-	-	-	-	Everybody	Nobody
1-1-8	Digital inputs <i>Displaying the status of the digital inputs</i>	-	-	-	-	Service	Service
1-1-9.2	Position suppl.valve <i>Position of supply valve</i>	Open	Open, closed	-	-	Everybody	Nobody
1-1-9.1	Position suppl.valve <i>Position of proportional supply valve 0 % ... 100 %</i>	0	0...100	0	100	Everybody	Nobody
1-1-10	Power down speed <i>Calculated stop speed if zero-flow detection is activated in energy-saving mode.</i>	-	-	-	-	Service	Nobody
1-1-14	WSD pulses tank 1 <i>Water flow detection, number of fills in tank 1</i>	0	-	-	-	Everybody	Nobody
1-1-15	WSD pulses tank 2 <i>Water flow detection, number of fills in tank 2</i>	0	-	-	-	Everybody	Nobody

Parameter	Description	Factory setting	Possible settings	min. value	max. value	Read access right	Write access right
1-1-16	WSD pulses tank 3 <i>Water flow detection, number of fills in tank 3</i>	0	-	-	-	Everybody	Nobody
1-2	Pumps <i>Pump-relevant status information</i>	-	-	-	-	Everybody	Nobody
1-2-1	Operating mode <i>Setting the operating mode for each individual pump</i>	-	-	-	-	Everybody	Everybody
1-2-1.1.1	Pump number <i>Entering the pump number for which the operating mode is configured</i>	1	1.. 3	1	3	Everybody	Everybody
1-2-1.2.1	Operating mode <i>Displaying the operating status of the pump</i>	1	Automatic, Manual On (10 s), Manual Off	-	-	Everybody	Everybody
1-2-2	Pump load <i>Displaying the pump load</i>	-	-	-	-	Everybody	Nobody
1-2-3	Thermal fail. flags <i>Bit-based display of status of all thermal fault inputs</i>	-	Not tripped Tripped	-	-	Service	Nobody
1-2-4	Running hours pump <i>Displaying the operating hours per pump</i>	-	-	-	-	Everybody	Nobody
1-2-5	Number of pumpstarts <i>Displaying the number of starts per pump</i>	-	-	-	-	Customer	Nobody
1-3	Time and statistics <i>Operating times and statistics</i>	-	-	-	-	Everybody	Nobody
1-3-1	Act runtime Op hours <i>Operating hours of the system</i>	0	-	-	-	Everybody	Nobody
1-3-2	Time to service <i>Time to next service interval</i>	0	-	-	-	Everybody	Nobody
1-3-3	Act Minimum Runtime <i>Current minimum pump runtime in seconds</i>	-	-	-	-	Everybody	Nobody
2	Diagnosis <i>Monitoring and diagnosis</i>	-	-	-	-	Everybody	Nobody
2-1	General <i>General monitoring functions</i>	-	-	-	-	Everybody	Nobody
2-1-1	Active Messages <i>Current messages for all available warnings/alerts</i>	-	-	-	-	Everybody	Customer
2-1-2	History <i>History of all warnings/alerts</i>	-	-	-	-	Everybody	Nobody
2-1-3	Acknowledge All <i>All messages are acknowledged</i>	-	-	-	-	Everybody	Everybody

Parameter	Description	Factory setting	Possible settings	min. value	max. value	Read access right	Write access right
2-1-4	Clear History <i>Deleting the message history</i>	-	-	-	-	Service	Service
3	Settings <i>Settings</i>	-	-	-	-	Everybody	Nobody
3-1	HMI <i>Control panel</i>	-	-	-	-	Everybody	Nobody
3-1-1	Basic settings <i>Basic settings for control panel</i>	-	-	-	-	Everybody	Nobody
3-1-1-1	Language <i>Language settings</i>	English	English, German, Dutch, French, Turkish	-	-	Everybody	Everybody
3-1-1-4	contrast <i>Contrast</i>	13	5.. 20	5	20	Everybody	Everybody
3-1-1-2	Backlight <i>Configuring the illumination time of the display</i>	-	-	-	-	Everybody	Everybody
3-1-1-2-1	Mode <i>Illumination type of system display</i>	Timed	Always on, timer-based	-	-	Everybody	Everybody
3-1-1-2-2	Backlight Time <i>System display: setting the illumination time in seconds</i>	600	10.. 999	10	999	Everybody	Service
3-1-1-3	Displayed units <i>Selecting the units shown on the display The measured values are converted in the device.</i>	-	-	-	-	Everybody	Nobody
3-1-1-3-1	Pressure <i>Units of measured pressure values</i>	kPa	kPa, bar, PSI, feet, mwc	-	-	Everybody	Service
3-1-1-3-2	Height <i>Fill level Units of tank fill level</i>	cm	cm, m	-	-	Everybody	Service
3-1-1-3-3	Temperature <i>Units of water flow detection temperature</i>	°C	°C, °F	-	-	Everybody	Service
3-1-2	Fieldbus <i>Field bus settings</i>	-	-	-	-	Nobody	Nobody
3-1-2-1	Fieldbus Type <i>Type of field bus module connected</i>	No module	No module, Profibus, Modbus	-	-	Nobody	Nobody
3-1-4	Logo <i>Setting the logo displayed</i>	-	-	-	-	Service	Nobody

Parameter	Description	Factory setting	Possible settings	min. value	max. value	Read access right	Write access right
3-1-4-1	Logo <i>Selecting of logo displayed</i>	No logo	KSB logo, dp logo, no logo	-	-	Service	Service
3-2	Device <i>Device-specific settings</i>	-	-	-	-	Everybody	Nobody
3-2-1	Login <i>Login</i>	-	-	-	-	Everybody	Nobody
3-2-1-1.1	PIN <i>Entering the user level and password</i>	-	-	-	-	Everybody	Nobody
3-2-1-1.1.1	Access Level <i>Selecting the login level</i>	User level	User level, service level, factory level	-	-	Everybody	Everybody
3-2-1-1.1.2	PIN acceptance <i>Prompt to enter PIN</i>	-	0.. 9999	0	9999	Everybody	Everybody
3-2-1-1.2	PIN <i>Entering the user level and password</i>	-	-	-	-	Factory	Nobody
3-2-1-1.2.1	Access Level <i>Selecting the login level</i>	User level	User level, service level, factory level, development level	-	-	Factory	Factory
3-2-1-1.2.2	PIN acceptance <i>Prompt to enter PIN</i>	-	0.. 9999	0	9999	Factory	Factory
3-2-1-2	Login required <i>Password entry required</i>	Yes	No, yes	-	-	Customer	Customer
3-2-2	Service <i>Service settings</i>	-	-	-	-	Customer	Nobody
3-2-2-1	Factory setting <i>Factory settings</i>	-	Reset OK, No set available	-	-	Customer	Customer
3-2-2-2	Reset Srv Interval <i>Resetting the service interval</i>	-	OK, Failed	-	-	Service	Service
3-2-2-3	Customer setting <i>Loading locally saved settings.</i>	-	Reset OK, No set available	-	-	Customer	Customer
3-2-2-4	Save custom. setting <i>Saving the customer settings</i>	-	-	-	-	Customer	Customer
3-2-2-5	Save factory setting <i>Saving the factory settings</i>	-	-	-	-	Factory	Factory
3-2-2-6	Default setting <i>Resetting to default settings</i>	-	-	-	-	Service	Service
3-2-2-6.1.1	Reset default param. <i>Resetting to default settings</i>	Default	Default, Hyamat K, Hyamat V, Hyamat VP, HyaEco VP	-	-	Service	Service

Parameter	Description	Factory setting	Possible settings	min. value	max. value	Read access right	Write access right
3-2-2-7	Edit Pump Opera. hrs <i>Editing pump operating hours</i>	-	-	-	-	Service	Service
3-2-2-7.1.1	Pump number <i>Number of pump</i>	1	1.. 6	1	6	Service	Service
3-2-2-7.2.1	Hours <i>Hours</i>	0	0.. 500000	0	500000	Service	Service
3-2-2-7.2.2	Minutes <i>Minutes</i>	0	0.. 59	0	59	Service	Service
3-2-2-7.2.3	Seconds <i>Second</i>	0	0.. 59	0	59	Service	Service
3-2-2-8	Reset Sys. Oper. hrs <i>Resetting the operating hours</i>	-	OK, Failed	-	-	Service	Service
3-2-3	Factory Test <i>Factory test</i>	-	-	-	-	Factory	Nobody
3-2-3-1	Factory Test <i>Factory test</i>	-	-	-	-	Factory	Factory
3-2-3-1.1.1	Test result <i>Test result</i>	Failed	Failed, Passed	-	-	Factory	Factory
3-3	Configuration <i>System configuration</i>	-	-	-	-	Everybody	Nobody
3-3-1	Number of pumps <i>Maximum number of pumps used in system</i>	3	1.. 6	1	6	Everybody	Service
3-3-2	Inlet <i>General configuration, suction side</i>	Pressure switch	Pressure switch, pressure sensor, water flow detection, inlet tank/gate valve, inlet tank/ proportional valve	-	-	Everybody	Service
3-3-3	Discharge <i>General configuration, discharge side</i>	Cascade	Cascade (without frequency inverter), 1 jockey, 2 jockeys, floating frequency inverter, frequency inverter per pump	-	-	Everybody	Service
3-3-4	WSD <i>Configuring the water flow detection for the tank</i>	Off	Off, 1 tank, 2 tanks, 3 tanks, 1 tank + temp., 2 tanks + temp., 3 tanks + temp., temperature	-	-	Everybody	Service

Parameter	Description	Factory setting	Possible settings	min. value	max. value	Read access right	Write access right
3-3-5	Leakage detection <i>Activating leakage monitoring</i>	Off	On, off	-	-	Everybody	Service
3-3-6	MPO Functionality <i>Synchronous operation</i>	Off	Off, On	-	-	Service	Service
3-3-7	PumpMode int/ext <i>Setting for pump mode via HMI (internal) or switch (external)</i>	Internal	Internal, external	-	-	Everybody	Service
3-4	System settings <i>Parameterisation of system</i>	-	-	-	-	Everybody	Nobody
3-4-1	Inlet <i>Suction-side parameterisation</i>	-	-	-	-	Everybody	Nobody
3-4-1-1	Sensor press. 4 mA <i>Analog measured value at 4 mA, suction side</i>	0	-100.. 1000	-100	1000	Everybody	Service
3-4-1-2	Sensor press. 20 mA <i>Analog measured value at 20 mA, suction side</i>	1000	0.. 9999	0	9999	Everybody	Service
3-4-1-3	Damp. Time Inlet <i>Damping time for smoothing measured value to compensate for measurement peaks</i>	200	100.. 2000	100	2000	Factory	Factory
3-4-1-4	Level config <i>Configuring inlet tank control</i>	-	-	-	-	Everybody	Service
3-4-1-4-1	0% level <i>Minimum water level at which no air enters into tank, in percent, from upper edge of inlet nozzle</i>	0	0.. 99	0	99	Everybody	Service
3-4-1-4-2	100% level <i>Maximum water level of inlet tank, in percent, from upper edge of inlet nozzle</i>	200	0.. 999	0	999	Everybody	Service
3-4-1-4-3	Sensor level <i>Distance of sensor positioned above tank floor to tank floor, in centimetres</i>	0	-100.. 999	-100	999	Everybody	Service
3-4-1-4-4	Low level shut down <i>System stop when dry running level reached</i>	10	0.. 99	0	99	Everybody	Service
3-4-1-4-5	Low level reset <i>Resetting the system when defined dry running level is reached</i>	15	0.. 99	0	99	Everybody	Service
3-4-1-4-6	Critical water level <i>Threshold of critical water level in inlet tank</i>	30	0.. 99	0	99	Everybody	Service
3-4-1-4-7	High water level <i>Threshold of high water level in inlet tank</i>	105	0.. 199	0	199	Everybody	Service

Parameter	Description	Factory setting	Possible settings	min. value	max. value	Read access right	Write access right
3-4-1-4-8	Threshold 1 or 2 extra signalling relay contacts for switching thresholds	-	-	-	-	Everybody	Service
3-4-1-4-8-1	Threshold 1 ON Inlet tank level for relay 1 energised in percent	50	0...199	0	199	Everybody	Service
3-4-1-4-8-2	Threshold 1 OFF Inlet tank level for relay 1 de-energised in percent	50	0...199	0	199	Everybody	Service
3-4-1-4-8-3	Threshold 2 ON Inlet tank level for relay 2 energised in percent	40	0...199	0	199	Everybody	Service
3-4-1-4-8-4	Threshold 2 OFF Inlet tank level for relay 2 de-energised in percent	40	0...199	0	199	Everybody	Service
3-4-1-4-9	Supply valve ON/OFF Position of inflow gate valve for filling inlet tank	-	-	-	-	Everybody	Nobody
3-4-1-4-9-1	Level 1 open Level for opening gate valve to start filling inlet tank	70	0.. 99	0	99	Everybody	Service
3-4-1-4-9-2	Level 1 closed Level for closing gate valve to stop filling inlet tank	90	0.. 99	0	99	Everybody	Service
3-4-1-4-9-3	Level 1A open Second level (timer-based) for opening gate valve to start filling	40	0.. 99	0	99	Everybody	Service
3-4-1-4-9-4	Level 1A closed Second level (timer-based) for closing gate valve to stop filling	60	0.. 99	0	99	Everybody	Service
3-4-1-4-10	Supply valve prop. Use of a proportional valve to fill inlet tank	-	-	-	-	Everybody	Nobody
3-4-1-4-10-1	Level setpoint 1 Level in inlet tank at which valve is completely closed	80	0.. 99	0	99	Everybody	Service
3-4-1-4-10-2	Level setpoint 1A Second level (timer-based) in inlet tank at which valve is completely closed	40	0.. 99	0	99	Everybody	Service
3-4-1-4-10-3	Hysteresis Setting the hysteresis for fully open valve	15	0.. 99	0	99	Everybody	Service
3-4-1-4-10-4	Sample time Measurement cycle for measuring to control proportional valve	10	0.. 99	0	99	Everybody	Service

Parameter	Description	Factory setting	Possible settings	min. value	max. value	Read access right	Write access right
3-4-1-4-10-5	Analog output <i>Configuring the analog output</i>	4-20mA	4-20 mA, 0-20 mA	-	-	Everybody	Service
3-4-1-5	Auto. Setpoint Redu. <i>Automatic setpoint reduction in case of inlet pressure drop</i>	-	-	-	-	Everybody	Nobody
3-4-1-5-1	ASR function <i>Automatic setpoint reduction in case of inlet pressure drop</i>	Off	Off, On	-	-	Everybody	Service
3-4-1-5-2	Switch on point <i>Re-start point</i>	200	100.. 400	100	400	Everybody	Service
3-4-1-5-3	Inlet Set point <i>Entering the minimum inlet pressure setpoint</i>	100	0.. 400	0	400	Everybody	Service
3-4-1-5-4	Switch off point <i>Stop point</i>	90	0.. 100	0	100	Everybody	Service
3-4-1-5-5	Proportional const. <i>Proportional constant of PID controller</i>	3	0.. 10	0	10	Everybody	Service
3-4-1-5-6	Integral time <i>Integral constant of PID controller</i>	1	0.. 60	0	60	Everybody	Service
3-4-1-5-7	Differential time <i>Differential constant of PID controller</i>	0	0.. 99	0	99	Everybody	Service
3-4-1-5-9	Switch On time <i>Time to pump start</i>	5	0.. 60	0	60	Service	Service
3-4-1-5-10	Switch Off time <i>Time to pump stop</i>	5	0.. 60	0	60	Service	Service
3-4-2	Discharge <i>Discharge-side parameterisation</i>	-	-	-	-	Everybody	Service
3-4-2-1	Sensor press. 4 mA <i>Analog measured value at 4 mA, discharge side</i>	0	-100.. 1000	-100	1000	Everybody	Service
3-4-2-2	Sensor press. 20 mA <i>Analog measured value at 20 mA, discharge side</i>	1000	0.. 9999	0	9999	Everybody	Service
3-4-2-3	Pumps ON sensor fail <i>Number of pumps started up in the event of a sensor failure on the discharge side</i>	0	0.. 3	0	3	Everybody	Service
3-4-2-4	Max power <i>Limitation of maximum system power (n x 100 %, n = number of pumps)</i>	600	0.. 600	0	600	Everybody	Service
3-4-2-5	Max power ext. oper. <i>Limitation of maximum system power for operation on emergency power</i>	600	0.. 600	0	600	Everybody	Service

Parameter	Description	Factory setting	Possible settings	min. value	max. value	Read access right	Write access right
3-4-3	Variable freq. drive <i>Configuring the frequency inverters</i>	-	-	-	-	Everybody	Nobody
3-4-3-1	Communication <i>Configuring the communication protocol for the frequency inverter</i>	None	None, Analog 4-20 mA, Analog 0-20 mA, PumpDrive, Danfoss VLT 2800, Danfoss MicroDrive, Danfoss AquaDrive	-	-	Everybody	Service
3-4-3-2	Proportional const. <i>Proportional constant of PID controller</i>	3	0.. 100	0	100	Everybody	Service
3-4-3-3	Integral time <i>Integral constant of PID controller</i>	1	0.. 60	0	60	Everybody	Service
3-4-3-4	Differential time <i>Differential constant of PID controller</i>	0	0.. 99,99	0	99,99	Everybody	Service
3-4-3-9	VFD Ramp-Up <i>Configuring the start ramp for frequency inverters in seconds</i>	3	0,1.. 999	0,1	999	Everybody	Service
3-4-3-10	VFD Ramp-Down <i>Configuring the stop ramp for frequency inverters in seconds</i>	3	0,1.. 999	0,1	999	Everybody	Service
3-4-3-11	VFD min. frequency <i>Configuring the minimum frequency for frequency inverters in Hz</i>	30	0.. 50	0	50	Everybody	Service
3-4-3-12	VFD max. frequency <i>Configuring the maximum frequency for frequency inverters in Hz</i>	50	30.. 140	30	140	Everybody	Service
3-4-3-13	P nominal of VFD <i>Nominal power of frequency inverters</i>	1500	0.. 100000	0	100000	Everybody	Service
3-4-3-14	U nominal of VFD <i>Nominal voltage of frequency inverters</i>	400	0.. 500	0	500	Everybody	Service
3-4-3-15	F nominal of VFD <i>Nominal frequency of frequency inverters</i>	50	50.. 50	50	50	Everybody	Service
3-4-3-16	I nominal of VFD <i>Nominal amperage of frequency inverters</i>	4	0.. 450	0	450	Everybody	Service
3-4-3-17	RPM nominal of VFD <i>Nominal speed of frequency inverters</i>	2880	0.. 10000	0	10000	Everybody	Service
3-4-3-20	Motor Speed Unit <i>Motor speed unit</i>	U/min	Rpm, Hz	-	-	Everybody	Service
3-4-3-21	Digital I/P 33 func. <i>Selecting the digital input</i>	No function	No function, Coasting stop inv.	-	-	Everybody	Service
3-4-3-22	Digital I/P 29 func. <i>Selecting the digital input</i>	No function	No function, Jog function, Jog function	-	-	Everybody	Service

Parameter	Description	Factory setting	Possible settings	min. value	max. value	Read access right	Write access right
3-4-3-23	Jog frequency <i>Speed in manual mode</i>	50	30.. 50	30	50	Everybody	Service
3-4-3-24	Jog ramp time <i>Ramp time</i>	5	0,04.. 3600	0,04	3600	Everybody	Service
3-4-3-25	Costing select <i>Selecting the manual mode</i>	Digital and bus	Digital input, bus, digital and bus, digital or bus	-	-	Everybody	Service
3-4-3-26	Start select <i>Selecting the start signal</i>	Digital and bus	Digital input, bus, digital and bus, digital or bus	-	-	Everybody	Service
3-4-3-27	Slip Compensation <i>Slip compensation</i>	0	-400.. 399	-400	399	Everybody	Service
3-4-3-5	No flow detection <i>Accuracy with which a minimum flow is detected (procedure for stopping the pumps)</i>	-	-	-	-	Everybody	Service
3-4-3-5-1	No flow bandwidth <i>Bandwidth of flow detection</i>	6	0.. 50	0	50	Service	Service
3-4-3-5-2	No flow time <i>Flow detection time in seconds</i>	16	0.. 60	0	60	Service	Service
3-4-3-5-3	No flow step <i>Step height of flow detection in percent</i>	1	1.. 50	1	50	Service	Service
3-4-3-5-4	No flow max. power <i>Flow detection is active below this pump load in percent</i>	100	0.. 100	0	100	Service	Service
3-4-4	WSD settings <i>Configuring water flow detection</i>	-	-	-	-	Everybody	Nobody
3-4-4-1	Nbr of refreshments <i>Number of water replacement cycles</i>	30	0.. 99	0	99	Everybody	Service
3-4-4-2	Refresh time span <i>Duration of water replacement procedure in hours</i>	24	0.. 999	0	999	Everybody	Service
3-4-4-3	Average room temp. <i>Measured average ambient temperature</i>	25	0.. 50	0	50	Everybody	Service
3-4-4-4	Room temp. time span <i>Duration of ambient temperature measurement in hours</i>	24	0.. 999	0	999	Everybody	Service
3-4-5	MPO settings <i>Configuring the multiple pump operation functions</i>	-	-	-	-	Everybody	Customer
3-4-5-1	High Load Profile <i>Characteristic of pump</i>	Cubic	Linear, Cubic	-	-	Customer	Develop

Parameter	Description	Factory setting	Possible settings	min. value	max. value	Read access right	Write access right
3-4-5-2	Rated Freq <i>Rated frequency of pump</i>	50	45.. 50	45	50	Everybody	Service
3-4-5-3	Switch On Freq. <i>Start frequency of pump</i>	49	31.. 50	31	50	Everybody	Service
3-4-5-4	Switch Off Freq. <i>Stop frequency of pump</i>	31	30.. 49	30	49	Everybody	Service
3-4-5-5	Cubic setting <i>Cubic setting</i>	-	-	-	-	Everybody	Service
3-4-5-5-1	Power 1 <i>Power 1 of pump</i>	2	0.. 100	0	100	Everybody	Service
3-4-5-5-2	Power 2 <i>Power 2 of pump</i>	2	0.. 100	0	100	Everybody	Service
3-4-5-6	Linear setting <i>Linear setting of pump</i>	-	-	-	-	Everybody	Service
3-4-5-6-1	Power 1 <i>Power 1 of pump</i>	2	0.. 100	0	100	Everybody	Service
3-4-5-6-2	Power 2 <i>Power 2 of pump</i>	2	0.. 100	0	100	Everybody	Service
3-4-5-6-3	Power 3 <i>Power 3 of pump</i>	2	0.. 100	0	100	Everybody	Service
3-4-5-6-4	Power 4 <i>Power 4 of pump</i>	2	0.. 100	0	100	Everybody	Service
3-4-5-7	Motor settings <i>Motor settings</i>	-	-	-	-	Everybody	Nobody
3-4-5-7-1	Rated Motor Power <i>Rated power of motor as per name plate</i>	2	0.. 110	0	110	Everybody	Service
3-4-5-7-2	Rated Motor Speed <i>Rated speed of motor as per name plate</i>	1450	300.. 3600	300	3600	Everybody	Service
3-4-5-7-3	Rated Freq <i>Rated frequency of motor as per name plate</i>	50	45.. 50	45	50	Everybody	Service
3-4-5-7-4	Rated Current <i>Rated current of motor as per name plate</i>	10	0,1.. 999	0,1	999	Everybody	Service
3-4-5-7-5	Rated Cosphi <i>Rated cos phi of motor as per name plate</i>	1	0,1.. 0,99	0,1	0,99	Everybody	Service
3-4-5-8	Pump parameters <i>Pump settings</i>	-	-	-	-	Everybody	Nobody
3-4-5-8-1	Rated Pump Speed <i>Rated speed of pump for rated H/Q characteristic curve</i>	2900	300.. 3600	300	3600	Everybody	Service
3-5	Pressure <i>Configuring the system pressure</i>	-	-	-	-	Everybody	Nobody

Parameter	Description	Factory setting	Possible settings	min. value	max. value	Read access right	Write access right
3-5-1	Set point <i>Entering the pressure setpoint (system pressure)</i>	400	0.. 1000	0	1000	Everybody	Customer
3-5-3	Bandwidth <i>Bandwidth within which the frequency inverters remain at the same, constant speed independent of pressure.</i>	5	0.. 999	0	999	Everybody	Customer
3-5-4	Accumulation press. <i>Procedure for increasing pressure in the accumulator before the system stops</i>	30	0.. 999	0	999	Everybody	Customer
3-5-5	Max.set point Limit value for maximum setpoint	1000	400.. 1000	400	1000	Everybody	Service
3-5-9	Adapt. setpoint <i>Date/time-based alternative setpoint</i>	400	0.. 1000	0	1000	Everybody	Customer
3-5-10	Delta p Dynamic pressure compensation <i>Quadratic function for correcting the setpoint</i>	0	-999.. 999	-999	999	Everybody	Customer
3-5-11	High pressure alarm <i>Upper limit value for maximum system pressure</i>	1000	400.. 1000	400	1000	Everybody	Customer
3-5-12	High pressure action <i>Parameter for selecting action in case of excessively high system pressure (stop pumps or output message only)</i>	Stop pumps	Stop pumps, message only	-	-	Everybody	Customer
3-5-13	Low pressure alarm <i>Lower limit value for minimum system pressure</i>	0	0.. 400	0	400	Everybody	Customer
3-5-14	Low pressure action <i>Parameter for selecting action in case of excessively low system pressure (stop pumps or output message only)</i>	Stop pumps	Stop pumps, message only	-	-	Everybody	Customer
3-5-15	Shut down RDP <i>Minimum suction-side pressure limit for dry running protection</i>	20	0.. 80	0	80	Everybody	Customer
3-5-16	Reset RDP <i>Suction-side pressure for re-start following dry running occurrence</i>	80	20.. 999	20	999	Everybody	Customer
3-5-17	Press. Flow Control <i>Lack-of-water fault is set if setpoint minus pressure defined is undershot.</i>	100	0.. 1000	0	1000	Everybody	Service
3-6	Timer settings <i>Configuring the time parameters</i>	-	-	-	-	Everybody	Nobody

Parameter	Description	Factory setting	Possible settings	min. value	max. value	Read access right	Write access right
3-6-1	Opt. pump starts /h <i>Entering the optimal pump starts per hour. The pump runtime is automatically adapted</i>	10	0.. 99	0	99	Everybody	Service
3-6-2	Min. run time <i>Limit for minimum runtime of pump</i>	180	0.. 999	0	999	Everybody	Customer
3-6-3	Min. run time corr. <i>Correction value for minimum runtime of pump</i>	10	0.. 99	0	99	Everybody	Service
3-6-4	Max. run time <i>Maximum pump runtime. After the time has lapsed, the system switches over to the next pump.</i>	86400	0.. 604800	0	604800	Everybody	Service
3-6-5	Start delay <i>Start delay of pumps if pressure remains below setpoint</i>	1	0.. 999	0	999	Everybody	Service
3-6-6	Stop delay <i>Stop delay of pumps if pressure remains at setpoint</i>	1	0.. 999	0	999	Everybody	Service
3-6-8	RDP delay <i>Stop delay following detection of dry running occurrence</i>	10	0.. 999	0	999	Everybody	Service
3-6-9	High/low alarm delay <i>Time window for suppressing alerts when system pressure is exceeded/undershot</i>	60	10.. 999	10	999	Everybody	Service
3-6-10	WSD 1 pulse length <i>Water flow detection 1, length of pulse in seconds</i>	4	0.. 99	0	99	Everybody	Service
3-6-11	WSD 2 pulse length <i>Water flow detection 2, length of pulse in seconds</i>	4	0.. 99	0	99	Everybody	Service
3-6-12	WSD 3 pulse length <i>Water flow detection 3, length of pulse in seconds</i>	4	0.. 99	0	99	Everybody	Service
3-6-13	Sys. start up delay <i>Start delay following re-start</i>	10	0.. 32	0	32	Service	Service
3-6-14	Jockey min. run time <i>Limit for minimum runtime of jockey pump</i>	0	0.. 999	0	999	Service	Service
3-7	Time/Date <i>Date and time</i>	-	-	-	-	Everybody	Nobody
3-7-1	Date <i>Setting the date</i>	-	-	-	-	Everybody	Customer
3-7-1.1.1	Year <i>Setting the year</i>	...	1970.. 2099	1970	2099	Everybody	Customer

Parameter	Description	Factory setting	Possible settings	min. value	max. value	Read access right	Write access right
3-7-1.1.2	Month <i>Setting the month</i>	1	1.. 12	1	12	Everybody	Customer
3-7-1.1.3	Day <i>Setting the day of the week</i>	1	1.. 31	1	31	Everybody	Customer
3-7-2	Time <i>Setting the time</i>	-	-	-	-	Everybody	Customer
3-7-2.1.1	Time <i>Setting the time in the format HH:MM:SS</i>	0	0.. 86399	0	86399	Everybody	Customer
3-7-3	Check run mode <i>Basic setting for forced start (check run)</i>	Interval	Off, Digital input, Interval, Day-based, Week-based	-	-	Everybody	Customer
3-7-4	Check run interval <i>Interval-controlled forced start (check run); the pumps are started at fixed, defined intervals.</i>	86400	0.. 1000000	0	1000000	Everybody	Service
3-7-5	Check run at <i>Day-controlled forced start (check run); the pumps are started at a defined time</i>	-	-	-	-	Everybody	Customer
3-7-5.1.1	Hours <i>Hours for daily forced start (check run)</i>	0	0.. 23	0	23	Everybody	Customer
3-7-5.1.2	Minutes <i>Minutes for daily forced start (check run)</i>	0	0.. 59	0	59	Everybody	Customer
3-7-6	Check run at <i>Weekly forced start (check run): at a defined time on specific days</i>	-	-	-	-	Everybody	Customer
3-7-6.1.1	Hours <i>Weekly forced start (check run): at a defined time (hours) on specific days</i>	-	0.. 23	0	23	Everybody	Customer
3-7-6.1.2	Minutes <i>Weekly forced start (check run): at a defined time (minutes) on specific days</i>	-	0.. 59	0	59	Everybody	Customer
3-7-6.1.3	Day <i>Weekly forced start (check run): at a defined time on a specific day</i>	Sunday	Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday	-	-	Everybody	Customer
3-7-7	Check run duration <i>Specifying the duration of the forced start (check run)</i>	30	0.. 30	0	30	Everybody	Service

Parameter	Description	Factory setting	Possible settings	min. value	max. value	Read access right	Write access right
3-7-9	Date adapt level On <i>The alternative fill level is activated in accordance with day(s)/month(s).</i>	-	-	-	-	Everybody	Customer
3-7-9.1.1	Month adapt level On <i>Entering the month in which the alternative fill level is activated</i>	Off	Off, January, February, March, April, May, June, July, August, September, October, November, December	-	-	Everybody	Customer
3-7-9.1.2	Day adapt level On <i>Entering the weekday on which the alternative fill level is activated.</i>	1	1.. 31	1	31	Everybody	Customer
3-7-10	Date adapt level Off <i>Entering the date on which the alternative fill level is deactivated.</i>	-	-	-	-	Everybody	Customer
3-7-10.1.1	Month adapt lev Off <i>Entering the month in which the alternative fill level is deactivated</i>	Off	Off, January, February, March, April, May, June, July, August, September, October, November, December	-	-	Everybody	Customer
3-7-10.1.2	Day adapt level Off <i>Entering the weekday on which the alternative fill level is deactivated.</i>	1	1.. 31	1	31	Everybody	Customer
3-7-11	Maintenance interval <i>Configuring the maintenance interval for the system in days.</i>	0	0.. 3000	0	3000	Service	Service
3-7-8	Clock adapt setp. <i>Alternative setpoint to take effect based on time</i>	-	-	-	-	Everybody	Nobody

Parameter	Description	Factory setting	Possible settings	min. value	max. value	Read access right	Write access right
3-7-8-1	Adaptation mode <i>Configuring the alternative setpoint to take effect on a daily or weekly basis</i>	Off	Off, Weekly, Daily	-	-	Everybody	Customer
3-7-8-2	Change on/off times <i>The alternative pressure setpoint is activated/deactivated</i>	-	-	-	-	Everybody	Customer
3-7-8-2.1.1	Hours adapt setp.ON <i>Entering the hours when the alternative pressure setpoint is activated</i>	0	0.. 23	0	23	Everybody	Customer
3-7-8-2.1.2	Min adapt setp.ON <i>Entering the minutes when the alternative pressure setpoint is activated</i>	0	0.. 59	0	59	Everybody	Customer
3-7-8-2.1.3	Hours adapt setp.OFF <i>Entering the hours when the alternative pressure setpoint is deactivated</i>	0	0.. 23	0	23	Everybody	Customer
3-7-8-2.1.4	Min adapt setp.OFF <i>Entering the minutes when the alternative pressure setpoint is deactivated</i>	0	0.. 59	0	59	Everybody	Customer
3-7-8-3	Select day of week <i>Entering the weekday on which the alternative pressure setpoint is activated.</i>	Sunday	Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Saturday	-	-	Everybody	Customer
3-7-8-4	Change on/off times <i>Entering the weekday on which the alternative pressure setpoint is deactivated.</i>	-	-	-	-	Everybody	Customer
3-7-8-4.1.1	Hours adapt setp.ON <i>Entering the hours when the alternative pressure setpoint is activated</i>	0	0.. 23	0	23	Everybody	Customer
3-7-8-4.1.2	Min adapt setp.ON <i>Entering the minutes when the alternative pressure setpoint is activated</i>	0	0.. 59	0	59	Everybody	Customer
3-7-8-4.1.3	Hours adapt setp.OFF <i>Entering the hours when the alternative pressure setpoint is deactivated</i>	0	0.. 23	0	23	Everybody	Customer
3-7-8-4.1.4	Min adapt setp.OFF <i>Entering the minutes when the alternative pressure setpoint is deactivated</i>	0	0.. 59	0	59	Everybody	Customer
3-8	Definable I/O <i>Programming inputs/outputs</i>	-	-	-	-	Service	Service
3-8-1	Inputs <i>Inputs</i>	-	-	-	-	Service	Nobody

Parameter	Description	Factory setting	Possible settings	min. value	max. value	Read access right	Write access right
3-8-1-1	Input 1 <i>Configuration of input 1</i>	None	None, forced start (check run), alt. setpoint, leakage, remote acknowledgement, bypass valve, emergency power	-	-	Service	Service
3-8-1-2	Input 2 <i>Configuration of input 2</i>	None	None, forced start (check run), alt. setpoint, leakage, remote acknowledgement, bypass valve, emergency power	-	-	Service	Service
3-8-1-3	Input 3 <i>Configuration of input 3</i>	None	None, forced start (check run), alt. setpoint, leakage, remote acknowledgement, bypass valve, emergency power	-	-	Service	Service
3-8-2	Outputs <i>Outputs</i>	-	-	-	-	Service	Nobody
3-8-2-1	Output 1 (P4) <i>Configuration of output 1</i>	None	None, threshold 1, threshold 2, supply valve, bypass valve, lack of water	-	-	Service	Service
3-8-2-2	Output 2 (P5) <i>Configuration of output 2</i>	None	None, threshold 1, threshold 2, supply valve, bypass valve, lack of water	-	-	Service	Service
3-8-2-3	Output 3 (P6) <i>Configuration of output 3</i>	None	None, threshold 1, threshold 2, supply valve, bypass valve, lack of water	-	-	Service	Service

Parameter	Description	Factory setting	Possible settings	min. value	max. value	Read access right	Write access right
3-8-2-4	Output 4 (FR4) <i>Configuration of output 4</i>	None	None, threshold 1, threshold 2, supply valve, bypass valve, lack of water	-	-	Service	Service
3-8-2-5	Output 5 (FR5) <i>Configuration of output 5</i>	None	None, threshold 1, threshold 2, supply valve, bypass valve, lack of water	-	-	Service	Service
3-8-2-6	Output 6 (FR6) <i>Configuration of output 6</i>	None	None, threshold 1, threshold 2, supply valve, bypass valve, lack of water	-	-	Service	Service
3-9	Messages <i>Messages</i>	-	-	-	-	Service	Nobody
3-9-1	Message Settings <i>List of all alerts</i>	-	-	-	-	Service	Service
3-9-1.1.1	failure id <i>Fault ID</i>	-	(⇒ Section 11.1, Page 78)	-	-	Service	Service
3-9-1.2.1	Traffic Light <i>Assignment of fault as warning or alert</i>	Red	Green, amber, red	-	-	Service	Service
3-9-1.2.2	Fault on Hold <i>Without/with automatic reset (re-start)</i>	Off	Off, On	-	-	Service	Service
3-10	Root menu <i>Configuring the main menu</i>	-	-	-	-	Customer	Nobody
3-10-1.1	Root Menu Settings <i>List of all main menu elements</i>	-	-	-	-	Customer	Everybody
3-10-1.2	Root Menu Settings <i>List of all main menu elements</i>	-	-	-	-	Develop	Develop
3-10-1.2.1	rootmenu selection <i>Root menu selection</i>	1	1.. 65	1	65	Develop	Develop
3-10-1.2.1	Traffic Light <i>Assignment of fault as warning or alert</i>	Off	Off, On	-	-	Develop	Develop
3-11	Energy Saving Mode <i>Energy-saving mode</i>	-	-	-	-	Service	Nobody
3-11-1	Energy Saving Mode <i>Energy-saving mode</i>	Off	Off, On	-	-	Service	Service

Parameter	Description	Factory setting	Possible settings	min. value	max. value	Read access right	Write access right
3-11-2	direct off <i>Energy-saving mode is carried out without zero-flow detection function</i>	Off	Off, On	-	-	Service	Service
3-11-3	Power down speed % <i>Calculated stop speed if zero-flow detection is activated in energy-saving mode (in %).</i>	30	1.. 99	1	99	Service	Service
3-11-4	time direct off <i>Time after which the energy-saving mode is carried out without the zero-flow detection function</i>	5	0.. 9999	0	9999	Service	Service
3-12	FC failure behavior <i>Frequency inverter fault behaviour</i>	-	-	-	-	Everybody	Service
3-12-1	behavior <i>Behaviour</i>	Off	Off, cascade (without frequency inverter)	-	-	Service	Service
3-12-2	Fixed Speed <i>Cascade (without frequency inverter)</i>	-	-	-	-	Service	Nobody
3-12-2-1	Max power <i>Limitation of maximum system power (n x 100 %, n = number of pumps)</i>	300	0.. 600	0	600	Service	Service
3-12-2-2	Set point <i>Entering the pressure setpoint (system pressure)</i>	400	0.. 1000	0	1000	Service	Customer
3-12-2-3	Bandwidth <i>Bandwidth</i>	30	0.. 999	0	999	Service	Customer
3-12-2-4	Min. run time <i>Limit for minimum runtime of pump</i>	30	0.. 999	0	999	Service	Customer
3-12-2-5	Max. run time <i>Maximum pump runtime. After the time has lapsed, the system switches over to the next pump.</i>	86400	0.. 356400	0	356400	Service	Service
3-12-2-6	Start delay <i>Start delay of pumps if pressure remains below setpoint.</i>	2	0.. 999	0	999	Service	Service
3-13	Pump Changeover <i>Pump changeover</i>	-	-	-	-	Everybody	Service
3-13-1	Supply reaction <i>Selection of oversupply/undersupply</i>	Undersupply	Undersupply, oversupply	-	-	Everybody	Service
3-13-2	Changeover delay <i>Time delay between pump changeover</i>	0	0.. 10	0	10	Everybody	Service
3-14	By Pass Valve <i>Bypass valve</i>	-	-	-	-	Everybody	Service

Parameter	Description	Factory setting	Possible settings	min. value	max. value	Read access right	Write access right
3-14-1	Valve Function Activating/deactivating the valve function	Off	Off, forced start (check run), PT 1000, digital input	-	-	Everybody	Service
3-14-2	Open delay <i>Delay time that lapses before valve is opened.</i>	2	0.. 20	0	20	Everybody	Service
3-14-3	Close delay <i>Delay time that lapses before valve is closed.</i>	2	0.. 20	0	20	Everybody	Service
3-14-4	Temperature <i>Temperature above which the valve is opened</i>	20	0.. 40	0	40	Everybody	Service
3-14-5	Flush Time <i>Time window in which the valve is opened</i>	120	10.. 600	10	600	Everybody	Service
3-14-6	Attempts in 24Hrs <i>Valve opening frequency before an alert is displayed</i>	2	1.. 5	1	5	Everybody	Service
3-14-7	Min. open time <i>Minimum opening time of valve</i>	2	0.. 20	0	20	Everybody	Service
3-15	Fieldbus <i>Field bus settings</i>	-	-	-	-	Customer	Nobody
3-15-1	Profibus <i>Profibus settings</i>	-	-	-	-	Customer	Nobody
3-15-1-1	PB Slave Address <i>Profibus slave address</i>	126	1.. 255	1	255	Customer	Customer
3-15-2	Modbus <i>Modbus settings</i>	-	-	-	-	Customer	Nobody
3-15-2-1	MB Slave Address <i>Modbus slave address</i>	247	1.. 247	1	247	Customer	Customer
3-15-2-2	Baudrate <i>Baud rate</i>	192	9600,192	-	-	Customer	Customer
4	Info <i>Information</i>	-	-	-	-	Everybody	Nobody
4-1	Device <i>Control module (CM)</i>	-	-	-	-	Everybody	Nobody
4-1-1	Serial Number <i>Serial number of control module</i>	-	-	-	-	Everybody	Nobody
4-1-2	Parameter Set <i>Version of the control panel parameter set</i>	0	-	-	-	Everybody	Everybody

Parameter	Description	Factory setting	Possible settings	min. value	max. value	Read access right	Write access right
4-2	IO Info <i>IO Info</i> IO information for internal communications unit	-	-	-	-	Everybody	Nobody
4-2-1	IO Serial Number <i>IO Serial Number</i> IO information for serial number of internal communications unit	-	-	-	-	Everybody	Nobody
4-2-2	IO FW-Version <i>IO FW Version</i> IO information for firmware of internal communications unit	-	-	-	-	Everybody	Nobody
4-2-3	IO FW-Revision <i>IO FW Revision</i> IO information for revision of internal communications unit	-	-	-	-	Everybody	Nobody
4-2-4	IO HW-Revision <i>IO HW Revision</i> IO information for hardware of internal communications unit	-	-	-	-	Everybody	Nobody
4-3	HMI Info <i>HMI Info</i> IO information for HMI	-	-	-	-	Everybody	Everybody
4-3-1	HMI Serial Number <i>HMI Serial Number</i> IO information for serial number of HMI	-	-	-	-	Everybody	Nobody
4-3-2	HMI FW-Version <i>HMI FW Version</i> IO information for firmware of HMI	-	-	-	-	Everybody	Nobody
4-3-3	HMI FW-Revision <i>HMI FW Revision</i> IO information for revision of HMI	-	-	-	-	Everybody	Nobody
4-3-4	HMI HW-Revision <i>HMI HW Revision</i> IO information for hardware of HMI	-	-	-	-	Everybody	Nobody
4-4	Profibus Info <i>Profibus Info</i> Information for Profibus used	-	-	-	-	Everybody	Everybody
4-4-1	PB FW-Version <i>PB FW Version</i> Information for firmware of Profibus	-	-	-	-	Everybody	Nobody
4-4-2	PB FW-Revision <i>PB FW Revision</i> Information for firmware of Profibus	-	-	-	-	Everybody	Nobody

Parameter	Description	Factory setting	Possible settings	min. value	max. value	Read access right	Write access right
4-4-3	PB HW-Revision <i>PB HW Revision</i> Information for hardware of Profibus	-	-	-	-	Everybody	Nobody
4-5	Modbus Info <i>Modbus Info</i> Information for Modbus used	-	-	-	-	Everybody	Everybody
4-5-1	MB FW-Version <i>MB FW Version</i> Information for firmware of Modbus	-	-	-	-	Everybody	Nobody
4-5-2	MB FW-Revision <i>MB FW Revision</i> Information for revision of Modbus	-	-	-	-	Everybody	Nobody
4-5-3	MB HW-Revision <i>MB HW Revision</i> Information for hardware of Modbus	-	-	-	-	Everybody	Nobody
5	Quickmenu <i>Quick Menu</i> Information for quick menu	-	-	-	-	Everybody	Nobody

11 Trouble-shooting

11.1 Fault messages

Table 58: Overview of fault messages

Fault message	Description	Type of message	
		Warning	Alert
Failure PT. Dis.	Fault, pressure-side pressure sensor	-	X
Sys. press.to low	System pressure below minimum pressure	-	X
Sys press.to high	System pressure above maximum pressure	-	X
No water	Insufficient water or insufficient inlet pressure on suction side	-	X
Maintenance req.	Service interval exceeded	X	-
More pumps fail	Multiple pump faults	-	X
No refresh tank 1	Insufficient water replacement, tank 1	-	X
No refresh tank 2	Insufficient water replacement, tank 2	-	X
No refresh tank 3	Insufficient water replacement, tank 3	-	X
Aver temp to high	Average temperature of water flow detection too high	-	X
Curr temp to high	Current temperature of water flow detection too high	X	-
Temp. Fail. Pump 1	Fault (temperature, motor protection switch, etc.), pump 1	X	-
Temp. Fail. Pump 2	Fault (temperature, motor protection switch, etc.), pump 2	X	-
Temp. Fail. Pump 3	Fault (temperature, motor protection switch, etc.), pump 3	X	-
Temp. Fail. Pump 4	Fault (temperature, motor protection switch, etc.), pump 4	X	-
Temp. Fail. Pump 5	Fault (temperature, motor protection switch, etc.), pump 5	X	-
Temp. Fail. Pump 6	Fault (temperature, motor protection switch, etc.), pump 6	X	-
Failure valve	Fault, suction-side valve	X	-
Inlet sensor fail	Fault, suction-side pressure or level sensor	X	-
High water level	Water level in inlet tank too high	-	X
Crit. water level	Water level in inlet tank too low	X	-
Low water level	Water level in inlet tank low (lack of water)	-	X
Comm. Error FC 1	Communication not possible, frequency inverter 1	X	-
Comm. Error FC 2	Communication not possible, frequency inverter 2	X	-
Comm. Error FC 3	Communication not possible, frequency inverter 3	X	-
Comm. Error FC 4	Communication not possible, frequency inverter 4	X	-
Comm. Error FC 5	Communication not possible, frequency inverter 5	X	-
Comm. Error FC 6	Communication not possible, frequency inverter 6	X	-
incor. check sum F1	Communication fault, frequency inverter 1	X	-
incor. check sum F2	Communication fault, frequency inverter 2	X	-
incor. check sum F3	Communication fault, frequency inverter 3	X	-
incor. check sum F4	Communication fault, frequency inverter 4	X	-
incor. check sum F5	Communication fault, frequency inverter 5	X	-
incor. check sum F6	Communication fault, frequency inverter 6	X	-
Temp. sensor fail	Fault, temperature sensor of water flow detection	X	-
24V out of range	Internal 24 V voltage outside permissible range	X	-
5V out of range	Internal 5 V voltage outside permissible range	X	-
3V out of range	Internal 3 V voltage outside permissible range	X	-
External off	External command for system stop active	X	-

Fault message	Description	Type of message	
		Warning	Alert
Fire alarm	External fire alert command for starting all pumps active	-	X
Failure VFD	Fault, frequency inverter	-	X
Br. Wire Sens.dis	Fault, pressure-side pressure sensor	-	X
Br. Wire Sens.Inl	Fault, suction-side pressure sensor	-	X
Fail. several FCs	Fault, several frequency inverters	-	X
Leakage	Leak detected	-	X
Eeprom HW Error	EEPROM data not saved due to hardware problems	-	X
Manual off Pump 1	Pump 1 switched off (independent of automatic mode)	X	-
Manual off Pump 2	Pump 2 switched off (independent of automatic mode)	X	-
Manual off Pump 3	Pump 3 switched off (independent of automatic mode)	X	-
Manual off Pump 4	Pump 4 switched off (independent of automatic mode)	X	-
Manual off Pump 5	Pump 5 switched off (independent of automatic mode)	X	-
Manual off Pump 6	Pump 6 switched off (independent of automatic mode)	X	-
Manual On Pump 1	Pump 1 in manual mode (independent of automatic mode)	X	-
Manual On Pump 2	Pump 2 in manual mode (independent of automatic mode)	X	-
Manual On Pump 3	Pump 3 in manual mode (independent of automatic mode)	X	-
Manual On Pump 4	Pump 4 in manual mode (independent of automatic mode)	X	-
Manual On Pump 5	Pump 5 in manual mode (independent of automatic mode)	X	-
Manual On Pump 6	Pump 6 in manual mode (independent of automatic mode)	X	-
More Pumps off	Several pumps switched off (independent of automatic mode)	X	-
Internal Failure P1	Internal fault, frequency inverter 1	X	-
Internal Failure P2	Internal fault, frequency inverter 2	X	-
Internal Failure P3	Internal fault, frequency inverter 3	X	-
Internal Failure P4	Internal fault, frequency inverter 4	X	-
Internal Failure P5	Internal fault, frequency inverter 5	X	-
Internal Failure P6	Internal fault, frequency inverter 6	X	-
Mains Failure P1	Power supply fault, frequency inverter 1	X	-
Mains Failure P2	Power supply fault, frequency inverter 2	X	-
Mains Failure P3	Power supply fault, frequency inverter 3	X	-
Mains Failure P4	Power supply fault, frequency inverter 4	X	-
Mains Failure P5	Power supply fault, frequency inverter 5	X	-
Mains Failure P6	Power supply fault, frequency inverter 6	X	-
Over voltage P1	DC link voltage too high, frequency inverter 1	X	-
Over voltage P2	DC link voltage too high, frequency inverter 2	X	-
Over voltage P3	DC link voltage too high, frequency inverter 3	X	-
Over voltage P4	DC link voltage too high, frequency inverter 4	X	-
Over voltage P5	DC link voltage too high, frequency inverter 5	X	-
Over voltage P6	DC link voltage too high, frequency inverter 6	X	-
Under voltage P1	DC link voltage too low, frequency inverter 1	X	-

Fault message	Description	Type of message	
		Warning	Alert
Under voltage P2	DC link voltage too low, frequency inverter 2	X	-
Under voltage P3	DC link voltage too low, frequency inverter 3	X	-
Under voltage P4	DC link voltage too low, frequency inverter 4	X	-
Over voltage P5	DC link voltage too low, frequency inverter 5	X	-
Over voltage P6	DC link voltage too low, frequency inverter 6	X	-
Overload Failure P1	Overload, frequency inverter 1	X	-
Overload Failure P2	Overload, frequency inverter 2	X	-
Overload Failure P3	Overload, frequency inverter 3	X	-
Overload Failure P4	Overload, frequency inverter 4	X	-
Overload Failure P5	Overload, frequency inverter 5	X	-
Overload Failure P6	Overload, frequency inverter 6	X	-
Brake resistor P1	Braking resistor fault, frequency inverter 1	X	-
Brake resistor P4	Braking resistor fault, frequency inverter 2	X	-
Brake resistor P3	Braking resistor fault, frequency inverter 3	X	-
Brake resistor P4	Braking resistor fault, frequency inverter 4	X	-
Brake resistor P5	Braking resistor fault, frequency inverter 5	X	-
Brake resistor P6	Braking resistor fault, frequency inverter 6	X	-
Temp. Failure P1	Temperature too high, frequency inverter 1	X	-
Temp. Failure P2	Temperature too high, frequency inverter 2	X	-
Temp. Failure P3	Temperature too high, frequency inverter 3	X	-
Temp. Failure P4	Temperature too high, frequency inverter 4	X	-
Temp. Failure P5	Temperature too high, frequency inverter 5	X	-
Temp. Failure P6	Temperature too high, frequency inverter 6	X	-
ATM Failure P1	Automatic motor adaptation fault, frequency inverter 1	X	-
ATM Failure P2	Automatic motor adaptation fault, frequency inverter 2	X	-
ATM Failure P3	Automatic motor adaptation fault, frequency inverter 3	X	-
ATM Failure P4	Automatic motor adaptation fault, frequency inverter 4	X	-
ATM Failure P5	Automatic motor adaptation fault, frequency inverter 5	X	-
ATM Failure P6	Automatic motor adaptation fault, frequency inverter 6	X	-
Flushing	Flushing procedure active	X	-
Valve opened oftenly	Several flushing procedures carried out	X	-
Circuit Fail. FC1	Short circuit/earth fault, frequency inverter 1	X	-
Circuit Fail. FC2	Short circuit/earth fault, frequency inverter 2	X	-
Circuit Fail. FC3	Short circuit/earth fault, frequency inverter 3	X	-
Circuit Fail. FC4	Short circuit/earth fault, frequency inverter 4	X	-
Circuit Fail. FC5	Short circuit/earth fault, frequency inverter 5	X	-
Circuit Fail. FC6	Short circuit/earth fault, frequency inverter 6	X	-
Ext. Power Operation	Emergency power mode active; maximum system load limited	X	-
Setpoint Reduction	Setpoint reduced due to drop in inlet pressure	X	-
Factory Test	No test carried out in factory	-	X
MPO Failure	Fault in VP mode, synchronous operation	X	-
ASR Shutdown	Cancellation of automatic setpoint reduction	-	X

12 Related documents

12.1 Checklist for commissioning and inspection

Table 59: 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: **KSB SE & Co. KGaA**
Johann-Klein-Straße 9
67227 Frankenthal (Germany)

The manufacturer herewith declares that the product:

BoosterControl Advanced

- is in conformity with the provisions of the following Directives as amended from time to time:
 - Electromagnetic Compatibility Directive 2014/30/EU
 - Low-voltage Directive 2014/35/EU

The manufacturer also declares that:

- The following harmonised international standards have been applied:
 - EN 61000-6-1, EN 61000-6-3, EN 61000-6-4

The EU Declaration of Conformity was issued in/on:

Frankenthal, 1 February 2018



Joachim Schullerer
Head of Product Development Pump Systems and Drives
KSB SE & Co. KGaA
Johann-Klein-Straße 9
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