DID

Installation and operating instructions

be
think
innovate

GRUNDFOS

Original installation and operating instructions

These installation and operating instructions describe Grundfos DID (Dosing Instrumentation Digital).

Sections 1-6 give the information necessary to be able to unpack, install and start up the product in a safe way.

Sections 7-13 give important information about the product, as well as information on service, fault finding and disposal of the product.

CONTENTS

Read this document before installing the product. Installation and operation must comply with local regulations and accepted codes of good practice.

1. General information

1.1 Target group

1.1.1 Qualification and training

The persons responsible for installation, startup and service must be appropriately qualified for these tasks.

If the persons do not have the necessary knowledge, training and instruction must be given. If necessary, training can be performed by the manufacturer or supplier on request.

1.1.2 Obligations of the operating company

- Observe the local safety regulations.
- Instruct the operating persons.
- Provide the stipulated safety equipment and personal protective equipment.
- Arrange regular maintenance.

1.1.3 Obligations of the user

- Read this manual thoroughly before taking the product into operation.
- Observe the recognised health and safety regulations as well as the accident prevention regulations.
- Wear protective equipment in accordance with national health and safety regulations when working on the system and handling chemicals.

1.2 Symbols used in this document

DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious personal injury.

WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious personal injury.

CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate personal injury.

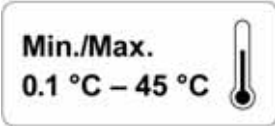If these instructions are not observed, it may result in malfunction or damage to the equipment.
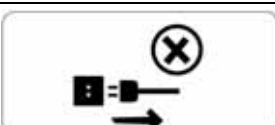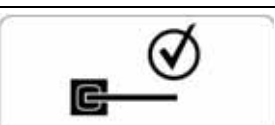
Tips and advice that make the work easier.

1.3 Symbols on the product

Label	Description
	In case of problems, call the Grundfos Service Hotline. Scanning the QR code forwards you to the Grundfos support site.
	For more information: Scanning the QR code forwards you to the Grundfos Product Center.
Min./Max. 0.1 °C – 45 °C	Operating temperature: 0.1 °C to 45 °C
	Protect from freezing.
	Protect from direct sunlight.
	Read the installation and operating instructions before installing and operating the DID.
	Avoid drying-out of the sensors.
	The sensors must always be immersed in water.
	Avoid siphon effect.
	Use a vented outlet or a pressure-loading valve.
	Avoid power loss of the sensors that are equipped with electrolyte and membrane cap.
	Sensors equipped with electrolyte and membrane cap must remain powered.

Label	Description
Max. 0.5 bar	The maximum pressure permitted inside the flow cell is 0.5 bar. The inlet pressure is limited by the flow restrictor. The operator must make sure that no counterpressure is on the outlet.
~10 ml 3-4	Before taking a sample for calibration, flush the sampling point 3-4 times with approximately 10 ml each time.
Max. 3 bar Min. 0.5 l/min	Maximum inlet pressure: 3 bar Minimum flow rate: 0.5 litres per minute

2. Safety instructions

WARNING
Electric shock
- Switch off the power supply before connecting the power supply cable and relay contacts.
- Do not dismantle the control unit.
- Installation and connection of the device and the associated supplementary components must only be carried out by qualified persons.
- Maintenance and repair must only be carried out by qualified persons.
- Observe the local safety regulations.

WARNING
Toxic material
- Parts of the DID can be contaminated with dangerous chemicals or pathogenic germs.
- If the DID has been in contact with dangerous chemicals or pathogenic germs, wear protective clothing and take all necessary precautions to prevent endangering your health when installing or dismantling the DID.

Modification of the DID is strictly prohibited.

3. Receiving the product

3.1 Inspecting the product
- Check the received consignment for completeness.
- Check the DID for damage.
- Install as soon as possible after unpacking.
- Do not install or connect damaged products.

3.2 Transporting the product
- Before transporting the DID, empty all pipes, hoses and flow cells, remove the sensors and pack them separately.
- Observe the permissible ambient conditions. See section *12. Technical data*.
- Transport the DID carefully, do not drop. Do not expose the DID to strong impact, mechanical loads or vibrations.
- Keep the DID away from corrosive substances, vapours of organic solvents, nuclear radiation and strong electromagnetic radiation.
- Use the original packaging or equivalent to protect the DID during transport.

4. Installation

WARNING

Electric shock
- Switch off the power supply before installation.
- IP65 only applies, if the housing cover and the terminal compartment of the CU 382 are properly closed, and the appropriate cable glands or dummy caps are fitted.
- Installation must be carried out by qualified and authorised persons.

See also the manual "Sensors" supplied with the sensor. Find the manual "Sensors for DID" on Grundfos Product Center: (http://net.grundfos.com/Appl/ccmsservices/public/literature/filedata/Grundfosliterature-6119622.pdf).

4.1 Installation location

Correct installation is important for proper functioning of the DID.
- Make the DID easily accessible for all tasks.
- Provide sufficient space for all components of the DID.
- Avoid external interferences, such as electric and electro-magnetic interferences by leakage current, earth fault of pumps, electric motors, high voltage currents.
- Protect the DID from direct sunlight and rain.
- Provide a reliable power supply for the control unit.

See also section *12. Technical data*.

4.2 Installation of the DID

DID with flow cell

All parts of the DID with flow cell are assembled on a backplate with pre-drilled holes for quick and easy installation.
- Use spacers (min. 10 mm) for installation of the DID with flow cell on a flat wall.

See also sections *8. Product introduction* and *12.4 Dimensions*.

DID with sensor for tank immersion

The CU 382 control unit of the DID with sensor for tank immersion can be mounted directly on a wall. See also sections *8. Product introduction* and *12.4 Dimensions*.

4.3 Hydraulic connection

See also the labels on the backplate as well as the section *12. Technical data*.

The maximum flow through the flow cell of the DID is limited by the integrated flow restrictor.

Use a vented outlet or a pressure-loading valve to avoid siphon effect. Do not install a shut-off valve in the outlet line.

4.3.1 Installing the measuring water inlet and outlet

1. Remove the blind plugs from the inlet thread and the outlet thread of the flow cell.

Fig. 1 Blind plug

2. Connect the Rp 1/2" hose adaptor fittings to the inlet and the outlet.
   – The Rp 1/2" hose adaptor fittings are included in the standard delivery of the DID.
3. Assemble the inlet and the outlet hose as follows:
   – Push union nut and tensioning ring across the hose.
   – Push the cone part fully into the hose, see fig. 2.
   – Attach the cone part with hose to the adaptor fitting.
   – Tighten the union nut manually. Do not use tools.
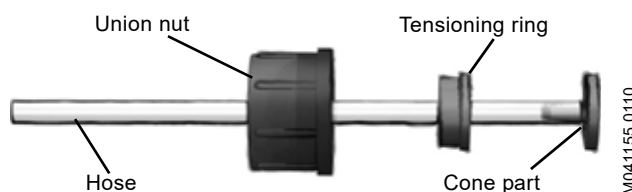
Fig. 2 Connecting the inlet hose

Avoid high loads caused by long or heavy hoses hanging from the outlet port of the flow cell. A strain-relief for the outlet hoses may be required.

4.4 Installing the sensors

All sensors used in the DID are packed separately to avoid damage. They have to be prepared before installation according to the "Installation" section in the manual "Sensors" supplied with the sensor.
- For installation of the sensors in the flow cell, see the manual "Sensors" supplied with the sensors.
- As soon as the sensors are ready for operation, they must be wetted.
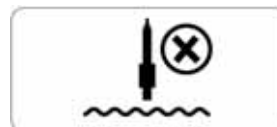
- Sensors equipped with electrolyte and membrane cap must remain powered.

4.5 Checking the tightness

1. Carefully open the inlet valve and check for any leakage of the flow cell assembly.
2. Check if any air bubbles are visible within the hose.
3. Purge the bubbles out by temporary increase of the flow.

5. Starting up the product

5.1 Initial startup

WARNING

Electric shock

- Switch off the power supply before startup.
- IP65 only applies, if the housing cover and the terminal compartment of the CU 382 are properly closed, and the appropriate cable glands or dummy caps are fitted.
- Initial startup must be carried out by qualified and authorised persons.

1. Connect all sensors to the CU 382 control unit. See also section *6.2 Connecting the sensors to the CU 382 control unit*.

2. Slowly open the inlet valve.

3. Check the hydraulic system of the DID for leakages.

6. Electrical connection

6.1 Terminal connection

WARNING

Electric shock

- Switch off the power supply of the DID and all devices you plan to connect before terminal connection.
- Terminal connection must be carried out by qualified and authorised persons.

6.1.1 Connecting the terminals

1. Remove the two cross-head screws on the terminal compartment of the CU 382 control unit.

2. Open the terminal compartment.

3. Connect the terminals according to the terminal connection plan.

Fig. 3 Terminal connection plan

Description and use of the terminals

Terminal	Description	Use
1	Phase	Power supply (100-240 V, 50-60 Hz)
2	Neutral	
3	PE	
4	PE	
5-8	Unused, can be used to connect S::CAN sensors	
9	12 V output	Cleaning valve control
10	Cleaning valve output (provides power for the valve +12 V)	
11	GND, for cleaning valve and external trigger	
12	External trigger for cleaning valve	
13	4-20 mA output #1 (+)	Analog outputs
14	4-20 mA output #1 (-)	
15	Shield connections (optional)	
16		
17	4-20 mA-output #2 (+)	
18	4-20 mA-output #2 (-)	
19	Shield connections (optional)	
20		
21	4-20 mA-output #3 (+)	
22	4-20 mA-output #3 (-)	
23	Power supply for 4-20 mA input (only for passive sources)	Analog input
24	4-20 mA-input #1 (-)	
25	4-20 mA-input #1 (+)	
26	Shield connection (optional)	
27	Digital input #1 (+), relay to switch on/off or as pulse source	Digital inputs
28	Digital input #1 (-)	
29	Digital input #2 (+), relay to switch on/off or as pulse source	
30	Digital input #2 (-)	
31	Flow #1, flow switch of bypass flow cell, pre-wired in BF1/BF3	Flow cell - flow switch
32	Flow #1, flow switch of bypass flow cell, pre-wired in BF1/BF3	
33	RS485 A-	Modbus to upper controls (CU 382 is slave)
34	RS485 B+	
35	RS485 GND	
36	RS485 shield	
37-46	Unused, for later add-ons	
47	Relay 1-NO, switches on/off or provides pulse frequency	Digital output (with relays)
48	Relay 1-C, common connector	
49	Relay 2-NO, switches on/off or provides pulse frequency	
50	Relay 2-C, common connector	
51	Error relay NO Relay closes on alarm	Error relay
52	Error relay C, common connector	
53	Error relay NC Relay opens on alarm	
54	Error relay C, common connector, duplication of 52	

TM065958 0316

5

6.2 Connecting the sensors to the CU 382 control unit

All sensors for the DID have plugs.

Sensors for immersion have fixed cables with plugs.

1. Make sure that the sensor plug and the socket of the CU 382 control unit are dry and clean.
   – Otherwise communication errors may occur and the DID might be damaged.
2. Connect the sensor to a compatible socket on the CU 382 control unit using the connection cable provided.
3. Cover the connectors that are not used with protective caps.

6.3 Connecting the valve for automatic cleaning

Only DID with sensor for tank immersion with valve for automatic cleaning:

• Connect the valve to terminals 10 ("Valve", "12 VDC") and 11 (GND). See fig. 3.
• If an external cleaning signal is used, connect the signal line to terminal 12 ("Clean In", minimum 5 V).

6.4 Connecting further inputs and outputs

Observe the supplier manuals when connecting actuator devices, such as dosing pumps or regulators.

6.5 Connecting the CU 382 to the power supply

WARNING

Electric shock

- Switch off the power supply before connecting the CU 382 control unit.
- IP65 only applies, if the housing cover and the terminal compartment of the CU 382 are properly closed, and the appropriate cable glands or dummy caps are fitted.
- Electrical connection must be carried out by qualified and authorised persons.

• Install an earth leakage circuit breaker for the power supply.
• If the installation is in an area prone to lightning strikes, install surge protection.
• Use an AC power supply with an earthed conductor wire.
   – PE: protective earth
• Connect the process medium (e.g. waste water) to the same earth ground with less than 0.5 Ohm.

6.6 Start-up of the operating software

If the CU 382 control unit is connected to the power supply, it starts up and shows the s::can logo for 5 seconds. At first start-up or if the internal settings have been reset to default, the CU 382 control unit starts with the selection of the language. See also section 9.4.7 Select language....

After this, the parameter screen is shown and the most recent information is displayed.

6.7 Sensor initialisation

Every sensor that is connected to the CU 382 control unit must be installed and initiated individually. This can be done using the software-supported initialisation process.

• Connect only the sensor you want to initialise to the CU 382.
   – An individual address is allocated to the initialised sensor.

If no sensor was connected before, the CU 382 jumps into the "Add s::can Sensor..." menu to check for connected sensors, right after setting the language.

7. Storing and handling the product

• Before storing the DID, empty all pipes, hoses and flow cells, remove the sensors and pack them separately.
• Observe the permissible ambient conditions. See section 12. Technical data.
• Do not expose the DID to strong impact, mechanical loads or vibrations.
• Keep the DID away from corrosive substances, vapours of organic solvents, nuclear radiation and strong electromagnetic radiation.
• Use the original packaging or equivalent to protect the DID during storage.

8. Product introduction

8.1 Product description
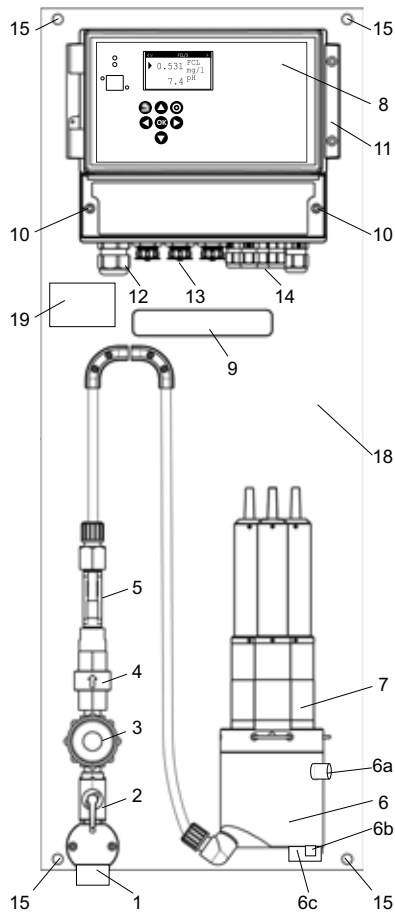
Fig. 4   Components of DID with flow cell
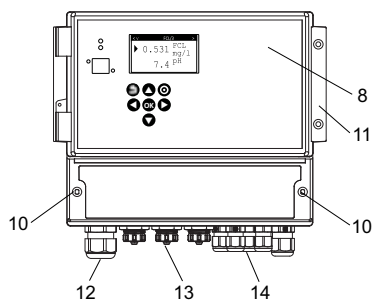
Fig. 5   Components of DID with immersed sensor

TM068088 3416

TM068089 3416

Pos.	Description
1	Water inlet, G 1/2 internal thread, connections for Grundfos hoses
2	Ball valve, 1/4 NPT
3	Inlet strainer, with screw cap for removal and cleaning of the sieve
4	Flow restrictor, mechanical
5	Flow detector, digital
6	Flow cell for 1 or 3 sensors
6a	Sampling valve
6b	Sampling point
6c	Water outlet, G 1/2 internal thread, connections for Grundfos hoses
7	Sensors
8	CU 382 control unit
9	Opening for power supply and sensor cables
10	Screws for the terminal compartment
11	Latch of CU 382 cover
12	Cable gland for power supply
13	Connectors for s::can sensors
14	Cable gland for signal outputs
15	Holes for wall mounting
16	Sensor holder
17	Sensor guard
18	Backplate
19	Nameplate
20	Transparent hose for sample water

8.2 Intended use

The DID is designed for online monitoring of water quality parameters and offers control functions for these parameters.

The DID must be used in accordance with the instructions given in this manual. The values mentioned in this manual must be observed.

8.3 Functional principle

The CU 382 control unit has a display and 7 operating buttons on the front. The operating software starts automatically when the CU 382 is powered-on.

The CU 382 control unit collects and displays readings from all sensors via a digital bus connection. The CU 382 control unit includes a PID (Proportional-Integral-Derivative) controller. With the PID controller and dosing units, a closed control loop can be set up.

The hydraulic part of the DID manages the complete water flow from the inlet to the outlet. This includes filtration, pressure reduction, flow restriction and flow control. The DID comprises specifically designed flow cells for mounting of the sensors and appropriate sampling.

8.4 Identification

8.4.1 Nameplate

Fig. 6 Nameplate on the CU 382 control unit

Pos.	Description
1	Manufacturer and country of origin
2	s::can product name
3	Number of sensors
4	Bar code
5	Serial number (S/N)
6	Enclosure class
7	Certification marks
8	QR code
9	Type
10	Voltage [V]
11	Frequency [Hz]
12	Power consumption [W]
13	Humidity limits
14	Temperature limits
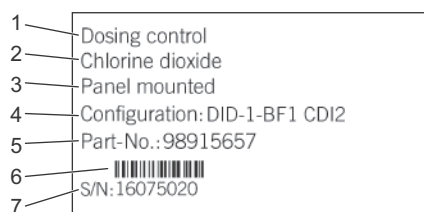
Fig. 7 Nameplate on the DID

Pos.	Description
1	s::can product name
2	Parameter
3	Mounting type
4	Type
5	Part number
6	Bar code
7	Serial number (S/N)

8.4.2 Type key

Example: DID-3 BF3-FCL2/TCL2/pH

	Code	Description
CU 382 control unit variant	DID-1	CU 382-1 for 1 parameter + temperature, 100-240 VAC, 50-60 Hz
	DID-3	CU 382-3 for 3 parameters + temperature, 100-240 VAC, 50-60 Hz
Installation variant	BF1	Bypass flow cell, 1 sensor
	BF3	Bypass flow cell, 3 sensors
	BT4	Bypass flow cell, 1 optical sensor and 3 additional sensors
	TI1	Tank immersion, 1 sensor
	TI2	Tank immersion, 2 sensors
Parameters / Sensors	FCL2	Free chlorine 0-2 ppm
	FCL20	Free chlorine 0-20 ppm
	TCL2	Total chlorine 0-2 ppm
	TCL20	Total chlorine 0-20 ppm
	CDI2	Chlorine dioxide 0-2 ppm
	CDI20	Chlorine dioxide 0-20 ppm
	HP2	Hydrogen peroxide 0-200 ppm
	HP20	Hydrogen peroxide 0-2000 ppm
	PA2	Peracetic acid 0-200 ppm
	PA20	Peracetic acid 0-2000 ppm
	pH	pH 2-12 pH, up to 10 bar, 70 °C
	ORP	ORP, -2000 mV to +2000 mV, up to 10 bar, 70 °C
	CND	Conductivity, 1-500000 µS/cm (2-42 PSU), up to 20 bar, 70 °C
	TURB	Turbidity in drinking water, 0-800 FTU/NTU
	TURB/ORG	Turbidity in drinking water, 0-800 FTU/NTU, total or dissolved organic content TOCeq / DOCeq 0.1- 25mg/l and UV254 0-70 Abs/m

Remarks:
- All sensors include temperature measurement
- Measurement of disinfectant parameters (FCL,TCL, CDI, HP or PA) is only possible with BF1 or BF3 installation variant
- BF1, BF3 and BT4 installation variants include flow detection
- BF1, BF3 and BT4 installation variants include 1.0 m sensor cable
- TI1 and TI2 installation variants are only possible for parameters pH, ORP or CND
- TI1 and TI2 installation variants include 7.5 m sensor cable
- Power cable is not included, please select it from the accessories list and order separately

9. Operation

9.1 Operating elements

Fig. 8 CU 382 operating elements

Pos.	Description
1	Power LED, green
2	Communication LED, orange • Flashes during communication with a sensor
3	USB slot
4	Display screen
5	Operating buttons

	[Back] button • Exits the current menu
	[Up] button • Moves the marker to the line above – The first character of the selected line is a triangle • Increases values
	[Function] button • Enters the setup menus • Disables or deletes values
	[Left] button • Moves the marker to the left
	[OK] button • Enters the selected menu • Confirms the selected line or value • Acknowledges alarms
	[Right] button • Moves the marker to the right
	[Down] button • Moves the marker to the line below – The first character of the selected line is a triangle • Decreases values

9.2 Display screen
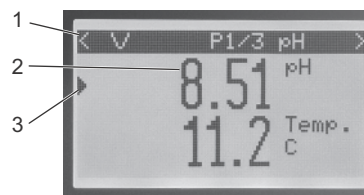
Fig. 9 CU 382 display screen

Pos.	Description
1	Top menu bar
	Symbols in the top menu bar of the display screen:
	[Right] symbol • If this symbol is shown, you can navigate to the next menu with the [Right] button.
	[Left] symbol • If this symbol is shown, you can navigate to the previous menu with the [Left] button.
	[Down] symbol • If this symbol is shown, you can navigate inside the selected menu with the [Down] button.
	[Up] symbol • If this symbol is shown, you can navigate inside the selected menu with the [Up] button.
	Sensor symbol • If this symbol is shown, a parameter or calibration error occurred, or a sensor is missing. For details, navigate through the parameters in the parameter menu.
2	**Parameter name and unit** • If a parameter name and symbol appears inverted and flashes, an error occurred and the error relay is activated.
3	► Marker showing the relevant line

9.3 Software overview

The CU 382 has different screens and menus, which can be selected by the [Right] and [Left] buttons. The default screen is the parameter screen.

When pressing the [Back] button several times in a submenu, you come back to one of the following screens:

Service	Status	Parameter	Controller

Service...	**Status**	**P1/3 pH**	**C2/2**
Timeout [min]:	Version : Vx.xx	pH	
Outputs:	Serial:	► 9.49	► 15 %
► Enter service mode	Waiting 1 s	Temp	pH >4-20mA #2
	YYYY/MMM/DD HH:NN:SS	22.1 C	AV/SP: 6.86/7.00 (ext.)

Service
- ► Trigger measurement
- Trigger cleaning
- Leave service mode

General setup
- ► Manage sensors...
- Cleaning 1...
- Cleaning 2...
- Meas. settings...
- Date/Time...
- MODBUS slave...
- Update software...
- Select language...
- Service...
- License...

Parameter setup
- ► Calibrate expert...
- Monitor...
- Display settings...
- Alarm settings...
- Output:
- Output settings...
- pH compensation...
- Parameter info...
- Move up
- Move down
- Remove parameter

Controller setup
- ► Setpoint...
- Settings... PID/2-P
- Source:
- Output:
- Output settings...
- Alarm sources...
- Reset state

Alarm		USB Data transfer

AP001 A1/1	**USB data transfer**
YYYY/MMM/DD HH:NN:SS	► Copy results
pHbelow	Delete results
lower alarm limit	Copy log/cfg
	Delete log/cfg
	Update software...
	Copy license
	Config backup
	Config restore

► Acknowledgment of alarms

9.3.1 Service screen

The service menu is not required for the applications described in this manual.

Service	
Timeout [min]:	20
Outputs:	update
Enter service mode	

Timeout [min]:	After an adjusted time of inactivity, the controller leaves the service mode automatically.
Outputs:	The output behaviour can be controlled manually
Enter service mode	Enter the service mode
Leave service mode	Leave the service mode

9.3.2 Status screen

Status	
Version :	V7.11.B1
Serial:	12345678
Waiting	1 s
2020/Sep/05	16:40:21

Version :	Software version
Serial:	Serial number of the CU 382
Waiting	Waiting time until the next action (start of measurement or start of cleaning) starts. The waiting time can be set in the Meas. settings menu.
2020/Sep/05 16:40:21	Current date and time (YYYY/MMM/DD HH:NN:SS)

9.3.3 Parameter screen

Up to 8 parameters can be configured and displayed in the parameter screen, for example:

- Sensor reading
- Analog input
- Digital input
- Flow guard

Scroll through the list of configured parameters with the [Up] and [Down] buttons.

P1/3 FCL	
► 0.531	FCL mg/l
7.8	pH

"FCL"	Parameter name
"mg/l"	Parameter unit
"pH"	Parameter name

Calibration

"Span" calibration and "Offset" calibration can be started directly from the parameter screen. For the calibration procedures, see *9.5.1 Calibrate expert...*.

9.3.4 Controller screen

Up to 3 controllers can be configured and displayed.

Scroll through the list of controllers with the [Up] and [Down] buttons.

C2/2 pH	
► 15 %	
pH	>4-20mA #2
AV/SP:	6.86/7.00

C2	Controller 2
15 %	Output of the controller in %

Controller status:

►	• Running: the controller is running and dosing is activated.
► M	• Running: the controller is running with manual setting.
■	• Stopped: the controller is stopped and no dosing takes place.
II	• Hold: the controller is paused and no dosing takes place.

pH	Input parameter • Input options: sensor reading, analog input, digital input
>4-20mA #2	Controller output • Output options: analog outputs (4-20 mA), digital outputs (PULSE or PWM)
AV/SP	"AV" is the actual value (input parameter reading) "SP" is the setpoint (desired value of the input parameter reading)

Adjusting the output manually

1. Press [OK].
2. Select a value with the [Up] and [Down] buttons.
3. Confirm with [OK].
   – The controller type changes to "**M**".mode.
4. Press [OK] again to go back.
5. Press the [Function] button to clear the output value.
   – The value changes to "---".
6. Press [OK] to set the controller back to "2-P" or "PID".

Restarting the controller from "M" mode

1. Press [OK].
2. Press the [Function] button to clear the output value.
   – The value changes to "---".
3. Press [OK] again.

Resetting the controller

1. Press [OK].
2. Press the [Function] button to clear the output value.
   – The value changes to "---".

9.3.5 Alarm screen

```
┌─────────────────────────────────────┐
│            AP001 A1/1                │
├─────────────────────────────────────┤
│ 2020/Sep/05              16:40:21   │
│                                     │
│ pHbelow                             │
│ lower alarm limit                   │
│                                     │
└─────────────────────────────────────┘
```

AP001 A1/1	The amount of alarms and the number of the selected alarm
2020/Sep/05 16:40:21	Date and time of occurrence of the alarm (YYYY/MMM/DD HH:NN:SS)
pHbelow lower alarm limit	The alarm message

An alarm can be acknowledged with [OK]. If the reason of the alarm is still present, a new alarm will be generated immediately.

9.3.6 USB screen

The USB menu is activated when a USB stick is plugged in the USB slot.

```
┌─────────────────────────────────────┐
│           USB data transfer         │
├─────────────────────────────────────┤
│ ►  Copy results                     │
│    Delete results                   │
│    Copy log/cfg                     │
│    Delete log/cfg                   │
│    Update software                  │
│    Copy license                     │
│    Config backup                    │
│    Config restore                   │
└─────────────────────────────────────┘
```

9.4 General setup

In the "Setup" menu, general settings can be made.

• Press the [Function] button in the status screen to open the "Setup" menu.

```
┌─────────────────────────────────────┐
│              Setup                  │
├─────────────────────────────────────┤
│ ►  Manage sensors...                │
│    Cleaning 1...                    │
│    Cleaning 2...                    │
│    Meas. settings...                │
│    Date/Time...                     │
│    MODBUS slave...                  │
└─────────────────────────────────────┘
```

```
┌─────────────────────────────────────┐
│              Setup                  │
├─────────────────────────────────────┤
│ ►  MODBUS slave...                  │
│    Update software...               │
│    Select language...               │
│    Service...                       │
│    License...                       │
└─────────────────────────────────────┘
```

Submenu	Settings
Manage sensors...	Add, remove, configure sensors or parameters.
Cleaning 1...	DID with immersed sensor and cleaning device: Configure cleaning device.
Cleaning 2...	Required for optical probes or if different cleaning devices are used. Not required for DID.
Meas. settings...	Set the measurement interval between 1-3600 s.
Date/Time...	Adjust date and time.
MODBUS slave...	If CU 382 is used as MODBUS-Slave: Change MODBUS settings.
Update software...	Update the software of the control unit via the USB port.
Select language...	Choose the operating language.
Service...	Make additional settings and function checks. This menu is protected by a password and should only be opened by an authorised person.
License...	Displays the features of the installed license.

9.4.1 Manage sensors

Manage sensors
► pH::lyser
chlori::lyser
Digital Input 1
Add sensor...

pH::lyser/0/1 chlori::lyser/0/2	Names of the connected sensors
Digital Input 1	Configured inputs (digital or analog)
Add sensor...	Add a new sensor

Sensor configuration

• Select a sensor or an input with the [UP] and [DOWN] buttons. Confirm with [OK].
  – The "Sensor configuration" menu opens.

Sensor configuration
► Configure...
Add parameters...
Remove sensor
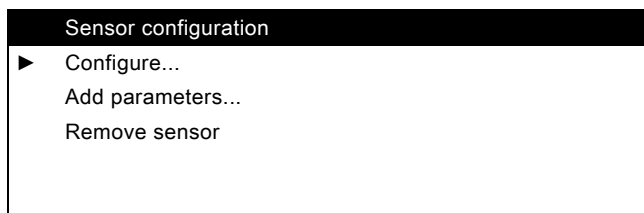
Configure...

• Select "Configure..." with the [Up] and [Down] buttons. Confirm with [OK].
  – The "Configure..." menu opens.

Configure...	
► Type:	4-20 mA

The "Configure..." menu is available for analog and digital inputs.

If an analog input is chosen, the following settings can be configured:

• "0-20 mA"
• "4-20 mA"

Configure...	
► Type:	State
Invert pol.:	No

Configure...	
► Type:	Count
Interval [s]:	60

If a digital input is chosen, the following settings can be configured:

• "State": Depending on the contact type of the digital input, the result is 1 or 0.
  – The contact type of the digital input can be changed with "Invert pol.:".
• "Count": Counts the digital pulses within the interval.
  – The interval can be defined with "Interval [s]:".

Adding a parameter

Add para.
► Add pH
Add pH-mV
Add Temp

1. Select a parameter with the [Up] and [Down] buttons.
2. Confirm with [OK].

Removing a sensor

1. Select "Remove sensor" with the [Up] and [Down] buttons.
2. Confirm with [OK].

The sensor and the parameters for the sensor are removed. If an input of a controller is linked to the sensor or parameter, the controller is deactivated.

Adding a new sensor

1. Select "Add sensor..." in the "Manage sensors" menu with the [Up] and [Down] buttons.
2. Confirm with [OK].
   – The "Add new sensor" menu opens.

Add new sensor
► Add 0/4-20mA...
Add digital in...
Add s::can Sensor...
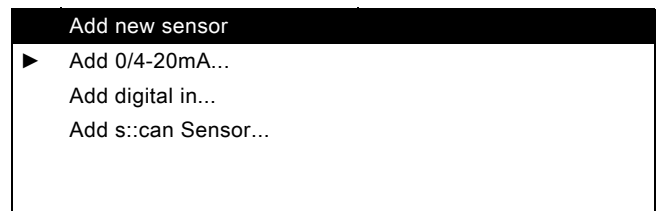
• To add an analog sensor select "Add 0/4-20mA..." with the [Up] and [Down] buttons. Confirm with [OK].
• To add a digital sensor select "Add digital in..." with the [Up] and [Down] buttons. Confirm with [OK].
• To add an s::can sensor select "Add s::can Sensor..." with the [Up] and [Down] buttons. Confirm with [OK].
  – The port for a new sensor is searched and the new s::can sensor is added to the sensor list automatically. No further interaction is required.

After adding a sensor, a parameter has to be added. See section *Adding a parameter*.

9.4.2 Cleaning device

The "Cleaning 1..." and "Cleaning 2..." menus are used for the DID with sensor for tank immersion, if an automatic cleaning device is installed.

Cleaning 1...	
► Interval [s]:	120
Duration [s] :	2
Wait [s] :	10
Clean now!	

Interval [s]:	The time between two cleaning actions
Duration [s] :	The time the cleaning device is activated for one cleaning action
Wait [s] :	The time before starting a new measurement after a cleaning action is finished
Clean now!	Automatic cleaning test

Changing the cleaning interval

1. Select "Interval [s]:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the interval value with the [Up] and [Down] buttons. Confirm with [OK].

Changing the cleaning duration

1. Select "Duration [s] :" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the duration value with the [Up] and [Down] buttons. Confirm with [OK].

Changing the delay before a new measurement

1. Select "Wait [s]   :" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the delay value with the [Up] and [Down] buttons. Confirm with [OK].

Testing automatic cleaning

1. Select "Clean now!" with the [Up] and [Down] buttons. Confirm with [OK].

9.4.3 Measurement settings

Meas. settings	
► Interval [s]:	5
Average:	4
Log. Interval:	45
Use Fahrenheit:	No
Ignore limits:	No

Interval [s]:	Time between two measurements in a range of 1-3600 seconds.
Average:	The displayed value is averaged over the last x readings. "Average:" can be set between 1 and 10.
Log. Interval:	Each x reading is stored in the logged result file. "Log. Interval:" can be set between 1 and 60.
Use Fahrenheit:	Temperature values are displayed in [°C] by default. If set to "Yes", all temperature values are displayed in [F].
Ignore limits:	If set to "Yes", also parameter values outside the nominal measuring range can be used to configure outputs, alarm limits, etc.

Changing the measurement interval

1. Select "Interval [s]:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the interval value with the [Up] and [Down] buttons. Confirm with [OK].
   – This changes also the sampling interval of the analog and digital inputs.

9.4.4 Date/Time

Date/Time	
► Year :	2020
Month :	Jan
Day :	8
Hour :	6
Minute:	43

Changing the year

1. Select "Year :" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the year value with the [Up] and [Down] buttons. Confirm the new year with [OK].

Changing the month

1. Select "Month :" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the month value with the [Up] and [Down] buttons. Confirm the new month with [OK].

Changing the day

1. Select "Day   :" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the day value with the [Up] and [Down] buttons. Confirm the new day with [OK].

Changing the hour

1. Select "Hour :" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the hour value with the [Up] and [Down] buttons. Confirm the new hour with [OK].

Changing the minute

1. Select "Minute:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the minute value with the [Up] and [Down] buttons. Confirm the new minute with [OK].

9.4.5 MODBUS slave

If the CU 382 is used as a Modbus slave, the connection settings can be configured in the "MODBUS slave" menu.

MODBUS slave	
► Address:	1
Parity:	Odd
Baudrate:	38400

Address: The Modbus ID. The address of each device must be unique in the Modbus environment (1-247)

Parity: The parity of the communication with RS 485 bus (Even, Odd, none)

Baudrate: The baud rate of the communication with RS 485 bus (9600, 19200, 38400, 57600)

Changing the Modbus address
1. Select "Address:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the address value with the [Up] and [Down] buttons. Confirm with [OK].

Changing the parity
1. Select "Parity:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the parity with the [Up] and [Down] buttons. Confirm with [OK].

Changing the baud rate
1. Select "Baudrate:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the baud rate with the [Up] and [Down] buttons. Confirm with [OK].

9.4.6 Update software

The operating software of the CU 382 control unit can be updated in the field with a USB stick. See also section 9.4.6 Update software.

• To activate the software, press the [Function] button and keep it pressed.

Update software
Press FUNC key and
keep pressed!

9.4.7 Select language...

Select language...
► English
Deutsch
Francais

Changing the operating language of the CU 382 control unit
1. Select the desired language with the [Up] and [Down] buttons.
2. Confirm the new language with [OK].

9.4.8 Service

Setup	
► Access code:	0001

Use the "Access code:" "0001" to open the "Service" menu.

Service
► 4-20mA Outputs
0/4-20mA Inputs
Digital Outputs
Digital Input
Internal Sensors

Service
► Digital Input
Internal Sensors
USB
Date/Time...
Hardware

Service
► Date/Time...
Hardware
Communication test
Modules

The "Service" menu allows the following:

4-20mA Outputs	Test and recalibrate the 4-20 mA outputs
0/4-20mA Inputs	Test and recalibrate the 0/4-20 mA inputs
Digital Outputs	Switch all digital outputs manually
Digital Input	Read in all digital inputs
Internal Sensors	Read in all internal sensors
USB	Measure the performance of the USB stick
Date/Time...	Set the time and the date
Hardware	Read out the hardware revision
Communication test	Check the communication with the sensors and external devices
Modules	Check the integrated plug-in modules

9.5 Parameter setup

In the parameter setup menu, a parameter can be calibrated, monitored, linked to an alarm, linked to an output or removed.

P1 FCL/mg/l	
► Calibrate expert...	
Monitor...	
Display settings...	
Alarm settings...	
Output:	4-20mA #1

P1 FCL/mg/l	
► Output:	4-20mA #1
Output settings...	
pH compensation...	
Parameter info...	
Move up	
Move down	
Remove parameter	

Submenu	Settings
Calibrate expert...	Calibrate a parameter
Monitor...	Display the raw value and the status of the parameter and the sensor
Display settings...	Configure the appearance of the parameter
Alarm settings...	Configure the alarm-trigger of the parameter
Output:	Allocate an output to a parameter value
Output settings...	Configure the selected output for the parameter
pH compensation...	Enable or disable the pH compensation software for the chlorine sensor (FCL)
Parameter info...	Display a summary of the parameter settings
Move up	Move the selected parameter one row up
Move down	Move the selected parameter one row down
Remove parameter	Remove the parameter

9.5.1 Calibrate expert...

> **!** Before calibration make sure that the parameter value is stable.

Depending on the connected sensor, several types of calibration can be performed.
- "Local" is set by default. "Local" calibration is performed by the user during operation.
- "Global" is used for factory calibration. "Global" is performed by the manufacturer of the sensors.

Depending on the sensor type, different "Local" calibration modes can be chosen in "Mode:":
- "Offset"
- "Linear"
- "Span"

Sensor type	Parameter	Mode:
pH::lyser, redo::lyser	pH, ORP	Offset, Linear
chlori::lyser chlodi::lyser, peroxy::lyser, hyper::lyser	Cl_2, ClO_2, H_2O_2, PAA	Span
condu::lyser	Conductivity	Span

See the manual "Sensors" for more detailed information.

"Offset" calibration

P2 Calibrate expert...	
► Type:	Local
Mode:	Offset
Perform Calibration	
Value:	7.77
Lab 1:	7.8

P2 Calibrate expert...	
► Perform Calibration	
Value:	7.77
Lab 1:	7.8
Sample 1 :	54.34
Offset	-1.85

Type:	Calibration type: "Local" (default) or "Global" (for factory calibration)
Mode:	Calibration mode: "Offset", "Linear", "Span"
Value:	The value measured in the current sensor calibration
Lab 1:	The value received from the analysis of the sample with a reference method
Sample 1 :	The raw value of the sample measured by the sensor. The raw value can have a different unit.

Performing "Offset" calibration

The "Offset" calibration is an in-situ calibration. The sensor must not be removed from the flow cell.

1. Select "Offset" in the "Mode:" entry field with the [Up] and [Down] buttons. Confirm with [OK].

   ❗ Before taking a sample for calibration, flush the sampling point 3-4 times with approximately 10 ml each time.

2. Take a sample of approx. 10 ml.
3. While taking the sample, select "Sample 1 :" with the [Up] and [Down] buttons. Confirm with [OK].
   – The raw value of the sample is measured and stored in the sensor.
4. Analyse the sample with a reference method and enter the result into the "Lab 1:" field with the [Up] and [Down] buttons.
5. Select "Perform Calibration" with the [Up] and [Down]. Confirm with [OK].
   – The calibration process starts.

The calibration result is shown in "Value:".

The calibration coefficient is shown in "Offset", and stored in the sensor.

Performing "Linear" calibration

1. Select "Linear" in the "Mode:" entry field. Confirm with [OK].
2. Take the sensor out of the flow cell or the tank.
3. Immerse the sensor into a beaker with the first reference solution for "Sample 1 :".
4. Let the sensor adapt to the solution until the displayed value is stable, before measuring the raw value.
5. Read the value on the label of the first reference solution. Select the value in the "Lab 1:" field with the [Up] and [Down] buttons. Confirm with [OK].
   – Use a temperature-compensated value.
   – The entire measuring range that can be expected at the location should be covered between "Sample 1 :" and "Sample 2 :".
6. Select "Sample 1 :" with the [Up] and [Down] buttons. Confirm with [OK].
   – The measured raw value is shown and stored in the sensor.
7. Carefully rinse the sensor with distilled water three times before measuring the second value.
8. Immerse the sensor into a beaker with the second reference solution for "Sample 2 :".
9. Let the sensor adapt to the solution until the displayed value is stable, before measuring the raw value.
10. Read the value on the label of the second reference solution. Select the value in the "Lab 2:" field with the [Up] and [Down] buttons. Confirm with [OK].
    – Use a temperature-compensated value.
11. Select "Sample 2 :" with the [Up] and [Down] buttons. Confirm with [OK].
    – The measured raw value is shown and stored in the sensor.
12. Select "Perform Calibration" with the [Up] and [Down] buttons. Confirm with [OK].
    – The calibration process starts.

The calibration result is shown in "Value:".

The calibration coefficients are shown in "Offset" and "Slope", and stored in the sensor.

"Span" calibration

P1 Calibrate expert...	
► Type:	Local
Mode:	Span
Perform Calibration	
Value:	0.50
Private:	3.0

P1 Calibrate expert...	
► Value:	0.50
Private:	3.00
Lab 1:	0.50
Sample 1 :	3.00
Slope	6.00

Type:	Calibration type: "Local" (default) or "Global" (for factory calibration)
Mode:	Calibration mode: "Offset", "Linear", "Span"
Value:	The value measured in the current sensor calibration
Private:	Internal sensor value which is only relevant for service. If a pH::lyser or redo::lyser is connected, this value is the quality factor of the sensor. 0 means bad quality and 1 means perfect quality. If another sensor connected, this value is the currently measured raw value of the sensor.
Lab 1:	The value received from the analysis of the sample with a reference method can be entered.
Sample 1 :	The raw value of the sample measured by the sensor is displayed. The raw value can have a different unit.
Slope	The calibration coefficient

Performing "Span" calibration

The "Span" calibration is an in-situ calibration. The sensor must not be removed from the flow cell.

1. Select "Span" in the "Mode:" entry field with the [Up] and [Down] buttons. Confirm with [OK].

   ❗ Before taking a sample for calibration, flush the sampling point 3-4 times with approximately 10 ml each time.

2. Take a sample of approx. 10 ml.
3. While taking the sample, select "Sample 1 :" with the [Up] and [Down] buttons. Confirm with [OK].
   – The raw value of the sample is measured and stored in the sensor.
4. Analyse the sample with a reference method and enter the result into the "Lab 1:" field with the [Up] and [Down] buttons.
5. Select "Perform Calibration" with the [Up] and [Down] buttons. Confirm with [OK].
   – The calibration process starts.

The calibration result is shown in "Value:".

The calibration coefficient is shown in "Slope", and stored in the sensor.

9.5.2 Monitor...

The "Monitor..." menu shows the internal value, raw value and status information of the chosen parameter and sensor. The operator can identify problems with the sensors in the "Monitor..." menu.

P2 Monitor...	
► Value:	7.8
Private:	0.99
S-Status:	0000
S-Status(Pri):	0000
P-Status:	0000

P2 Monitor...	
► Private:	0.99
S-Status:	0000
S-Status(Pri):	0000
P-Status:	0000
P-Status(Pri):	0000

Value:	The value measured in the current sensor calibration
Private:	Internal sensor value which is only relevant for service. If a pH::lyser or redo::lyser is connected, this value is the quality factor of the sensor. 0 means bad quality and 1 means perfect quality. If another sensor connected, this value is the currently measured raw value of the sensor.
S-Status:	Sensor status. If "0000" is displayed, the status is ok.
P-Status:	Parameter status. If "0000" is displayed, the status is ok.

Viewing the error messages for sensor status and parameter status

In case of a fault, an error code is displayed.
1. Select the error code with the [Up] and [Down] buttons. Confirm with [OK].
   – The error message is shown.

For the list of the error codes and messages, see the manual "Sensors".

9.5.3 Display settings...

In the "Display settings..." menu the appearance of the parameter on the parameter screen and in the stored parameter files can be configured.

P2/Display settings...	
► Name:	pH 1
Unit:	
Disp. Format:	2
Load Defaults	

Name:	Name of the parameter
Unit:	Unit of the parameter
Disp. Format:	Number of decimal places that are displayed
Load Defaults	Reload default display settings

Changing the name of the parameter
1. Select "Name:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the name of the parameter with the [Up], [Down], [Left] or [Right] buttons. Confirm with [OK].

Changing the unit of the parameter
1. Select "Unit:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the unit of the parameter with the [Up], [Down], [Left] or [Right] buttons. Confirm with [OK].

Changing the number of decimal places
1. Select "Disp. Format:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the number of decimal places with the [Up] and [Down] buttons. Confirm with [OK].

Reloading the default display settings
1. Select "Load Defaults" with the [Up] and [Down] buttons. Confirm with [OK].
2. The default display settings are loaded from the sensor.
   – All modifications of the display settings are documented in the logbook of the CU 382 control unit.

9.5.4 Alarm settings...

In the "Alarm settings..." menu a lower and upper limit for an alarm can be defined. If the upper or lower limit is exceeded, an alarm is generated. Depending on the controller settings, the alarm can stop the controller.

• If in the "Alarm settings..." menu for the controller "Stop on Error:" is set to "Yes", and "Require ack.:" is set to "No", the controller starts running again automatically, when the parameter is back in the limits.
• If in the "Alarm settings..." menu for the controller "Stop on Error:" is set to "Yes", and "Require ack.:" is set to "Yes", the alarm must be confirmed manually to start the controller again, when the parameter is back in the limits.

See also section *9.6.6 Alarm sources...*.

P2 Alarm settings...	
► Require ack.:	Yes
Al. lower:	6.5
Al. upper:	7.5
Output:	none
Use Sys-Error:	No

Require ack.:	Acknowledgement of an alarm
Al. lower:	Lower limit for an alarm
Al. upper:	Upper limit for an alarm
Output:	Output of an alarm
Use Sys-Error:	Output of an alarm on the error relay

Changing the requirement for acknowledging an alarm
1. Select "Require ack.:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Select "Yes" or "No" with the [Up] and [Down] buttons. Confirm with [OK].

Changing the lower limit for triggering an alarm
1. Select "Al. lower:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the lower limit value with the [Up], [Down], [Left] or [Right] buttons. Confirm with [OK].

Changing the upper limit for triggering an alarm
1. Select "Al. upper:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the upper limit value with the [Up], [Down], [Left] or [Right] buttons. Confirm with [OK].

Defining the output of an alarm

1. Select "Output:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Select "none", "DigOut #1" or "DigOut #2" with the [Up] and [Down] buttons. Confirm with [OK].
3. If "DigOut #1" or "DigOut #2" is selected, the submenu "Invert pol.:" is shown.
   – The contact type of the digital output can be changed with "Invert pol.:".

Defining if the error relay is activated on an alarm

1. Select "Use Sys-Error:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Select "Yes" or "No" with the [Up] and [Down] buttons. Confirm with [OK].

9.5.5 Outputs

The following outputs can be selected:
- Analog output: "4-20mA #1", "4-20mA #2", "4-20mA #3"
- Digital output: "Level", "PULSE", "PWM"

Changing the output

1. Select "Output:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the output with the [Up] and [Down] buttons. Confirm with [OK].

9.5.6 Output settings...

In the "Output settings..." menu a parameter can be allocated to an analog output or a digital output.

Analog outputs

```
   P2 Output settings...
►  [4mA]                      0.00
   [20mA]                    14.00
```

| [4mA] | The parameter value for 4 mA |
| [20mA] | The parameter value for 20 mA |

Parameter values between these two limits are calculated according to a linear calibration.

Assigning the parameter value for 4 mA

1. Select "[4mA]" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the parameter value with the [Up], [Down], [Left] and [Right] buttons. Confirm with [OK].

Assigning the parameter value for 20 mA

1. Select "[20mA]" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the parameter value with the [Up], [Down], [Left] and [Right] buttons. Confirm with [OK].

Digital outputs

The following output types can be defined:
- Level
- PULSE
- PWM

Level

```
   P2 Output settings...
►  Type:                      Level
   Threshold:                  7.00
```

Threshold: Below the defined threshold the output is 0 (Relay NO = open). Above the defined threshold the output is 1 (Relay NO = closed). Threshold: defines the limits for 0 or 1.

Changing the digital output to "Level"

1. Select "Type:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Select "Level" with the [Up] and [Down] buttons. Confirm with [OK].
   – An additional row is shown.

Changing the threshold value

1. Select "Threshold:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the threshold value with the [Up], [Down], [Left] and [Right] buttons. Confirm with [OK].

PULSE

```
   P2 Output settings...
►  Type:                      PULSE
   [0%]                        0.00
   [100%]                     14.00
   Pulses [Min]:                180
```

[0%]	Parameter value for 0 % output (0 pulses/min).
[100%]	Parameter value for 100 % output (maximum pulses/min).
Pulses [Min]:	Maximum number of pulses per minute for 100 % output. The highest number is 180.

Changing the digital output to "PULSE"

1. Select "Type:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Select "PULSE" with the [Up] and [Down] buttons. Confirm with [OK].
   – Three additional rows are shown.

Assigning the parameter value for 0 % output

1. Select "[0%]" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the parameter value for 0 % output with the [Up], [Down], [Left] and [Right] buttons. Confirm with [OK].

Assigning the parameter value for 100 % output

1. Select "[100%]" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the parameter value for 100 % output with the [Up], [Down], [Left] and [Right] buttons. Confirm with [OK].

Changing the maximum of pulses/min for 100 % output

1. Select "Pulses [Min]:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the maximum pulses/min value with the [Up], [Down], [Left] and [Right] buttons. Confirm with [OK].

PWM

P2 Output settings...	
► Type:	PWM
[0%]	0.00
[100%]	14.00
Period [s]:	100

[0%]	Parameter value for 0 % output (0 pulses/min).
[100%]	Parameter value for 100 % output (maximum pulses/min).
Period [s]:	Duration of one pulse for 100 % output. The highest duration is 100 s.

Changing the digital output to "PWM"

1. Select "Type:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Select "PWM" with the [Up] and [Down] buttons. Confirm with [OK].
   – Three additional rows are shown.

Assigning the parameter value for 0 % output

1. Select "[0%]" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the parameter value for 0 % output with the [Up], [Down], [Left] and [Right] buttons. Confirm with [OK].

Assigning the parameter value for 100 % output

1. Select "[100%]" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the parameter value for 100 % output with the [Up], [Down], [Left] and [Right] buttons. Confirm with [OK].

Changing the duration of one pulse for 100 % output

1. Select "Period [s]:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the value for the duration of one pulse with the [Up], [Down], [Left] and [Right] buttons. Confirm with [OK].

9.5.7 pH compensation...

If the pH of the water is above 8.5, it is recommended to use the automatic pH compensation for the chlorine sensor. The pH compensation is only available for the chlorine sensor and requires a pH sensor.

P1 pH compensation...	
► Type:	Disabled

P1 pH compensation...	
► Type:	Auto
Source:	pH

Type:	Compensation type
Source:	The source for pH compensation (parameter pH from pH sensor)
Auto	Automatic pH compensation

Enabling the pH compensation

1. Select "Type:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the type to "Auto" with the [Up] and [Down] buttons. Confirm with [OK].
   – The pH compensation is enabled.

Defining the source for pH compensation

1. Select "Source:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the source to the desired parameter (pH) with the [Up] and [Down] buttons. Confirm with [OK].
   – pH is defined as the source parameter.

9.5.8 Parameter info...

The "Parameter info..." screen shows a summary of all important settings and information of one parameter.

P2 Parameter info...	
► Sen.:	pH::lyser/0/
Name:	pH
Unit:	
Disp. Format:	2
P. lower:	0.00

P2 Parameter info...	
► Disp. Format:	2
P. lower:	0.00
P. upper:	14.00
Al. lower:	6.5
Al. upper:	7.5

Sen.:	Name of the sensor
Name:	Name of the parameter
Unit:	Unit of parameter
Disp. Format:	Number of decimal places that are displayed
P. lower:	Lower end of the parameter measuring range
P. upper:	Upper end of the parameter measuring range
Al. lower:	Lower limit for triggering an alarm
Al. upper:	Upper limit for triggering an alarm

9.5.9 Removing a parameter

1. Select "Remove parameter" with the [Up] and [Down] buttons.
2. Confirm with [OK].
   – The parameter for the sensor is removed.
   – If an input of a controller is linked to the parameter, the controller is deactivated.

9.6 Controller setup

In the controller setup menu, a setpoint can be defined, controller parameters can be configured, the input for the controller can be chosen, the output for the controller value can be chosen, the digital output can be configured, alarms can be configured and the state of the controller can be reset.

C2 pH/	
► Setpoint...	
Settings... PID	
Source:	pH
Output:	DigOut #1
Output settings...	

C2 pH/	
► Source:	pH
Output:	DigOut #1
Output settings...	
Alarm sources...	
Reset state	

Submenu	Settings
Setpoint:	The setpoint of the controller can be set.
Settings PID/ 2-P	The parameter for a PID or a 2-P controller can be configured.
Source:	The input parameter of the controller can be selected.
Output settings...	The output of the controller can be configured. Only visible if a digital output is defined.
Alarm sources...	The alarms for the controller can be configured for every parameter alarm.
Reset state	The state of the controller can be set to 0.

9.6.1 Setpoint...

The setpoint of the controller can be defined directly in the operating software of the controller, or an external setpoint adjustment can be configured. A setpoint can be controlled by an analog input or a digital input.

Two types of setpoint adjustment can be defined:
• "Internal"
• "External"

C2 Setpoint...	
► Type:	Internal
Setpoint:	7.00

Changing the type to "Internal"

1. Select "Type:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Select "Internal" with the [Up] and [Down] buttons. Confirm with [OK].

Changing the setpoint of the controller

1. Select "Setpoint:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the setpoint with the [Up], [Down], [Left] and [Right] buttons. Confirm with [OK].

The unit of the setpoint is defined by the parameter that is used as an input.

C2	
► Type:	External
Source:	4-20mA #1

Changing the type to "External"

1. Select "Type:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Select "External" with the [Up] and [Down] buttons. Confirm with [OK].

Changing the source of the external setpoint

1. Select "Source:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the source with the [Up], [Down], [Left] and [Right] buttons. Confirm with [OK].

9.6.2 Settings PID

C2 Settings	
► Type:	PID
Kp [%]	5.0
Ti [s]	200.00
Td [s]	0.00
Stop on Error:	Yes
Max. 100%[s]:	200
Disturb.:	DI 1

C2 Settings	
► Td [s]	0.00
Disturb.:	DI 1
D. factor:	50.0
Direction:	up
Deadband:	0.05

Kp [%]	The proportional part of the PID controller with a range of 0 to 100000 %
Ti [s]	The integral part of the PID controller with a range of 1 to 10000 seconds.
Td [s]	The derivative part of the PID controller with a range of 0 to 1000 seconds.
Stop on Error:	If "Stop on Error:" is set to "Yes", the controller stops, if a sensor error occurs. The status of the controller changes to "Stopped".
Max. 100%[s]:	Maximum dosing time with a controller output of 100 % (60-3600 s).
Disturb.:	Defines the source of the disturbance control.
D. factor:	The disturbance factor is a multiplicative factor
Direction:	Direction of the controller:

- "up": The controller increases the controller output, if the setpoint is above the parameter, and decreases the controller output, if the setpoint is below the parameter.
- "down": The controller decreases the controller output, if the setpoint is above the parameter, and increases the controller output, if the setpoint is below the parameter.

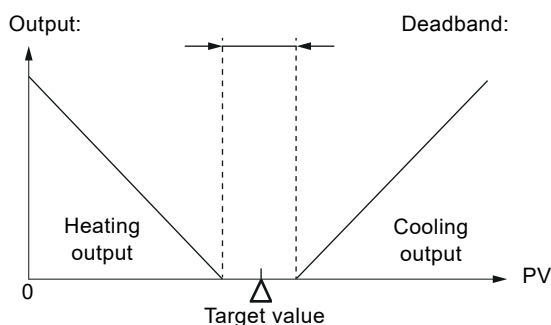|	
Deadband:	A dead band is defined to avoid repeated activation-deactivation cycles (Hunting).

Fig. 10 Hunting (repeated activation-deactivation cycles)

Changing the controller type

1. Select "Type:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Select "PID", "2-P" or "none" with the [Up] and [Down] buttons. Confirm with [OK].
   – "none" deactivates the controller.

Changing the proportional part of the PID controller

1. Select "Kp [%]" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the proportional part value with the [Up], [Down], [Left] and [Right] buttons. Confirm with [OK].

Changing the integral part of the PID controller

1. Select "Ti [s]" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the integral part value with the [Up], [Down], [Left] and [Right] buttons. Confirm with [OK].

Disabling the integral part of the PID controller

1. Select "Ti [s]" with the [Up] and [Down] buttons. Confirm with [OK].
2. Press the [Function] button and confirm with [OK] again to disable "Ti [s]".
   – The displayed value is "++++++.++".

Changing the derivative part of the PID controller

1. Select "Td [s]" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the derivative part with the [Up], [Down], [Left] and [Right] buttons. Confirm with [OK].

Disabling the derivative part of the PID controller

1. Select "Td [s]" with the [Up] and [Down] buttons. Confirm with [OK].
2. Press the [Function] button and confirm with [OK] again to disable "Td [s]".
   – The displayed value is "0.00".

Changing the behaviour of the controller if an error occurs

1. Select "Stop on Error:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Select "Yes" or "No" with the [Up] and [Down] buttons. Confirm with [OK].

Changing the maximum dosing time

1. Select "Max. 100%[s]:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the maximum dosing time with the [Up], [Down], [Left] and [Right] buttons. Confirm with [OK].

Disturbance control

The function of disturbance control (compound-loop control) is defined by following equation:

Controller output value with disturbance control = controller output value * Source value * "D. factor:".

Example:

- The controller output value is 50 %
- The source is the analog input with 1.2 mA
- The disturbance factor is 0.5

The new controller output is:

Controller output value with disturbance control = 50 [%] * 1.2 [mA] * 0.5 [1/mA] = 30 [%]

Assigning the disturbance control to an input (parameter)

1. Select "Disturb.:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the input for disturbance control with the [Up] and [Down] buttons. Confirm with [OK].

Changing the disturbance factor

1. Select "D. factor:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the disturbance factor with the [Up], [Down], [Left] and [Right] buttons. Confirm with [OK].

Changing the direction of the controller

1. Select "Direction:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Select "up" or "down" with the [Up] and [Down] buttons. Confirm with [OK].

Changing the level of the deadband

1. Select "Deadband:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the value for the level of the deadband with the [Up], [Down], [Left] and [Right] buttons. Confirm with [OK].

9.6.3 Stop on Error:

C2 Stop on Error:	
► Stop on Error:	Yes

Stop on Error:	The behaviour of the controller can be defined for the parameter alarm selected under "Alarm sources...".

9.6.4 Settings 2-P

C2 Settings	
► Type:	2-P
Hysteresis:	0.05
Stop on Error:	Yes
Max. 100%[s]:	200
Disturb.:	DI 1
D. factor:	50.0
Direction:	up

Type:	Controller type: "PID" or "2-P"
Hysteresis:	Hysteresis for the 2-P-controller. The switching points for the controller are: Setpoint ± Hysteresis
Stop on Error:	If "Stop on Error:" is set to "Yes", the controller stops, if a sensor error occurs. The status of the controller changes to "Stopped".
Max. 100%[s]:	Maximum dosing time with a controller output of 100 %.
Disturb.:	Defines the source of the disturbance control.
D. factor:	The disturbance factor is a multiplicative factor
Direction:	Direction of the controller: • "up": The controller increases the controller output, if the setpoint is above the parameter, and decreases the controller output, if the setpoint is below the parameter. • "down": The controller decreases the controller output, if the setpoint is above the parameter, and increases the controller output, if the setpoint is below the parameter.

Changing the controller type

1. Select "Type:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Select "PID", "2-P" or "none" with the [Up] and [Down] buttons. Confirm with [OK].
   – "none" deactivates the controller.

Changing the hysteresis of the controller

1. Select "Hysteresis:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the hysteresis value with the [Up], [Down], [Left] and [Right] buttons. Confirm with [OK].

Assigning the disturbance control to an input (parameter)

1. Select "Disturb.:" with the [Up] and [Down] buttons. Confirm with [OK].
   – "Disturb.:" defines the source of the disturbance control. Analog outputs ("4-20 mA") or digital outputs ("PULSE" or "PWM") can be selected.
2. Change the input for disturbance control with the [Up] and [Down] buttons. Confirm with [OK].

Changing the disturbance factor

1. Select "D. factor:" with the [Up] and [Down] buttons. Confirm with [OK].
   – "D. factor:" is a multiplicative factor.
2. Change the disturbance factor with the [Up], [Down], [Left] and [Right] buttons. Confirm with [OK].

Changing the direction of the controller

1. Select "Direction:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Select "up" or "down" with the [Up] and [Down] buttons. Confirm with [OK].

9.6.5 Output settings...

If an analog output "4-20mA #1", "4-20mA #2" or "4-20mA #3" is selected, the 0-100 % output of the controller is automatically assigned to 4-20 mA.

If a digital output is selected, two different types can be defined: "PULSE" or "PWM".

C2 Output settings...	
► Type:	PULSE
Pulses [Min]:	180

Pulses [Min]: Maximum number of pulses per minute for 100 % output. The highest number is 180.

Changing the digital output to "PULSE"

1. Select "Type:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Select "PULSE" with the [Up] and [Down] buttons. Confirm with [OK].
   – An additional row is shown.

Assigning the parameter value for an output

The output range of the controller is 0 % to 100 %, so it is not necessary to assign the parameter value for an output.

The only parameter that can be changed is the maximum of pulses/min for 100 % output.

Changing the maximum of pulses/min for 100 % output

1. Select "Pulses [Min]:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the maximum pulses/min value with the [Up], [Down], [Left] and [Right] buttons. Confirm with [OK].

C2 Output settings...	
► Type:	PWM
Period [s]:	100

Period [s]: Duration of one pulse for 100 % output. The highest duration is 100 s.

23

Changing the digital output to "PWM"
1. Select "Type:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Select "PWM" with the [Up] and [Down] buttons. Confirm with [OK].
   – One additional row is shown.

Assigning the parameter value for an output

The output range of the controller is 0 % to 100 %, so it is not necessary to assign the parameter value for an output.

The only parameter that can be changed is the duration of one pulse for 100 % output.

Changing the duration of one pulse for 100 % output
1. Select "Period [s]:" with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the value for the duration of one pulse with the [Up], [Down], [Left] and [Right] buttons. Confirm with [OK].

9.6.6 Alarm sources...

C2 Alarm sources...	
► FCL:	------------
pH:	Up/Low
Temp.:	Upper

FCL	---------	The controller does not react or stop on an FCL alarm
pH	Up/Low	The controller stops, if the lower or upper alarm limit is reached.
Temp.:	Upper	The controller stops, if the upper alarm limit is reached.

The upper and lower limits for triggering an alarm are set in the parameter setup menu. See *9.5.4 Alarm settings...*.

The behaviour of the controller can be defined for every parameter alarm separately.

Changing the behaviour of the controller
1. Select the desired parameter with the [Up] and [Down] buttons. Confirm with [OK].
2. Change the parameter alarm value with the [Up] and [Down] buttons. Confirm with [OK].
   – The controller stops when the chosen alarm occurs.

9.6.7 Reset state

Resetting the state of the controller
1. Select "Reset state" with the [Up] and [Down] buttons.
2. Confirm with [OK] to reset the state of the controller.
   – The controller value is set to 0 %.
   – For the PID controller, all three parts are set to 0 (P = 0, I = 0, D = 0).

9.7 USB menu / Data transfer

The USB menu is activated when a USB stick is plugged in the USB slot.

USB data transfer	
► Copy results	
Delete results	
Copy log/cfg	
Delete log/cfg	
Update software	
Copy license	
Config backup	
Config restore	

Copy results	All data regarding the parameters and controllers are copied to the USB stick.
Delete results	All data regarding the parameters and controllers are deleted.
Copy log/cfg	All data regarding the system logfiles are copied to the USB stick.
Delete log/cfg	All system logfiles are deleted.
Update software	The software of the CU 382 control unit can be updated in the field with an USB stick. A file called "image.hex" has to be in the root directory of the USB stick.
Copy license	A new license file for the CU 382 is copied from the USB stick.
Config backup	Download configuration data
Config restore	Upload configuration data

Copying all data to the USB stick
1. Select "Copy results" with the [Up] and [Down] buttons.
2. Confirm with [OK] to copy all data to the USB stick.
3. The copied data are stored in a result file in .txt format. See *9.7.1 Result file*.

Deleting all data
1. Select "Delete results" with the [Up] and [Down] buttons.
2. Confirm with [OK] button to delete the data.

Copying all logfiles to the USB stick
1. Select "Copy log/cfg" with the [Up] and [Down] buttons.
2. Confirm with [OK] to copy the data to the USB stick.

Deleting all logfiles
1. Select "Delete log/cfg" with the [Up] and [Down] buttons.
2. Confirm with [OK] to delete the logfiles.

Updating the software
1. Select "Update software" with the [Up] and [Down] buttons.
2. Press the [Function] button and keep pressed until the message "Update OK" appears. The CU 382 control unit restarts.
3. Remove the USB stick.

Downloading the configuration data
1. Select "Config backup" with the [Up] and [Down] buttons.
   – All configuration data are copied from the USB stick.

Uploading the configuration data
1. Select "Config restore" with the [Up] and [Down] buttons.
   – All configuration data are loaded to the USB stick.

9.7.1 Result file

The result file is in .txt format and structured as follows:

Time	YearMonthDay-HourMinuteSecond
System status	Status of the monitoring system
P	Marks the beginning of the parameter data block
Parameter value	Value of the parameter
Parameter status	Status of the parameter
Parameter private status	Private status of the parameter
Upper alarm triggered	If upper alarm was triggered = "U" else "-"
Lower alarm triggered	If lower alarm was triggered = "L" else "-"
C	Marks the beginning of the controller data block
Controller output [%]	Output of the controller
Disturbance input	Input of disturbance control
Controller status	Status of the controller 0x0001 - General error 0x0002 - Input error 0x0004 - Output error 0x0008 - Disturbance error
Controller operating mode	Operating mode of the controller 0 - "Stopped" 1 - "Running" 2 - "Hold"

10. Maintenance

WARNING

Electric shock

- Switch off the power supply before connecting the power supply cable and relay contacts.
- Do not dismantle the control unit.
- Maintenance and repair must only be carried out by qualified persons.
- Observe the local safety regulations.

WARNING

Toxic material

- Parts of the DID can be contaminated with dangerous chemicals or pathogenic germs.
- If the DID has been in contact with dangerous chemicals or pathogenic germs, wear protective clothing and take all necessary precautions to prevent endangering your health when installing or dismantling the DID.

10.1 Cleaning

The following components of the DID require periodical checks and cleaning, the interval depends on the quality of the water in which they are used. We suggest to check these components on a monthly basis.

10.1.1 Inlet strainer

The strainer includes a filter that collects coarse material and can foul. Therefore, a periodical check of the strainer is necessary. We recommend to clean the filter in the following intervals:

- monthly
- if the flow drops, although all valves are open, the pump (if installed) is working properly and the inlet pressure is suitable.

Cleaning the inlet strainer

1. Turn off the water flow.
2. Unscrew the cap from the strainer.
3. Remove the filter.
4. Rinse the filter with drinking water.
5. Remove any coarse materials from the strainer housing.
6. Reinsert the filter.
7. Screw the cap back onto the strainer.

10.1.2 Flow detector

The flow detector contains inner parts that can be affected by fouling. It case the flow detector does not respond to flow changes, it can be dismantled from the DID and carefully cleaned with water and a soft brush.

Dismantling the flow detector

1. Turn off the water flow.
2. Disconnect the CU 382 control unit from the power supply.
3. Unscrew the hose connection.
4. Remove the hose.
5. Disconnect the wires of the flow detector from the CU 382.
6. Unscrew the flow detector.
7. Clean the flow detector carefully with water and a soft brush.
8. Screw in the flow detector back.
9. Reconnect the wires of the flow detector to the CU 382.
10. Refit the hose.
11. Screw on the hose connection.

10.1.3 Sensor

See the manual "Sensors" supplied with the sensor. Find the manual "Sensors for DID" on Grundfos Product Center: (http://net.grundfos.com/Appl/ccmsservices/public/literature/filedata/Grundfosliterature-6119622.pdf).

10.1.4 Control unit CU 382

If necessary, clean the surfaces of the CU 382 control unit with a damp and clean cloth.

10.2 Functional check

A functional check can be required for one of the following reasons:

- Initial startup
- Routine
- Malfunction
- Modification of the DID setup (e.g. integration of an additional sensor)
- Change of measuring location.

We recommend to perform a regular functional check as described in the table below. The functional check should be carried out monthly or weekly, depending on the application (water quality), the sensors connected and the environmental conditions.

For the functional check of the sensors, see the manual "Sensors" supplied with the sensor. Find the manual "Sensors for DID" on Grundfos Product Center: (http://net.grundfos.com/Appl/ccmsservices/public/literature/filedata/Grundfosliterature-6119622.pdf).

Component	Functional check
CU 382 control unit	The green LED is on and the text is visible on the display.
CU 382 control unit	The displayed system time is correct and the time is updated every second.
CU 382 control unit	No error messages or error symbols are displayed.
DID	All hoses and fittings are tight.
CU 382 control unit	The digital output of the flow detector is ok.
Outlet	Water is flowing out of the outlet hose. Water is visible within the hoses.
Flow cell	Water is flowing out of the outlet hose. Water is flowing out of the sampling point.
Hoses	The water flow is continuous, no air bubbles are visible in the hoses.
CU 382 control unit and sensors	No "NaN", no "- - - -,- -" or "++++,++" is displayed. No Parameter name is flashing. All readings are plausible. Scroll through the displayed parameters with the [Up], [Down], [Left] and [Right] buttons.
CU 382 control unit and sensors	The chronological sequence looks plausible, with daily or seasonal fluctuation.
CU 382 control unit and sensors	All readings are within the specified and calibrated measuring range.
CU 382 control unit and sensors	There is a difference between the laboratory values and the readings of the sensor. • If the difference is significant, perform a local calibration. • Use a reliable and validated comparison method to verify the accuracy of the displayed readings.

11. Fault finding

See also the manual "Sensors" supplied with the sensor. Find the manual "Sensors for DID" on Grundfos Product Center: (http://net.grundfos.com/Appl/ccmsservices/public/literature/filedata/Grundfosliterature-6119622.pdf).

Fault	Cause	Remedy
1. No water flow	a) The inlet valve is closed.	Open the inlet valve completely.
	b) The inlet strainer is blocked	Clean the filter of the inlet strainer.
	c) The flow detector or the flow restrictor is blocked.	Clean the flow detector or the flow restrictor, or replace the complete component.
2. Water is running out of the sampling point.	a) The sampling point is not closed correctly.	Close the outlet fitting of the sampling point.
3. The power supply LED is off.	a) No power supply.	Connect to the power supply.
4. The displayed system time is not correct or is not updated every second.	a) The internal clock is not adjusted.	Adjust the clock in the "Setup" menu.
		Restart the CU 382 control unit.
5. Error messages or error symbols are displayed.	a) The sensor communicates an error.	In the menu "Parameter settings", select "Monitor" and check the sensor status. See also the manual "Sensors" for status information.
6. Hoses or connections are leaking.	a) The fittings are not tight.	Tighten the fittings carefully. Do not use force.
7. The flow detector shows no flow.	a) The inlet valve is closed.	Open the inlet valve.
	b) The inlet strainer is blocked.	Clean the inlet strainer.
8. Water is not visible in the hoses.	a) The inlet valve is closed.	Open the inlet valve.
	b) The inlet strainer is blocked.	Clean the inlet strainer.
9. Water is not visible in the hoses. Air comes out of the flow restrictor.	a) The pressure on the inlet is too high.	Reduce the pressure on the inlet.
10. The parameter readings are fluctuating.	a) The measuring electrode is contaminated or faulty.	Exchange the electrolyte or the membrane cap. See the manual "Sensors" for more information.
	b) The inlet strainer is blocked.	Clean the inlet strainer.
	c) Air bubbles are in the flow cell.	Reduce the pressure on the inlet.
11. The parameter readings are not plausible.	a) The measuring electrode is contaminated or faulty.	Exchange the electrolyte or the membrane cap. See the manual "Sensors" for more information.
	b) The inlet strainer is blocked.	Clean the inlet strainer.
	c) Air bubbles are in the flow cell.	Reduce the pressure on the inlet.
12. The readings are not within the specified and calibrated measuring range.	a) The sensor or the DID was powered-on very recently.	It takes up to an hour until a sensor provides correct values.
	b) The concentration of the measured substance is to high.	Change to a sensor with a wider measurement range.

12. Technical data

12.1 Hydraulic specifications of DID

Variants BF1 and BF3

Data		Unit	BF1	BF3	BT4
General data	Number of connectable s::can sensors		1	3	3 + 1 optical sensor
	Minimum liquid temperature*	[°C]		0.1	
	Maximum liquid temperature*	[°C]		45	
	Minimum ambient temperature*	[°C]		0.1	
	Maximum ambient temperature*	[°C]		45	
Hydraulic data	Minimum flow rate	[l/h]		30	
	Maximum flow rate (integrated flow restrictor)	[l/h]		60	
	Maximum pressure at inlet (non fluctuating)	[bar]		3	
	Minimum pressure at inlet (non fluctuating)	[bar]		0.5	
	Maximum pressure at outlet (non fluctuating)	[bar]		0.5	
Connection data	Internal thread of inlet and outlet	["]		Rp1/2	
	Size of inlet and outlet connection thread	-		G 5/8	
	Inlet/outlet hose connections, metric, (ID/OD)	[mm]		4/6, 6/9, 6/12 or 9/12	
	Inlet/outlet hose connections, inch, (IDxOD)	["]		0.17 x 1/4, 1/4 x 3/8 or 3/8 x 1/2	
	Sample water outlet, hose nipple	[mm]		4	-

*   Depends also on the limits of the sensor and the CU 382 control unit. The lowest value defines the operating limit.

Variants TI1 and TI2

Data		Unit	TI1	TI2
General data	Number of connectable s::can sensors		1	2
	Minimum liquid temperature*	[°C]		0.1	
	Maximum liquid temperature*	[°C]		45	
	Minimum ambient temperature*	[°C]		0.1	
	Maximum ambient temperature*	[°C]		45	
Hydraulic data	Maximum flow speed*	[m/s]	See the manual "Sensors"	
	Maximum pressure*	[bar]		10	
Connection data	Prepared for pipe dimension (metric, OD)	[mm]		50	
	Prepared for pipe dimension (inch (OD)	["]		2	

*   Depends also on the limits of the sensor and the CU 382 control unit. The lowest value defines the operating limit.

12.2 CU 382 control unit

4-20 mA analog outputs

Description	Unit	D-320-GF1-230 (CU 382-1)	D-320-GF3-230 (CU 382-3)
Number of outputs		3	
Connection		Terminal block, stripped wire, AWG 28-12	
Galvanic isolation	[kV]	1 kV to system ground/earth	
Maximum load resistance	[Ohm]	500	
Minimum load resistance	[Ohm]	0	
Maximum output current	[mA]	20	
Resolution of reading		12-bit	
Response time	[ms]	< 1	
Drift over full temperature range		-50 µA to +10 µA at 10 mA	
Uncertainty	[uA]	< 30	

4-20 mA analog input

Description	Unit	D-320-GF1-230 (CU 382-1)	D-320-GF3-230 (CU 382-3)
Number of inputs		1	
Connection		Terminal block, stripped wire, AWG 28-12	
Input resistance	[Ohm]	100	
Galvanic isolation	[kV]	1 kV to system ground/earth	
Minimum input current	[mA]	0	
Maximum input current	[mA]	20	
Resolution of reading		12-bit	
Response time	[ms]	< 1	
Drift over full temperature range	[uA]	+30 µA to +0 µA at 10 mA	
Uncertainty	[uA]	< 30	

Digital output / Relay output

Description	Unit	D-320-GF1-230 (CU 382-1)	D-320-GF3-230 (CU 382-3)
Number of NO relays		2	
Number of NO/NC relays (error relays)		1	
Connection		Terminal block, stripped wire, AWG 28-12	
Maximal RMS current	[A]	< 6	
Maximal working voltage	[VAC]	< 240	
Maximal switchable load	[A]	< 6	
Maximal number of operating cycles	[VA]	< 600	
Required external protection		Depending on the load, additional snubber circuits may be required.	

Digital input - S4/S5 JP1:2 and JP5:6 set

Description	Unit	D-320-GF1-230 (CU 382-1)	D-320-GF3-230 (CU 382-3)
Number of inputs		2	
Connection		Terminal block, stripped wire, AWG 28-12	
Intended use		Digital input for external mechanical relay/switch	
Galvanic isolation	[kV]	none	
Maximum input frequency	[Hz]	100	
Low input voltage	[V]	< 7	
High input voltage	[V]	> 8	
Input resistance	[Ohm]	> 1000	

Digital input - S4/S5 JP1:2 and JP5:6 not set

Description	Unit	D-320-GF1-230 (CU 382-1)	D-320-GF3-230 (CU 382-3)
Number of inputs		2	
Connection		Terminal block, stripped wire, AWG 28-12	
Intended use		Digital input for external voltage output	
Galvanic isolation	[kV]	1 kV to system ground/earth	
Maximum input frequency	[Hz]	100	
High input	[Ohm]	> 2000	
Low input	[Ohm]	< 100	

Flow switch input

Description	Unit	D-320-GF1-230 (CU 382-1)	D-320-GF3-230 (CU 382-3)
Number of inputs		1	
Connection		Terminal block, stripped wire, AWG 28-12	
Intended use		For use with s::can flow detector	

Cleaning output

Description	Unit	D-320-GF1-230 (CU 382-1)	D-320-GF3-230 (CU 382-3)
Number of outputs		1	
Connection		Terminal block, stripped wire, AWG 28-12	
Intended use		For use with s::can cleaning valve B-44 or flow-cell autobrush F-446-2/F-446-1	

Sensor

Description	Unit	D-320-GF1-230 (CU 382-1)	D-320-GF3-230 (CU 382-3)
Connection		1 x Buccaneer 400 Series 1 x Terminal block, stripped wire, AWG 28-12	
Intended use		For use with s::can sensors	
Maximum load	[W]	7 (constant), < 15 (peak)	

Control unit specifications

Description	Unit	D-320-GF1-230 (CU 382-1)	D-320-GF3-230 (CU 382-3)
Housing material		Polycarbonate, RAL 9005	
Material other		Polyamide, Polyurethane, EPDM	
Weight	[kg]	1.3	
Dimensions (WxHxL)	[mm]	213 x 185 x 118	
Mains connection		1.5 mm^2, 3-wire P/N/PE, fixed installation, M20 cable-gland entry	
Mains supply voltage	[VAC]	100-240/50-60 Hz	
Power consumption (typical)	[VA]	33, cos φ = 0.66	
Power consumption (maximum)	[A]	AC inrush current: < 30 AC current: < 0.15	
Terminal connections		4 x M12 cable-gland entry (one used by flow-switch) 1 x M16 cable-gland entry	
IP rating		IP65	
Memory	[MB]	512, industrial grade SLC	
Display	[mm]	128 x 64 graphical display, 70 x 40 viewing area, transreflective, white background	
Data transfer		USB host mode support for data transfer with USB stick, Supports FAT/FAT32	
Firmware update		USB stick with FAT/FAT32 and firmware image.	
Integrated RTC		Uncertainty < 2 minutes/month at 25 °C	
Installation		A circuit breaker must be included in the installation. • The circuit breaker must be easily accessible. • The circuit breaker must be marked as the disconnecting device.	
Conformity - EMC		EN 61326-1:2013	
Conformity - safety		EN 61010-1:2010	
Conformity - RoHS2 (2011/65/EU)		EN 50581:2012	
Approvals		cTUVus, CE, CSA	

Operating conditions

Description	Unit	D-320-GF1-230 (CU 382-1)	D-320-GF3-230 (CU 382-3)
Operating temperature limits	[°C]	-20 to +45	
Humidity limits	[%]	5 to 90, non-condensing	
Maximum altitude	[m]	3000	
Manual cleaning		Clean with lukewarm water and mild detergents, such as dish-washing soap	

Storage

Description	Unit	D-320-GF1-230 (CU 382-1)	D-320-GF3-230 (CU 382-3)
Temperature limits	[°C]	-20 to +50	
Humidity limits	[%]	5 to 90, non-condensing	

12.3 Weights

DID type	Without packaging [kg]	With packaging [kg]
DID-1 BF1	4.00	7.69
DID-1 BF1-FCL2	4.26	8.10
DID-1 BF1-FCL20	4.26	8.10
DID-1 BF1-CDI2	4.26	8.10
DID-1 BF1-PH	4.25	8.09
DID-1 BF1-CND	4.25	8.09
DID-1 TI1-PH	2.08	5.88
DID-1 TI1-CND	2.08	5.88
DID-3 BF3	4.31	8.52
DID-3 BF3-FCL2/PH	4.71	8.77
DID-3 BF3-FCL20/PH	4.71	8.77
DID-3 BF3-FCL2/PH/ORP	4.96	9.17
DID-3 BF3-PA2/PH	4.71	8.77
DID-3 BF3-PA20/PH	4.71	8.77
DID-3 BF3-ORP/PH	4.70	8.76
DID-3 BF3-FCL20/PH BF1-FCL20	8.50	13.25
DID-3 BT4	5.07	9.28

12.4 Dimensions
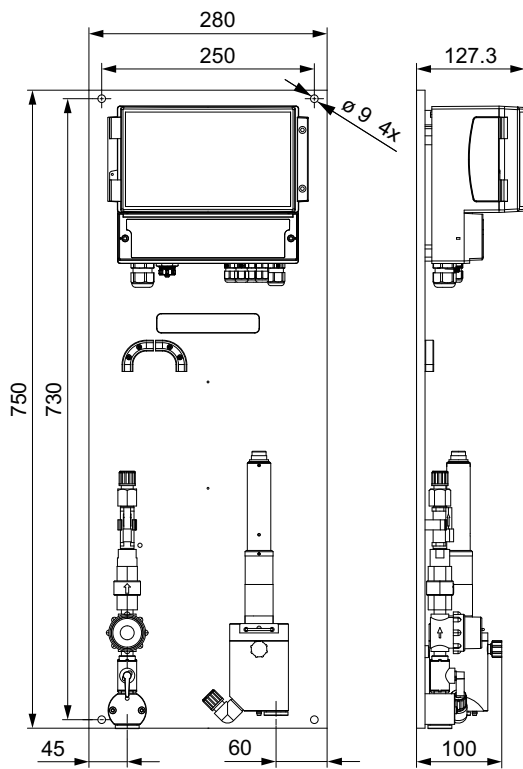
Fig. 11 Dimensions of DID with flow cell, BF1 installation variant, for 1 sensor (in mm)
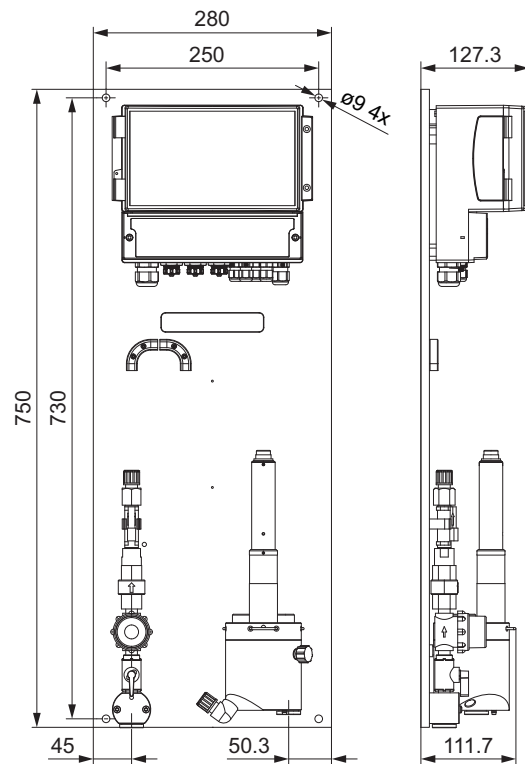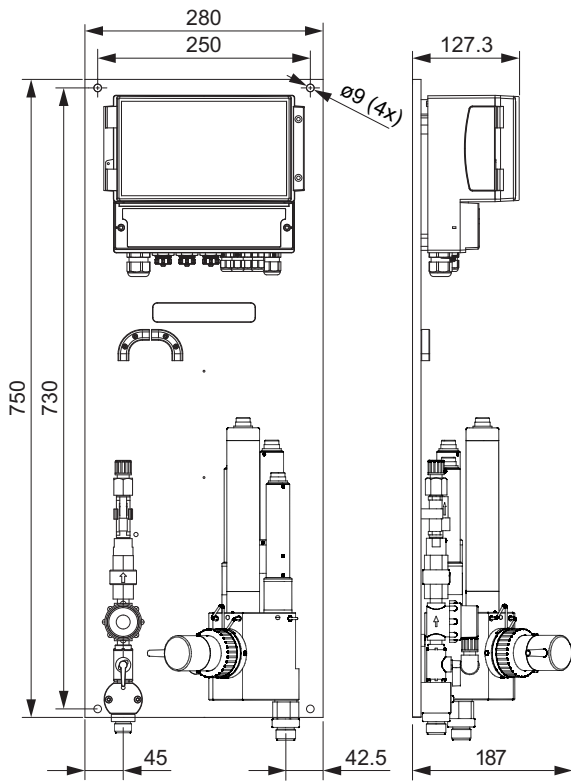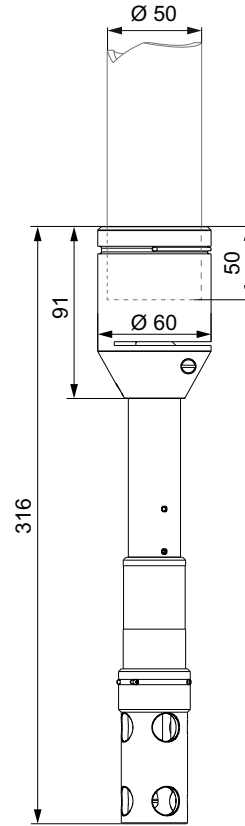

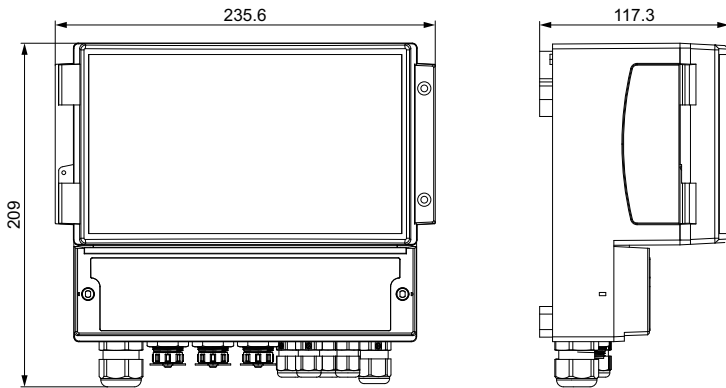**Fig. 12** Dimensions of DID with flow cell, BF3 installation variant, for up to 3 sensors (in mm)

Fig. 13 Dimensions of DID with flow cell, BT4 installation variant, for up to 3 sensors plus 1 sensor (in mm)
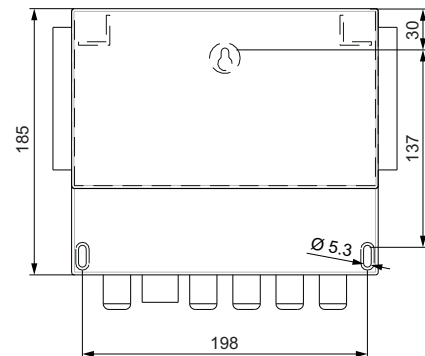

Fig. 14 Dimensions of sensor holder (in mm), pipe with outside diameter 50 mm not included

Fig. 15 Dimensions of CU 382 control unit, front, side and back (in mm)

13. Disposal

This product or parts of it must be disposed of in an environmentally sound way:

1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.

The crossed-out wheelie bin symbol on a product means that it must be disposed of separately from household waste. When a product marked with this symbol reaches its end of life, take it to a collection point designated by the local waste disposal authorities. The separate collection and recycling of such products will help protect the environment and human health.

Appendix

Modbus protocol

The Modbus protocol guide explains how to transfer results using MODBUS RTU from the con::lyte V5 slave RS-485 interface. This allows to implement the terminal to your SCADA system.

Find the Modbus protocol on Grundfos Product Center: http://net.grundfos.com/Appl/ccmsservices/public/literature/filedata/Grundfosliterature-6512070.pdf

Sensor manual

The sensor manual contains general information, safety guidelines and technical data of the s::can sensors as well as instructions for installation, calibration, functional check, maintenance and troubleshooting.

Find the manual "Sensors for DID" on Grundfos Product Center: http://net.grundfos.com/Appl/ccmsservices/public/literature/filedata/Grundfosliterature-6119622.pdf

Video instructions

The following video instructions are available on YouTube:

- **Sensor preparation:** https://www.youtube.com/watch?v=v985JRhsNUo
- **General setup:** https://www.youtube.com/watch?v=Zt7PPYcsL_8
- **Chlorine sensor calibration:** https://www.youtube.com/watch?v=A3FJoXWzX0Y
- **Controller setup:** https://www.youtube.com/watch?v=zDyBZcswh-w

GB: EC declaration of conformity

We, s::can Messtechnik GmbH, hereby declare that the product listed below, to which this Declaration of Conformity relates, is in conformity with Directives, Standards and other Normative Documents as listed.

Type of product: Measurement & Process Control
Name of product: DID
Model number: D-320-GF1-230, D-320-GF3-230

— Low Voltage Directive (2014/35/EU)
   Standard used: EN 61010-1:2010
— RoHS2 (2011/65/EU)
   Standard used: EN 50581:2012
— EMC Directive (2014/30/EU).
   Standard used: EN 61326-1:2013

Vienna, 20th March 2017

Andreas Weingartner
(Director s::can Messtechnik GmbH, Vienna)

Person authorised to compile technical file and empowered to sign the EC declaration of conformity.

YETKİLİ GRUNDFOS SERVİSLERİ

Firma	Adres	Telefon Cep telefonu Faks	İlgili Kişi Eposta
GRUNDFOS POMPA KOCAELİ	GEBZE ORGANİZE SANAYİ BÖLGESİ. İHSAN DEDE CADDESİ.2.YOL 200.SOKAK.NO:204 GEBZE KOCAELİ	0262 679 79 79 0553 259 51 63 0262 679 79 05	EMRAH ŞİMŞEK esimsek@grundfos.com
SUNPO ELEKTRİK ADANA	YEŞİLOBA MAH. 46003 SOK. ARSLANDAMI İŞ MERK. C BLOK NO:6/2-I SEYHAN ADANA	0322 428 50 14 0533 461 71 14 0322 428 48 49	LEVENT BAKIRKOL sunpo-elektrik@hotmail.com
ARDA POMPA ANKARA	26 NOLU İŞ MERKEZİ 1120.SOKAK NO:5/1,5/5 OSTİM/ANKARA	0312 385 98 93 0541 805 89 44 0312 385 8904	METİN ENGİN CANBAZ metincanbaz@ardapompa.com.tr
UĞUR SU POMPALARI ANKARA	AHİ EVRAN MAHALLESİ ÇAĞRIŞIM CADDESİ NO:2/15 SİNCAN /ANKARA	0312 394 37 52 0532 505 12 62 0312 394 37 19	UĞUR YETİŞ ÖCAL uguryetisocal@gmail.com
GROSER A.Ş. ANTALYA	ŞAFAK MAHALLESİ.5041.SOKAK.SANAYİ 28 C BLOK NO:29 KEPEZ ANTALYA	0242 221 43 43 0532 793 89 74 0242 221 43 42	DOĞAN YÜCEL servis@groseras.com
KOÇYİĞİTLER ELEKTRİK BOBİNAJ ANTALYA	ORTA MAH. SERİK CAD. NO.116 SERİK ANTALYA	0242 722 48 46 0532 523 29 34 0242 722 48 46	BİLAL KOÇYİĞİT kocyigitler@kocyigitlerbobinaj.com
TEKNİK BOBİNAJ BURSA	ALAADDİN BEY MH.624.SK MESE 5 İŞ MERKEZİ NO:26 D:10 NİLÜFER/BURSA	0224 443 78 83 0507 311 19 08 0224 443 78 95	GÜLDEN MÜÇEOĞLU gulden@tbobinaj.com.tr
ASİN TEKNOLOJİ GAZİANTEP	MÜCAHİTLER MAHALLESİ 54 NOLU SOKAK.GÜNEYDOĞU İŞ MERKEZİ NO:10/A ŞEHİTKAMİL	0342 321 69 66 0532 698 69 66 0342 321 69 61	MEHMET DUMAN mduman@asinteknoloji.com.tr
ARI MOTOR İSTANBUL	ORHANLI MESCİT MH.DEMOKRASİ CD.BİRMES SAN.SİT.A-3 BLOK NO:9 TUZLA İSTANBUL	0216 394 21 67 0532 501 47 69 0216 394 23 39	EMİN ARI aycan@arimotor.com.tr
SERİ MEKANİK İSTANBUL	SEYİTNİZAM MAH. DEMİRCİLER SİT. 7.YOL . NO:6 ZEYTİNBURNU İSTANBUL	0212 679 57 23 0532 740 18 02 0212 415 61 98	TAMER ERÜNSAL servis@serimekanik.com
DAMLA POMPA İZMİR	1203/4 SOKAK NO:2/E YENİŞEHİR İZMİR	0232 449 02 48 0532 277 96 44 0232 459 43 05	NEVZAT KIYAK nkiyak@damlapompa.com
ÇAĞRI ELEKTRİK KAYSERİ	ESKİ SANAYİ BÖLGESİ 3.CADDE NO;3-B KOCASİNAN-KAYSERİ	0352 320 19 64 0532 326 23 25 0352 330 37 36	ADEM ÇAKICI kayseri.cagrielektrik@gmail.com
MAKSOM OTOMASYON SAMSUN	19 MAYIS MAHALLESİ.642.SOKAK.NO:23 TEKKEKÖY SAMSUN	0362 256 23 56 0532 646 61 42 -	MUSTAFA SARI info@maksom.com
DETAY MÜHENDİSLİK TEKİRDAĞ	ZAFER MAHALLESİ ŞEHİT YÜZBAŞI YÜCEL KENTER CADDESİ 06/A BLOK NO:5-6 ÇORLU TEKİRDAĞ	0282 673 51 33 0549 668 68 68 0282 673 51 35	EROL KARTOĞLU erol@detay-muhendislik.com
ROTATEK ENDÜSTRİYEL TEKİRDAĞ	ZAFER MH. ŞEHİT YÜZBAŞI YÜCEL KENTER CD. YENİ SANAYİ SİTESİ 08-A BLOK NO:14 ÇORLU / TEKİRDAĞ	0282 654 51 99 0532 788 11 39 0282 654 51 81	ÖZCAN AKBAŞ ozcan@rotaendustriyel.com
İLDEM TEKNİK ISITMA VAN	ŞEREFİYE MAH ORDU CAD ARAS AP NO 75 İPEKYOLU VAN	0432 216 20 83 0532 237 54 59 0432 216 20 83	BURHAN DEMİREKİ il-dem-teknik@hotmail.com
BARIŞ BOBİNAJ K.K.T.C.	LARNAKA YOLU ÜZERİ.PAPATYA APT.NO:3-4 GAZİMAĞUSA	0542 884 06 62 0542 854 11 35 0533 884 06 62	BARIŞ KIZILKILINÇ barisbobinaj@hotmail.com

Argentina
Bombas GRUNDFOS de Argentina S.A.
Ruta Panamericana km. 37.500 Centro
Industrial Garin
1619 Garín Pcia. de B.A.
Phone: +54-3327 414 444
Telefax: +54-3327 45 3190

Australia
GRUNDFOS Pumps Pty. Ltd.
P.O. Box 2040
Regency Park
South Australia 5942
Phone: +61-8-8461-4611
Telefax: +61-8-8340 0155

Austria
GRUNDFOS Pumpen Vertrieb Ges.m.b.H.
Grundfosstraße 2
A-5082 Grödig/Salzburg
Tel.: +43-6246-883-0
Telefax: +43-6246-883-30

Belgium
N.V. GRUNDFOS Bellux S.A.
Boomsesteenweg 81-83
B-2630 Aartselaar
Tél.: +32-3-870 7300
Télécopie: +32-3-870 7301

Belarus
Представительство ГРУНДФОС в
Минске
220125, Минск
ул. Шафарнянская, 11, оф. 56, БЦ
«Порт»
Тел.: +375 17 397 397 3
        +375 17 397 397 4
Факс: +375 17 397 397 1
E-mail: minsk@grundfos.com

Bosnia and Herzegovina
GRUNDFOS Sarajevo
Zmaja od Bosne 7-7A,
BH-71000 Sarajevo
Phone: +387 33 592 480
Telefax: +387 33 590 465
www.ba.grundfos.com
e-mail: grundfos@bih.net.ba

Brazil
BOMBAS GRUNDFOS DO BRASIL
Av. Humberto de Alencar Castelo Branco,
630
CEP 09850 - 300
São Bernardo do Campo - SP
Phone: +55-11 4393 5533
Telefax: +55-11 4343 5015

Bulgaria
Grundfos Bulgaria EOOD
Slatina District
Iztochna Tangenta street no. 100
BG - 1592 Sofia
Tel. +359 2 49 22 200
Fax. +359 2 49 22 201
email: bulgaria@grundfos.bg

Canada
GRUNDFOS Canada Inc.
2941 Brighton Road
Oakville, Ontario
L6H 6C9
Phone: +1-905 829 9533
Telefax: +1-905 829 9512

China
GRUNDFOS Pumps (Shanghai) Co. Ltd.
10F The Hub, No. 33 Suhong Road
Minhang District
Shanghai 201106
PRC
Phone: +86 21 612 252 22
Telefax: +86 21 612 253 33

COLOMBIA
GRUNDFOS Colombia S.A.S.
Km 1.5 vía Siberia-Cota Conj. Potrero
Chico,
Parque Empresarial Arcos de Cota Bod.
1A.
Cota, Cundinamarca
Phone: +57(1)-2913444
Telefax: +57(1)-8764586

Croatia
GRUNDFOS CROATIA d.o.o.
Buzinski prilaz 38, Buzin
HR-10010 Zagreb
Phone: +385 1 6595 400
Telefax: +385 1 6595 499
www.hr.grundfos.com

**GRUNDFOS Sales Czechia and
Slovakia s.r.o.**
Čajkovského 21
779 00 Olomouc
Phone: +420-585-716 111

Denmark
GRUNDFOS DK A/S
Martin Bachs Vej 3
DK-8850 Bjerringbro
Tlf.: +45-87 50 50 50
Telefax: +45-87 50 51 51
E-mail: info_GDK@grundfos.com
www.grundfos.com/DK

Estonia
GRUNDFOS Pumps Eesti OÜ
Peterburi tee 92G
11415 Tallinn
Tel: + 372 606 1690
Fax: + 372 606 1691

Finland
OY GRUNDFOS Pumput AB
Trukkikuja 1
FI-01360 Vantaa
Phone: +358-(0) 207 889 500

France
Pompes GRUNDFOS Distribution S.A.
Parc d'Activités de Chesnes
57, rue de Malacombe
F-38290 St. Quentin Fallavier (Lyon)
Tél.: +33-4 74 82 15 15
Télécopie: +33-4 74 94 10 51

Germany
GRUNDFOS GMBH
Schlüterstr. 33
40699 Erkrath
Tel.: +49-(0) 211 929 69-0
Telefax: +49-(0) 211 929 69-3799
e-mail: infoservice@grundfos.de
Service in Deutschland:
e-mail: kundendienst@grundfos.de

Greece
GRUNDFOS Hellas A.E.B.E.
20th km. Athinon-Markopoulou Av.
P.O. Box 71
GR-19002 Peania
Phone: +0030-210-66 83 400
Telefax: +0030-210-66 46 273

Hong Kong
GRUNDFOS Pumps (Hong Kong) Ltd.
Unit 1, Ground floor
Siu Wai Industrial Centre
29-33 Wing Hong Street &
68 King Lam Street, Cheung Sha Wan
Kowloon
Phone: +852-27861706 / 27861741
Telefax: +852-27858664

Hungary
GRUNDFOS Hungária Kft.
Tópark u. 8
H-2045 Törökbálint,
Phone: +36-23 511 110
Telefax: +36-23 511 111

India
GRUNDFOS Pumps India Private Limited
118 Old Mahabalipuram Road
Thoraipakkam
Chennai 600 096
Phone: +91-44 2496 6800

Indonesia
PT. GRUNDFOS POMPA
Graha Intirub Lt. 2 & 3
Jln. Cililitan Besar No.454. Makasar,
Jakarta Timur
ID-Jakarta 13650
Phone: +62 21-469-51900
Telefax: +62 21-460 6910 / 460 6901

Ireland
GRUNDFOS (Ireland) Ltd.
Unit A, Merrywell Business Park
Ballymount Road Lower
Dublin 12
Phone: +353-1-4089 800
Telefax: +353-1-4089 830

Italy
GRUNDFOS Pompe Italia S.r.l.
Via Gran Sasso 4
I-20060 Truccazzano (Milano)
Tel.: +39-02-95838112
Telefax: +39-02-95309290 / 95838461

Japan
GRUNDFOS Pumps K.K.
1-2-3, Shin-Miyakoda, Kita-ku,
Hamamatsu
431-2103 Japan
Phone: +81 53 428 4760
Telefax: +81 53 428 5005

Korea
GRUNDFOS Pumps Korea Ltd.
6th Floor, Aju Building 679-5
Yeoksam-dong, Kangnam-ku, 135-916
Seoul, Korea
Phone: +82-2-5317 600
Telefax: +82-2-5633 725

Latvia
SIA GRUNDFOS Pumps Latvia
Deglava biznesa centrs
Augusta Deglava ielā 60, LV-1035, Rīga,
Tālr.: + 371 714 9640, 7 149 641
Fakss: + 371 914 9646

Lithuania
GRUNDFOS Pumps UAB
Smolensko g. 6
LT-03201 Vilnius
Tel: + 370 52 395 430
Fax: + 370 52 395 431

Malaysia
GRUNDFOS Pumps Sdn. Bhd.
7 Jalan Peguam U1/25
Glenmarie Industrial Park
40150 Shah Alam
Selangor
Phone: +60-3-5569 2922
Telefax: +60-3-5569 2866

Mexico
Bombas GRUNDFOS de México S.A. de
C.V.
Boulevard TLC No. 15
Parque Industrial Stiva Aeropuerto
Apodaca, N.L. 66600
Phone: +52-81-8144 4000
Telefax: +52-81-8144 4010

Netherlands
GRUNDFOS Netherlands
Veluwezoom 35
1326 AE Almere
Postbus 22015
1302 CA ALMERE
Tel.: +31-88-478 6336
Telefax: +31-88-478 6332
E-mail: info_gnl@grundfos.com

New Zealand
GRUNDFOS Pumps NZ Ltd.
17 Beatrice Tinsley Crescent
North Harbour Industrial Estate
Albany, Auckland
Phone: +64-9-415 3240
Telefax: +64-9-415 3250

Norway
GRUNDFOS Pumper A/S
Strømsveien 344
Postboks 235, Leirdal
N-1011 Oslo
Tlf.: +47-22 90 47 00
Telefax: +47-22 32 21 50

Poland
GRUNDFOS Pompy Sp. z o.o.
ul. Klonowa 23
Baranowo k. Poznania
PL-62-081 Przeźmierowo
Tel: (+48-61) 650 13 00
Fax: (+48-61) 650 13 50

Portugal
Bombas GRUNDFOS Portugal, S.A.
Rua Calvet de Magalhães, 241
Apartado 1079
P-2770-153 Paço de Arcos
Tel.: +351-21-440 76 00
Telefax: +351-21-440 76 90

Romania
Grundfos Pompe România SRL
S-PARK BUSINESS CENTER, Clădirea
A2,
etaj 2, Str. Tipografilor, Nr. 11-15, Sector 1,
Cod 013714, Bucuresti, Romania,
Tel: 004 021 2004 100
E-mail: romania@grundfos.ro
www.grundfos.ro

Russia
ООО Грундфос Россия
ул. Школьная, 39-41
Москва, RU-109544, Russia
Тел. (+7) 495 564-88-00 (495) 737-30-00
Факс (+7) 495 564 8811
E-mail grundfos.moscow@grundfos.com

Serbia
Grundfos Srbija d.o.o.
Omladinskih brigada 90b
11070 Novi Beograd
Phone: +381 11 2258 740
Telefax: +381 11 2281 769
www.rs.grundfos.com

Singapore
GRUNDFOS (Singapore) Pte. Ltd.
25 Jalan Tukang
Singapore 619264
Phone: +65-6681 9688
Telefax: +65-6681 9689

Slovakia
GRUNDFOS s.r.o.
Prievozská 4D
821 09 BRATISLAVA
Phona: +421 2 5020 1426
sk.grundfos.com

Slovenia
GRUNDFOS LJUBLJANA, d.o.o.
Leskoškova 9e, 1122 Ljubljana
Phone: +386 (0) 1 568 06 10
Telefax: +386 (0)1 568 06 19
E-mail: tehnika-si@grundfos.com

South Africa
Grundfos (PTY) Ltd.
16 Lascelles Drive, Meadowbrook Estate
1609 Germiston, Johannesburg
Tel.: (+27) 10 248 6000
Fax: (+27) 10 248 6002
E-mail: lgradidge@grundfos.com

Spain
Bombas GRUNDFOS España S.A.
Camino de la Fuentecilla, s/n
E-28110 Algete (Madrid)
Tel.: +34-91-848 8800
Telefax: +34-91-628 0465

Sweden
GRUNDFOS AB
Box 333 (Lunnagårdsgatan 6)
431 24 Mölndal
Tel.: +46 31 332 23 000
Telefax: +46 31 331 94 60

Switzerland
GRUNDFOS Pumpen AG
Bruggacherstrasse 10
CH-8117 Fällanden/ZH
Tel.: +41-44-806 8111
Telefax: +41-44-806 8115

Taiwan
GRUNDFOS Pumps (Taiwan) Ltd.
7 Floor, 219 Min-Chuan Road
Taichung, Taiwan, R.O.C.
Phone: +886-4-2305 0868
Telefax: +886-4-2305 0878

Thailand
GRUNDFOS (Thailand) Ltd.
92 Chaloem Phrakiat Rama 9 Road,
Dokmai, Pravej, Bangkok 10250
Phone: +66-2-725 8999
Telefax: +66-2-725 8998

Turkey
GRUNDFOS POMPA San. ve Tic. Ltd. Sti.
Gebze Organize Sanayi Bölgesi
Ihsan dede Caddesi,
2. yol 200. Sokak No. 204
41490 Gebze/ Kocaeli
Phone: +90 - 262-679 7979
Telefax: +90 - 262-679 7905
E-mail: satis@grundfos.com

Ukraine
Бізнес Центр Європа
Столичне шосе, 103
м. Київ, 03131, Україна
Телефон: (+38 044) 237 04 00
Факс.: (+38 044) 237 04 01
E-mail: ukraine@grundfos.com

United Arab Emirates
GRUNDFOS Gulf Distribution
P.O. Box 16768
Jebel Ali Free Zone
Dubai
Phone: +971 4 8815 166
Telefax: +971 4 8815 136

United Kingdom
GRUNDFOS Pumps Ltd.
Grovebury Road
Leighton Buzzard/Beds. LU7 4TL
Phone: +44-1525-850000
Telefax: +44-1525-850011

U.S.A.
GRUNDFOS Pumps Corporation
9300 Loiret Blvd.
Lenexa, Kansas 66219
Phone: +1-913-227-3400
Telefax: +1-913-227-3500

Uzbekistan
Grundfos Tashkent, Uzbekistan The
Representative Office of Grundfos
Kazakhstan in Uzbekistan
38a, Oybek street, Tashkent
Телефон: (+998) 71 150 3290 / 71 150
3291
Факс: (+998) 71 150 3292

Addresses Revised 09.09.2020

be think innovate

99037650 11.2020

ECM: 1291846

www.grundfos.com

GRUNDFOS