Complete operating instructions

Multi-Channel Measuring and Control System DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa

A0204

Please enter the identity code of your device here! DXCa _ _ _ _ _ _ _ _ _ _ _ _ _

Please carefully read these operating instructions before use! · Do not discard!
The operator shall be liable for any damage caused by installation or operating errors!
Technical changes reserved.

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General non-discriminatory approach

In order to make it easier to read, this document uses the male form in grammatical structures but with an implied neutral sense. It is aimed equally at both men and women. We kindly ask female readers for their understanding in this simplification of the text.

Supplementary information

Read the following supplementary information in its entirety!

The following are highlighted separately in the document:

- Enumerated lists

Instructions

⇨ Results of the instructions

Information

> *This provides important information relating to the correct operation of the system or is intended to make your work easier.*

Safety information

Safety information are provided with detailed descriptions of the endangering situation, see *Chapter 2.1 'Explanation of the safety information' on page 15*

Overall Table of Contents

Assembly instructions

Multi-Channel Measuring and Control System
DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa

Part 1: Assembly and installation

A0507

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Further applicable documents

These operating instructions and supplementary instructions are only valid in combination with the following operating and supplementary instructions:

- Multi-channel measuring and control system operating instructions DULCOMARIN® II , Swimming Pool Controller and Disinfection Controller DXCa Part 2: Operation
- Supplementary instructions DULCOMARIN® II, Screen plotter operation
- Supplementary instructions DULCOMARIN® II, M-Module (measuring module for pH, redox [ORP], temperature) DXMaM connection
- Supplementary instructions DULCOMARIN® II, A-Module (control module, pump and standard signal outputs mA) DXMaA
- Supplementary instructions DULCOMARIN® II, N-Module (power supply module without relay) DXMaN
- Supplementary instructions DULCOMARIN® II, P-Module (power supply module with relay) DXMaP
- Supplementary instructions DULCOMARIN® II, I-Module (current input module, standard signal inputs mA) DXMaI

Table of contents

1 Device identification / identity code

The identity code describes the DULCOMARIN® II, compact controller

[1)] The supplied cable is for connection to a hub, switch, router or an intranet.

For direct connection of the DULCOMARIN® II to a PC/ MAC, the supplied LAN coupling and category 5 cross-over cable are required.

The maximum LAN cable length is approximately 100 m.

To operate the web server on a PC we recommend Microsoft® Internet Explorer 5 or higher as the browser.

The scope of supply of the DXCa includes:

- *1 T-coupler*
- *1 CAN connection cable*
- *1 terminating resistance coupling and 1 terminating resistance plug*
- *1 SD memory card 64 MB or greater*
- *1 card reader suitable for PCs*

DXCa	Multi-channel measuring and control system - DULCOMARIN® II Series DXC						
							Mounting type:
	W						Wall mounted (IP 65)
	S						Control cabinet (IP 54)
							Version:
		0					With operating elements
		D					With operating elements for use in drinking water/disinfection applications
							Communication interfaces:
			0				none
			5				Embedded Web-Server, LAN incl. 5 m LAN patch cable 1:1, LAN coupling, 5 m cross-over cable [1)]
			6				OPC-Server + Embedded Web-Server, LAN incl. 5 m LAN patch cable 1:1, LAN coupling, 5 m cross-over cable [1)]
							Option:
				1			Screen plotter with data logger incl. SD card and USB card reader for PC
							Module 1:
					M		M module, measuring module pH, redox, temperature
					I		I module, current input module, 3x mA, 0/4 ... 20 mA
							Module 2:
						0	not occupied
						A	A module, control module: 3 pumps and 4 analog outputs

DXCa	Multi-channel measuring and control system - DULCOMARIN® II Series DXC									
						I	I module, current input module, 3x mA, 0/4 ... 20 mA			
								Application:		
							S	Swimming Pools		
							D	Disinfection, general		
									Preset language:	
								DE	German	
								EN	English	
								ES	Spanish	
								FR	French	
								IT	Italian	
								PL	Polish	
										Certification:
									01	CE mark

The identity code describes the complete DULCO-MARIN® II DULCO® Net Central Unit.

If the central unit is populated with modules, then the following applies:

Module 1 preferably as M module

Module 2 preferably allocated to the A module.

Module 3 must always be allocated to the P or N module.

1) Module 1 preferably as M module

2) only in version: "2" without controls

DXCa	Multi-channel measuring and control system - DULCOMARIN® II Series DXC			
		Mounting type:		
	W	Wall mounted (IP 65)		
	S	Control cabinet (IP 54)		
			Version:	
		0	With operating elements	
		2	Without operating elements	
				Communication interfaces:
			0	none
			5	Embedded Web-Server, LAN incl. 5 m LAN patch cable 1:1, LAN-coupling, 5 m cross-over-cable 1)
			6	OPC-Server + Embedded Web-Server, LAN incl. 5 m LAN patch cable 1:1, LAN-coupling, 5 m cross-over-cable 1)

DXCa	Multi-channel measuring and control system - DULCOMARIN® II Series DXC
	Option:
0	Without screen plotter [2)]
1	Screen plotter with data logger incl. SD card and USB card reader for PC
	Module 1:
0	not occupied
M	M module, measuring module pH, redox, temperature
A	A module, control module: 3 pumps and 4 analog outputs
I	I module, current input module, 3x mA, 0/4 ... 20 mA
	Module 2:
0	not occupied
A	A module, control module: 3 pumps and 4 analog outputs
M	M module, measuring module: pH, redox, temperature
I	I module, current input module, 3x mA, 0/4 ... 20 mA
	Module 3:
0	not occupied
P	P module, power supply, 1 alarm relay, 3 solenoid valve relays
N	N module, power supply without relay
A	A module, control module: 3 pumps and 4 analog out-puts
M	M module, measuring module: pH, redox, temperature
	Application:
S	Swimming Pools
D	Disinfection, general
	Preset language:
DE	German
EN	English
ES	Spanish
FR	French
IT	Italian
PL	Polish
	Certification:
01	CE mark

2 Introduction

The operating instructions describe the technical data and functions of the multi-channel measuring and control system DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa. The operating instructions subsequently refer to the system merely as DXCa.

2.1 Explanation of the safety information

Introduction

These operating instructions provide information on the technical data and functions of the product. These operating instructions provide detailed safety information and are provided as clear step-by-step instructions.

The safety information and notes are categorised according to the following scheme. A number of different symbols are used to denote different situations. The symbols shown here serve only as examples.

DANGER!

Nature and source of the danger

Consequence: Fatal or very serious injuries.

Measure to be taken to avoid this danger

Danger!

– Denotes an immediate threatening danger. If this is disregarded, it will result in fatal or very serious injuries.

WARNING!

Nature and source of the danger

Possible consequence: Fatal or very serious injuries.

Measure to be taken to avoid this danger

Warning!

– Denotes a possibly hazardous situation. If this is disregarded, it could result in fatal or very serious injuries.

CAUTION!

Nature and source of the danger

Possible consequence: Slight or minor injuries, material damage.

Measure to be taken to avoid this danger

Caution!

– Denotes a possibly hazardous situation. If this is disregarded, it could result in slight or minor injuries. May also be used as a warning about material damage.

NOTICE!
Nature and source of the danger
Damage to the product or its surroundings

Measure to be taken to avoid this danger

Note!

– Denotes a possibly damaging situation. If this is disregarded, the product or an object in its vicinity could be damaged.

Type of information
Hints on use and additional information

Source of the information, additional measures

Information!

– *Denotes hints on use and other useful information. It does not indicate a hazardous or damaging situation.*

2.2 Users' qualifications

WARNING!
Danger of injury with inadequately qualified personnel!
The operator of the plant / device is responsible for ensuring that the qualifications are fulfilled.

If inadequately qualified personnel work on the unit or loiter in the hazard zone of the unit, this could result in dangers that could cause serious injuries and material damage.

– All work on the unit should therefore only be conducted by qualified personnel.
– Unqualified personnel should be kept away from the hazard zone

Training	Definition
Instructed personnel	An instructed person is deemed to be a person who has been instructed and, if required, trained in the tasks assigned to him/her and possible dangers that could result from improper behaviour, as well as having been instructed in the required protective equipment and protective measures.
Trained user	A trained user is a person who fulfils the requirements made of an instructed person and who has also received additional training specific to the system from ProMinent or another authorised distribution partner.
Trained qualified personnel	A qualified employee is deemed to be a person who is able to assess the tasks assigned to him and recognize possible hazards based on his/her training, knowledge and experience, as well as knowledge of pertinent regulations. The assessment of a person's technical training can also be based on several years of work in the relevant field.

Training	Definition
Electrician	Electricians are deemed to be people, who are able to complete work on electrical systems and recognize and avoid possible hazards independently based on his/her technical training and experience, as well as knowledge of pertinent standards and regulations. Electricians should be specifically trained for the working environment in which the are employed and know the relevant standards and regulations. Electricians must comply with the provisions of the applicable statutory directives on accident prevention.
Customer Service department	Customer Service department refers to service technicians, who have received proven training and have been authorised by ProMinent to work on the system.

Note for the system operator

The pertinent accident prevention regulations, as well as all other generally acknowledged safety regulations, must be adhered to!

3 Safety and responsibility

3.1 General safety information

WARNING!

Unexpected start-up

The DULCOMARIN® II has no on/off switch. It starts working as soon as voltage is supplied to the mains cable.

Possible consequence: Fatal or very serious injuries

- Measure: Ensure that there can be no unauthorised access to the device
- Match your actions to this particular feature
  - Only connect the device to the mains if all preparatory tasks have been completed and the device can be placed in service without any danger

WARNING!

Possibility of overdosing of feed chemicals

Prevent overdosing of feed chemicals in the event of sensor failure or removal.

Possible consequence: Fatal or very serious injuries

- Measure: Configure your processes so that uncontrolled dosing during sensor selection or malfunction is not possible

WARNING!

Maintenance of the degree of protection

Screw the transparent interface cover in place over the LEDs so that leak-tightness is recreated, if it has been opened.

Otherwise the IP 65 rating is not achieved.

CAUTION!

Only use the devices which are described in these operating instructions with CANopen third party devices which are certified.

3.2 Correct and proper use

NOTICE!

Compensation for control deviations

Damage to the product or its surroundings

- The controller can be used in processes, which require compensation of > 30 seconds

NOTICE!

Correct and proper use

The unit is intended to measure and regulate liquid media. The marking of the measured variables is located on the controller and is absolutely binding.

The unit may only be used in accordance with the technical details and specifications provided in this operating manual and in the operating manuals for the individual components (such as, for example, sensors, fittings, calibration devices, metering pumps etc.).

Any other uses or modifications are prohibited.

4 Planning aids and requirements for the installation site

Ambient conditions

CAUTION!

Protect the module against moisture and the effects of chemicals, even while still packaged.

The DULCOMARIN® II is resistant to the normal atmospheres in plant rooms

Store and transport the module it its original packaging.

Ambient conditions for storage and transportation:

- Temperature: -10 °C ... 70 °C
- Max. permissible relative humidity: 95 %, non-condensing (DIN IEC 60068-2-30)

Ambient conditions for operation:

- Temperature: 0 °C ... 50 °C
- Max. permissible relative humidity: 95 %, non-condensing (DIN IEC 60068-2-30)

4.1 Requirements for the installation site

- Do not position the DULCOMARIN® II outside
- Protect the DULCOMARIN® II against sun and frost
- Secure the DULCOMARIN® II against unauthorized access
- A mains connection is necessary

4.2 Determine the requirement for cables and accessories

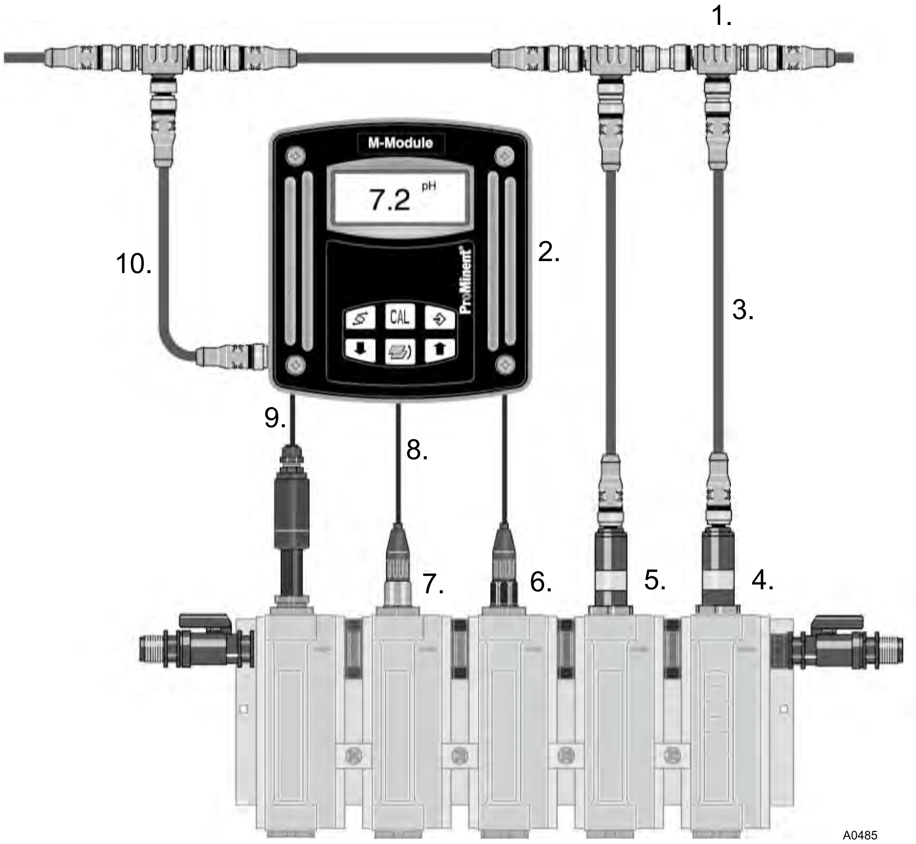


Fig. 1: A typical complete measuring point could appear as shown:

Item.	Quantity	Description	Part no.
1	3	T-coupler M12 5-pole CAN	1022155
2	1	M module DXMa M W 0 S DE 01	
3	4	Connecting cable - CAN, M12, 5 pole, 0.5 m	1022137
4	1	Chlorine sensor CLE 3.1-CAN-10 ppm	1023426
5	1	Chlorine sensor CTE 1 CAN-10 ppm	1023427
6	1	Redox sensor RHES-Pt-SE	150703
7	1	pH sensor PHES 112 SE	150702
8		Coaxial cable 2 m - SN6 - pre-assembled	1024106
9	2	Control lead 2 x 0.25 mm^2	725122
10	2	Connecting cable - CAN, M12, 5 pole, 0.5 m	1022137
-	1	In-line probe housing DGMa 3 2 2 T 0 0 0	
The central unit and each external module includes enclosed accessories.			

Fig. 2: Central unit DXCa

Accessories, supplied

Item.	Quantity	Description	Part no.
1	1	Connecting cable - CAN, M12, 5 pole, 0.5 m	1022137
2	1	T-coupler, M12,5-pole CAN	1022155
-	1	Terminating resistance M12 socket *[male]*	1022154
-	1	Terminating resistance M 12 plug *[female]*	1022592

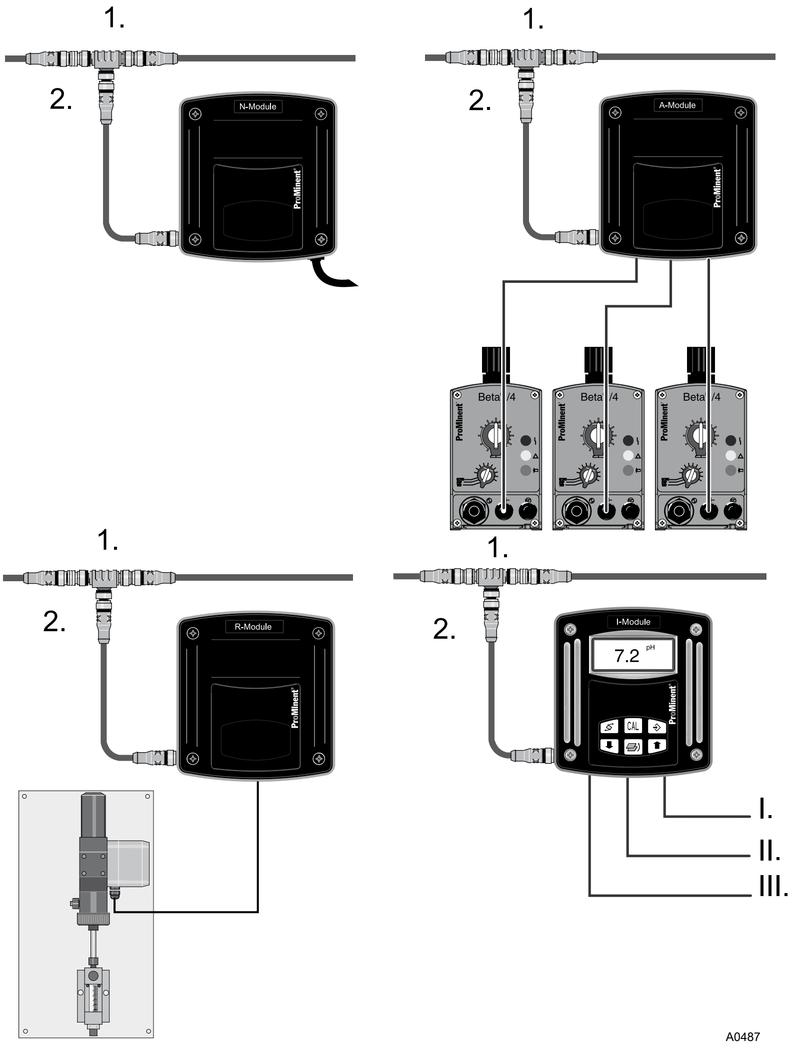


Fig. 3: External modules DXMa

Accessories, supplied

Item.	Quantity	Description	Part no.
1	1	T-coupler, M12,5-pole CAN	1022155
2	1	Connecting cable - CAN, M12, 5 pole 0.5 m	1022137

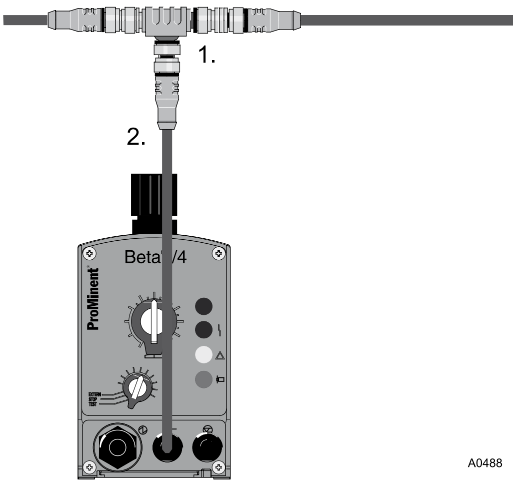


Fig. 4: Beta/4 CANopen

Accessories, supplied

Item.	Quantity	Description	Part no.
1	1	T-coupler, M12,5-pole CAN	1022155
2	1	Connecting cable - CAN, M12, 5 pole 1 m	1022139

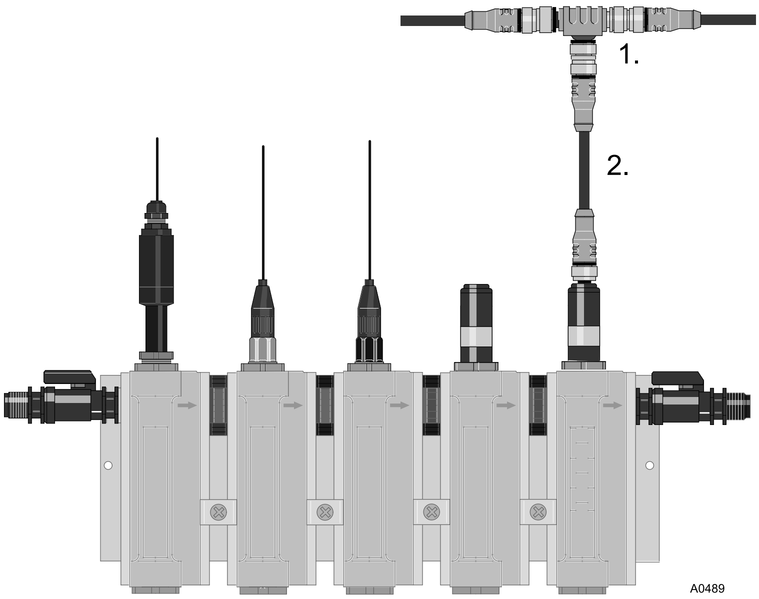


Fig. 5: Sensors DXUa

Accessories, supplied

Item.	Quantity	Description	Part no.
1	1	T-coupler, M12,5-pole CAN	1022155
2	1	Connecting cable - CAN, M12, 5 pole 0.5 m	1022137

1. Determine the requirement for power supply modules, see ↯ *Chapter 4.3 'Allocate power supply modules (DULCO-MARIN® II DULCO-Net)' on page 25*
2. Determine the requirement for connection cables between the external modules
3. Determine the requirement for holding clamps for the connection cables (ASV pipe clips, 16 mm, order no. 359904

4.3 Allocate power supply modules (DULCOMARIN® II DULCO-Net)

Determine the number of additionally required power supply modules (N modules and P modules).

1. Ensure that for each power supply module there is a power outlet

> *The distance between the power supply modules should not exceed 50 m.*

2. Distribute the power supply modules as uniformly as possible over the CAN bus line.
3. With an A module with connected plotters: arrange one of the power supply modules as close as possible to the A module

Locate the power supply module in the CAN bus backbone (main line) (DULCOMARIN® II DULCO-Net)

The central unit always contains a power supply module.

Number of pools	Additional N- or P-modules	Number of pools	Additional N- or P-modules
1	-	9	4
2	-	10	5
3	1	11	5
4	2	12	6
5	2	13	6
6	3	14	7
7	3	15	7
8	4	16	8
Divide the number of pools by *'2'*. If a remainder is obtained, round down: (Exception: number of pools = 2)			

4.4 Routing the CAN bus backbone

CAUTION!

Maximum backbone length

Possible consequence: Malfunctions.

– The maximum backbone length (without branching cables) must be less than 400 m

CAUTION!

Maximum length of branching cables

Possible consequence: Malfunctions.

The T-pieces and connecting cables (branching cables) enclosed with the modules (M-, A-, G-, N-, R-, I- modules, CAN sensors and metering pumps with CAN bus must be used.

Branching cables are the connections branching from the CAN bus backbone to the modules.

The external modules can be placed in any sequence along the CAN bus backbone. The operating instructions show for example possible sequences of the external modules.

Each CAN cable has a plug or coupling on each end so that these can be coupled together in sequence to create longer cables.

Rule

Arrange the external modules in groups for each pool.

First assemble and install the external modules and their attachments. Only then should you connect the external modules with the CAN bus backbone and with each other via the the shortest route.

Description	Part no.
Connecting cable - CAN, M12, 5 pole, 0.5 m	1022137
Connecting cable - CAN, M12, 5 pole, 1 m	1022139
Connecting cable - CAN, M12, 5 pole, 2 m	1022140
Connecting cable - CAN, M12, 5 pole, 5 m	1022141
Connecting cable - CAN sold by the metre	1022160

5 Assembly and installation

5.1 Procedure with DXC housing (large)

The DXC housing is suitable for mounting on a wall or in a control panel

5.1.1 Wall mounting

Mounting materials (contained in the scope of delivery)

- 1 x wall bracket
- 4 x PT screws 5 x 35 mm
- 4 x washers 5.3
- 4 x rawl plug Ø 8 mm, plastic

Wall mounting

Take the wall bracket out of the DXC housing

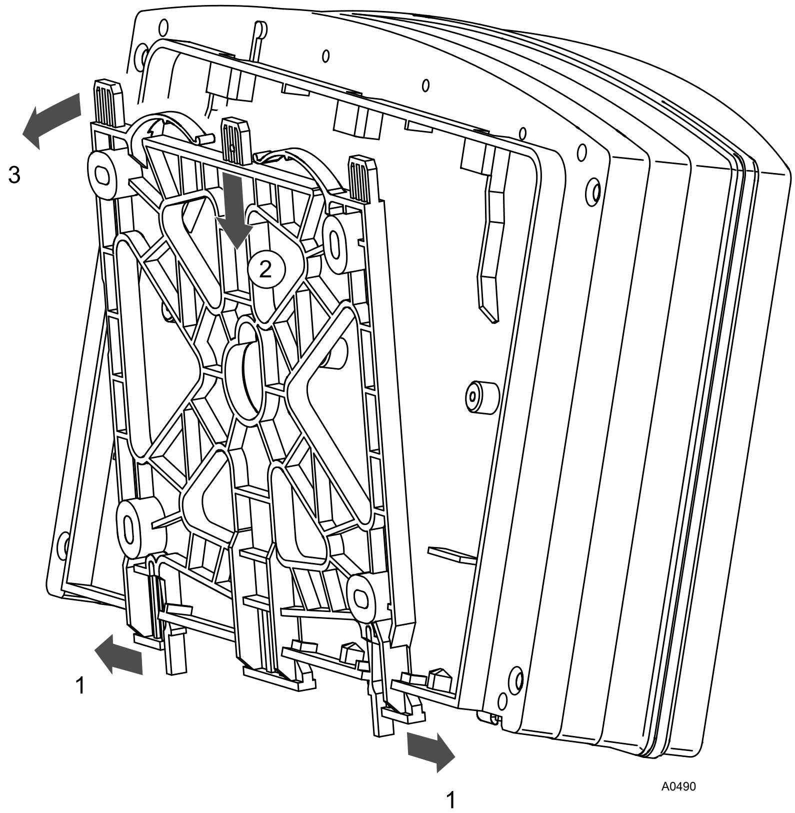


Fig. 6: Removing the wall bracket

1. Pull the two snap hooks (1) outwards

   ⇨ The wall brackets snaps slightly downwards.

2. Push the wall bracket downwards (2) from the DXC housing and fold (3) it out

3. Use the wall bracket as a drilling template to mark the positions of four drill holes

4. Drill the holes: Ø 8 mm, d = 50 mm

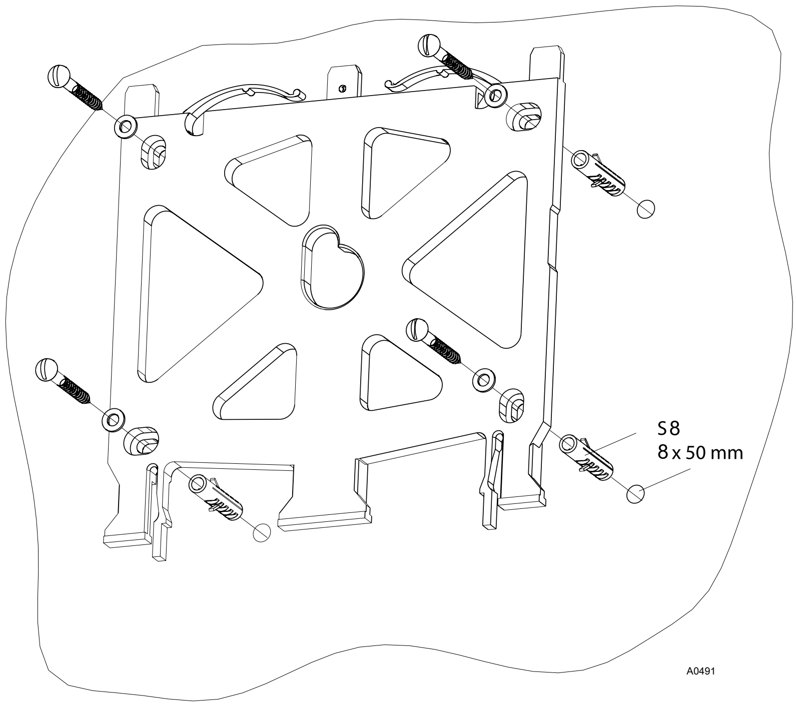


Fig. 7: Fitting the wall bracket

5. Screw the wall bracket into position using the washers, see Fig. 7

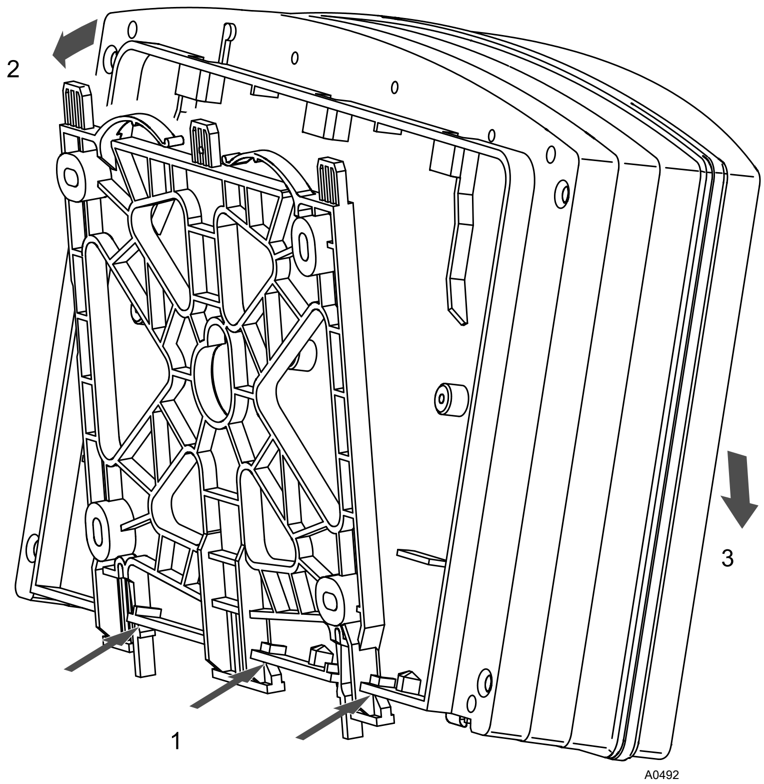


Fig. 8: Fitting the wall bracket

6. Hook the bottom of the DXC housing (1) into the wall bracket
7. Lightly press the DXC housing at the top (2) against the wall bracket
8. Then check that the DXC housing is hooked in at the top and press down (3) until it audibly engages

5.1.2 Control panel mounting

CAUTION!

Thickness of the control panel

The control panel must be sufficiently thick to ensure that after fitting it does not bend. With steel panels it must be at least 2 mm thick; select plastic correspondingly thicker.

Only in this way can the IP 54 rating be attained.

When fitted, the DXC housing extends approx. 45 mm from the control panel. A drilling template is enclosed.

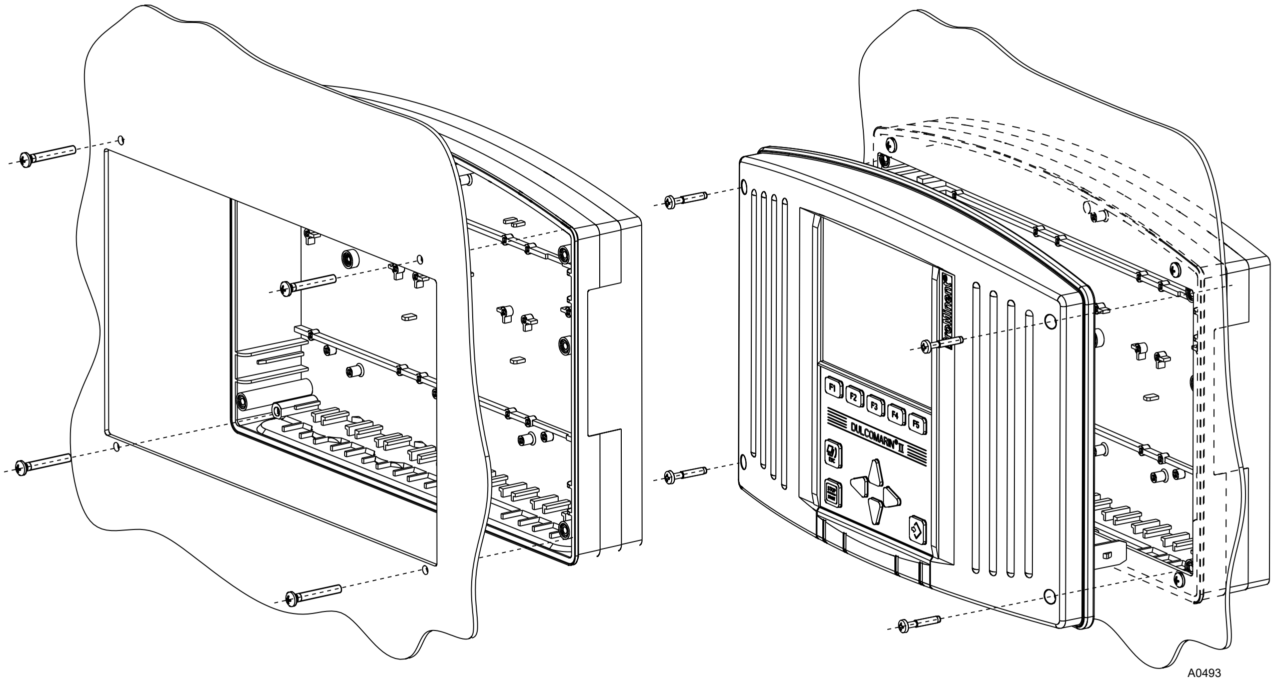


Fig. 9: Control panel mounting

1. Establish the exact position of the DXC housing using the drilling template on the control panel and secure it
2. Mark the holes for the attachment screws using a centre punch and the drilling holes for the cut-out using the drilling template
3. Drill four securing holes using a 5 mm Ø drill bit

CAUTION!

Take care not to cut yourself on the resulting edges.

4. Either punch the cut-out out or drill four inner holes using a 5 mm Ø drill bit and then cut the cut-out using a jigsaw
5. De-burr the resulting edges
6. Undo the four housing screws
7. Lift the front part out and disconnect the P module ribbon cable

8. Remove the front part
9. Now break out the necessary threaded holes of the lower series, see *Chapter 5.1.3 'Installation (electrical)' on page 30*
10. Screw the back part to the control panel (using the supplied PT screws)
11. Plug the ribbon cable back on
12. Move the front part into the *'park position'*
    ⇨ Now first electrically install the DULCOMARIN® II and then complete the control panel mounting.
13. Place the front part on the rear part of the DXC housing and screw it in
14. CAUTION!
    Protection class IP 54
    Once again check the seating of the seal. Protection class IP 54 is only achieved if the control panel mounting is correct.

5.1.3 Installation (electrical)

WARNING!

Failure of the circulating pumps

In the event that the circulating pump fails, it is not sufficient to use the sample water limit contact of the in-line probe housing on its own in order to stop the control for the corresponding pool (contact K1 of the M module).

The pool controller must also be set to Pause using the contact K2 *'Pause control '* of the M module.

Suitable triggers are:

- the zero volt contact of the filter control
- the zero volt contact of the circulation pump's motor protection switch
- a flow monitor in the circulation line

WARNING!

Safe operating status

Both hardware and software safety precautions must be taken to ensure that the DULCOMARIN® II adopts a safe operating status in the event of a fault. E.g. use limit switches, mechanical locks, ...

During installation the device must not be electrically live.

The installation must only be carried out by technically trained personnel.

Observe the technical data in these instructions.

NOTICE!

Cable strain relief

With control panel mounting, the cables must be routed in a site-provided cable duct to ensure strain relief.

1. Plan which threaded holes shall be broken out (mark the desired threaded holes)

CAUTION!

When breaking open the threaded holes, avoid pushing the screwdriver deep into the housing. Parts inside the device could be damaged.

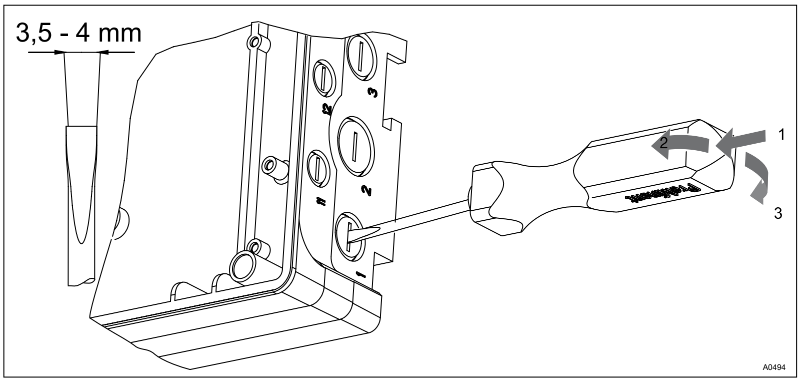


Fig. 10: Breaking out threaded holes

2. To break out the threaded holes, punch the slit in the middle of the threaded holes using a screwdriver (tip width 3.5 - 4 mm, see Fig. 10) and lever the material out

3. De-burr the resulting edges

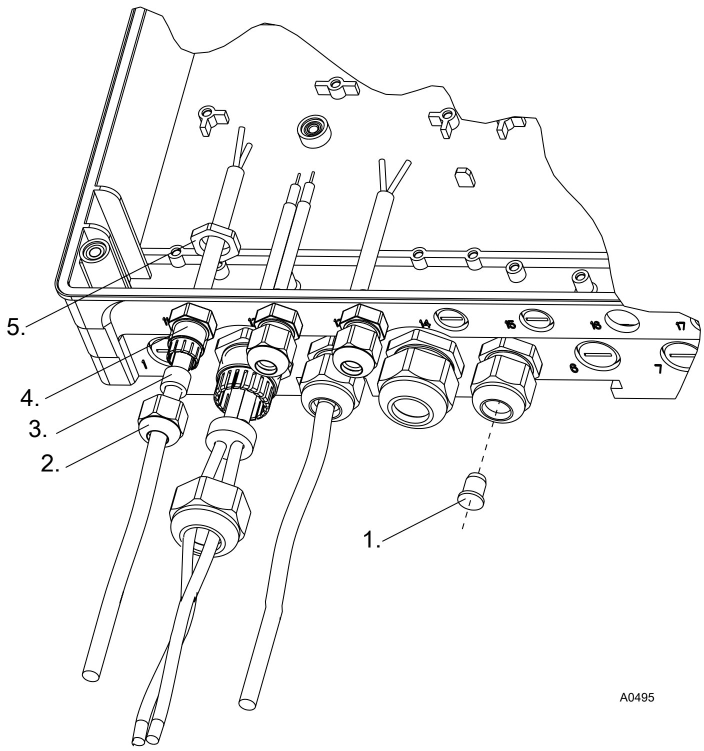


Fig. 11: Fitting the threaded cable glands

1. Blanking plug
2. Union nut
3. Multiple seal insert
4. Threaded cable gland
5. Lock nut

4. Screw in the appropriate threaded cable glands (4) using suitable lock nuts (5) and tighten firmly
5. Insert multiple seal inserts (3) depending on the cable diameter being used
6. Guide the cables into the threaded cable glands
7. Further steps are contained in ↯ *Chapter 5.1.4 'Connect the coaxial cable' on page 33* and ↯ *Chapter 5.1.5 'Connecting the terminals' on page 33*.
8. Tighten the union nuts (2) of the threaded cable glands so that they are properly sealed
9. Place the front part on the rear part
10. Manually tighten the four housing screws
11. CAUTION!

    Protection class IP 54

    Once again check the seating of the seal. Protection class IP 54 is only achieved if the control panel mounting is correct.

5.1.4 Connect the coaxial cable

The pH or redox sensor is connected using a coaxial cable

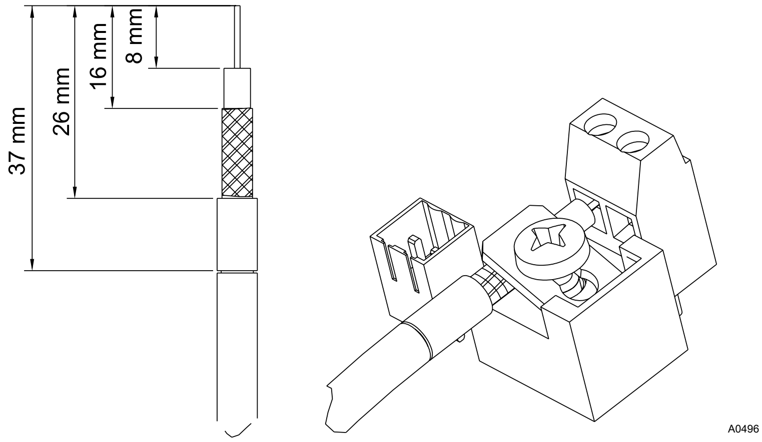


Fig. 12: Removing the cable insulation

1. Uncover the cable shielding according to Fig. 12
2. Tightly clamp the shielding

5.1.5 Connecting the terminals

> *The wiring diagram is contained in the appendix.*
>
> *Additionally there is an info field on the modules adjacent to the terminals containing connection information.*

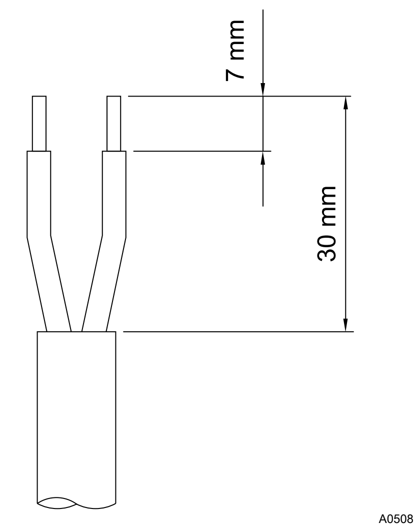


Fig. 13: Removing the cable insulation

1. Remove the insulation from the fork ends according to Fig. 13 and press on the corresponding cable end sleeves
2. Pull off the terminal blocks P1 to P4 for installation
3. To fit the cable, push the supplied screwdriver right into the square opening of the corresponding terminal in order to plug the cable end into the terminal block
4. Connect the cables according to the wiring diagram
5. Push the pulled-off terminal blocks back onto the circuit board after connecting the cables

6. Check the cabling using the wiring diagram

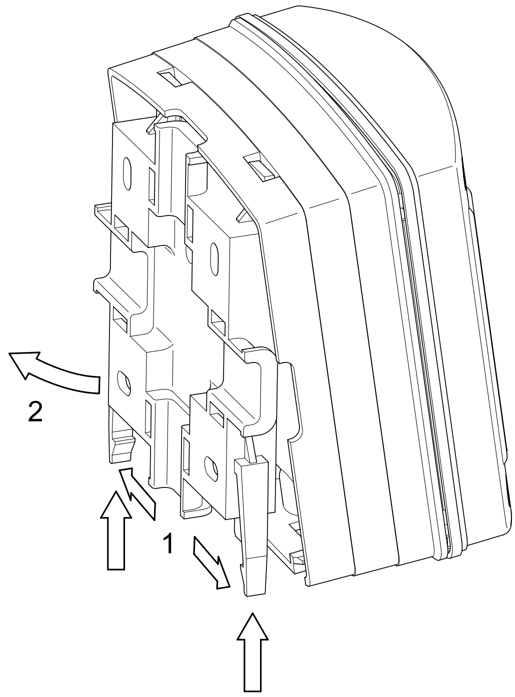
5.2 Procedure with DXM housing (small)

5.2.1 Mounting (mechanical)

For wall mounting, please observe the following steps:

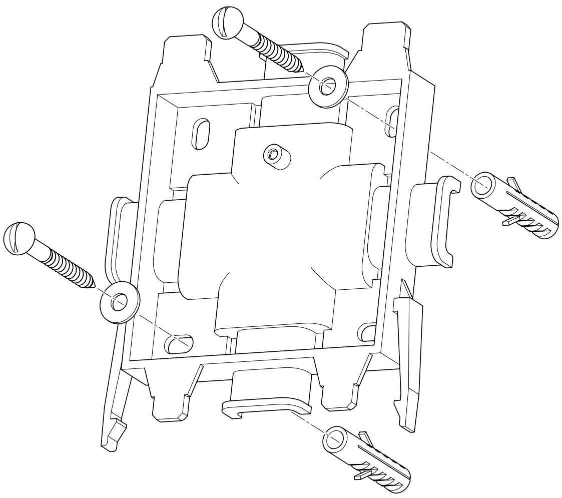
Mounting materials (contained in the scope of delivery):

- 1 x wall/pipe bracket
- 2 x half-round head screws 5x45 mm
- 2 x washers 5.3
- 2 x rawl plug Ø 8 mm, plastic
- 1 x sealing cap
- 1 x safety screw (PT)



A0273

1. Remove the wall/pipe bracket from the DXM
2. Pull the two snap hooks outwards and push them upwards (1)
3. Fold the wall/pipe bracket away and pull it out (2) in a downwards direction
4. Mark two drill holes diagonal to each other by using the wall/pipe bracket as a drilling template
5. Drill the holes: Ø 8 mm, d = 50 mm



A0274

6. Tighten the wall/pipe bracket
7. Hook in the housing at the top in the wall/pipe bracket and push it using light pressure at the bottom against the wall/pipe bracket. Then press the housing upwards, until it audibly engages

5.2.2 Installation (electrical)

WARNING!

Safe operating status

During installation the device must not be electrically live.

The installation must only be carried out by technically trained personnel.

Observe the technical data in these instructions.

NOTICE!

Cable strain relief

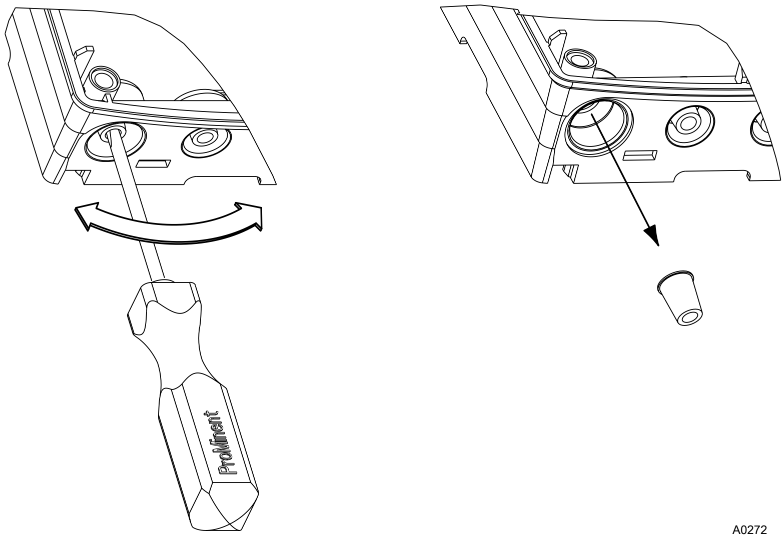
With control panel mounting, the cables must be routed in a site-provided cable duct to ensure strain relief.

For wall mounting

1. Undo the four housing screws.
2. NOTICE!

   The hinge between the front and rear part of the housing cannot absorb high mechanical loading. When working on the front part of the housing you must support it.

   Raise the front part slightly forwards and then fold out to the left.



3.

> *The large threaded cable gland (M20 x 1.5) is only for use with the coaxial cable.*

Punch out as many threaded holes on the bottom side of the rear part as required

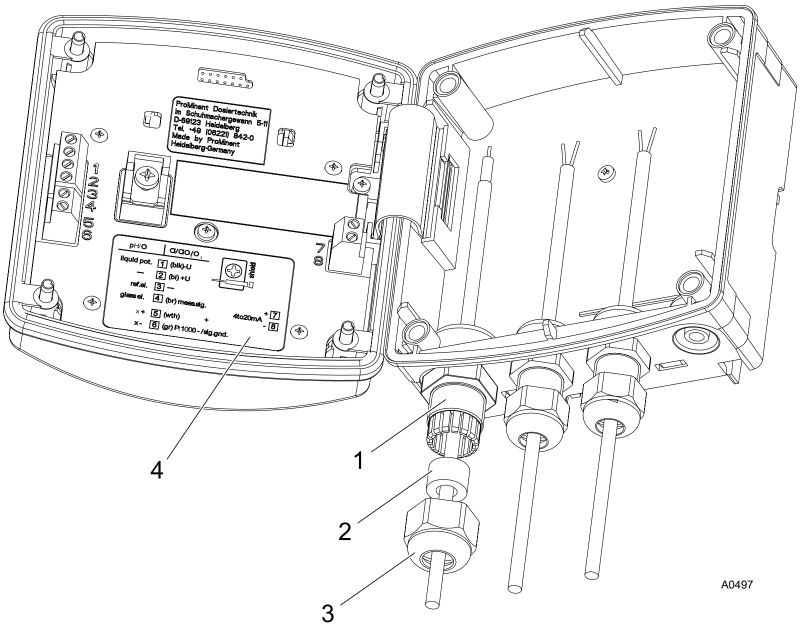


Fig. 14

1. Threaded cable gland
2. Reducing insert
3. Clamping nut
4. Terminal diagram

4. Screw the corresponding threaded cable glands (1) in and tighten

5. Insert the reducing inserts (2) in the threaded cable glands according to the cable cross section used

6. Guide the cables into the threaded cable glands

7. Further steps are contained in ↪ *Chapter 5.1.4 'Connect the coaxial cable' on page 33* and ↪ *Chapter 5.1.5 'Connecting the terminals' on page 33*

⇨ Thereafter please continue with the following steps:

8. Tighten the union nuts (3) of the threaded cable glands so that they are properly sealed

9. Fold the front part onto the rear part

10. NOTICE!

Protection class IP 65

Once again check the seating of the seal. Protection class IP 65 is only achieved if the control panel mounting is correct.

As necessary, pull the front part slightly forwards to relieve the strain on the seal.

Manually tighten the housing screws

For control panel mounting (internal module)

NOTICE!

Cable strain relief

With control panel mounting, the cables must be routed in a site-provided cable duct to ensure strain relief.

Connect the cables as follows: ↪ *Chapter 5.1.4 'Connect the coaxial cable' on page 33* and ↪ *Chapter 5.1.5 'Connecting the terminals' on page 33*

5.3 install the CAN bus cable

CAUTION!

Maximum backbone length

Possible consequence: Malfunctions.

– The maximum backbone length (without branching cables) must be less than 400 m

CAUTION!

Maximum length of branching cables

Possible consequence: Malfunctions.

The T-pieces and connecting cables (branching cables) enclosed with the modules (M-, A-, G-, N-, R-, I- modules, CAN sensors and metering pumps with CAN bus must be used.

Branching cables are the connections branching from the CAN bus backbone to the modules.

5.3.1 Connections outside the housing

CAUTION!

T-coupling

Never connect a T-coupling directly to the housing. The panel plug at the housing can break off.

CAUTION!

IP65 protection rating

Screw in the CAN cable threaded cable glands by hand up to the stop. Otherwise the IP65 rating is not achieved.

NOTICE!

Sequentially screw together the individual parts of the CAN bus line starting from one side. Otherwise it can occur that at one or several points socket is aligned with socket or plug with plug.

CAN devices always have plugs, never sockets.

CAN bus line

External modules, CAN version of chlorine sensor and DULCOMARIN® II are connected with each other via a CAN bus line. The individual CAN devices are inserted in this CAN bus line. There is a terminating resistance at each end of the CAN bus line.

1. Connect the supplied branching cables (e.g. 0.5 m) with a T-piece on the end to each module and the DULCOMARIN® II
2. Screw the T-pieces of the CAN modules sequentially together using CAN cables or directly one after the other
3. On each of the remaining ends of the CAN bus line screw on a terminating resistance (1 x with a plug connector, 1 x with a socket connector).

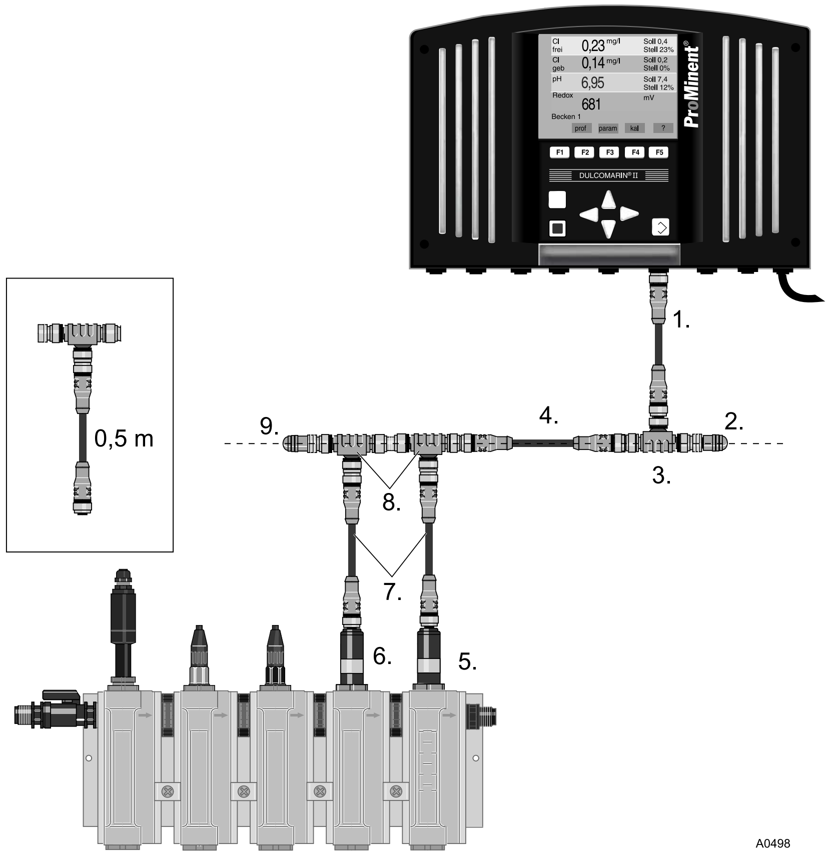


Fig. 15: Inserting modules in the CAN bus line, compact version

1. CAN connection cable (branching cable 0.5 m)
2. Terminating resistance, M12 socket
3. T-coupling
4. CAN connection cable
5. Chlorine sensor CTE
6. Chlorine sensor CLE
7. CAN connection cable (branching cable 0.5 m)
8. T-coupling
9. Terminating resistance, M12 plug

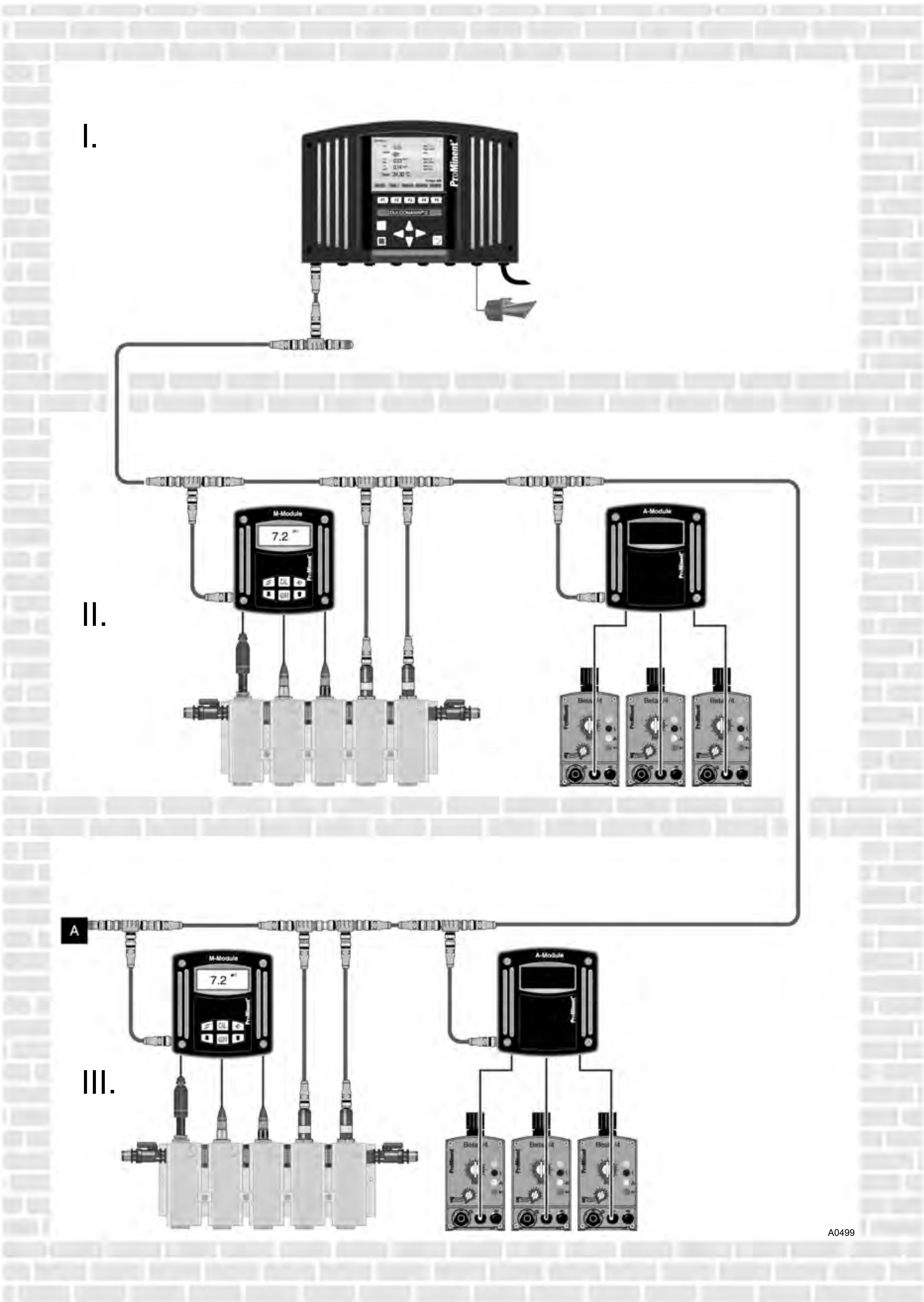


Fig. 16: Inserting modules in the CAN bus line

I. Control room
II. Plant room, e.g. pool 1
III. Plant room, e.g. pool 2
A. Terminating resistance at the end of the CAN bus line (the system can be extended from here)

5.3.2 Connections inside the DXC housing

In general it is not necessary to make modification to the cable connectors inside the DXC housing

All CAN bus cables end at the P module (power supply module with relay) or the N module (power supply module):

- the 5 conductors of the panel plug CAN 1 (4) at (3)
- the 16 pole ribbon cable of the display and operating module (not shown) at (2)
- the 10 pole ribbon cable from the A module (control module) (6) and from the M module (measurement module) (5) at (1)

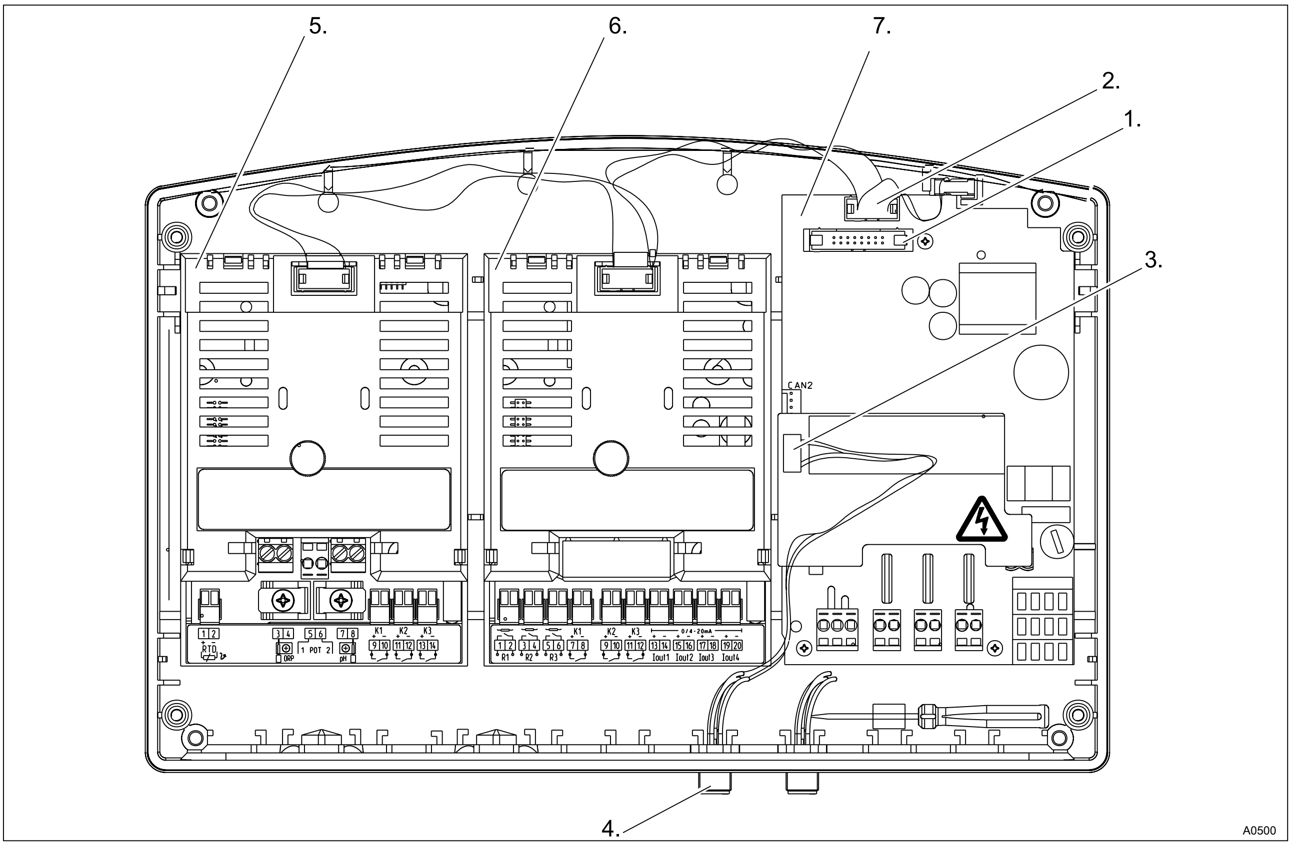


Fig. 17: CAN cabling inside the DXC housing

1. Cable connection to the display and operating module
2. Cable connection to the A and M modules
3. Cable connection to the panel plug CAN 1
4. Panel plug CAN 1
5. M module (measurement module)
6. A module (control module)
7. P module (power supply module with relay)

If there is no P module or N module in the DXC housing:

- Use a so-called L circuit board as a distributor for the CAN bus lines

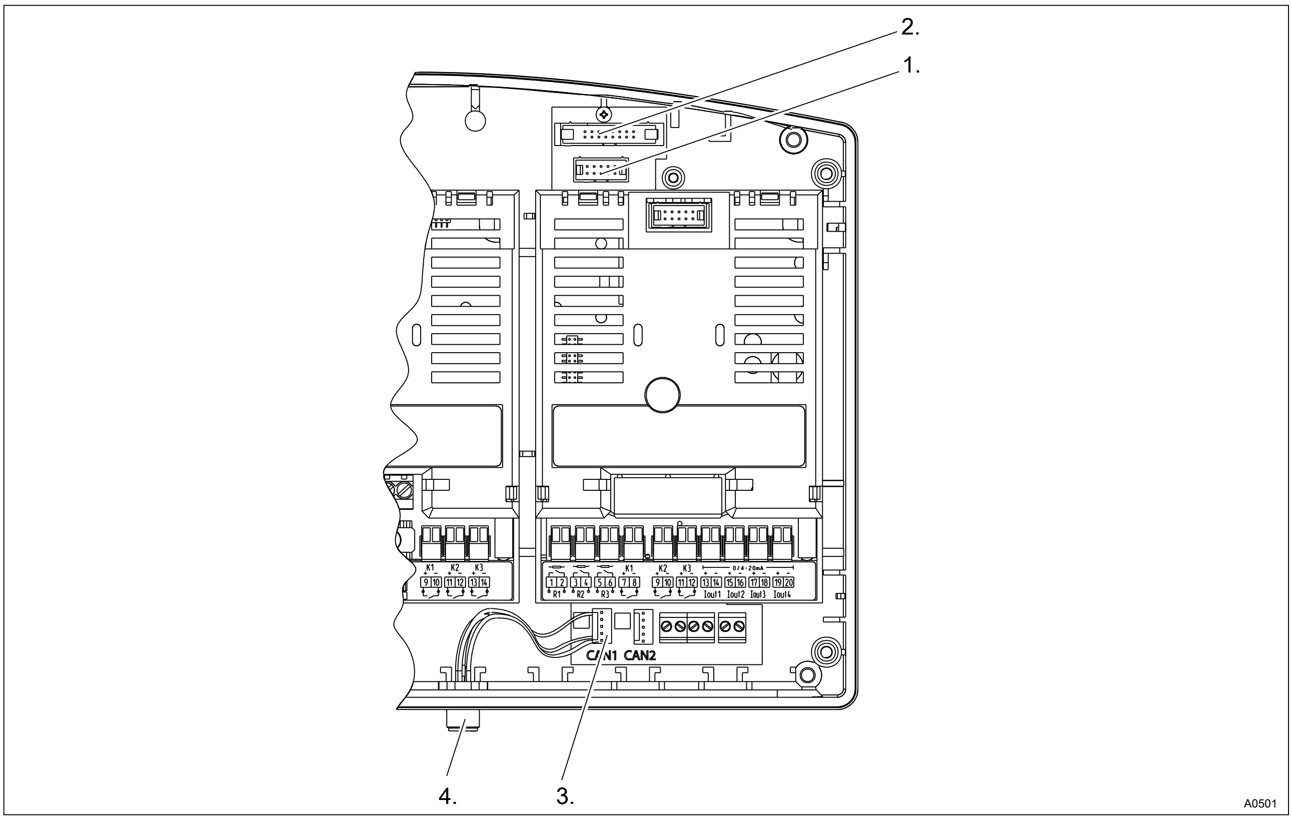


Fig. 18: Use of an L circuit board

1. Cable connection to the A and M modules
2. Cable connection to the display and operating module
3. Cable connection to the panel plug CAN 1
4. Panel plug CAN 1

6 Device overview and operating elements

Keys

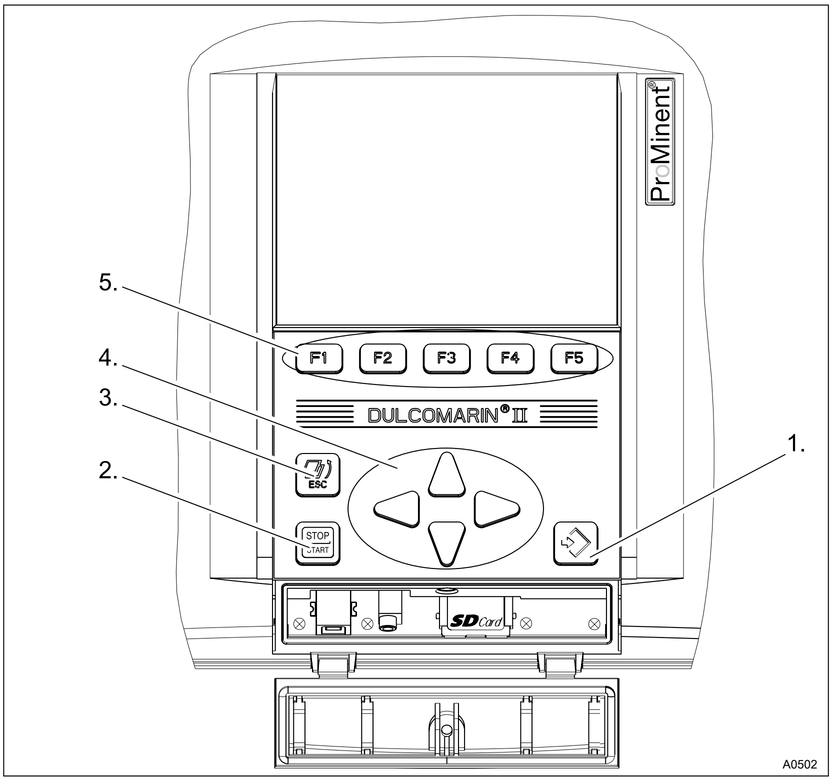


Fig. 19: Keys

1. Enter key
2. Start/Stop key
3. ESC key
4. Arrow keys
5. Function keys, variably assigned

Displays

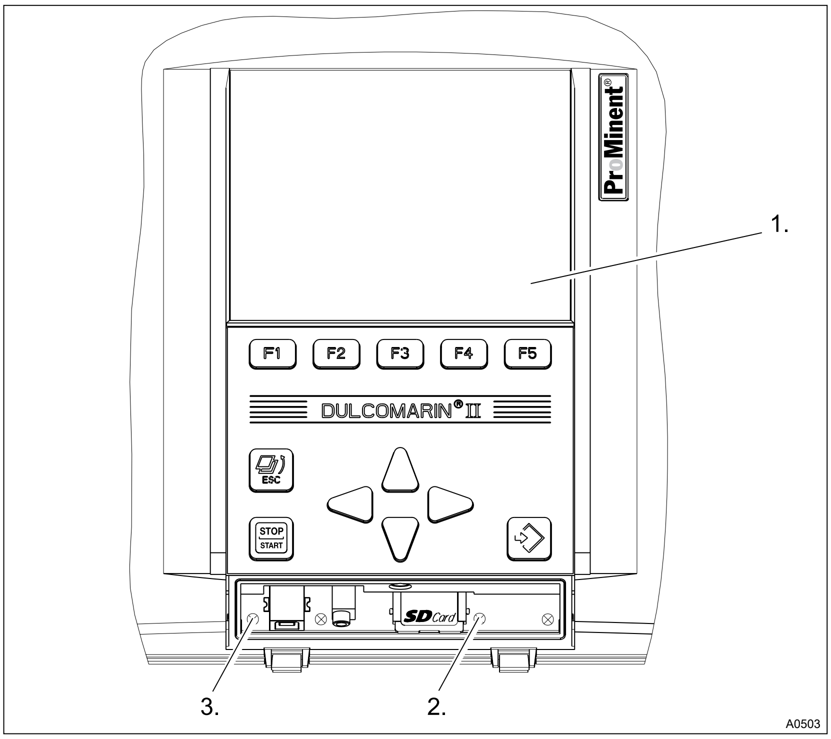


Fig. 20: Displays

1. LCD display
2. CAN 1-LED
3. Device LED

7 Functional description (general)

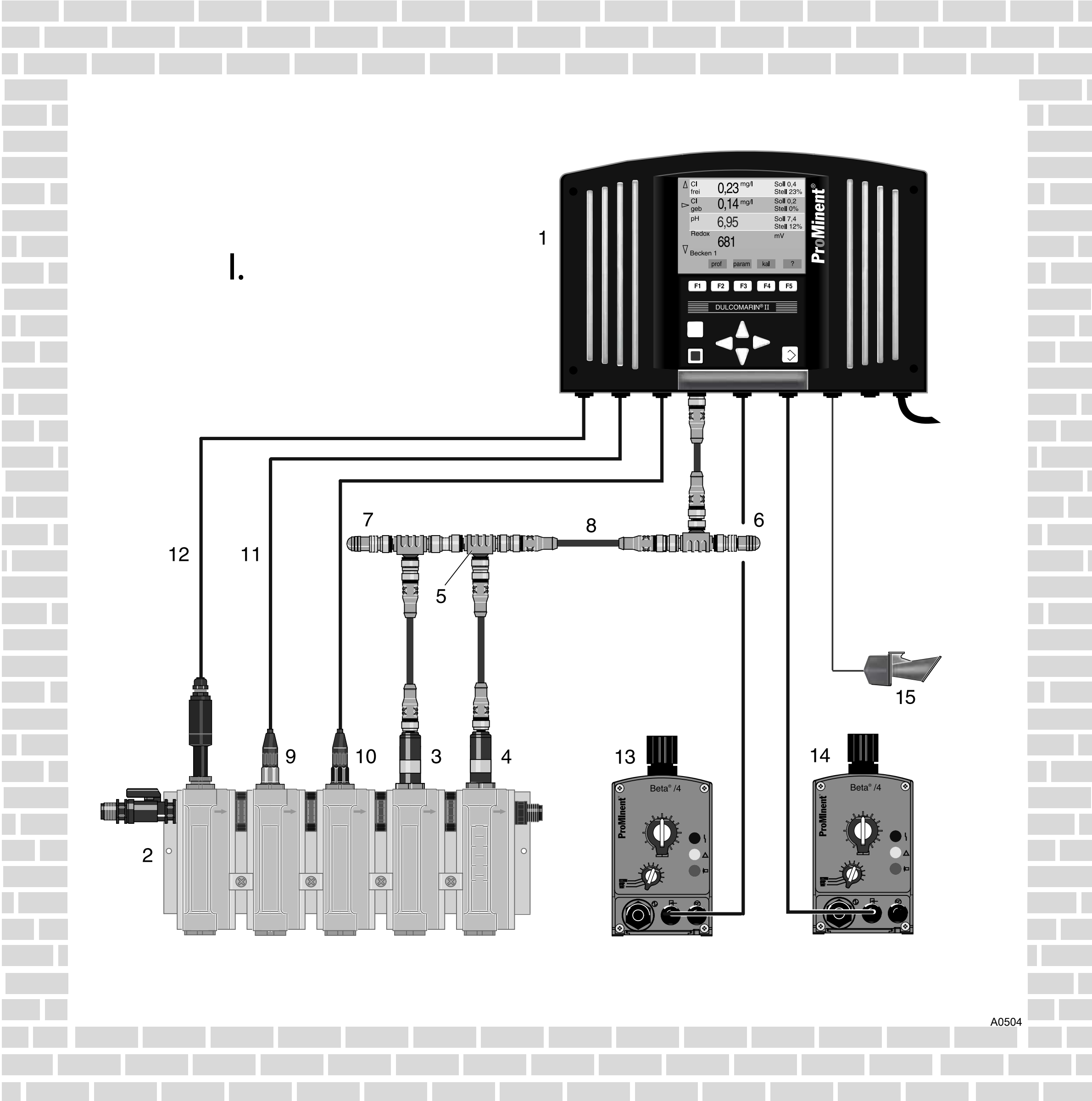


Fig. 21: Measurement and control system for a filter circuit

1. Multi-channel measuring and control system DULCOMARIN® II
2. In-line probe housing DGMa
3. Chlorine sensor CLE
4. Chlorine sensor CTE
5. T-coupling
6. Terminating resistance, M12 socket
7. Terminating resistance, M12 plug
8. CAN connection cable
9. pH sensor
10. ORP sensor
11. Coaxial cable
12. Control line
13. Metering pump 1
14. Metering pump 2
15. Signal horn

I. Plant room

The multi-channel measuring and control system DULCOMARIN® II is suitable for controlling one or more systems (filtration circuits, pools ...) (version dependent).

The base functions are distributed over the following modules:

- M module (measurement module)
- I module (current input module)
- A module (control module)
- R module (control module for chlorine gas metering devices)

- P module (power supply module with relay)
- N module (power supply module)

M module (measurement module)

- Measuring and control of the pH value
- Measuring and display (optional rules) of the redox potential
- Measuring and display of the temperature of the sample water
- Measuring and display of the circulating flow
- Monitoring the sample water
- Measuring the temperature of the sample water
- Measuring of free chlorine
- Measuring of total chlorine chlorine
- Displaying of combined chlorine
  - optional; calculated from total chlorine and free chlorine

Chlorine sensors:

- Measuring of free chlorine and temperature
- Measuring of total available chlorine and temperature
- Measuring of combined chlorine as a chlorine difference measurement

I module (current input module)

- Measurement monitoring and pause (2 contact inputs)
- Connection of 3 sensors
  - (3 standard signal inputs 0/4...20 mA, of which 2 as 2-conductor connection)
- Measuring and control of fluoride
- Measuring and control of ClO_2
- Measuring and control of chlorite
- Measuring and control of H_2O_2
- Measuring of PES (peracetic acid)
- Measuring and display of dissolved oxygen2
- Measuring and display of ammonia
- Measuring and display of conductive conductivity
- Measuring and display of flow
- Measuring and display of turbidity
- Measuring and display of UV intensity

A module (control module)

- Control of metering pumps for pH correction and disinfectant metering (over 3 frequency outputs, 3 contact inputs for pump errors or container level monitoring)
- Output of measured values for pH value, redox potential, free chlorine or total chlorine or combined chlorine or temperature (4 analog outputs 0/4...20 mA, freely programmable and scalable)

R module (control module for chlorine gas metering devices)

- Control of a servomotor with response signal for disinfectant metering (2 relay outputs, position feedback input)

P module (power supply module with relay)

- Control of solenoid valve or hose pump for pH correction (via pulse length output)
- Control of solenoid valve or hose pump for disinfectant (via pulse length output)
- Control of hose pump for flocculant (via pulse length output) on minimisation of the combined chlorine (via relay output)

- Alarm (via relay output)
- Provision of the CAN bus with supply voltage

N module (power supply module)

- Provision of the CAN bus with supply voltage

CANopen metering pumps (Beta/4a, delta DLTa, Sigma S1Ca-S2Ca-S3Ca)

- Metering of pH correction agents, disinfectants or flocculants

8 Maintenance, repairs and disposal

Maintenance

> **CAUTION!**
>
> **Solvent**
>
> Do not under any circumstances use solvent to clean the surfaces. Solvent can attack the surfaces.
>
> Clean the housing with a damp cloth. Then rub dry.

The DULCOMARIN® II is maintenance free. Replace the batteries after 10 years as a precautionary measure. The DULCOMARIN® II displays a warning should replacement be necessary sooner.

Battery type: CR2032, 3 V approx. 190 mAh

The battery is clamped in a holder on the rear side of the DXC housing upper section.

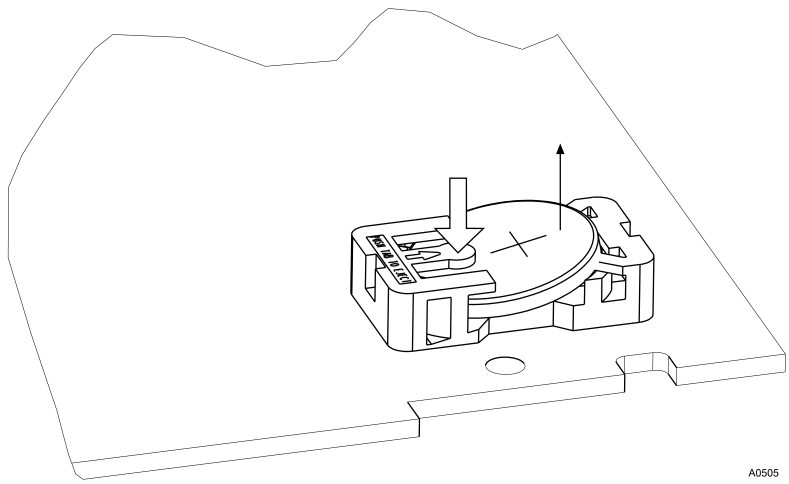


Fig. 22: Removing the battery

1. Unscrew the four retaining screws at the front on the housing upper section and take the housing upper section off from the housing lower section.

> **NOTICE!**
>
> **Hazardous waste**
>
> The battery is hazardous waste. It must be disposed of separately. Observe the conditions which apply on your site.

2. Press on the holder lug to release the battery from the holder, see Fig. 22
3. Insert a new battery in the holder
   ⇨ In so doing avoid pressing with the fingers on the battery poles. This will result in poor contacts.
4. Place the housing upper section on the housing lower section
5. Manually tighten the four retaining screws

Repairs

For repair please send the DULCOMARIN® II to the manufacturer.

8.1 Disposal of used parts

- **Users' qualification:** instructed persons, see ↳ *Chapter 2.2 'Users' qualifications' on page 16*

> **!**
>
> NOTICE!
>
> **Regulations governing disposal of used parts**
>
> – Note the current national regulations and legal standards which apply in your country

ProMinent Dosiertechnik GmbH, Heidelberg will take back decontaminated used devices providing that they are covered by adequate postage.

9 Technical data spare parts and accessories

Technical data

You can find the technical data in the operating instructions of the individual modules, see also the section "Further applicable documents".

Spare parts and accessories

Description:	Part no.
T-coupler M12 5-pole CAN	1022155
Terminating resistance, M12 socket	1022154
Terminating resistance, M12 plug	1022592
Connecting cable - CAN M12, 5 pole 0.5 m	1022137
Connecting cable - CAN M12, 5 pole 1m	1022139
Connecting cable - CAN M12, 5 pole 2 m	1022140
Connecting cable - CAN M12, 5 pole 5 m	1022141
Connecting cable - CAN M12, 5 pole Sold by the metre	1022160
Plug-CAN M12 5 pole Screwed connection	1022156
Coupling - CAN M12 5 pole Screwed connection	1022157
Cable combination coaxial 0.8 m-SN6, pre-assembled	1024105
Cable combination coaxial 2 m-SN6, pre-assembled	1024106
Cable combination coaxial 5 m-SN6, pre-assembled	1024107
Control cable by the metre 2x0.25 mm2	725122
Fuse 5x20 slow-acting 0.63 AT VDE	712030
Battery 3 V approx. 190 mAh Li cell BR2032	732829
Buffer solution pH 4, red, 50 ml	506251
Buffer solution pH 7, green, 50 ml	506253
Buffer solution redox 465 mV, 50 ml	506240
Redox sensor RHES-Pt-SE	150703
pH sensor PHES 112 SE	150702
Chlorine sensor CLE 3-CAN-10 ppm*	1023425
Chlorine sensor CLE 3.1-CAN-10 ppm*	1023426
Chlorine sensor CTE 1 CAN-10 ppm*	1023427
Chlorine sensor CGE 2-CAN-10 ppm*	1024420
*** Membrane caps and electrolyte for chlorine sensors, see the respective operating instructions of the sensor**	

10 EC Declaration of Conformity and fulfilled standards

EC Declaration of Conformity

We, ProMinent Dosiertechnik GmbH
Im Schuhmachergewann 5 - 11
D - 69123 Heidelberg

hereby declare that the product identified below conforms to the basic health and safety requirements of the EC Directive, by virtue of its design and construction, and in the configuration placed on the market by us.
This declaration is no longer applicable if changes are made to the product without our authorisation.

Productdescription:	DULCOMARIN II measuring and control unit
Producttype:	DXCa, DXMaN _ _ _ _ _ _ _ DXMaP _ _ _ _ _ _ _
Serial no.:	see type plate on the unit
Applicable EC Directives:	EC Low Voltage Directive (2006/95/EC) EC EMC Directive (2004/108/EC)
Applied harmonised standards, especially:	DIN EN 60068-2-30, DIN EN 61010-1, DIN EN 60335-1, DIN EN 50106, DIN EN 60204-1, DIN EN 60529, DIN EN 61326, DIN EN 61000-3-2, DIN EN 61000-3-3, DIN EN 50325-4, DIN EN 60746-1
Date/ Manufacturer signature:	07.03.2012
Name/ position of the signatory:	Joachim Schall, Manager Innovation and Technology

Fig. 23: EC Declaration of Conformity

11 Wiring diagram DULCOMARIN® II compact

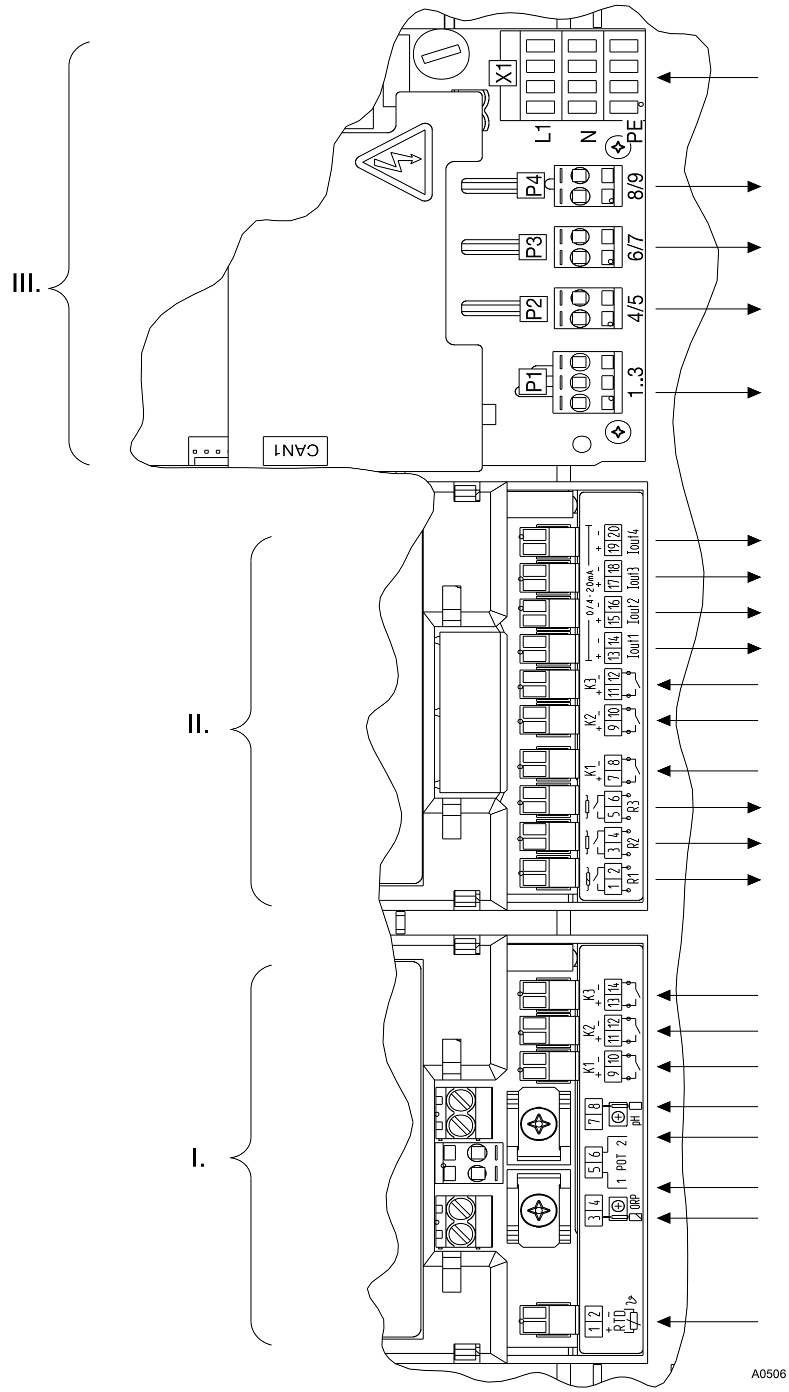


Fig. 24: Wiring diagram DULCOMARIN® II compact (typical arrangement of modules)

I. M module (measurement module) DXMaM
II. A module (control module) DXMaA
III. P module (power supply module with relay) DXMaP

Comprehensive module populating options are listed in the "Supplementary instructions DULCOMARIN® II, DXMa Modules".

M module (measurement module) DXMaM

Description	Terminal identifier	Terminal no.	Pole	Function	Cable ⌀	Drill hole no. Size	Remarks
Temp. input Pt1000/100	RTD	1	+	Temp.- sensor	d 5	1/M16	
		2	-				
Redox input 1	ORP(pH)	3	Ref.	Redox - sensor	d3/d5	2/M20	Guide cable through multiple seal inserts 2x5 or 2x4
		4	meas sig.				
Potential equalisation 1	Pot.1	5				11/M12	
Potential equalisation 2	Pot.2	6		pH - sensor		11/M12	
pH input 2	ORP(pH)	7	Ref.		d3/d5	2/M20	Guide cable through multiple seal inserts 2x5
		8	meas sig.				
Contact input 1	K1	9	+	Fault sample water	d4	3/M16	Guide cable through multiple seal inserts 2x4
		10	-				
Contact input 2	K2	11	+	Pause (backwashing)	d4	3/M16	"
		12	-				
Contact input 3	K3	13	+	ECO!Mode	d4	12/M12	
		14	-				

A module (control module) DXMaA

Description	Terminal identifier	Ter-minal no.	Pole	Function*	Cable ⌀	Drill hole no. Size	Remarks
Relay output 1	R1	1	+	Control acid pump or Control alkali pump	d5	13/M12	
		2	-				
Relay output 2	R2	3	+	Control chlorine pump Control acid pump Control redox pump	d5	14/M12	
		4	-				
Relay output 3	R3	5	+	Control flocculant pump Control chlorine pump Control redox pump	d5	15/M12	
		6	-				
Contact input 1	K1	7	+	Pump error or Filling level	d4	4/M20	Guide 2 cables through multiple seal inserts 2x4
		8	-				
Contact input 2	K2	9	+	Pump error or Filling level	d4	4/M20	Guide 2 cables through multiple seal inserts 2x4
		10	-				
Contact input 3	K3	11	+	Pump error or Filling level	d4	5/M16	Guide 2 cables through multiple seal inserts 2x4
		12	-				
Current output 0/4-20mA 1	I out 1	13	+	pH plotter connec-tion	d4	6/M16	Guide 2 cables through multiple seal inserts 2x4
		14	-				
Current output 0/4-20mA 2	I out 2	15	+	Redox plotter con-nection	d4	6/M16	Guide 2 cables through multiple seal inserts 2x4
		16	-				
Current output 0/4-20mA 3	I out 3	17	+	Chlorine free plotter connection	d4	/M16	Guide 2 cables through multiple seal inserts 2x4
		18	-				
Current output 0/4-20mA 4	I out 4	19	+	Comb. chlorine plotter connection or Temperature plotter connection	d4	7/M16	Guide 2 cables through multiple seal inserts 2x4
		20	-				

P module (power supply module with relay) DXMaP

Description	Terminal identifier	Terminal no.	Pole	Function	Cable ⌀	Drill hole no. Size
Alarm relay	P1	1		Horn control	d6.5	8/M16
		2				
		3				
Power relay 1	P2	4		Control acid solenoid valve or Control alkali solenoid valve	d6.5	9/M16
		5				
Power relay 2	P3	6		Control chlorine solenoid valve or Control redox solenoid valve or Control acid solenoid valve or Control alkali solenoid valve	d6.5	18/M12
		7				
Power relay 3	P4	8		Control UV (ozone, active carbon) or Control redox solenoid valve or Control chlorine solenoid valve or Control heating	d6.5	19/M12
		9				
Mains	X1	10	PE		d6.5	10/M16
		11	N			
		12	L(1)			

CAN connection module

Description	Terminal identifier	Terminal no.	Pole	Cable ⌀	Drill hole no. Size
CAN 1 - bus connection	CAN 1	1	Shielding	Plug A coding	16/M12
		2	24 V		
		3	ground		
		4	CAN high		
		5	CAN low		

12 Index

Operating instructions

Multi-Channel Measuring and Control System DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa

Part 2: Operation

A0204

Please carefully read these operating instructions before use! · Do not discard!
The operator shall be liable for any damage caused by installation or operating errors!
Technical changes reserved.

Part no. 986206

BA DC 067 02/11 EN

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986206, 3, en_GB

Table of contents

1 Further applicable documents

These operating instructions and supplementary instructions are only valid in combination with the following operating and supplementary instructions:

- Multi-channel measuring and control system operating instructions DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa
  - Part 1: Assembly and installation
- Supplementary instructions DULCOMARIN® II Screen writer operation
- Supplementary instructions DULCOMARIN® II, M-Module (measuring module for pH, redox [ORP], temperature) DXMaM operation
- Supplementary instructions DULCOMARIN® II, I-Module (current input module, standard signal inputs mA) DXMaI

2 Introduction

The operating instructions describe the technical data and functions of the multi-channel measuring and control system DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa. The operating instructions subsequently refer to the system merely as DXCa.

2.1 Explanation of the safety information

Introduction

These operating instructions provide information on the technical data and functions of the product. These operating instructions provide detailed safety information and are provided as clear step-by-step instructions.

The safety information and notes are categorised according to the following scheme. A number of different symbols are used to denote different situations. The symbols shown here serve only as examples.

DANGER!

Nature and source of the danger

Consequence: Fatal or very serious injuries.

Measure to be taken to avoid this danger

Danger!

– Denotes an immediate threatening danger. If this is disregarded, it will result in fatal or very serious injuries.

WARNING!

Nature and source of the danger

Possible consequence: Fatal or very serious injuries.

Measure to be taken to avoid this danger

Warning!

– Denotes a possibly hazardous situation. If this is disregarded, it could result in fatal or very serious injuries.

CAUTION!

Nature and source of the danger

Possible consequence: Slight or minor injuries, material damage.

Measure to be taken to avoid this danger

Caution!

– Denotes a possibly hazardous situation. If this is disregarded, it could result in slight or minor injuries. May also be used as a warning about material damage.

NOTICE!

Nature and source of the danger

Damage to the product or its surroundings

Measure to be taken to avoid this danger

Note!

– Denotes a possibly damaging situation. If this is disregarded, the product or an object in its vicinity could be damaged.

Type of information

Hints on use and additional information

Source of the information, additional measures

Information!

– *Denotes hints on use and other useful information. It does not indicate a hazardous or damaging situation.*

2.2 Users' qualifications

WARNING!

Danger of injury with inadequately qualified personnel!

The operator of the plant / device is responsible for ensuring that the qualifications are fulfilled.

If inadequately qualified personnel work on the unit or loiter in the hazard zone of the unit, this could result in dangers that could cause serious injuries and material damage.

– All work on the unit should therefore only be conducted by qualified personnel.
– Unqualified personnel should be kept away from the hazard zone

Training	Definition
Instructed personnel	An instructed person is deemed to be a person who has been instructed and, if required, trained in the tasks assigned to him/her and possible dangers that could result from improper behaviour, as well as having been instructed in the required protective equipment and protective measures.
Trained user	A trained user is a person who fulfils the requirements made of an instructed person and who has also received additional training specific to the system from ProMinent or another authorised distribution partner.
Trained qualified personnel	A qualified employee is deemed to be a person who is able to assess the tasks assigned to him and recognize possible hazards based on his/her training, knowledge and experience, as well as knowledge of pertinent regulations. The assessment of a person's technical training can also be based on several years of work in the relevant field.

Training	Definition
Electrician	Electricians are deemed to be people, who are able to complete work on electrical systems and recognize and avoid possible hazards independently based on his/her technical training and experience, as well as knowledge of pertinent standards and regulations. Electricians should be specifically trained for the working environment in which the are employed and know the relevant standards and regulations. Electricians must comply with the provisions of the applicable statutory directives on accident prevention.
Customer Service department	Customer Service department refers to service technicians, who have received proven training and have been authorised by ProMinent to work on the system.

Note for the system operator

The pertinent accident prevention regulations, as well as all other generally acknowledged safety regulations, must be adhered to!

3 Safety and responsibility

3.1 General Safety Information

WARNING!

Live parts!

Possible consequence: Fatal or very serious injuries

– Measure: Disconnect the mains power supply prior to opening the housing
– De-energise damaged, defective or manipulated units by disconnecting the mains plug

WARNING!

Unauthorised access!

Possible consequence: Fatal or very serious injuries

– Measure: Ensure that there can be no unauthorised access to the unit

WARNING!

Operating errors!

Possible consequence: Fatal or very serious injuries

– The unit should only be operated by adequately qualified and technically expert personnel
– Please also observe the operating instructions for controllers and fittings and any other component groups, such as sensors, measuring water pumps ...
– The operator is responsible for ensuring that personnel are qualified

CAUTION!

Electronic malfunctions

Possible consequence: Material damage to destruction of the unit

– The mains connection cable and data cable should not be laid together with cables that are prone to interference
– Measure: Take appropriate interference suppression measures

NOTICE!

Correct and proper use

Damage to the product or its surroundings

– The unit is not intended to measure or regulate gaseous or solid media
– The unit may only be used in accordance with the technical details and specifications provided in these operating instructions and in the operating instructions for the individual components

NOTICE!

Correct sensor operation / Run-in time

Damage to the product or its surroundings

– Correct measuring and dosing is only possible if the sensor is working perfectly
– It is imperative that the run-in times of the sensors are adhered to
– The run-in times should be allowed for when planning initial operation
– It may take a whole working day to run-in the sensor
– Please read the operating instructions for the sensor

NOTICE!

Correct sensor operation

Damage to the product or its surroundings

– Correct measuring and dosing is only possible if the sensor is working perfectly
– Check and calibrate the sensor regularly

NOTICE!

Compensation of control deviations

Damage to the product or its surroundings

– This controller cannot be used in control circuits which require rapid compensation (< 30 s)

3.2 Correct and Proper Use

NOTICE!

Compensation for control deviations

Damage to the product or its surroundings

– The controller can be used in processes, which require compensation of > 30 seconds

NOTICE!

Correct and Proper Use

The unit is intended to measure and regulate liquid media.

The unit may only be used in accordance with the technical details and specifications provided in this operating manual and in the operating manuals for the individual components (such as, for example, sensors, fittings, calibration devices, metering pumps etc.).

Any other uses or modifications are prohibited.

4 Functional description

The DXCa is a measuring and control unit designed to handle the specific requirements of drinking water treatment.

For this reason it is extremely versatile when combined with a various different measuring and actuating modules.

ProMinent uses a bus system in the DXCa in order to network the sensors and actuators with the controller.

The standard bus system CANopen® is used.

All of the modules work according to Plug & Play principles. This is a flexible system that can be realised to meet the requirements of a compact or decentralised modular system and which is ready for any future requirements that may be needed.

The DXCa can process measured values from up to 16 systems / pools.

The **I**-Module enables up to 3 (third-party)-sensors with mA signals to be connected per system / pool, e.g. for flow, turbidity and UV intensity.

Metering pumps, chlorine gas metering systems or chlorine dioxide production plants can be controlled directly in relation to these measured parameters. There is also the option of using the flow signal as interference value for the controlled measured variables.

The DXCa is equipped with an integrated data logger and optionally an embedded web server and OPC server, which enables the measured values and messages to be transferred to a control panel via LAN/Ethernet.

Possible measured variables

Measured variable	pH compensated
pH	
Free chlorine (Cl)	X
total available chlorine (Cl)	X
Oxygen (0_2)	
Fluoride (F^-)	X
Chlorine dioxide (ClO_2)	
Chlorite ($HClO_2$)	
Ammonia (NH_3) /Ammonium ($NH_4{}^+$)	X
Turbidity	
Hydrogen peroxide (H_2O_2)	
Temperature	
Peracetic acid (PES) ($C_2H_4O_3$)	
Conductivity	
Ultra violet rays (UV)	

5 Control elements

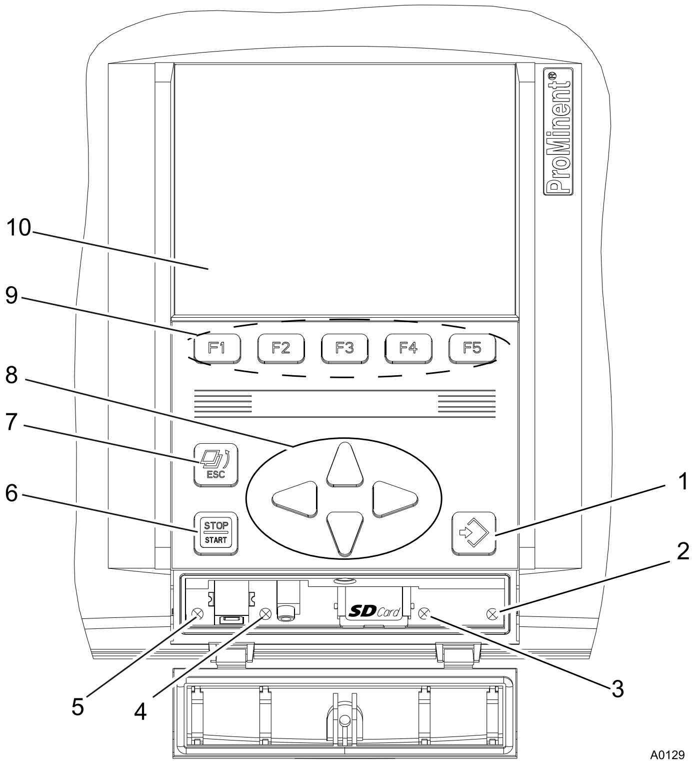

Fig. 1: Buttons and displays

1 ENTER button
2 LAN LED
3 CAN 1-LED
4 DXC-LED
5 System LED
6 START/STOP key
7 ESC button
8 Arrow keys
9 Function keys, variably assigned
10 LCD display

5.1 Function of the buttons

Navigation within the operating menu

Function of the ENTER button:

- Moving from menu item to menu item in the operating menu - into deeper tiers of the operating menu
- Selection within a file card of a menu item and confirming changes

Function of the ESC button:

- Moving from menu item to menu item in the operating menu - upwards into higher tiers of the operating menu

ESC button

Repeatedly press the ESC button in order return from any menu item of the operating menu and back to the permanent display.

Function of the buttons: UP, DOWN, LEFT, RIGHT:

- Move in a menu item between the file cards of a menu item
- Change between the selections in a file card

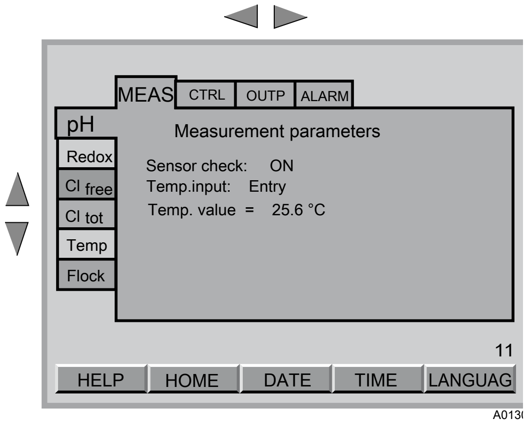

Fig. 2: Change between the file cards

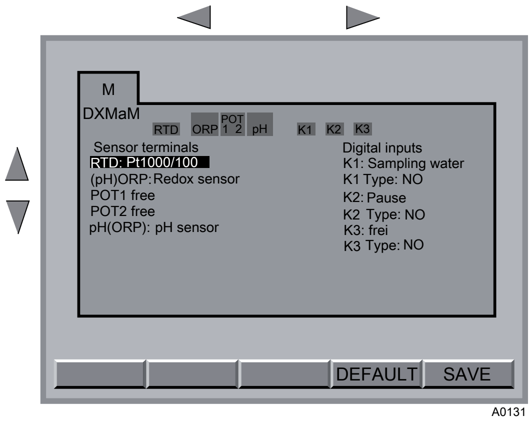

Fig. 3: Selection within a file card

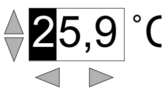

Fig. 4: Changing a numerical value

The UP and DOWN arrow keys can be used in a selection to change the displayed numerical value or displayed variable. The arrow keys LEFT and RIGHT can be used to select the decimal place of a numerical value which is to be changed.

The SAVE function enables you to store the numerical values or variables in a file card. Some numerical values such as PASSW, TIME or DATE are stored with the ENTER button.

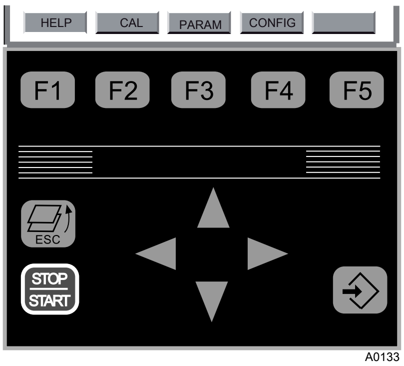

Fig. 5: Example assignment for the function keys

WARNING!

Function of the START/STOP key

The START / STOP key can be used to switch the system currently shown in the display off or on.

The START / STOP button has no influence on other systems that are not shown in the display.

First select the respective system, before you work with the START / STOP key.

Function of the START/STOP key

- The START / STOP key can be used to start or stop regulating or metering. Subsequently the permanent display and the central menu item is shown *'Metering ON'* or *'Metering OFF'*

5.2 Access code (password)

Access to the device can be granted in steps by setting up an access code. The DXCa system is supplied with access codes according to the following table.

– *Replace the factory-set access codes with your own access codes.*
Otherwise protection to the following menus will be extremely weak.

– *When toggling back to the permanent display, the DXCa automatically resets to level '0' for 'every user'*

– *You can set the level immediately to '0' by pressing the following key combination from the central menu item: F4 (CONFIG), F2 (OPTION), F5 (RESTART) - this causes module detection to be manually started*

– *You can freely calibrate level '0' and '1' if you set for level '1' (user) the password to '0000' .*

The various levels enable the following:

Level	0 (every user)	1 (user)	2 (Installation engineer)	3 (Service)	4 (Supervisor)	5 (ProMinent)
Password (Default)	0000	1111	2222	3333	4444	confidential
View	X	X	X	X	X	X
Calibration	X	X	X	X	X	X
Assign parameters			X	X	X	X
Configure			X	X	X	X
Calibrate Cl NP			X	X	X	X

Level	0 (every user)	1 (user)	2 (Installation engineer)	3 (Service)	4 (Supervisor)	5 (ProMinent)
Configure bus				X	X	X
Update all modules				X	X	X
Update individual modules					X	X
Update central unit						X

Areas protected by access codes:

- *Permanent display*
- *Central menu item*
- *Calibration menu*
- *Parameter menu*
- *Configuration menu*

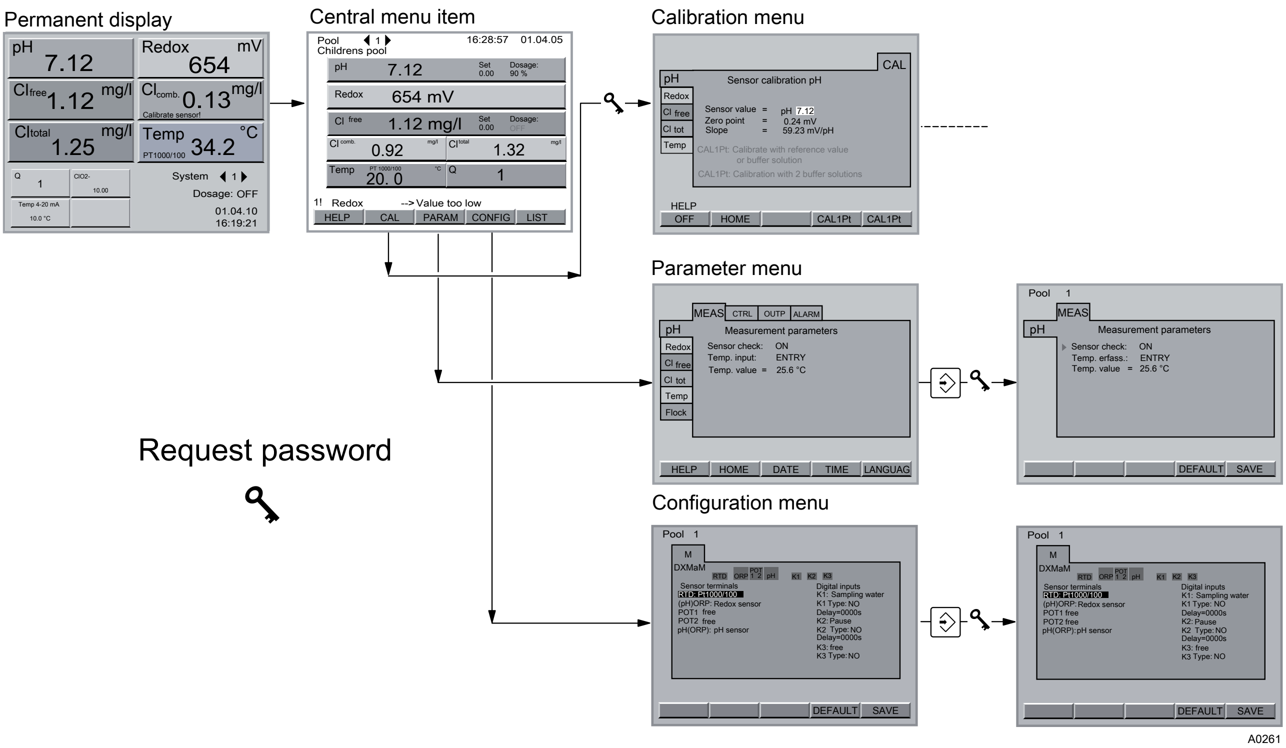

Fig. 6: Access code (password)

Language

You can set the language in submenu [LANGUAGE] . In order to do so, press function key F5 (LANGUAGE) in the parameter menu.

6 Commissioning: Configuring the CAN modules

CAUTION!

Delayed data processing

For these actions, you must always allow a few seconds to elapse between the last message or the last progress bar and the subsequent action.

You can also use the BUS menu to log modules on and off, but not temporarily. The central unit does not store all of the data required for seamlessly restoring operation of the modules.

Updating software

The corresponding update instructions for available updates can be requested from ProMinent Dosiertechnik GmbH.

6.1 Logging modules on and off

Adding a new module

If a new module is inserted into the CAN-configuration for DXCa or a module has been deleted from the central unit:

The central unit has no data relating to the module.

1. Connect the module to the CAN bus system.
   - ⇨ The following message appears on the central menu item *[Configuration service started – LSS node detected ...]* with progress bar.
2. The following message appears on the permanent display *[New module reported! Press ENTER.]*.
3. Press the ENTER button
   - ⇨ The following message appears on the central menu item *[New module reported! Press ENTER.]*.
4. Press the ENTER button
   - ⇨ The menu *[Reconfiguration complete. Press ESC.]* appears.
5. Press the ESC button
   - ⇨ the central menu item appears.

Temporarily disconnect a module

Temporarily disconnect a module from the CAN bus system without intermediate replacement:

> *The central unit stores all of the data required for re-assigning the module.*

1. Disconnect the module from the CAN bus system.
   ⇨ The following message appears on the central menu item *[Module disconnected! Press ENTER]*.
2. Press the ENTER button
   ⇨ The menu *[Logged off modules]* appears.
3. Press F4 (SAVE), in order that the module remains stored in the CAN configuration
   ⇨ The message *[Reconfiguration complete. Press ESC.]* appears.
4. Press the ESC button

   > *In the configuring menu, the overview at the start of the submenu [BUS] indicates that the module [is missing.].*

   ⇨ the central menu item appears.

Re-assign a temporarily disconnected module

Re-connect a module that has been temporarily disconnected from the CAN bus system without intermediate replacement back into the original CAN bus system:

> *The central unit will have stored all of the data required for re-assigning the module.*

1. Connect the module to the CAN bus system.
   ⇨ The following message appears on the central menu item *[Configuration service started – LSS node detected …]* with progress bar.
2. The following message appears on the permanent display *[Module re-registered! Press ENTER]*.
3. Press the ENTER button
   ⇨ The following message appears on the central menu item *[Module re-registered! Press ENTER]*.
4. Press the ENTER button
   ⇨ The menu *[Re-registered module detected]* appears.
5. Press F4 (ACCEPT), in order that the module will recommence operation in accordance with the stored CAN configuration
   ⇨ A progress bar is shown followed by the message *[Reconfiguration complete. Press ESC.]*.
6. Press the ESC button
   ⇨ The central menu item appears. The module is assigned to the CAN bus again.

Permanently disconnect a module

Permanently disconnect a module from its pool or the DXCa or insert it into another pool or another DXCa: (The central unit will delete all of your data related to the module.)

> *The central unit will delete all of your data related to the module.*

1. Disconnect the module from the CAN bus system.
   ⇨ The following message appears on the central menu item *[Module disconnected! Press ENTER]*.
2. Press the ENTER button
3. Press F2 (DELETE)
4. Press the ESC button
   ⇨ The central menu item appears. The module is logged off from the CAN bus and all of the module data is deleted from the central unit.

> *The module will now be detected as a new module if it is re-connected to the CAN bus.*

6.2 Commissioning CAN-Beta pump

> *Follow the instructions precisely in order to ensure correct detection of the CAN-Beta pump in the CAN bus.*

Commissioning a new or non-saved CAN-Beta pump

Preparation

1. Start up the central unit if this has not already been done.
2. Set the pumps to the required stroke length (default 95%)
3. Check that the multifunctional switch is positioned to BUS
4. Connect the pump to the CAN bus system
5. Connect the pump to the supply voltage
   ⇨ The following message appears on the central menu item *[Configuration service started – LSS node detected …]* with progress bar.
6. The following message appears on the permanent display *[New module reported! Press ENTER.]*.
7. Press the ENTER button
   ⇨ the central menu item appears.
8. Press the ENTER button
   ⇨ The menu *[New module detected 1]* appears.

Assign a system (pool, filtration circuit, etc.)

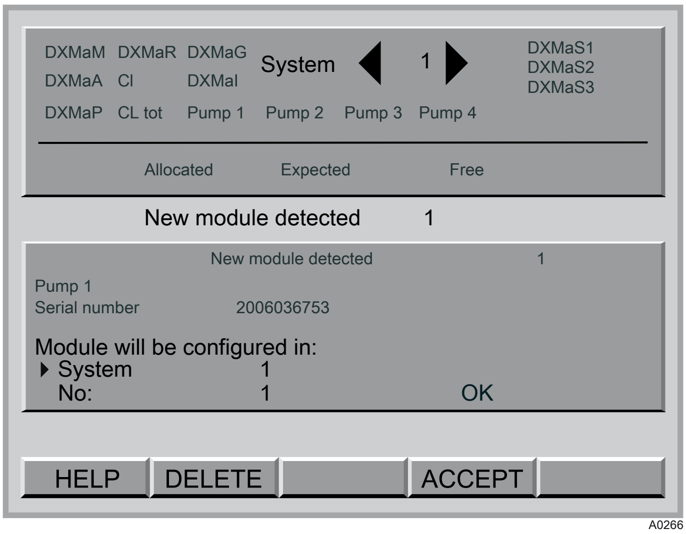

Fig. 7: New module detected 1

1. With the arrow keys select *[System]* and press the ENTER key
2. Enter the desired system number with the arrow keys and press the ENTER key

Assign a pump number

1. With the arrow keys select *[No.]* and press the ENTER button
2. Enter the desired number for the pump (1 - 4) with the arrow keys and press the ENTER button

Save CAN configuration

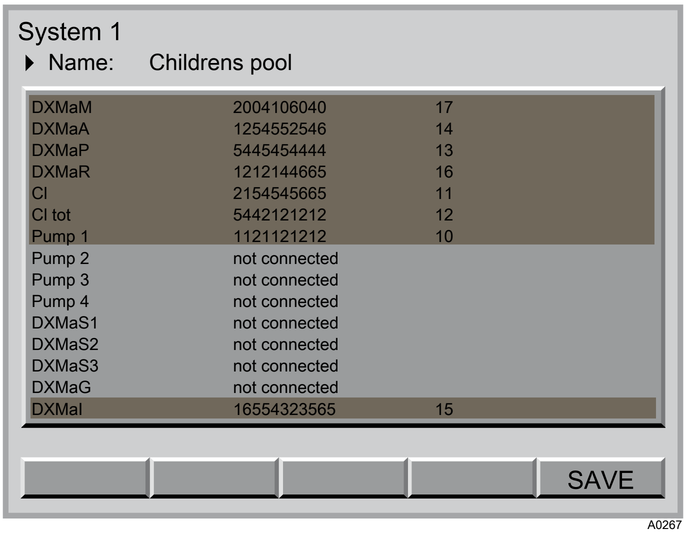

Fig. 8: Save assignment

1. Press F4 (ACCEPT) in order to store the CAN configuration or press the ENTER button in order to change the entry
2. Press the ENTER button in order to change the name of the system (e.g. from *'Children's pool'* to *'swimming pool'*.)
3. F5 (SAVE) in display, see Fig. 8
   ⇨ Data will be saved
4. Press the ESC button
   ⇨ Permanent display appears. The CAN configuration is now saved

Assign the pump a purpose

1. Press the following key combination in the central menu item in order to assign the pump a purpose: F4 (CONFIG)
2. LEFT/RIGHT (file card P1 or P2 ...)
   ⇨ The file card with the assignment number of the respective pump has been selected.
3. Press the ENTER button
4. Press the ENTER button
5. Enter the desired purpose by means of the vertical arrow keys and press the ENTER key
   ⇨ For example *[P1 Bus metering pump]* appears on the display
6. Press F5 (SAVE)
   ⇨ Prompt *[Save dialog, really save?; no=ESC, yes=ENTER]* appears on the display
7. Press the ENTER button
8. Subsequently press the ESC button
   ⇨ The pump has been assigned and saved. You can now exit the menu with the ESC button

Commissioning a stored CAN-Beta pump

Preparation

1. Start up the central unit if this has not already been done
2. Set the pumps to the required stroke length (default 95%)
3. Check that the multifunctional switch is positioned to BUS
4. Connect the pump to the CAN bus system
5. Connect the pump to the supply voltage
   ⇨ The following message appears on the central menu item *[Configuration service started – LSS node detected …]* with progress bar.
6. The following message appears on the permanent display *[Module re-registered! Press ENTER.]*.
7. Press the ENTER button
   ⇨ the central menu item appears.
8. Press the ENTER button
   ⇨ The menu *[Module redetected]* appears.
9. Press F4 (ACCEPT)
   ⇨ The module will be accepted
10. Press the ESC button
    ⇨ Permanent display appears

6.3 Commissioning R module

WARNING!

Emergency measures

The plant operator is responsible for establishing a set of emergency measures for the event of a chloric gas leak.

All persons who are able to do so are responsible for carrying out such emergency measures in the event of a chloric gas leak.

WARNING!

Chloric gas can leak

Possible consequence: Fatal or very serious injuries

Shut off the chloric gas metering system before commissioning. Otherwise chloric gas can leak out.

Check and enable an emergency stop system for the chloric gas metering system and emergency measures before commissioning.

Test the connection to R module

Shut off chloric gas metering

The test can be aborted at any time with F2 (STOP) - this causes the chloric gas metering unit to shut down. The chloric gas supply is then stopped.

1. Press F4 (TEST)
   ⇨ The TEST menu appears.
2. Manually control the chloric gas metering unit with the keys F3 (CLOSE) and F4 (OPEN) in order to test it
3. Press the F5 key (QUIT) in order to exit the menu

Calibrate R module

Shut off chloric gas metering

The test can be aborted at any time with F2 (STOP) - this causes the chloric gas metering unit to shut down. The chloric gas supply is then stopped.

At every point in time, the file card indicates the current opening angle of the chloric gas metering unit (= position in %; low number = valve relatively closed, large number = valve relatively open).

1. Successively press the buttons (CAL) and F2 (START)
   ⇨ The following message appears *[Calibration is running]*. The DXCa initially closes the chloric gas metering unit.

   Subsequently it carries out two calibration cycles (open and close). At each end position, the DXCa waits briefly in order to evaluate the consistency of the potentiometer signal.

   When calibration has been completed, the following appears *[Calibration completed] [Press QUIT]*.
2. Press the F5 key (QUIT) in order to exit the calibration menu.
   ⇨ After pressing the F5 key (SAVE) and the ENTER key, the DXCa opens the chloric gas metering unit in accordance with the current actuating variable.

7 Structure of the of the operating menu

7.1 Structural principle

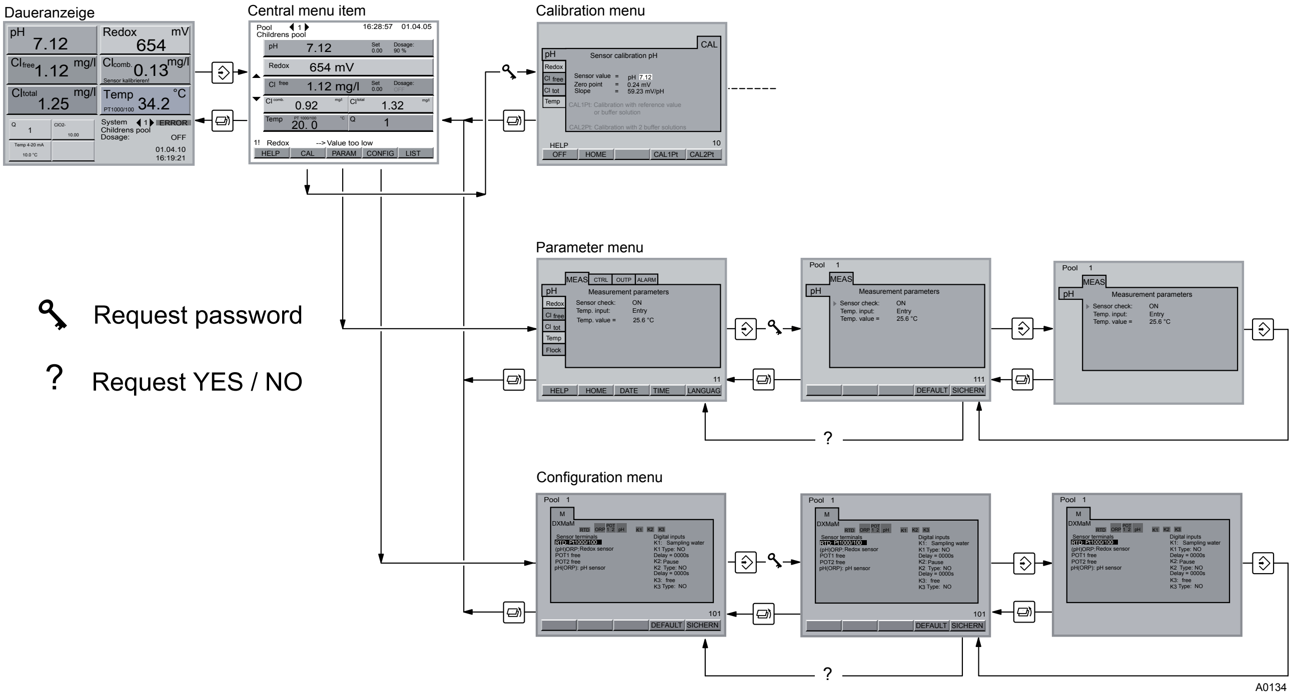

Fig. 9: Structural principle of the of the operating menu

You can toggle over from the permanent display to the central menu item. At this point the operating menu branches off into the settings menus:

- Calibration, see ↯ *Chapter 8 'Calibration' on page 88*
- Parametric assignment, see ↯ *Chapter 9 'Assign parameters' on page 120*
- Configuration, see ↯ *Chapter 10 'Configure' on page 148*

7.2 Permanent display

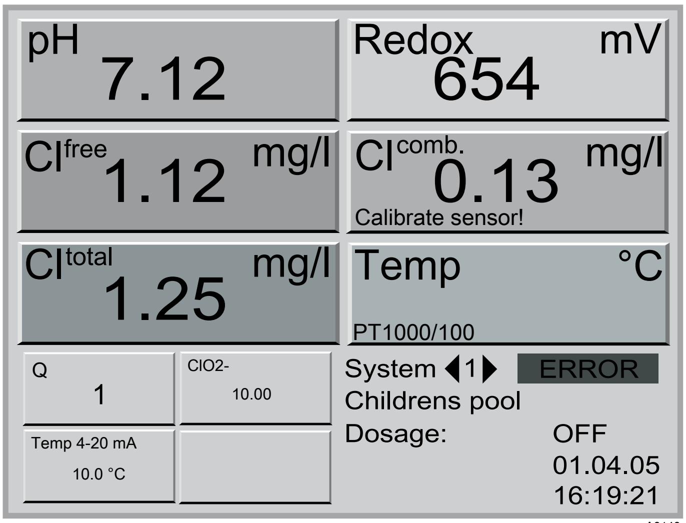

Fig. 10: The permanent display for all measured variables

The permanent display shows you all available measured values from the sampled water on a system. In the event that a limit value is exceeded (red) or undershot (blue), then a red or blue chevron is shown next to the measured value and the measured value is shown in the same colour.

In the event that a sensor-related fault occurs or the calibration is faulty, then an error message appears in the corresponding measured variable field. In the field at the bottom right-hand side, the permanent display shows the system number, the date and time and whether or not the metering system has been switched on or off by means of the START/STOP key. *'ON'* or *'OFF'*.

By pressing F4 (GLOBAL), you can obtain an overview of all measured values and the set points for all systems / pools, if numerous systems / pools have been configured.

- *The DXCa calculates the displayed value for bonded chlorine as the difference between the measured values from the free chlorine and total chlorine sensors.*
- *Each measured variable is assigned a fixed colour (e.g. pH = orange, redox = yellow, etc.)*
- *You can toggle from any menu item back to the operating menu by pressing the ESC key until the preeminent display is shown.*

7.3 Central menu item

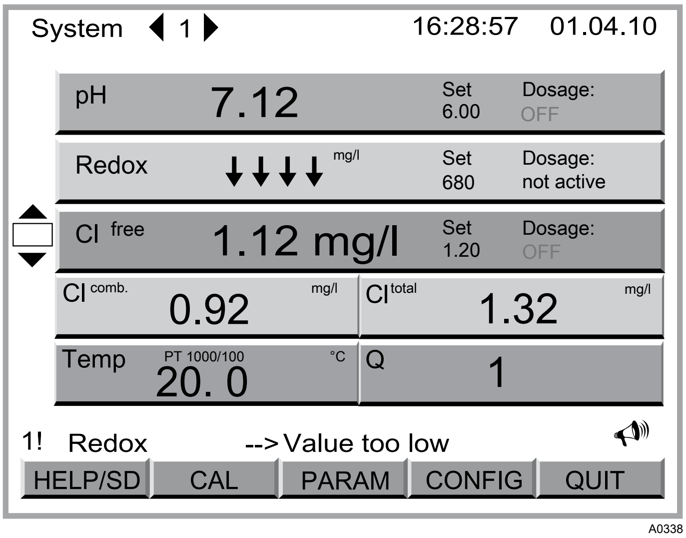

Fig. 11: The central menu item for all measured variables

The central menu item shows you the same data as the permanent display. However, it can additionally show the set points, the switching point for bonded chlorine or the temperature.

If a measured variable is controlled, then the coloured bars cover the entire width of the display. If a measured variable is only being displayed, then the coloured bars only cover half the width of the display.

In the event that there is insufficient space on the display for all of the measured variables, then you must subdivide them. This can be achieved by classifying a set of measured variables and assigning them to a second, virtual pool. These two pools will be defined as subsystems and you can name them in the same way, but, for example, with extensions to the names *'_A'* and *'_B'* in order to tell them apart.

In contrast to the permanent display, the central menu point for the individual measured variables on a system indicates whether the metering system is set to *'OFF'* or *' ON'* . Then it shows you the value of the actuating variable. If you have set the metering system to *'OFF'* then it cannot be switched on by means of the START/STOP key.

Underneath the field with the measured variables, the central menu item shows you the fault messages. In the event that more than one fault message is pending, then after acknowledging the alarm via F5, the function *'LIST is shown'*: When you press the F5 key, a list of the errors appears. Here you have the option of toggling over to an archive of previous fault messages with the F5 key (ARCHIVE) if an SD card is available for storage. You can return to the previous display by pressing the ESC key.

For each event, the following can be detailed:

- 1. Block: Number, date, time, COMES / GOES*
  - * Designates whether the error occurred or disappeared at this point in time
- 2. Block: Node-ID, system number
- 3. Block: Error message

On the SD card, this data is stored in file *'eventlog.txt'*. This can be read on a PC using a word processing application.

The central menu item braches off into the settings menus

- Calibration, see ↳ *Chapter 8 'Calibration' on page 88*

- Parametric assignment, see ↳ *Chapter 9 'Assign parameters' on page 120*
- Configuration, see ↳ *Chapter 10 'Configure' on page 148*

7.4 Log off SD card safely

Log off SD card safely

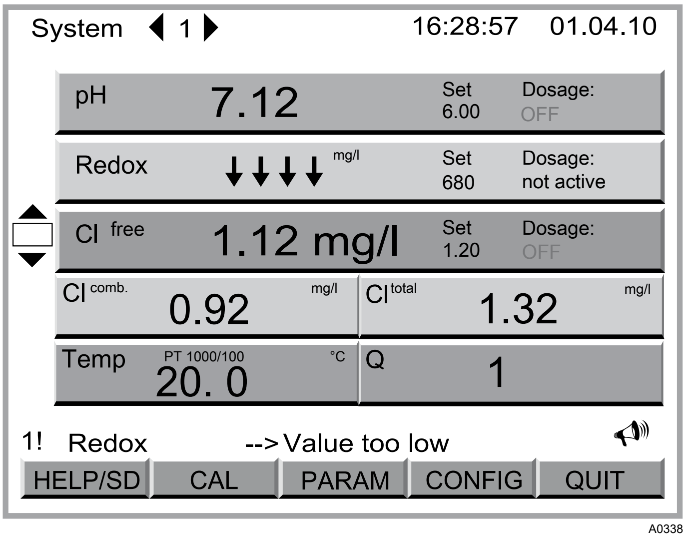

Fig. 12: Log off SD card safely

1. Press the F1 key from the central menu item *'HELP/SD'*

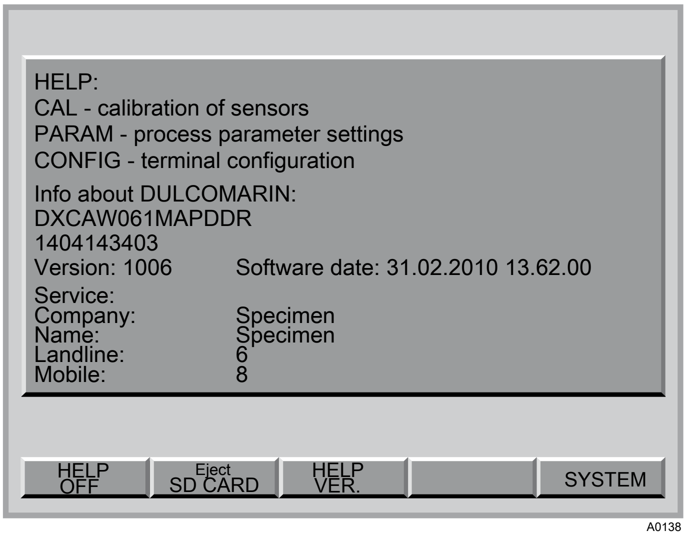

Fig. 13: Eject SD CARD

2. Press the F2 button *'Eject SD CARD'*

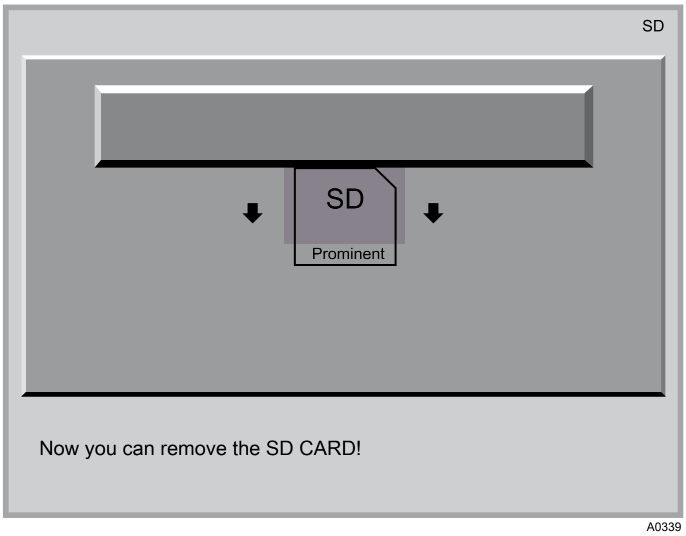

Fig. 14: Remove SD CARD

⇨ Now you can safely remove the SD CARD.

7.5 Generally applicable states

The controller states are signalised as follows:	
Display	**Information**
not active	If the parameter settings *'Control'* are set to inactive
100,0 %	If the plant is set to *'on'* and the parameter settings *'Control'* are set to *'active'* .
PAUSE	If relay *'K2 '*is connected
STOP	If the measured value and calibration are invalid
Q!	10.5 % interference value is active for the measured variable
Q min!	0.0 % for all controllers because Q < Qmin
ORP!	12.0 % only for chlorine
ECO	20.8 % for all controllers

The controller states are signalised as follows:	
Display	**Information**
checkout time	
Par. invalid!	If the parameter settings *'Par'* are outside of the permissible range (e.g. Xp = 0)

The measured value states are signalised as follows:		
Display	**Display colour**	**Information**
0,00	black	Normal measured value without error
0,00	blue	Measured value is lower than the lower limit value
0,00	red	Measured value is higher than the upper limit value
--,--	black	< 0.10
Measurement error	black. red background	if the measured value is invalid
Reasons:		Measured water error (all measured variables indicate incorrect values)
		Calibration is faulty
		A correction value is invalid (e.g. pH)
Calibrate sensor!	black	Calibration is faulty
Sensor not ready	black	Negative sensor power
pH correction value	black. red background	for the CLE sensor the value is > 8.5 pH; for all other sensors there is an invalid pH value

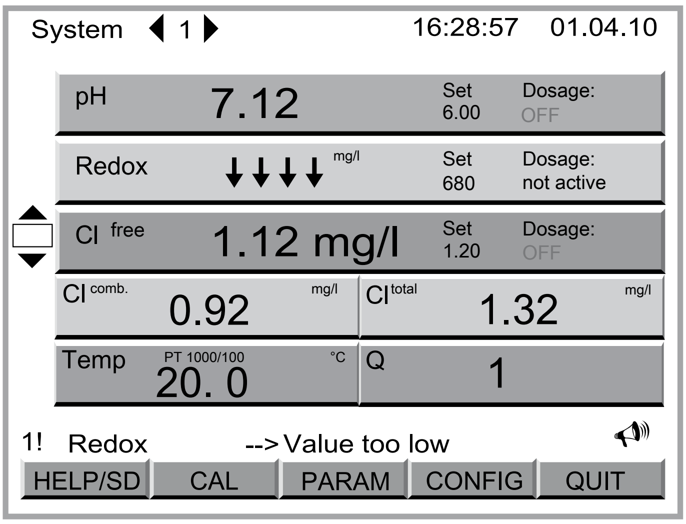

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Fig. 15: Generally applicable states

Wide display bar Measured value with control
Narrow display bar Measured value without control

7.6 Menus underneath the central menu item

Calibration menu

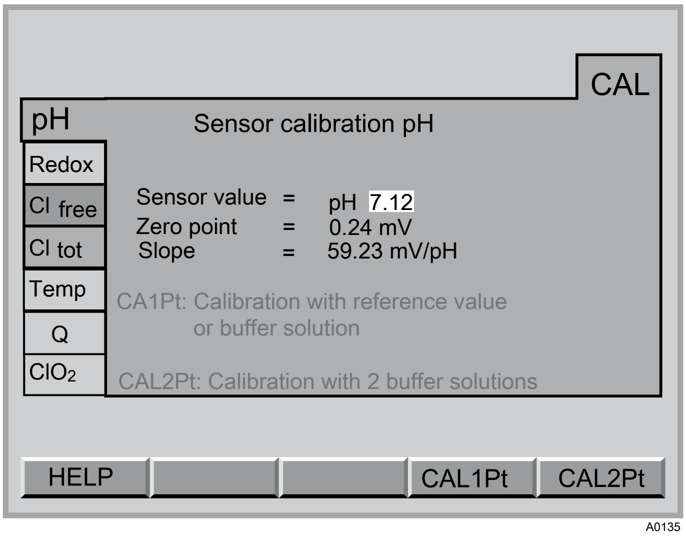

Fig. 16: First menu item of the calibration menu

You can call up the calibration menu for all measured variable in the central menu item via function key F2 (CAL).

Parametric assignment menu

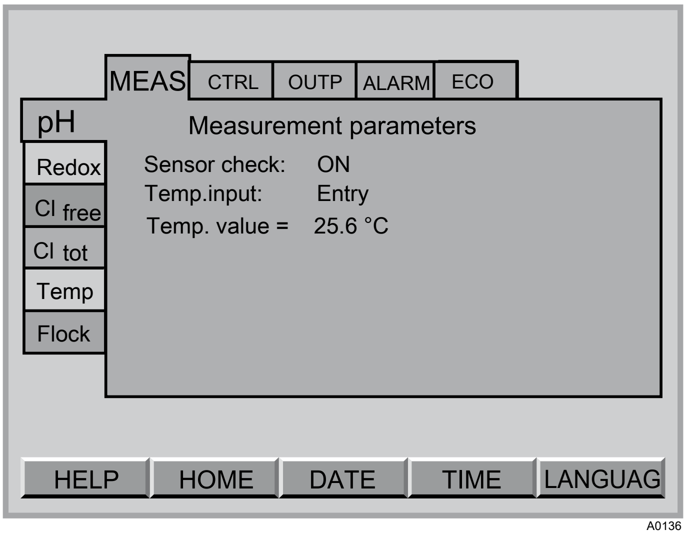

Fig. 17: First menu item of the parametric assignment menu

You can call up the parametric assignment menu in the central menu item via function key F3 (PARAM).

The structure of the parametric assignment menu is similar to that of a card file (with horizontal and vertical tabs):

- The vertical labelling forms the measured variables (pH, Redox, etc.)
- The horizontal labels for the groups of parameters (such as measurements, controls, etc)

Configuration menu

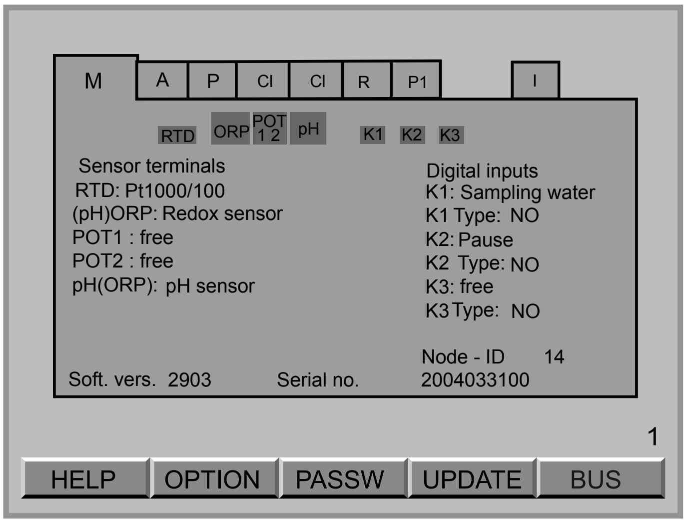

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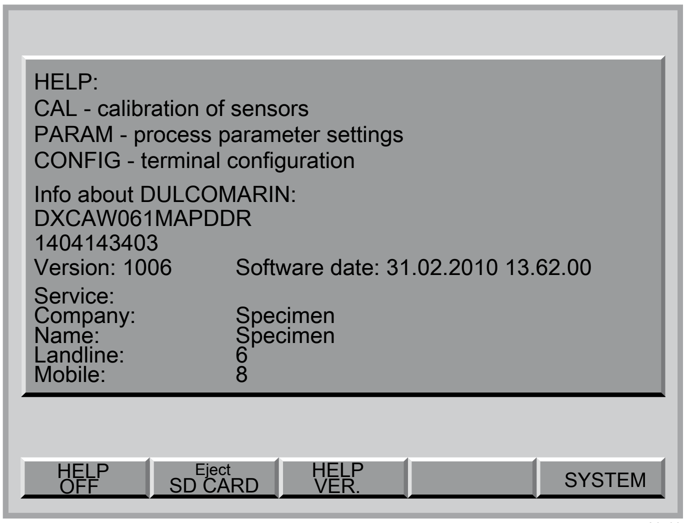
Fig. 18: First menu item of the configuration menu

You can call up the configuration menu in the central menu item via function key F4 (CONFIG).

The structure of the configuration menu reflects the configuration of the existing hardware modules. There is a file card for each module.

Example of a help display



A0138

Fig. 19: Example of a help display

You can call up the help menu in the central menu item via function key F1 (HELP) when the F1 *‘HELP’* key is available in the menu.

The help display called up from the central menu item additionally indicates the software version of the central unit and the date of manufacture. In the calibration menu you can choose to view or hide mutual help texts in the file cards for all menu items of the calibration menu via the F1 (help) key.

7.7 Submenus of the parametric assignment menu

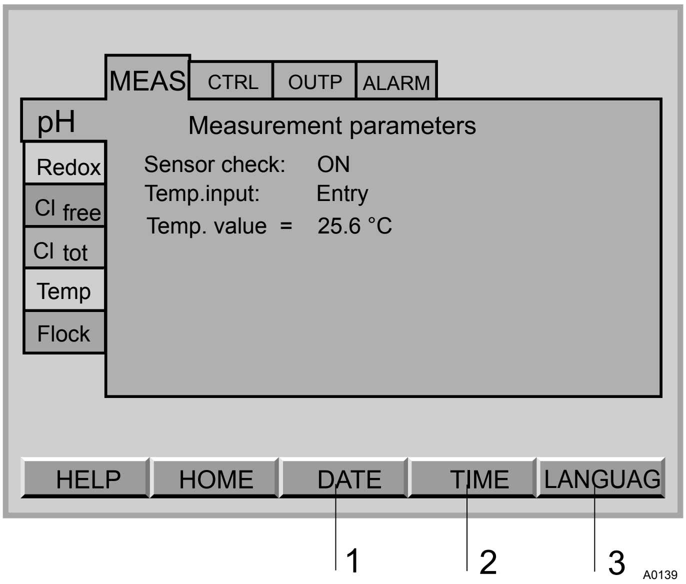


Fig. 20: Access to the submenus

1 Submenu DATE (F3)
2 Submenu TIME (F4)
3 Submenu LANGUAGE (F5)

The submenus DATE, TIME and LANGUAGE can be reached via the function keys in the parametric assignment menu.

Switchover to summer time

The DXCa does not have a function to automatically switch over to summer time.

8 Calibration

NOTICE!

Operating instructions

Always observe the operating instructions and other technical documentation for the installed sensors and flow gauges when calibrating the equipment.

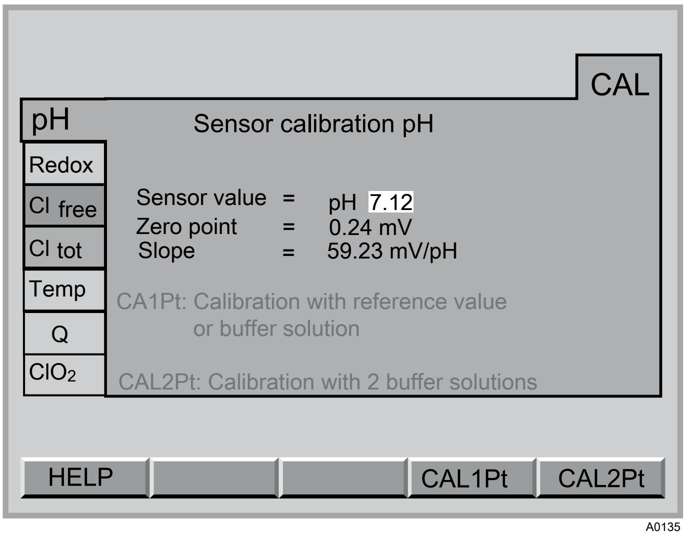


Fig. 21: Calibration menu

The DXCa sets the actuating outputs to ‘0’. Exception to this: When a basic load or a manual actuating variable has been set, this remains active during the calibration process. The mA standard signal outputs are frozen. When calibration has been completed successfully, all of the error checks relating to the reading are restarted. The DXCa stores the recorded data for zero point and slope.

Start calibration (for all measured variables):

- Shut down the measured water (acknowledge possible alarm with the ENTER button)
- Press the F2 key (CAL) from the central menu item
- Enter the access code, see *Chapter 5.2 ‘Access code (password)’ on page 70*
- Select a card file with the desired measured variable (arrow keys)

Support texts

You can choose to show or hide the support texts with the F1 key (HELP).

8.1 Calibration of pH measured variable

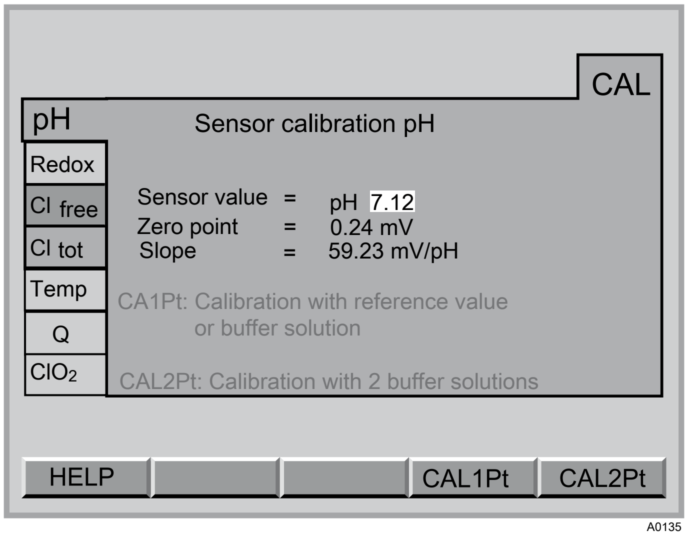


Fig. 22: Calibration of pH measured variable

Dispose of the used buffer solution

8.1.1 1-Point calibration pH

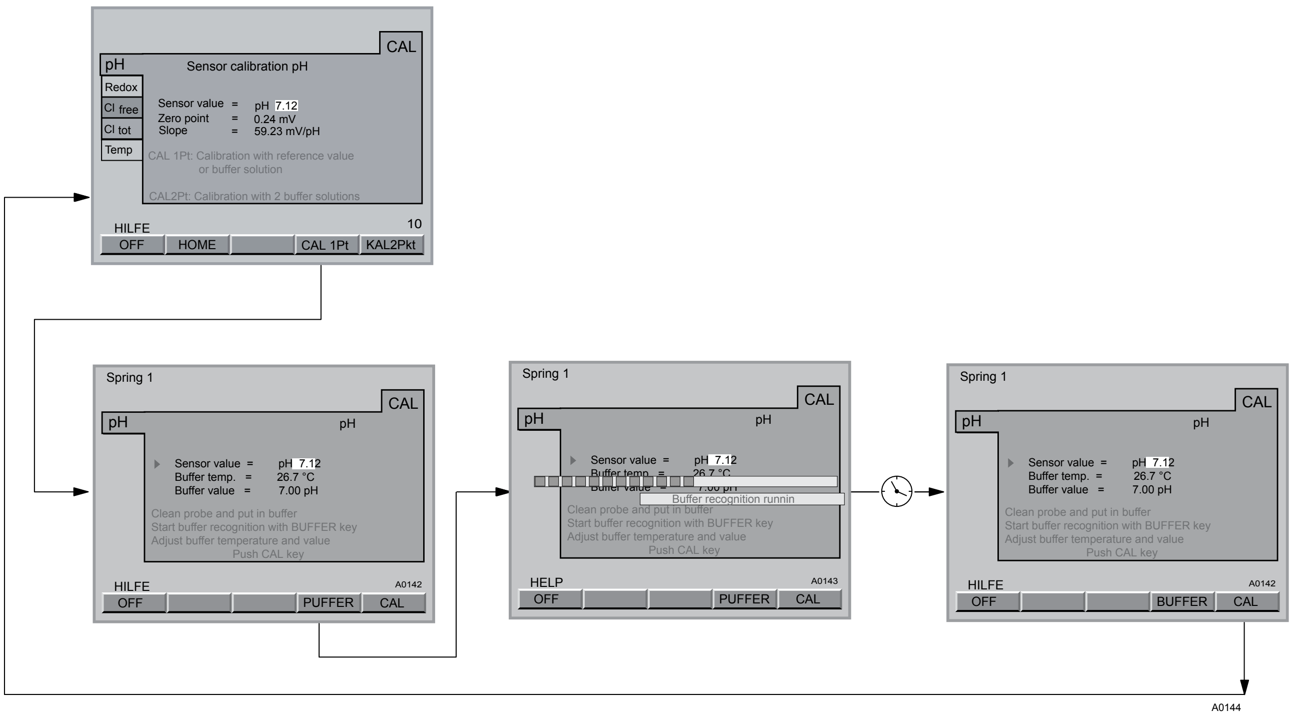


Fig. 23: 1-Point calibration pH

1-Point calibration pH

The DXCa calibrates:

- the zero point if the buffer values lies between 6.8 and 7.5 pH
- the slope, if the buffer value is less than 6.8 pH or greater than 7.5 pH

1. Shut down the measured water (acknowledge possible alarm with the ENTER button)
2. Unscrew the coaxial cable from the pH sensor
3. Remove the pH sensor (measured water shut off?)
4. Rinse the pH sensor with distilled water
5. Carefully pad the pH sensor dry with a cloth (free of grease, lint free)
6. Screw the coaxial cable back onto the pH sensor
7. Select 1-point calibration with F4 (CAL1Pt)
8. Dip the Ph sensor in a buffer solution (e.g. pH 7) and stir

> *If you are measuring with an equipotential bonding pin, then also dip this into the buffer solution.*

9. Select the desired buffer temperature in the file card (arrow keys) and press the ENTER key
10. Enter the temperature of the buffer solution (arrow keys) and press the ENTER key
11. Press F4 (Buffer) (buffer detection)
    ⇨ The progress bar and *'buffer recognition running'* appears on the display
12. Press the ESC key in order to repeat the calibration process
13. Press F5 (CAL) in order to conclude the calibration process
14. If you do not want to carry out any more calibrations, press the ESC key to return to the permanent display or central menu item
15. Unscrew the coaxial cable from the pH sensor
16. Re-install the pH sensor into the flow gauge
17. Screw the coaxial cable back onto the pH sensor
18. Re-install the equipotential bonding pin
19. Open the shut-off valves for the measured water
    ⇨ First open the outlet, then the inlet.

8.1.2 2-Point calibration pH

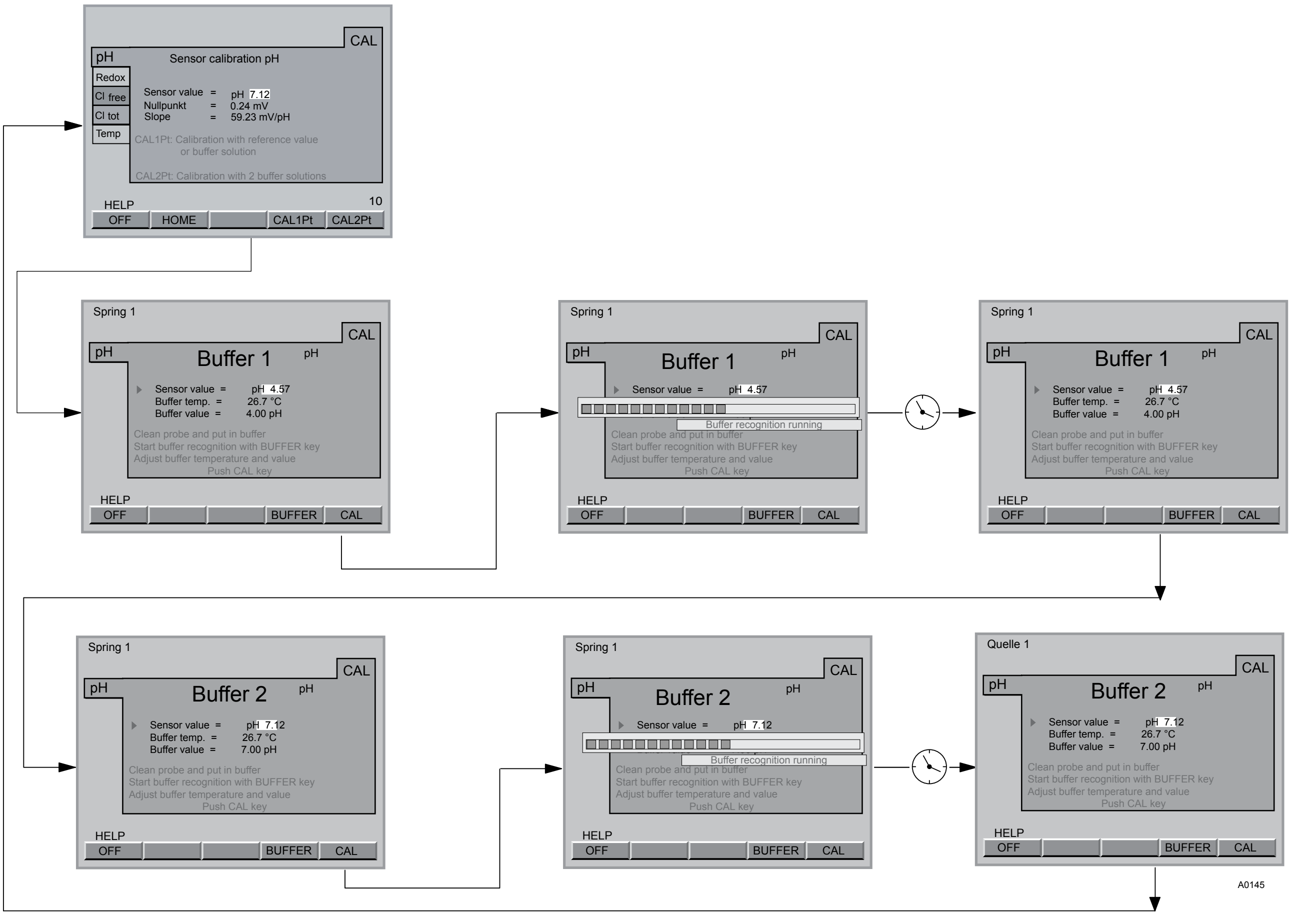


Fig. 24: 2-Point calibration pH

2-Point calibration pH

1. Shut down the measured water (acknowledge possible alarm with the ENTER button)
2. Unscrew the coaxial cable from the pH sensor
3. Remove the pH sensor (measured water shut off?)
4. Rinse the pH sensor with distilled water
5. Carefully pad the pH sensor dry with a cloth (free of grease, lint free)
6. Screw the coaxial cable back onto the pH sensor
7. Select 2-point calibration with F5 (CAL2Pt)
8. Dip the Ph sensor in a buffer solution (e.g. pH 7) and stir

> *If you are measuring with an equipotential bonding pin, then also dip this into the buffer solution.*

9. Select the desired buffer temperature (arrow keys) in the file card (buffer 1) and press the ENTER key
10. Enter the temperature of the buffer solution (arrow keys) and press the ENTER key

11. Press F4 (Buffer) (buffer detection)

    ⇨ The progress bar and *'buffer recognition running'* appears on the display

    The DXCa has detected and stored the value of the buffer solution pH 7 (buffer 1)

12. Press the ESC key in order to repeat the calibration process
13. Press the F5 key (CAL) in order to continue with calibration
14. Take the pH sensor out of the buffer pH7 (buffer 1) and rinse it with distilled water
15. Carefully pad the pH sensor dry with a cloth (free of grease, lint free)
16. Dip the Ph sensor in the buffer solution pH 4 (buffer 2) and stir

> *If you are measuring with an equipotential bonding pin, then also dip this into the buffer solution.*

17. Select the desired buffer temperature (arrow keys) in the currently displayed file card (buffer 2) and press the ENTER key
18. Enter the temperature of the buffer solution (arrow keys) and press the ENTER key
19. Press F4 (Buffer) (buffer detection)

    ⇨ The progress bar and *'buffer recognition running'* appears on the display

    The DXCa has detected and stored the value of the buffer solution pH 4 (buffer 2)

20. Press the ESC key in order to repeat calibration
21. Press F5 (CAL) in order to conclude the calibration process and store the values.

    ⇨ If calibration is successful, the following appears briefly: *'Calibration OK'* .

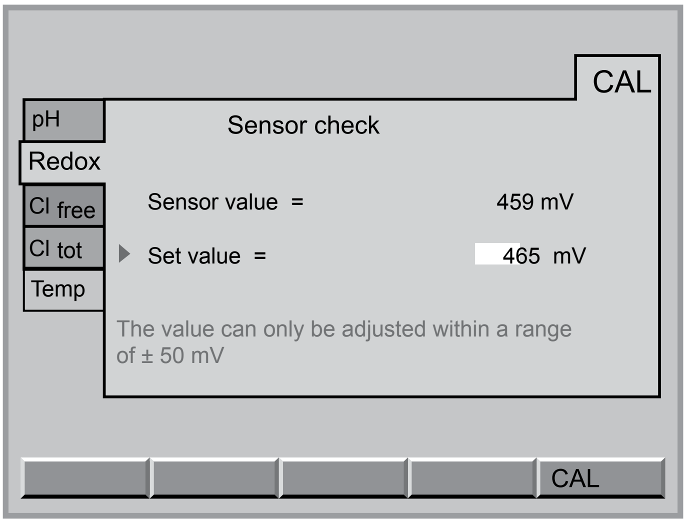
22. If you do not want to carry out any more calibrations, press the ESC key to return to the permanent display or central menu item
23. Unscrew the coaxial cable from the pH sensor
24. Re-install the pH sensor into the flow gauge
25. Screw the coaxial cable back onto the pH sensor
26. Re-install the equipotential bonding pin
27. Open the shut-off valves for the measured water

    ⇨ First open the outlet, then the inlet.

8.2 Redox measured variable

Check redox sensor

You cannot calibrate a redox sensor. A redox sensor can only be tested. If the value of the redox sensor deviates more than ± 50 mV from the value of the buffer solution, then the redox sensor is to be tested as described in its operating instructions and replaced if necessary.



A0146

Fig. 25: Redox measured variable

You can only compare deviations between the redox sensor and buffer solution within a bandwidth of ± 50 mV.

In the event that the displayed value deviates by more than ± 50 mV from the mV-value of the buffer solution, then the buffer solution and redox sensor should be checked and replaced if necessary.

Dispose of the used buffer solution

1. Select the file card *[Redox]*(arrow keys) and press the CAL button (F5)
2. Shut down the measured water (acknowledge possible alarm with the ENTER button)
3. Unscrew the coaxial cable from the redox sensor
4. Remove the redox sensor (measured water shut off?)
5. Rinse the redox sensor with distilled water
6. Carefully pad the redox sensor dry with a cloth (free of grease, lint free)
7. Screw the coaxial cable back onto the redox sensor
8. Dip the redox sensor in a buffer solution (e.g. with 465 mV).

If you are measuring with an equipotential bonding pin, then also dip this into the buffer solution.

9. If the displayed value is stable, compare it with the specified mV value detailed on the buffer solution bottle - it may not vary more than ± 50 mV from the buffer value
10. Press the ENTER button
11. Adjust the set value with the arrow keys. You can only compare deviations between the redox sensor and buffer solution within a bandwidth of ± 50 mV.
12. Press the ENTER button
13. Press the F5 key (ACCEPT)
14. If you do not want to carry out any more tests, press the ESC key to return to the permanent display or central menu item
15. Unscrew the coaxial cable from the redox sensor
16. Re-install the redox sensor into the flow gauge
17. Screw the coaxial cable back onto the redox sensor
18. Re-install the equipotential bonding pin
19. Open the shut-off valves for the measured water
    ⇨ First open the outlet, then the inlet.

8.3 Calibrate measured variable "chlorine free"

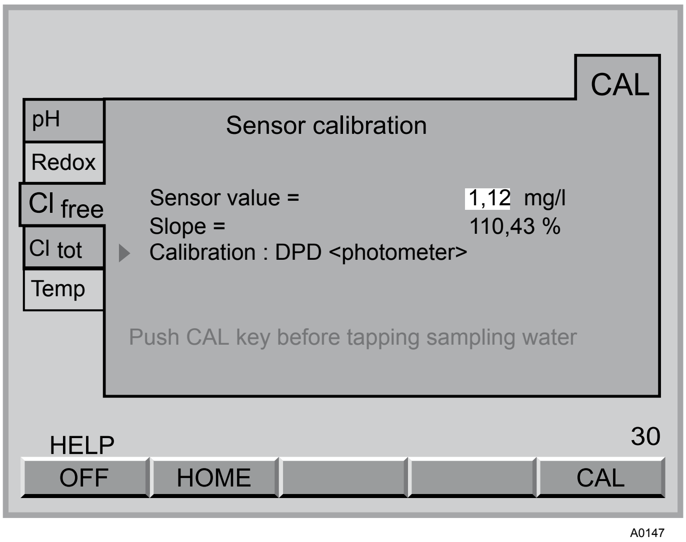


Fig. 26: Calibrate measured variable "chlorine free"

Calibrate zero point for measured variable "chlorine free"

CAUTION!

– Please also observe the operating instructions for the sensor and flow gauge
– You may only set up a chlorine differential measurement in combination with a calibrated pH sensor
– If you calibrated with pH correction, then you may only measure with pH correction! If you calibrated without pH correction, then you may only measure without pH correction
– Following the replacement of a sensor membrane cap or electrolyte, the slope has to be calibrated
– The slope has to be calibrated at regular intervals to ensure the optimal operation of the sensor. Calibrating the sensor every 3-4 weeks suffices with swimming pool or potable water
– Avoid air bubbles in the measured water. Air bubbles, which adhere to the membrane of the sensor, can result in too low a reading and thus lead to over-metering.
– Please note the applicable national guidelines for calibration intervals

Prerequisites

- Constant flow on flow gauge - minimum 40 l/h
- The sensor have been run-in

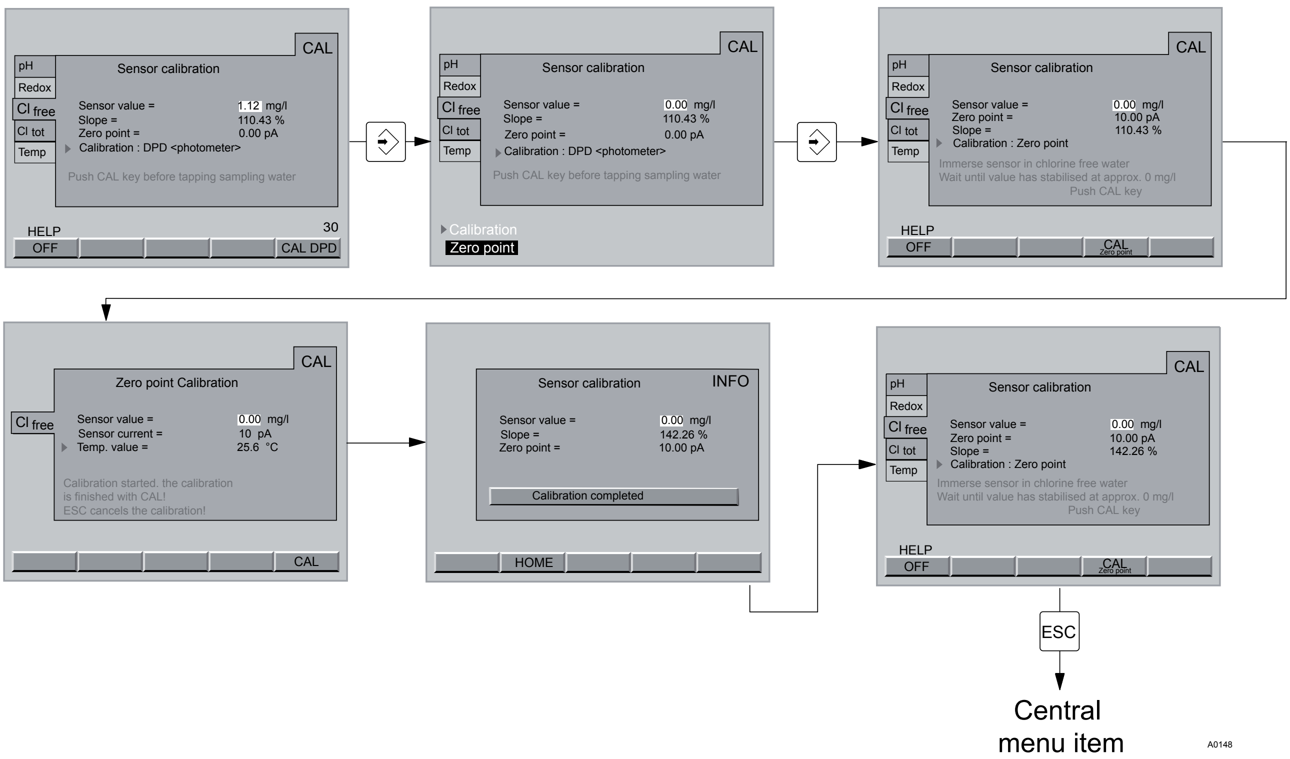


Fig. 27: Calibrate zero point for "chlorine free"

> – *The sensor have been run-in*
> – *Only carry out a zero point calibration if:*
>   – *you are using the sensor in the lower limit of the measuring range*
>   – *you want to measure bonded chlorine (chlorine differential measurement)*

1. Select the file card *'Cl free'* - *'Calibrate sensor'* (arrow keys) and press the ENTER button
2. Select the *'Zero point'* (arrow keys) and press the ENTER button
3. Shut down the measured water (acknowledge possible alarm with the ENTER button)
   ⇨ - First inlet, then the outlet.
4. Dismantle the sensor
   ⇨ Unscrew the CAN cable from the CLE sensor.
5. Rinse the sensor with chlorine free water

> *Examine the tap water for chlorine with an appropriate sampling instrument*

6. Dip the CLE sensor in a bucket of clean, chlorine free tap water (or in still mineral water or distilled water)
   ⇨ The chlorine free water must be the same temperature as the sample water.
7. Stir with the sensor until the measured value of the sensor is stable and near zero for approx. 5 mins.
8. Press F4 (CAL zero point) in order to conclude the calibration process and store the values
   ⇨ Enter the access codes as prompted.
9. Conclude calibration with the F5 key (CAL)
   ⇨ Display: *[zero point calibration completed]*
10. Press F2 (HOME)
    ⇨ Zero point calibration is completed.
11. You can now exit the menu with the ESC button
12. Re-install the sensor into the flow gauge
13. Open the shut-off valves for the measured water
    ⇨ First open the outlet, then the inlet.
14. Before calibrating the slope, wait until the measured value is constant (minimum 15 mins)
15.
    > CAUTION!
    > Now it is imperative to calibrate the *'slope'*

Calibrate slope for measured variable "chlorine free"

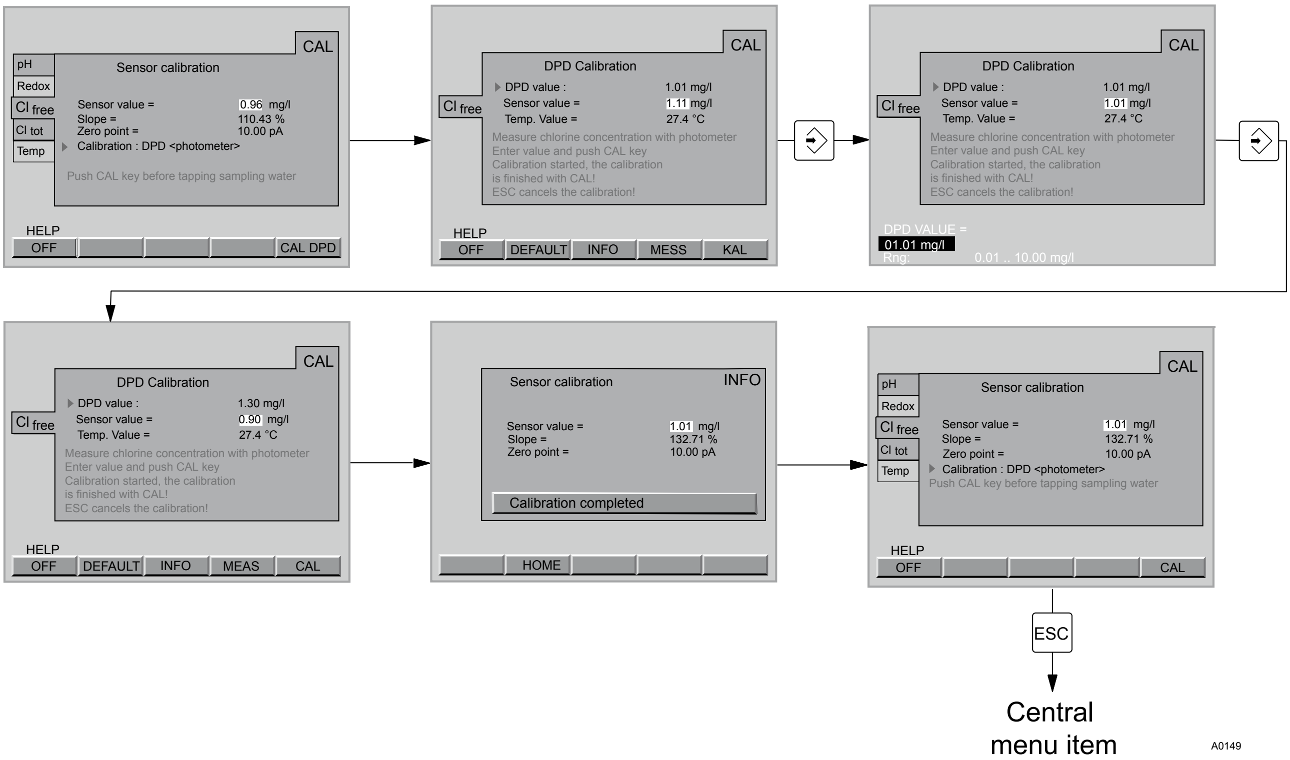


Fig. 28: Calibrate slope "chlorine free"

CAUTION!
Chlorine must be permanently present in the sample water (approx 0.5 mg/l). Otherwise the measuring system cannot calibrate.

1. Select the file card *[Cl free] [Sensor calibration]* (arrow keys) and press the ENTER button
2. Select *[DPD (photometer)]* (arrow keys) and press the ENTER button
3. If the *[Sensor value]* is stable, press F5 (CAL DPD)
4. Immediately afterwards, take a water sample from the flow gauge
5. Immediately afterwards, determine the chlorine content of the sample water with a photometer and a suitable sampling instrument (e.g. DPD 1 for free chlorine (CLE sensor CLE))
6. Press the ENTER button
7. Enter the chlorine content (arrow keys) and press the ENTER key
8. Press F5 (CAL) in order to conclude the calibration process

   ⇨ The following appears *[Calibration completed]*.
9. Press the F2 key (HOME) in order to return to the calibration menu screen
10. If you do not want to carry out any more calibrations, press the ESC key to return to the permanent display

If you also want to measure the total chlorine, then calibrate this measured variable with the same sample (see *Chapter 8.4 'Calibrate measured variable "Total chlorine"' on page 99*).

> *Repeat the calibration after one day.*

> *You can display the pH value, the sensor current and the temperature at the time of pressing the button with F4 (MESS).*
>
> – *In the event that an error message is shown when calibrating a chlorine sensor, you can call up detailed information with F3 INFO. This data will also help when discussing the matter with a technical consultant.*

In the event that the DXCa indicates an excessively low measured value or cannot be calibrated after the sensor has been run in (for CLE 3.1 and CTE/CGE approx. 2-6 h, for CLE 3 approx. 2 h) (in the sample water there must be approx. 1 mg/l of free chlorine, the pH-value 7.2 and the sample water and circulation pumps must be running), then the run-in times should be doubled and extended into the following day.

If the sensor still cannot not be calibrated, then please phone ProMinent customer service. Please have the following data ready:

- DPD1-value (free chlorine)
- DPD 1 + 3-value (total chlorine)
- Primary sensor current in pA (via F4 MESS in calibration menu for slope)
- pH value
- Redox value (if redox measurement is available)
- Volume of sample water in cubic metres

Set the CLE sensor for free chlorine to "DEFAULT" values

1. Select the file card *[Cl free] [Sensor calibration]* (arrow keys) and press the F5 button (CAL DPD)
2. Press the F2 key (DEFAULT) key, see Fig. 29
   ⇨ The zero point is now set to 0 pA and the slope at 100%. All previous calibrated values will now have been overwritten
3. Now you must re-calibrate the measured variable *'chlorine free'* , see Fig. 30
   ⇨ In order to do so, press the ESC button.
4. Press the F5 key (CAL)

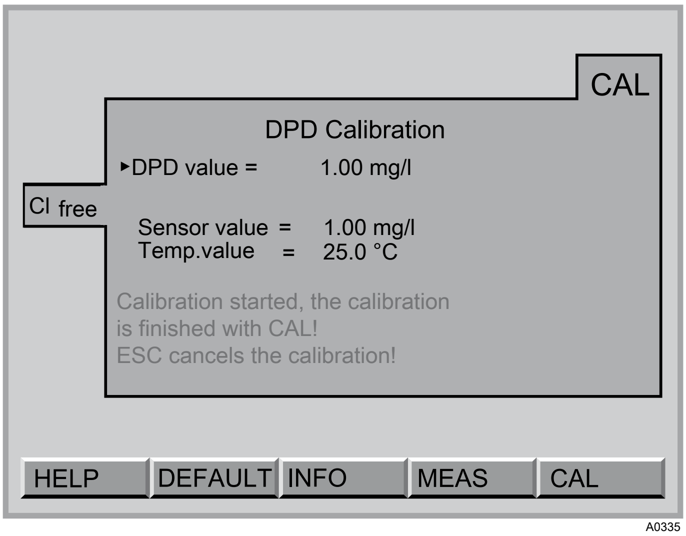


Fig. 29: [DEFAULT] .

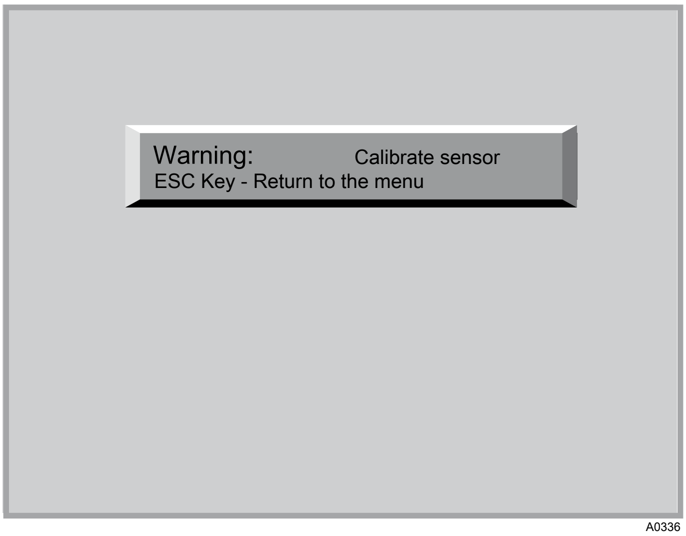


Fig. 30: Press the ESC button

8.4 Calibrate measured variable "Total chlorine"

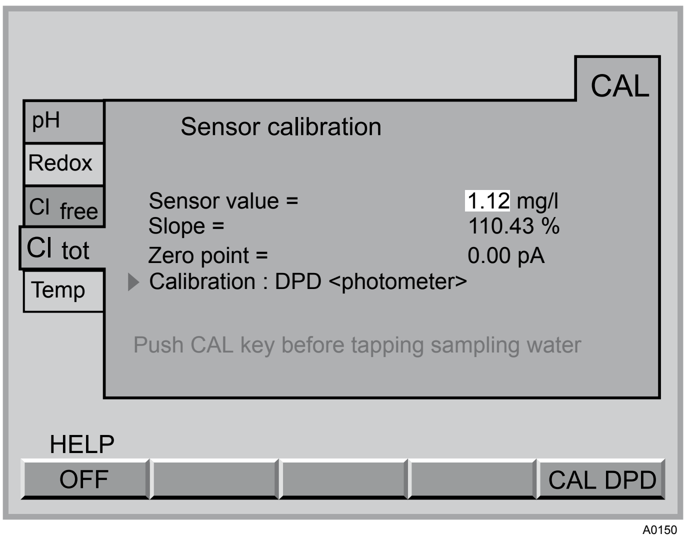


Fig. 31: Calibrate measured variable "Total chlorine"

Calibrate zero point for measured variable "total chlorine"

CAUTION!

– Here you calibrate the CTE sensor for total chlorine
– The DXCa calculates the displayed value for bonded chlorine as the difference between the measured values from the free chlorine and total chlorine sensors.
– The sensor for *'Free chlorine'* must be a CLE 3.1 sensor for the chlorine differential measurement
– Please also observe the operating instructions for the sensor and flow gauge
– You may only set up a chlorine differential measurement in combination with a calibrated pH sensor
– If you calibrated with pH correction, then you may only measure with pH correction! If you calibrated without pH correction, then you may only measure without pH correction
– Following the replacement of a sensor membrane cap or electrolyte, the slope has to be calibrated
– The slope has to be calibrated at regular intervals to ensure the optimal operation of the sensor. Calibrating the sensor every 3-4 weeks suffices with swimming pool or potable water
– Avoid air bubbles in the measured water. Air bubbles, which adhere to the membrane of the sensor, can result in too low a reading and thus lead to over-metering.
– Please note the applicable national guidelines for calibration intervals

Prerequisites

- Constant flow on flow gauge - minimum 40 l/h
- The sensor have been run-in
- A CLE 3.1 sensor for free chlorine must be available in the system (pools, filtration circuit, etc.)

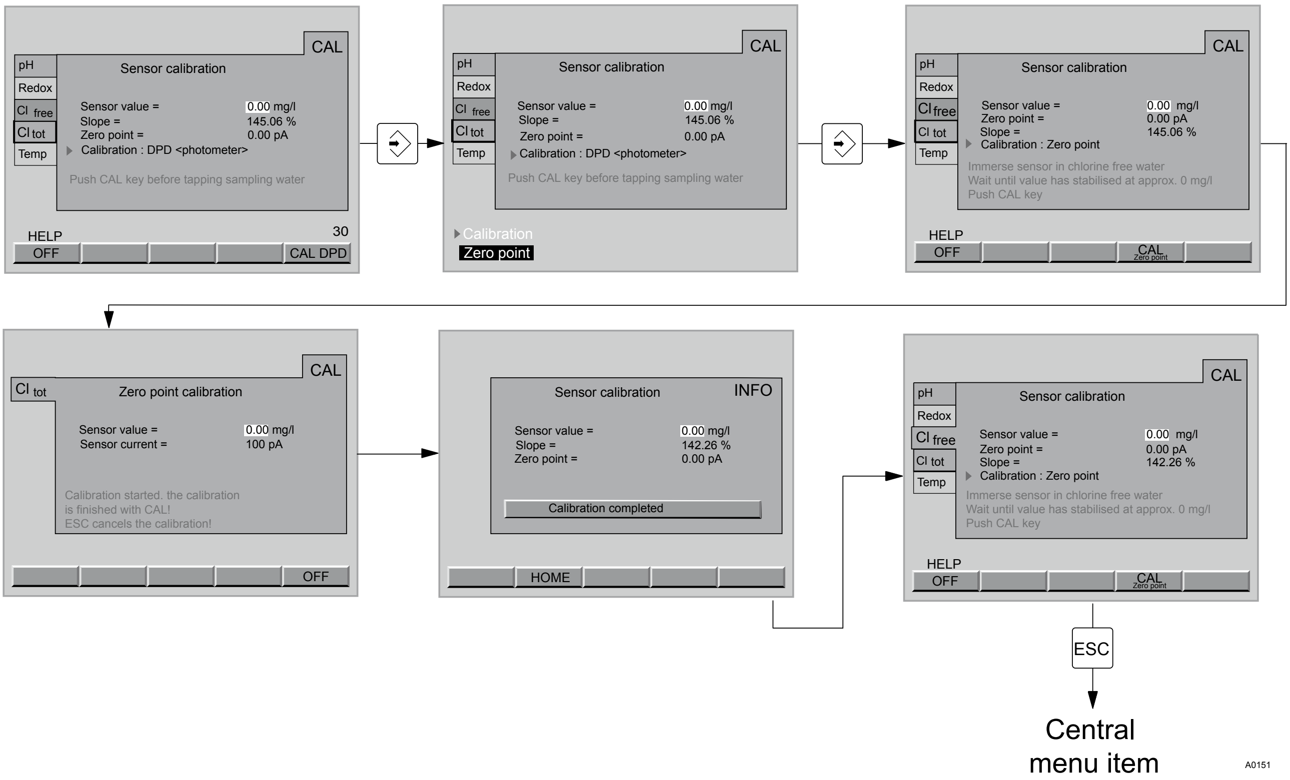


Fig. 32: Calibrate zero point for "Total chlorine"

> – *The sensor have been run-in*
> – *Only carry out a zero point calibration if:*
>   – *you are using the sensor in the lower limit of the measuring range*
>   – *you want to measure bonded chlorine (chlorine differential measurement)*

1. Select the file card *'Cl comb'* - *'Calibrate sensor'* (arrow keys) and press the ENTER button
2. Select the *'Zero point'* (arrow keys) and press the ENTER button
3. Shut down the measured water (acknowledge possible alarm with the ENTER button)

   ⇨ - First inlet, then the outlet.
4. Dismantle the sensor

   ⇨ Do not unscrew the CAN cable from the CTE sensor.
5. Rinse the sensor with chlorine free water

> *Examine the tap water for chlorine with an appropriate sampling instrument*

6. Dip the CTE sensor in a bucket of clean, chlorine free tap water (or in still mineral water or distilled water)

   ⇨ The chlorine free water must be the same temperature as the sample water.
7. Stir with the sensor until the measured value of the sensor is stable and near zero for approx. 5 mins.

8. Press F4 (CAL zero point) in order to conclude the calibration process and store the values
   ⇨ Enter the access codes as prompted.
9. Conclude calibration with the F5 key (CAL)
   ⇨ Display: *[zero point calibration completed]*
10. Re-install the sensor into the flow gauge
11. Open the shut-off valves for the measured water
   ⇨ First open the outlet, then the inlet.
12. Before calibrating the slope, wait until the measured value is constant (minimum 15 mins)
13. CAUTION!
   Now it is imperative to calibrate the *'slope'*

Calibrate slope for measured variable "total chlorine"

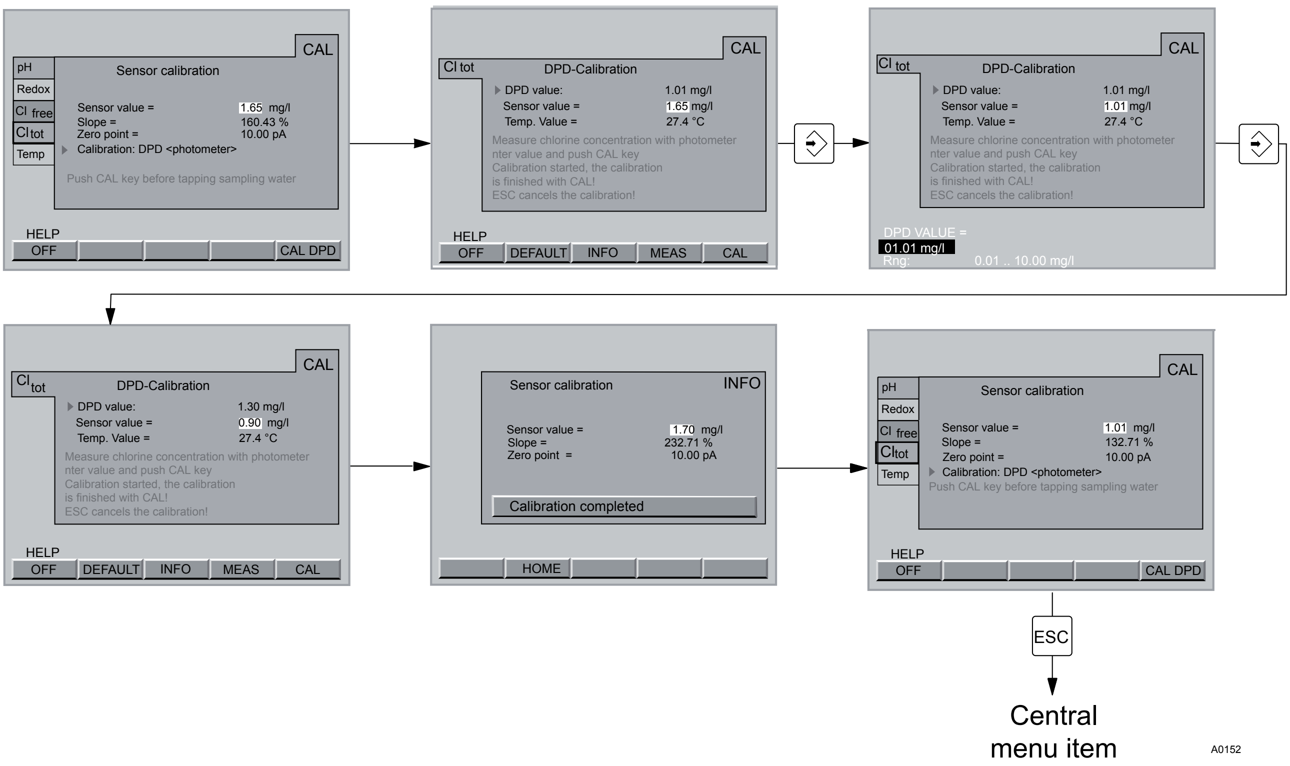


Fig. 33: Calibrate slope for "total chlorine"

CAUTION!
Chlorine must be permanently present in the sample water (approx 0.5 mg/l). Otherwise the measuring system cannot calibrate.

1. Select the file card *[Cl comb] [Sensor calibration]* (arrow keys) and press the ENTER button
2. Select *[DPD (photometer)]* (arrow keys) and press the ENTER button

3. If the *[Sensor value]* is stable, press F5 (CAL DPD)
4. Immediately afterwards, take a water sample from the flow gauge
5. Immediately afterwards, determine the chlorine content of the sample water with a photometer and a suitable sampling instrument (e.g. DPD 1 + 3 for total chlorine (CTE sensor))
6. Press the ENTER button
7. Enter the chlorine content (arrow keys) and press the ENTER key
8. Press F5 (CAL) in order to conclude the calibration process
   ⇨ The following appears *[Calibration completed]*.
9. Press the F2 key (HOME) in order to return to the calibration menu screen
10. If you do not want to carry out any more calibrations, press the ESC key to return to the permanent display

> *Repeat the calibration after one day.*

> *You can display the pH value, the sensor current and the temperature at the time of pressing the button with F4 (MESS).*
>
> – *In the event that an error message is shown when calibrating a chlorine sensor, you can call up detailed information with F3 INFO. This data will also help when discussing the matter with a technical consultant.*

Set the CTE sensor for total chlorine to "DEFAULT" values

1. Select the file card *[Clges] [Sensor calibration]* (arrow keys) and press the F5 button (CAL DPD)
2. Press the F2 key (DEFAULT) key, see Fig. 34
   ⇨ The zero point is now set to 0 pA and the slope at 100%. All previous calibrated values will now have been overwritten
3. Now you must re-calibrate the measured variable *‘chlorine free’* , see Fig. 35
   ⇨ In order to do so, press the ESC button.
4. Press the F5 key (CAL)

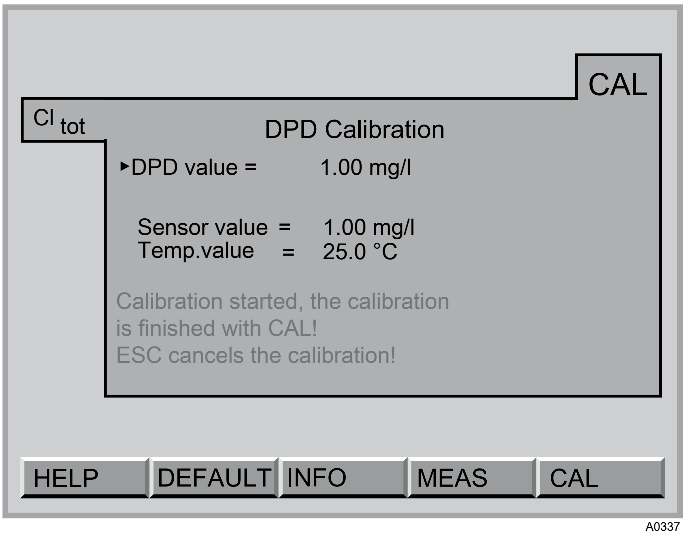


Fig. 34: [DEFAULT] .

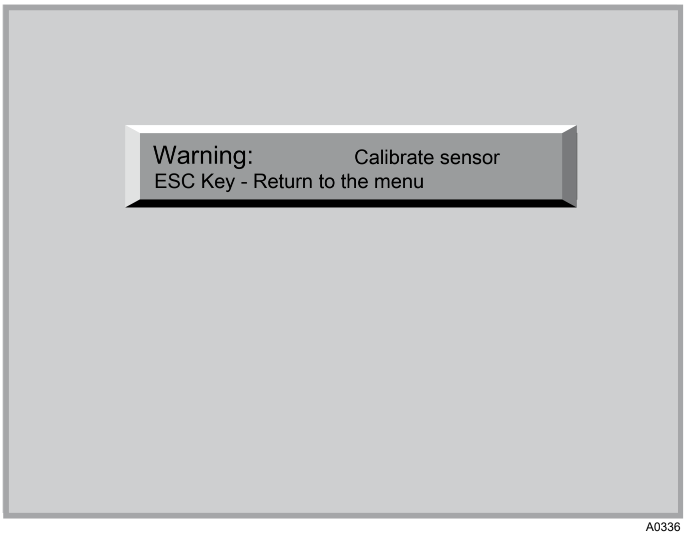


Fig. 35: Press the ESC button

8.5 Calibrate measured variable for fluoride (F^-)

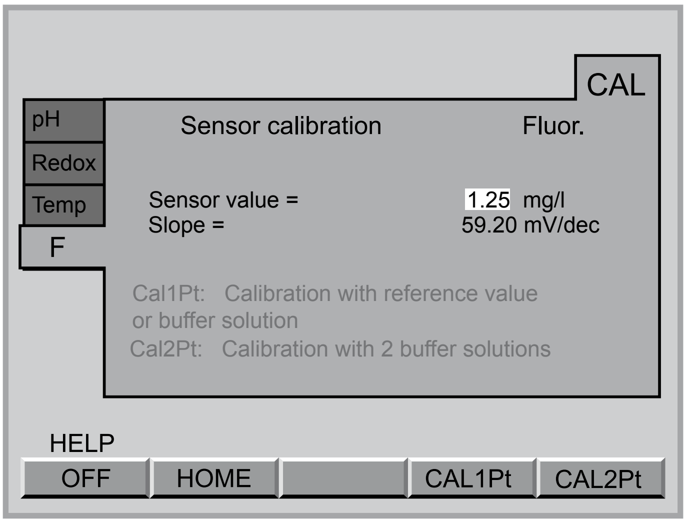


Fig. 36: Calibrate measured variable for fluoride (F^-)

1-Point calibration (via photometer)

CAUTION!
– Please also observe the operating instructions for the sensor and flow gauges, etc.
– The sensor must be checked at regular intervals to ensure optimal operation of the sensor and re-calibrated if necessary
– Avoid air bubbles in the measured water. Air bubbles, which adhere to the membrane of the sensor, can result in too low a reading and thus lead to over-metering.
– A 2-point calibration must be carried out during the initial commissioning process
– Please note the applicable national guidelines for calibration intervals

Prerequisites

- The sensor must be run-in (min. 1 h)

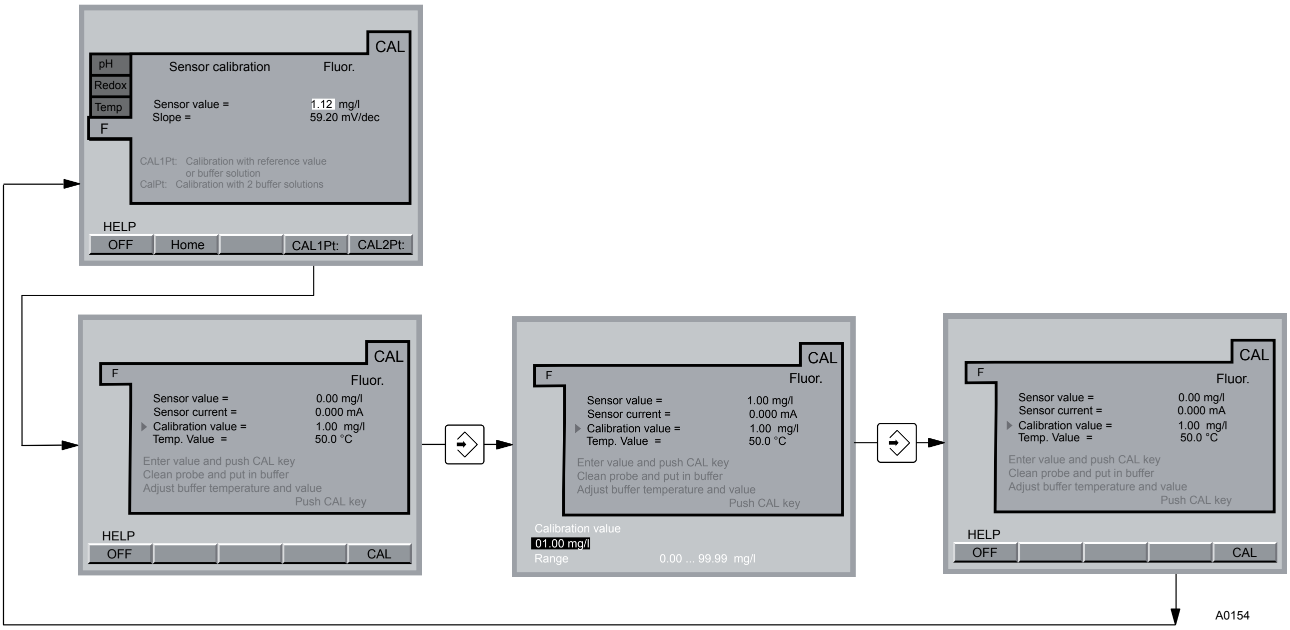


Fig. 37: 1-Point calibration (via photometer)

1. Take a water sample from the sampling cock for purposes of calibration
2. Measure the water sample in accordance with the photometer manufacturer's instructions
3. Subsequently switch directly to the calibration menu with F2 CAL
4. Select the file card "F-" (arrow keys) and press F4 CAL 1Pt
5. Select *[Temp.value]* (arrow keys), in the event that the temperature of the water is incorrect, and press the ENTER button
6. Enter the current measured temperature of the water (arrow keys) and press the ENTER key
7. Select the *[Calibration value]* (arrow keys) and press the ENTER button
8. Enter the measured fluoride concentration ascertained by the photometer (arrow keys) and press the ENTER key
9. Then press the F5 key (CAL)
10. If you do not want to carry out any more calibrations, press the ESC key to return to the permanent display

2-Point calibration (via photometer)

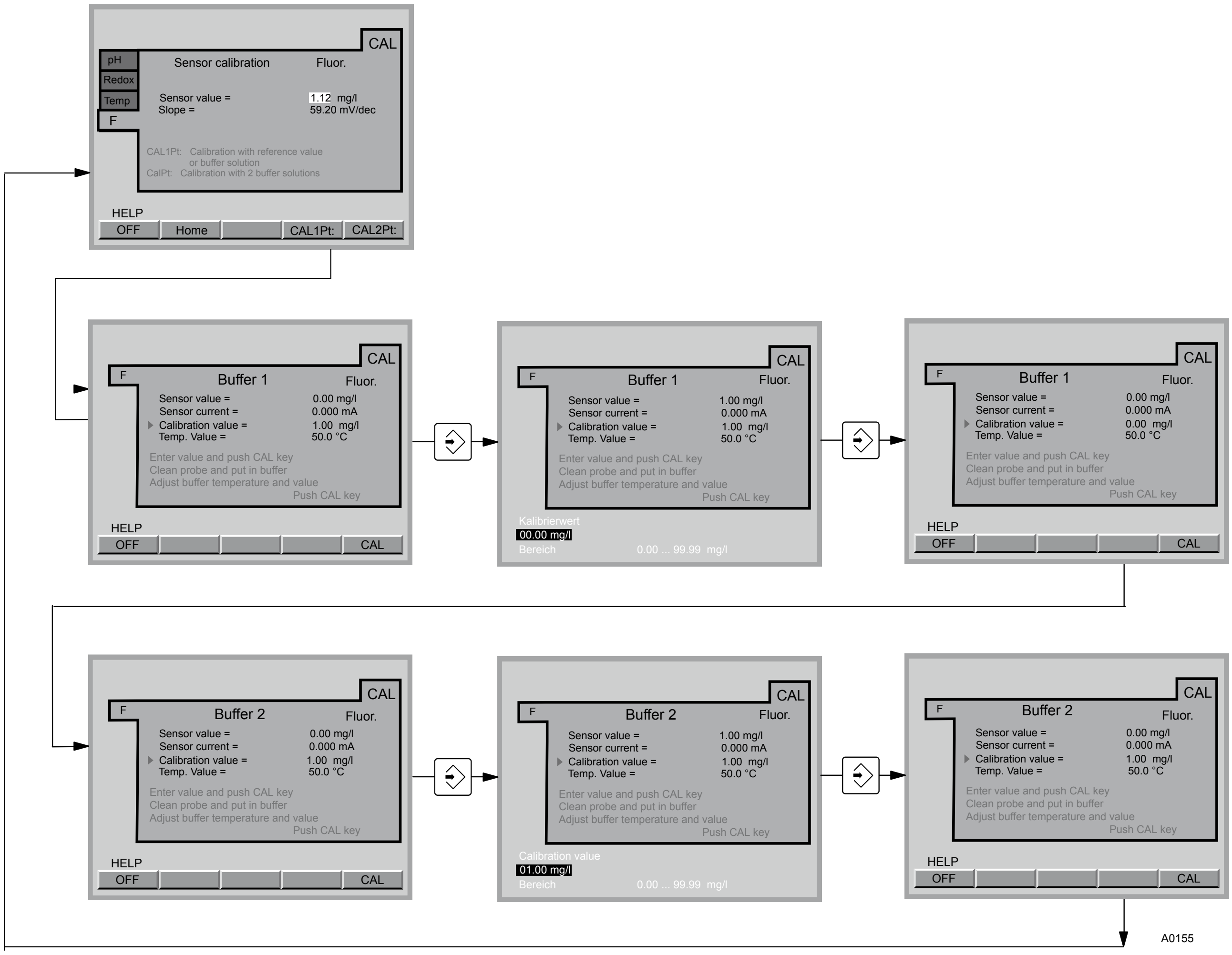


Fig. 38: 2-Point calibration (via photometer)

8.6 Calibrate measured variable for chlorine dioxide (ClO_2).

Calibrating at a higher temperature

As chlorine dioxide in the sample water is only physically dissolved, unlike chlorine, it gasses out of the sample water very quickly at high temperatures (> 30 °C). It is therefore essential that the DPD measurements are performed quickly. There should on no account be more than 1 minute between taking the sample and mixing it with the reagents. In this case you must generate the red dye by the addition of the reagent directly at the sampling point and then the measurement should be conducted in the laboratory as quickly as possible.

In the event that the DXCa indicates an excessively low measured value or cannot be calibrated after the sensor has been run in (for CDE approx. 2 - 6 hrs) then the run-in times should be doubled and extended into the following day.

If the sensor still cannot not be calibrated, then please phone ProMinent customer service.

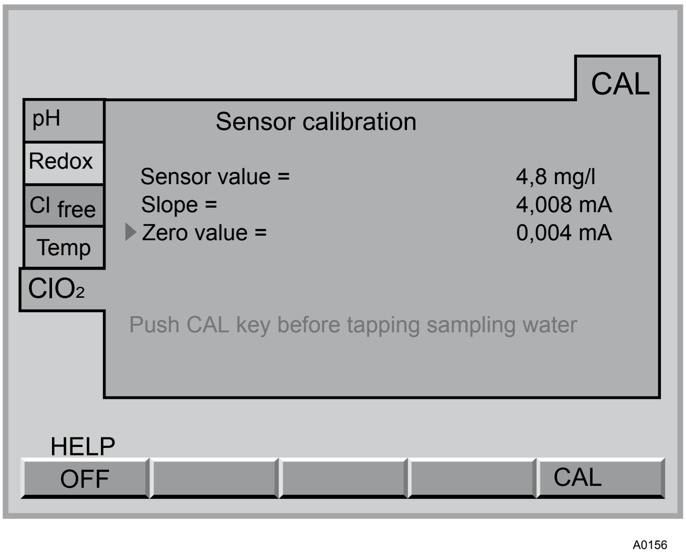


Fig. 39: Calibrate measured variable for chlorine dioxide (ClO_2).

Measured variable chlorine dioxide (ClO_2).

CAUTION!
- Please also observe the operating instructions for the sensor and flow gauge
- Following the replacement of a sensor membrane cap or electrolyte, the slope has to be calibrated
- Avoid air bubbles in the measured water. Air bubbles, which adhere to the membrane of the sensor, can result in too low a reading and thus lead to over-metering.
- The slope has to be re-calibrated at regular intervals to ensure the optimal operation of the sensor.
- Please note the applicable national guidelines for calibration intervals

Prerequisites

- Constant flow on flow gauge - minimum 20 l/h
- Constant temperature of the sample water
- Identical temperature of sample water and sensor (wait approx. 15 minutes)
- The sensor have been run-in

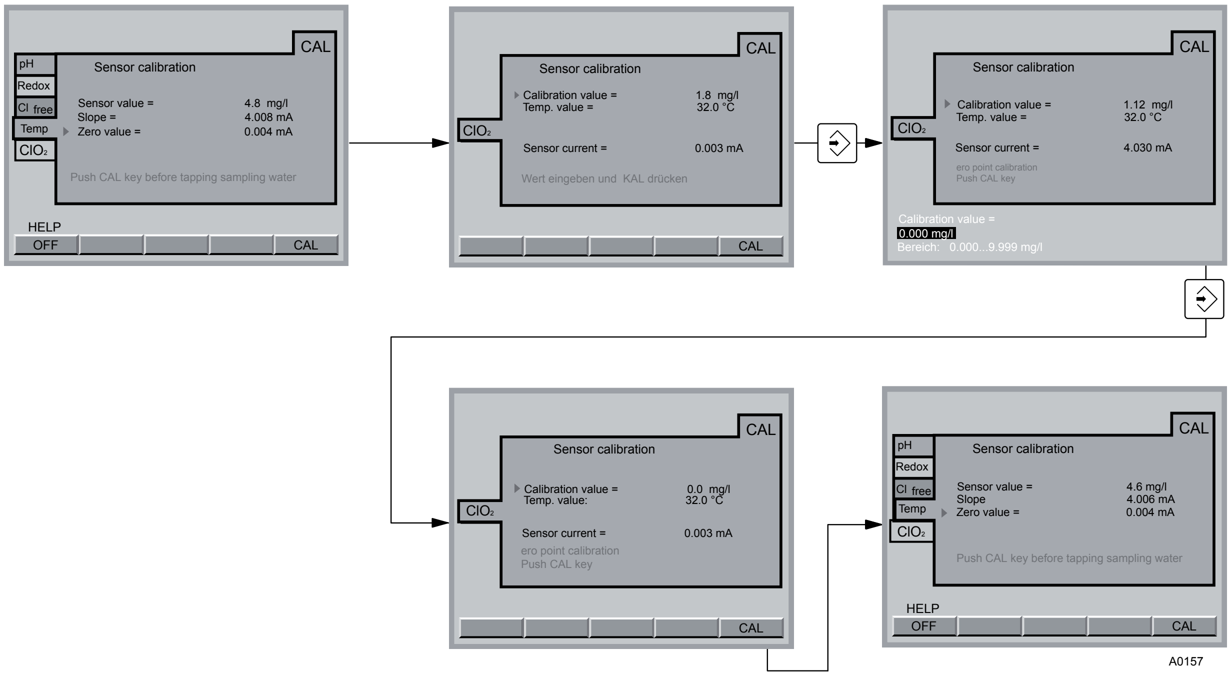


Fig. 40: Chlorine dioxide (ClO_2).

CAUTION!
- The sensor have been run-in
- Only carry out a zero point calibration if:
  - you are using the sensor in the lower limit of the measuring range
  - Use the 0.5 ppm variant

1. Select the file card "ClO_2“ - *‘Calibrate sensor’* (arrow keys) F5 CAL and press the ENTER button
2. Under *[DPD value]* enter the value 0.00 mg/l and press the ENTER-key - the following is now shown on the file card *[Zero point calibration]*
3. Shut down the measured water (acknowledge possible alarm with the ENTER button)

   ⇨ - First inlet, then the outlet.
4. Dismantle the sensor
5. Rinse the sensor with chlorine free water
6. Dip the CDE sensor in a container of still mineral water or distilled water. The water must be the same temperature as the sample water.
7. Stir with the sensor until the measured value of the sensor is stable and near zero for approx. 5 mins.
8. Then press the F5 key (CAL)
9. Re-install the sensor into the flow gauge
10. Open the shut-off valves for the measured water

    ⇨ First open the outlet, then the inlet.

CAUTION!
Now it is imperative to calibrate the *'slope'*

Measured variable chlorine dioxide (ClO_2).

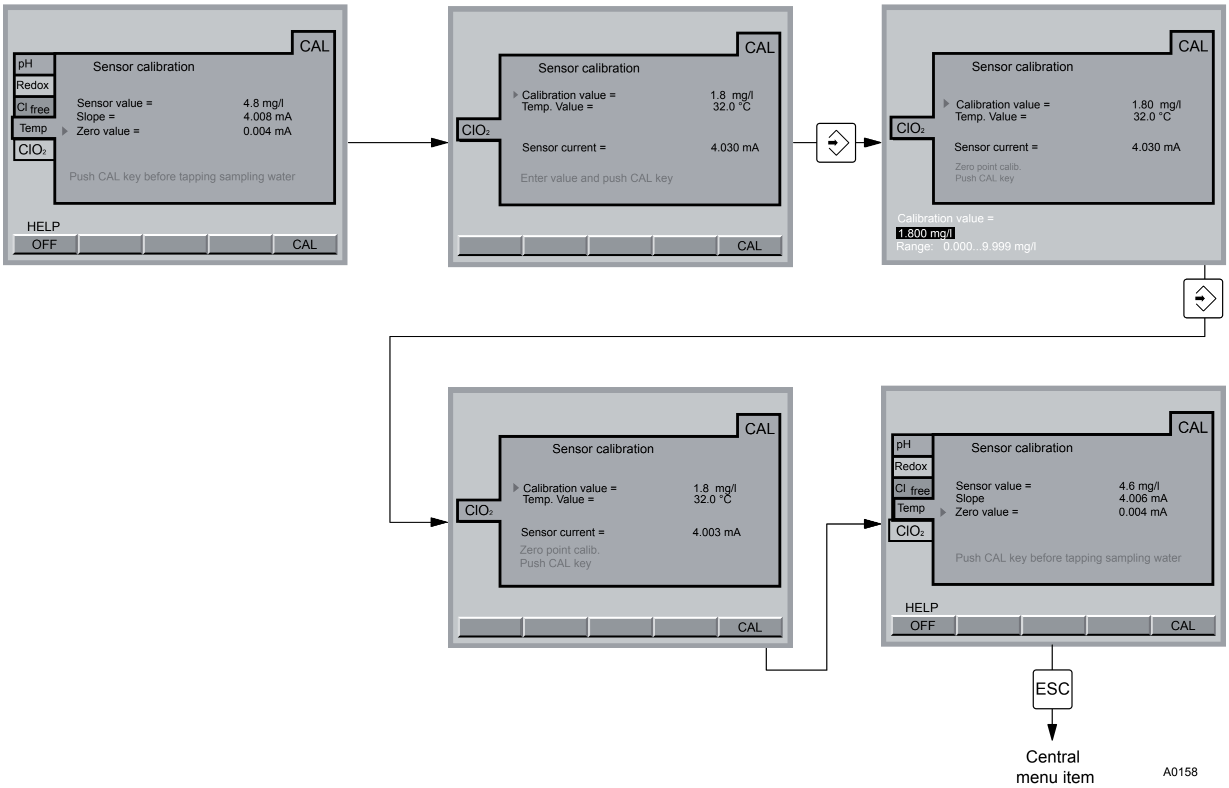


Fig. 41: Chlorine dioxide (ClO_2).

CAUTION!
- Before calibrating the slope, wait until the measured value is constant (wait minimum 15 mins.)
- Chlorine dioxide must be permanently present in the sample water (approx 0.5 mg/l).
  - Otherwise the measuring system cannot calibrate.
- Check the calibration 24 hrs after initial commissioning by means of DPD

1. Select the file card "ClO_2" - *'Calibrate sensor'* off (arrow keys)
2. If the *[Sensor value]* is stable, press F5 (CAL DPD)
3. Immediately afterwards, take a water sample from the flow gauge
4. Immediately afterwards, determine the chlorine dioxide content of the sample water with a photometer and a suitable sampling instrument (e.g. DPD)
5. Enter the chlorine dioxide content (arrow keys) and press F5 CAL
6. If you do not want to carry out any more calibrations, press the ESC key to return to the permanent display

8.7 Calibrate measured variable hydrogen peroxide (H_2O_2).

Calibrate measured variable hydrogen peroxide (H_2O_2).

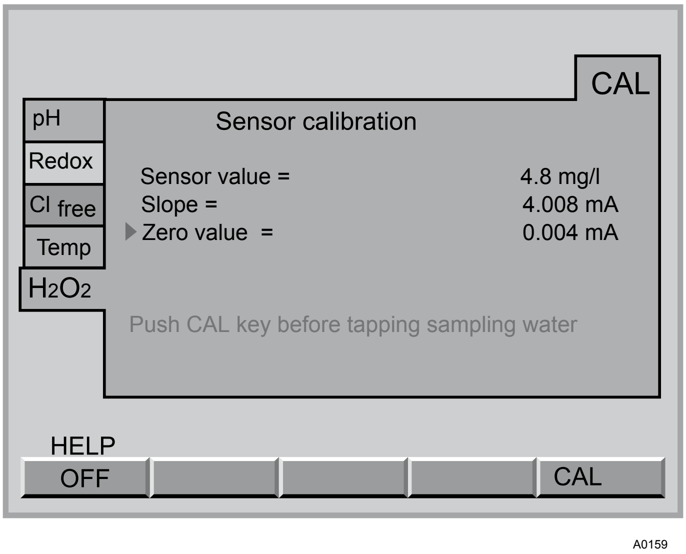


Fig. 42: Calibrate measured variable hydrogen peroxide (H_2O_2).

CAUTION!

– Please also observe the operating instructions for the sensor and flow gauge

– Following the replacement of a sensor membrane cap or electrolyte, the slope has to be calibrated

– The slope has to be re-calibrated at regular intervals to ensure the optimal operation of the sensor.

– Please note the applicable national guidelines for calibration intervals

Prerequisites

- The H_2O_2-concentration of the sample water is simultaneously sufficiently constant (observe the response time of the sensor over 8 mins)
- Constant, permissible flow rate at the flow gauge
- Identical temperature of sample water and sensor (wait approx. 15 minutes)
- The sensor have been run-in

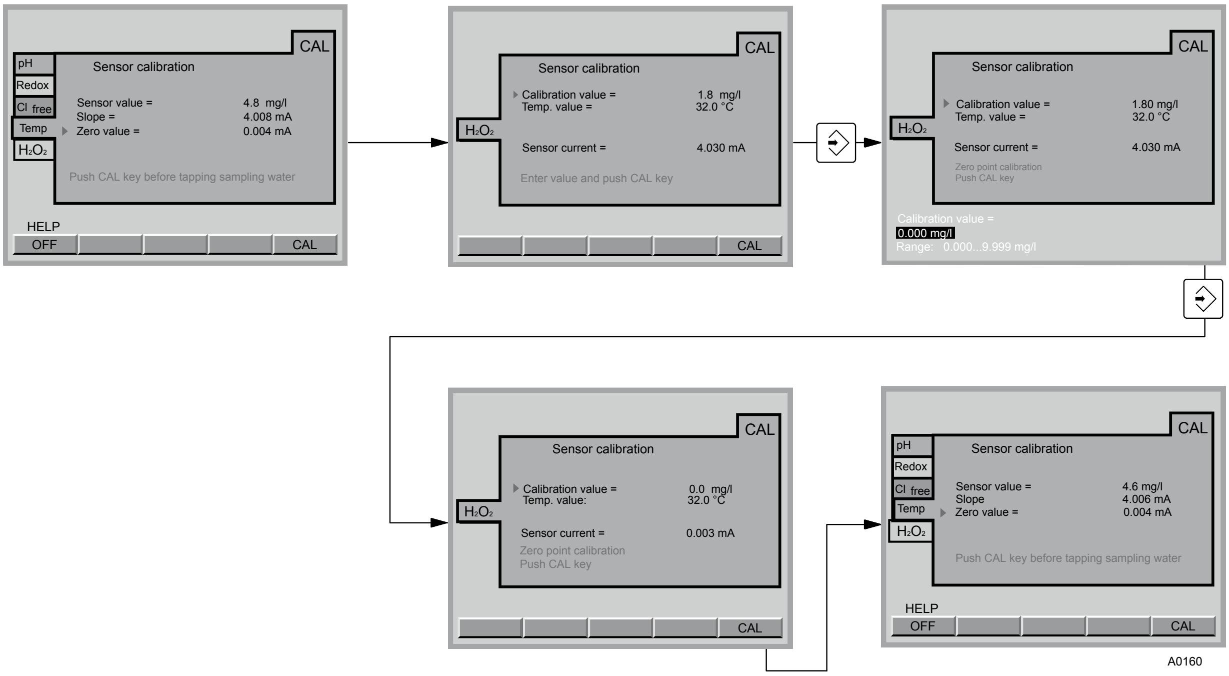


Fig. 43: Calibrate zero point

> **CAUTION!**
> – The sensor have been run-in
> – Only carry out a zero point calibration if:
>   – you are using the sensor in the lower limit of the measuring range

1. Select the file card "H_2O_2" *[Sensor calibration]* (arrow keys), F5 CAL and press the ENTER button
2. Under *[DPD value]* enter the value 0.00 mg/l and press the ENTER-key - the following is now shown on the file card *[Zero point calibration]*
3. Shut down the measured water (acknowledge possible alarm with the ENTER button)

   ⇨ - First inlet, then the outlet.
4. Dismantle the sensor
5. Rinse the sensor with H_2O_2-free water
6. Dip the PER sensor in a container of still mineral water or distilled water. The water must be the same temperature as the sample water.
7. Stir with the sensor until the measured value of the sensor is stable and near zero for approx. 5 mins.
8. Then press the F5 key (CAL)
9. Re-install the sensor into the flow gauge
10. Open the shut-off valves for the measured water

   ⇨ First open the outlet, then the inlet.

CAUTION!
Now it is imperative to calibrate the *'slope'*

Calibrate measured variable hydrogen peroxide (H_2O_2).

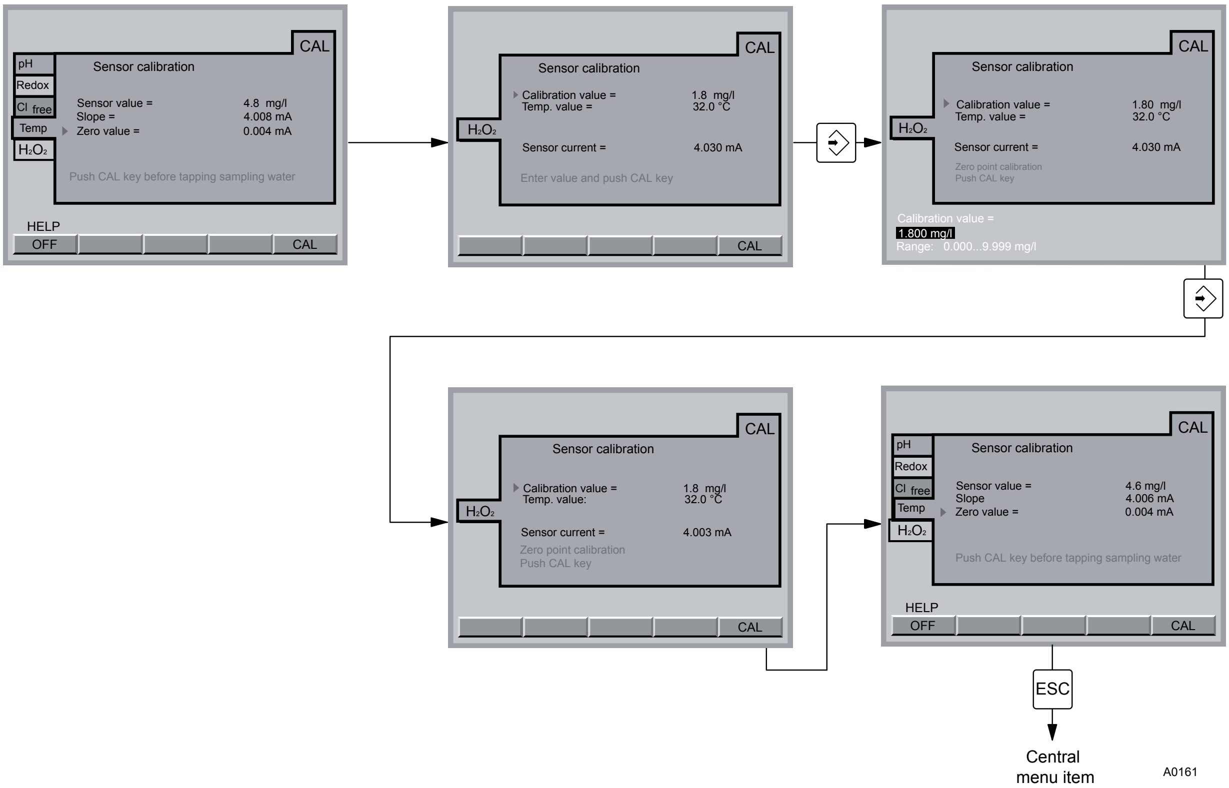


Fig. 44: Calibrate slope

CAUTION!
- Before calibrating the slope, wait until the measured value is constant (wait minimum 15 mins.)
- Check the calibration 24 hrs after initial commissioning by means of DPD
- Repeat calibration if the H_2O_2-concentration varies by more than 15 % from the reference value

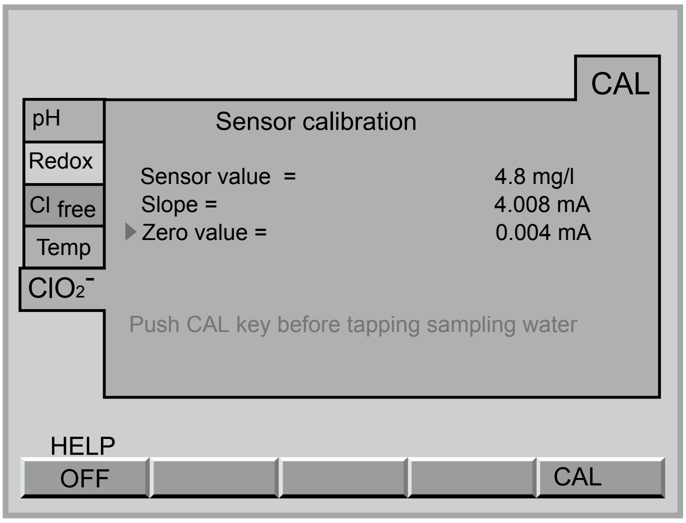
1. Select the file card "H_2O_2" *[Sensor calibration]* off (arrow keys)
2. If the *[Sensor value]* is stable, press F5
3. Immediately afterwards, take a water sample from the flow gauge
4. Immediately afterwards determine the H_2O_2-content of the sample water with a photometer and a suitable sampling instrument (e.g. DPD)
5. Enter the H_2O_2-content (arrow keys) and press F5 CAL
6. If you do not want to carry out any more calibrations, press the ESC key to return to the permanent display

In the event that the DXCa indicates an excessively low measured value or cannot be calibrated after the sensor has been run in (for H_2O_2 approx . 6-12 h) then the run-in times should be doubled and extended into the following day.

If the sensor still cannot not be calibrated, then please phone ProMinent customer service.

8.8 Measured variable chlorite (ClO_2^-)

Measured variable chlorite (ClO_2^-) zero point calibration



A0162

Fig. 45: Calibrate measured variable chlorite (ClO_2^-)

CAUTION!

- Please also observe the operating instructions for the sensor and flow gauge
- Following the replacement of a sensor membrane cap or electrolyte, the slope has to be calibrated
- Avoid air bubbles in the measured water. Air bubbles, which adhere to the membrane of the sensor, can result in too low a reading and thus lead to over-metering.
- The slope has to be re-calibrated at regular intervals to ensure the optimal operation of the sensor.
- Please note the applicable national guidelines for calibration intervals

Prerequisites

- Constant flow on flow gauge - minimum 20 l/h
- Constant temperature of the sample water
- Identical temperature of sample water and sensor (wait approx. 15 minutes)
- The sensor have been run-in
- There is a constant pH value in the permitted range (pH 6.5 - 9.5)

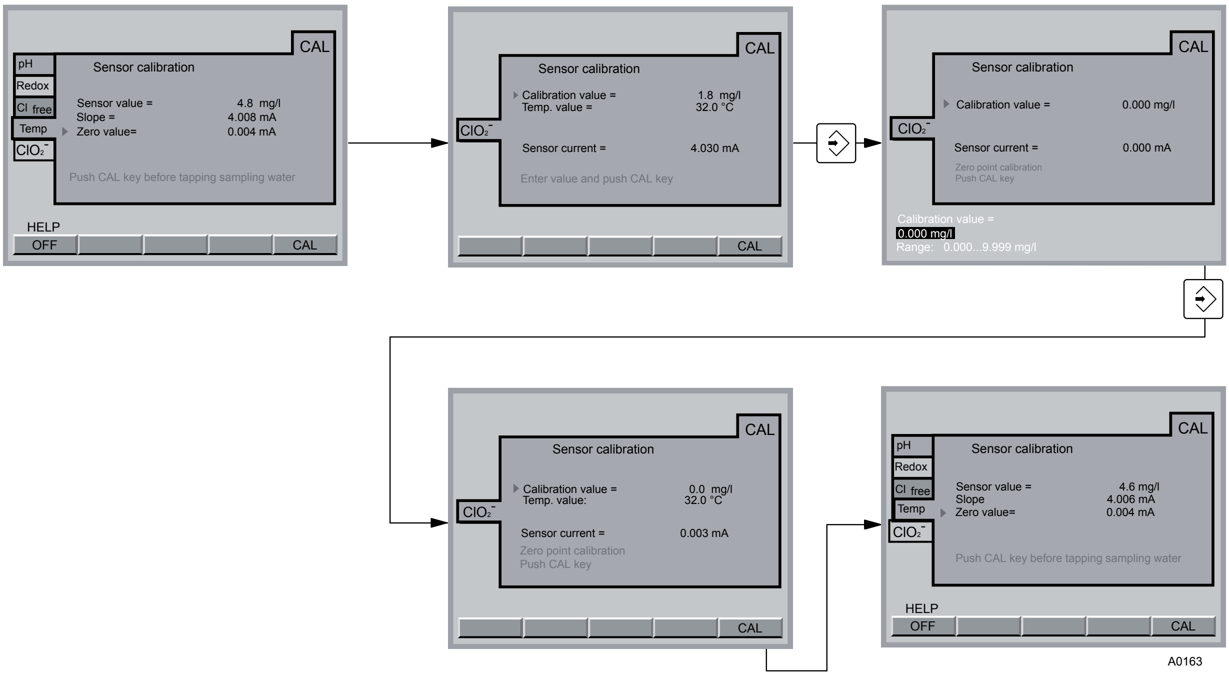


Fig. 46: Chlorite (ClO_2^-) zero point calibration

CAUTION!

– The sensor have been run-in

– Only carry out a zero point calibration if:

  – you are using the sensor in the lower limit of the measuring range

1. Select the file card "ClO_2^-" - *'Calibrate sensor'* (arrow keys) F5 CAL and press the ENTER button
2. Under *[DPD value]* enter the value 0.00 mg/l and press the ENTER-key - the following is now shown on the file card *[Zero point calibration]*
3. Shut down the measured water (acknowledge possible alarm with the ENTER button)

   ⇨ - First inlet, then the outlet.
4. Dismantle the sensor
5. Rinse the sensor with chlorine free water
6. Dip the CLT sensor in a container of still mineral water or distilled water. The water must be the same temperature as the sample water.
7. Stir with the sensor until the measured value of the sensor is stable and near zero for approx. 5 mins.
8. Then press the F5 key (CAL)
9. Re-install the sensor into the flow gauge
10. Open the shut-off valves for the measured water

    ⇨ First open the outlet, then the inlet.

CAUTION!
Now it is imperative to calibrate the *'slope'*

Calibrate slope for measured variable chlorite (ClO_2^-)

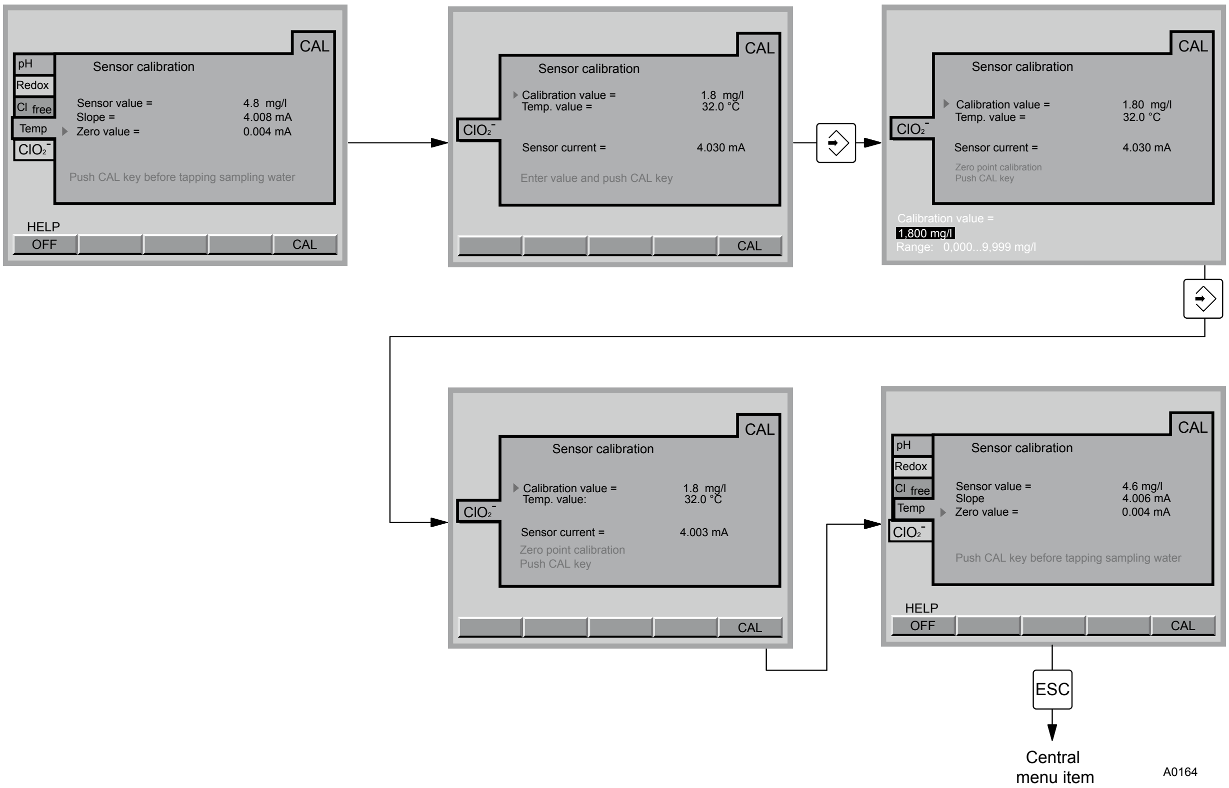


Fig. 47: Chlorite (ClO_2^-)

CAUTION!
– Before calibrating the slope, wait until the measured value is constant (minimum 15 mins)
– Chlorite must be permanently present in the sample water (approx 0.5 mg/l)! Otherwise the measuring system cannot calibrate.
– Check the calibration 24 hrs after initial commissioning by means of DPD

1. Select the file card "ClO_2^-" - *'Calibrate sensor'* off (arrow keys)
2. If the *[Sensor value]* is stable, press F5
3. Immediately afterwards, take a water sample from the flow gauge
4. Immediately afterwards determine the ClO_2^- content of the sample water with a photometer and a suitable sampling instrument (e.g. DPD)
5. Enter the ClO_2^--content (arrow keys) and press F5 CAL
6. If you do not want to carry out any more calibrations, press the ESC key to return to the permanent display

In the event that the DXCa indicates an excessively low measured value or cannot be calibrated after the sensor has been run in (for CLT approx. 2 - 6 hrs) then the run-in times should be doubled and extended into the following day.

If the sensor still cannot not be calibrated, then please phone ProMinent customer service.

8.9 Calibrate measured variable for peracetic acid (PES)

Calibrate measured variable slope for peracetic acid (PES)

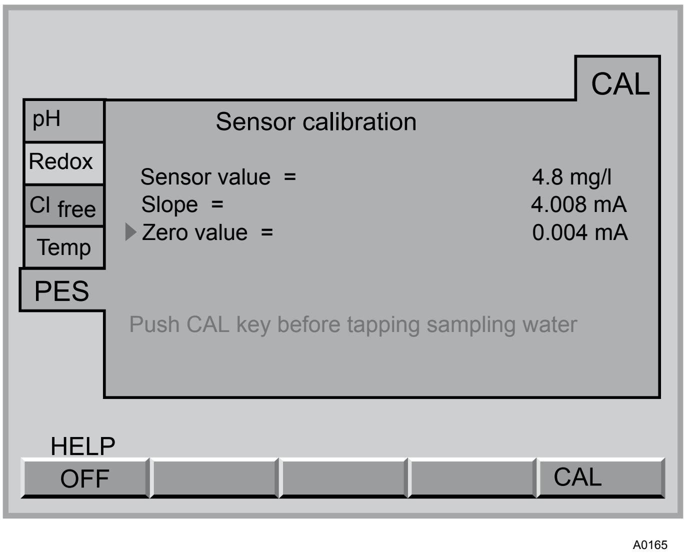


Fig. 48: Calibrate measured variable for peracetic acid (PES)

CAUTION!
– Please also observe the operating instructions for the sensor and flow gauge
– Following the replacement of a sensor membrane cap or electrolyte, the slope has to be calibrated
– Avoid air bubbles in the measured water. Air bubbles, which adhere to the membrane of the sensor, can result in too low a reading and thus lead to over-metering.
– The slope has to be re-calibrated at regular intervals to ensure the optimal operation of the sensor.
– Please note the applicable national guidelines for calibration intervals

Prerequisites

- Constant flow on flow gauge - minimum 20 l/h
- Constant temperature of the sample water
- The sensor have been run-in

It is not necessary to carry out zero point calibration

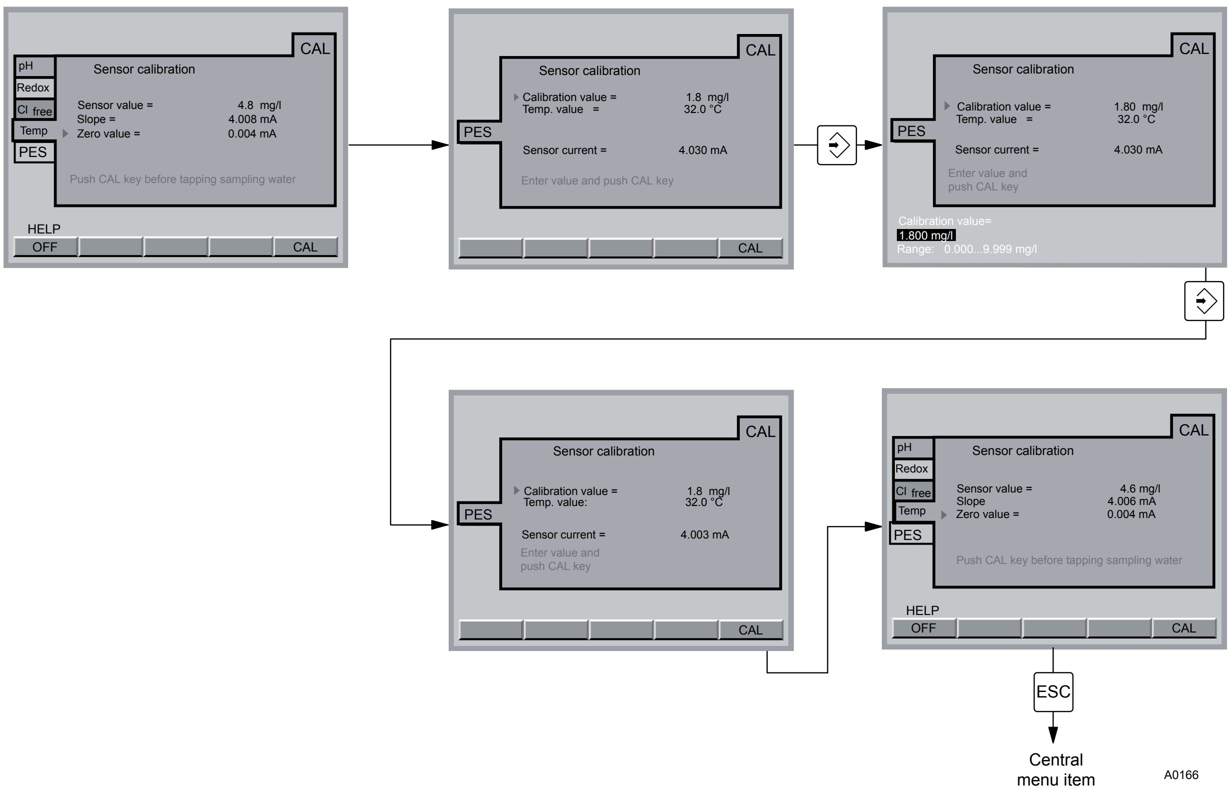


Fig. 49: Calibrate slope for peracetic acid (PES)

CAUTION!
– Check the calibration 24 hrs after initial commissioning
– Repeat the calibration process in the event that the PES concentration varies by more than 15 % from the reference value

1. Select the file card *[PES]* - *'Calibrate sensor'* (arrow keys) F5 CAL and press the ENTER button
2. Press F5 CAL if the sensor value is stable
3. Shut down the measured water (acknowledge possible alarm with the ENTER button)
   ⇨ - First inlet, then the outlet.
4. Fill a standard solution with a known PES concentration e.g. into the DLG III flow gauge container
5. Stir the contents of the container with a magnetic stirring bar
6. Dip the sensor into the container until the measured value remains constant (15 mins). Enter the PES content (arrow keys) and press F5 CAL.
7. Open the shut-off valves for the measured water
   ⇨ First open the outlet, then the inlet.
8. If you do not want to carry out any more calibrations, press the ESC key to return to the permanent display

In the event that the DXCa indicates an excessively low measured value or cannot be calibrated after the sensor has been run in (for PAA approx. 1 - 2 hrs) then the run-in times should be doubled and extended into the following day.

If the sensor still cannot not be calibrated, then please phone ProMinent customer service.

8.10 Calibration measured variable temperature

Calibration measured variable temperature

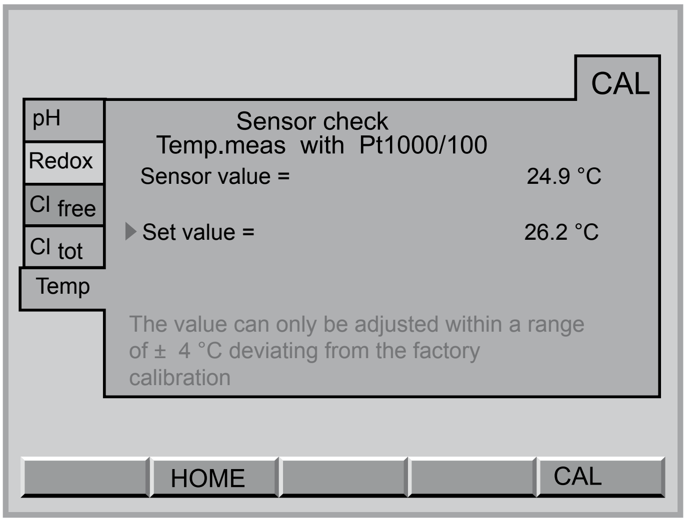


Fig. 50: Calibration measured variable temperature

- *You should only calibrate an external temperature sensor if:*
  - *you are using the temperature measurement from chlorine sensors*
  - *you are using type PT100 temperature sensors*
  - *you have a precise reference instrument*
- *Do not exchange the temperature sensors during the calibration process*
- *The temperature value can only be adjusted within a range of ± 4 °C from the factory set calibrated value*

1. Take a water sample of minimum 250 ml
2. Dip the external PT100 temperature sensor from the DXCa and the reference instrument sensor into the sample simultaneously
3. Press the ENTER key when the sensor value is stable
4. Under *[set value]* enter the reference instrument value (arrow keys) and press the ENTER key
5. Press F5 (SAVE) in order to conclude the calibration process and store the values
6. If you do not want to carry out any more calibrations, press the ESC key to return to the permanent display

9 Assign parameters

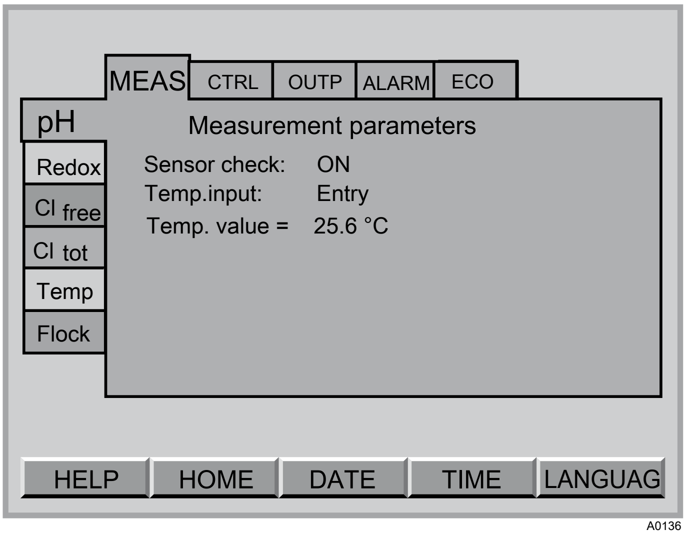


Fig. 51: Assign parameters

This chapter describes the menu items for the parameter groups:

- Measurement
- Control
- mA Output
- Alarm
- Eco!Mode

for the individual DXCa measured variables and flocculants.

9.1 All parameters

> ***Default values***
> *The default values can be loaded in the second menu item for the current file card with F4 (DEFAULT)*

Exit a file card in the parameter menu:

1. without saving: press the ESC key repeatedly until the DXCa returns to the permanent display
2. with saving: Press F5, if SAVE is shown above. Confirm the prompt *'Really save?'* with the ENTER button. If you do not want to carry out any more parametric assignments, press the ESC key to return to the permanent display or central menu item.

9.2 Measurement

Access to measurement settings

1. > ***Back with ESC***
   > *You can return back to the previous menu by pressing the ESC key.*

   Access to the settings is realised from the central menu item
2. Press the F3 button (PARAM)

3. Select the desired measured variable with the vertical arrow keys
4. Then select file card *[MESS]* with the horizontal arrow keys
5. Then press the ENTER button
   ⇨ You are now in the control system settings area.
6. Select the desired parameter with the vertical arrow keys
7. Then press the ENTER button
8. Adjust the parameter with the vertical or horizontal arrow keys
9. Move the cursor to the left or right with the help of the horizontal arrow keys
10. Conclude your entry with the ENTER key
11. Exit the file card without saving: Press the ESC button.

    Exit the file card with saving: press F5 if *[SAVE]* is visible. Confirm the prompt *[Really save?]* with the ENTER button.

9.2.1 Parametric assignment pH

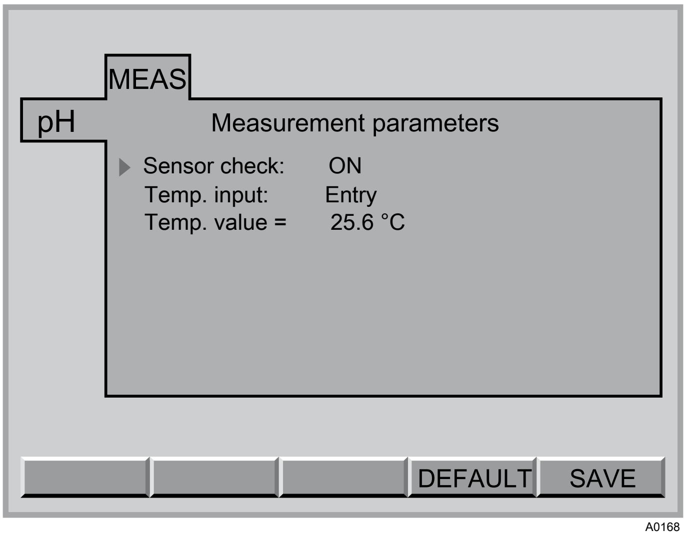


Fig. 52: Measurement pH

Adjustable variables	Increment	Remarks
Sensor check	Off	
	on	
liquid ref. Pot:	Off	appears only with configured equipotential bonding pin
	on	Equipotential bonding pin must be connected
Temp.input:	PT1000 (100)	Chlorine sensor or separate temperature sensor
	Entry	
Temp.value	0,0 ... 99.9 °C	At *[Temp.input. Entry]*

Sensor monitoring

Under "Sensor check" select *[on]* or *[off]*, in order to switch the sensor monitoring system on or off.

The resistance of the pH sensor is measured if sensor monitoring is activated.

If the resistance value remains under 2 MΩ for longer than 1 minute during operation, an error message appears in the central menu item. *[pH sensor defective!]*. However, if the value is above 200 MΩ and the measured signal fluctuates considerably, then error message *[Fault pH input!]* is triggered.

9.2.2 Parametric assignment redox

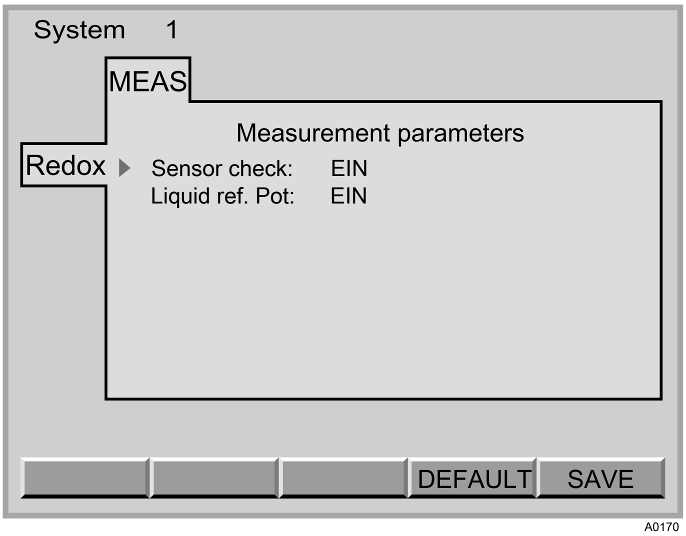


Fig. 53: Redox measurement

Adjustable variables	Increment	Remarks
Sensor check	off	The device van display a pH-corrected value for free chlorine
	on	
liquid ref. Pot:	off	appears only with configured equipotential bonding pin
	on	Equipotential bonding pin must be connected

Sensor monitoring

Select under *[Sensor check] [ON]* or *[OFF]*, in order to switch the redox sensor monitoring system on or off.

The resistance of the redox sensor is measured if sensor monitoring is activated.

If the resistance value remains under 2 MΩ for longer than 1 minute during operation, an error message appears in the central menu item. *[Redox sensor defective!]*. However, if the value is above 200 MΩ and the measured signal fluctuates considerably, then error message *[Fault redox input!]* is triggered.

9.2.3 Parametric assignment "chlorine free"

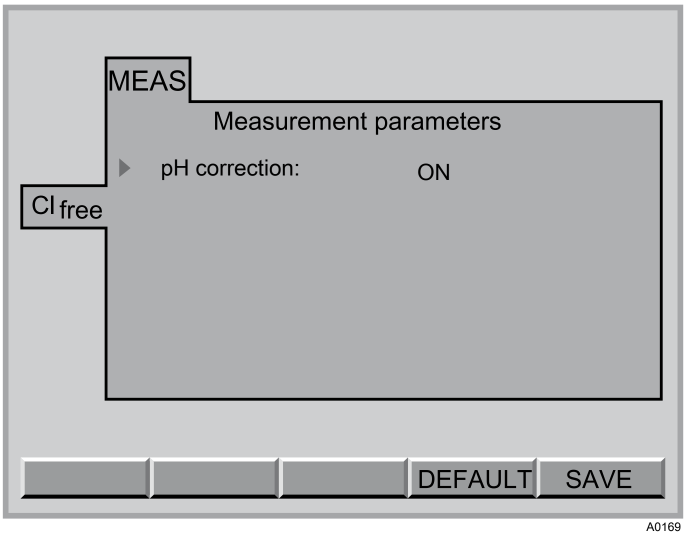


Fig. 54: Measurement for free chlorine

Adjustable variables	Increment	Remarks
pH correction	on	The device van display a pH-corrected value for free chlorine
	off	

NOTICE!
If you calibrated with pH correction, then you may only measure with pH correction! If you calibrated without pH correction, then you may only measure without pH correction

9.2.4 Parametric assignment "chlorine bound"

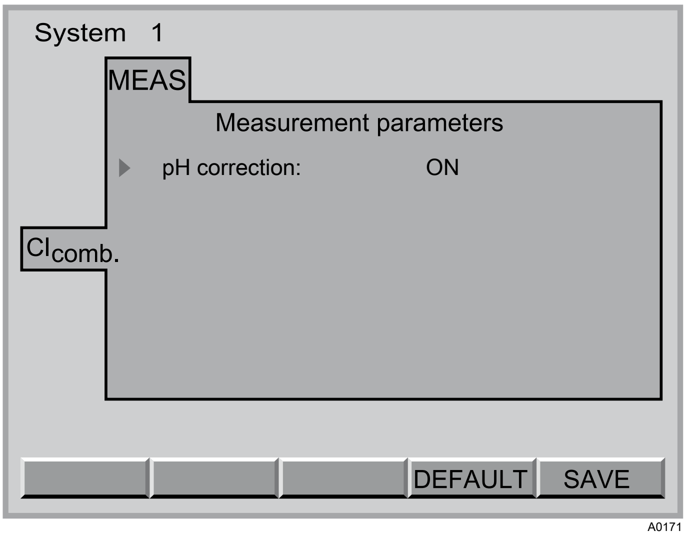


Fig. 55: Measurement for bound chlorine

Adjustable variables	Increment	Remarks
pH correction	on	The device van display a pH-corrected value for bound chlorine
	off	

NOTICE!
If you calibrated with pH correction, then you may only measure with pH correction. If you calibrated without pH correction, then you may only measure without pH correction.

The DXCa calculates the displayed value for bonded chlorine as the difference between the measured values from the free chlorine and total chlorine sensors (CLE and CTE).

9.2.5 Parametric assignment fluoride (F^-)

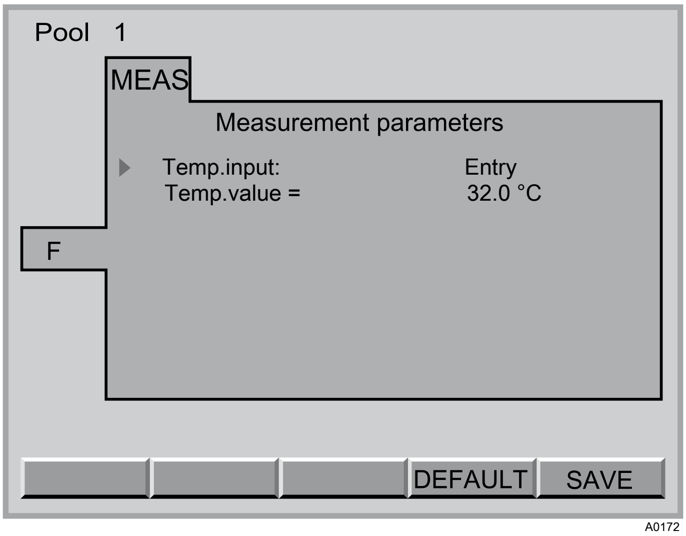
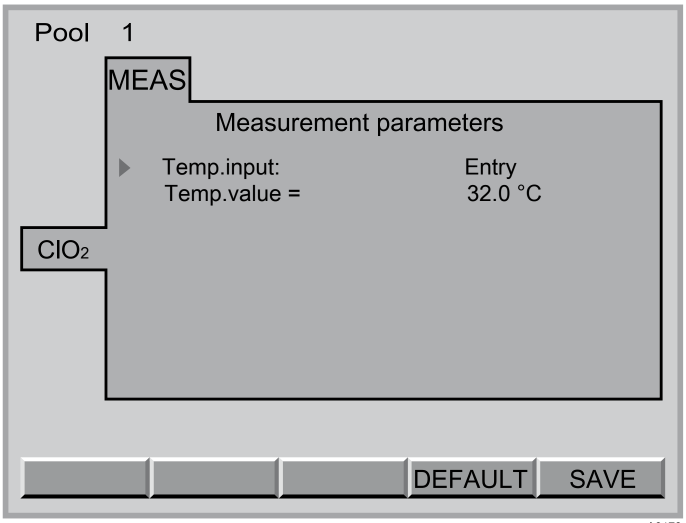


Fig. 56: Measurement fluoride (F^-)

Only available when the terminal *[I in 2]* on the I module is configured for measured variable "F^-".

Adjustable variables	Increment	Remarks
Temp.input:	switched off	The device van display a pH-corrected value for free chlorine
	Entry	
	Sensor *	
Temp.value	0,0 ... 99.9 °C	At *[Temp.input. Entry]*
* Only available when the terminal *[I in 3]* on the I module is configured for measured variable *[Temperature]*		

9.2.6 Parametric assignment ClO_2



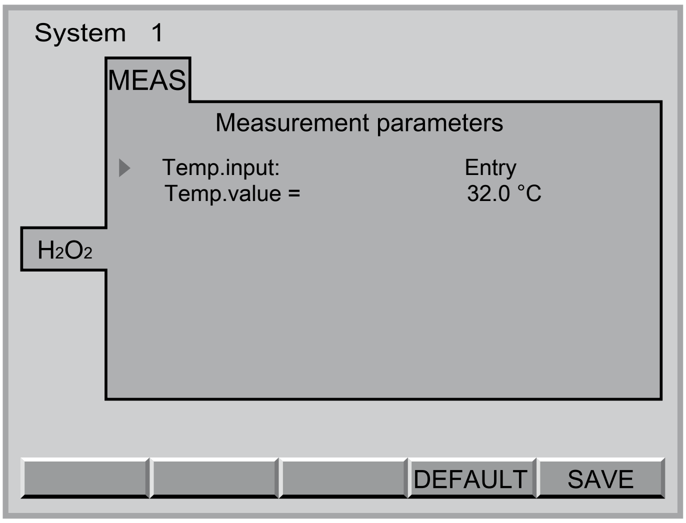
A0173

Fig. 57: Measurement ClO_2

Only available when the terminal *[I in 2]* on the I module is configured for measured variable ClO_2 and no chlorine sensor is connected.

Adjustable variables	Increment	Remarks
Temp.input:	switched off	The device van display a pH-corrected value for free chlorine
	Entry	
	Sensor *	
Temp.value	0,0 ... 99.9 °C	At *[Temp.input. Entry]*
* Only available when the terminal *[I in 3]* on the I module is configured for measured variable *[Temperature]*		

9.2.7 Parametric assignment H_2O_2



A0174

Fig. 58: Measurement H_2O_2

Only available when the terminal *[I in 2]* on the I module is configured for measured variable "ClO"$_2$ and no chlorine sensor is connected.

Adjustable variables	Increment	Remarks
Temp.input:	switched off	The device van display a pH-corrected value for free chlorine
	Entry	
	Sensor *	
Temp.value	0,0 ... 99.9 °C	At *[Temp.input. Entry]*
* Only available when the terminal *[I in 3]* on the I module is configured for measured variable *[Temperature]*		

9.3 Control

Access to control settings

1. > *Back with ESC*
   > *You can return back to the previous menu by pressing the ESC key.*

   Access to the settings is realised from the central menu item
2. Press the F3 button (PARAM)
3. Select the desired measured variable with the vertical arrow keys
4. Then select file card *[MESS]* with the horizontal arrow keys
5. Then press the ENTER button
   ⇨ You are now in the control system settings area.
6. Select the desired parameter with the vertical arrow keys
7. Then press the ENTER button
8. Adjust the parameter with the vertical or horizontal arrow keys
9. Move the cursor to the left or right with the help of the horizontal arrow keys
10. Conclude your entry with the ENTER key
11. Exit the file card without saving: Press the ESC button.

    Exit the file card with saving: press F5 if *[SAVE]* is visible. Confirm the prompt *[Really save?]* with the ENTER button.

9.3.1 pH Control

CAUTION!
Always check if for the settings under *[Control]* or *[control direction]* the requirements have actually been set in the configuration menu.

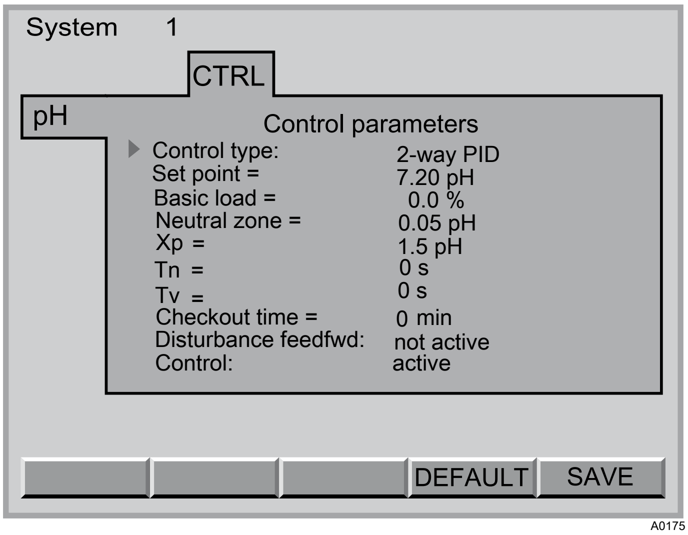


Fig. 59: pH Control

Adjustable variables	Increment	Remarks
Control type	Manual	
	2-way PID	refer to Fig. 60
	1-way PID	refer to Fig. 61
	2-way P	
	1-way P	
Set point	0,00 ... 12.00 pH	
Basic load	-100,0 ... 100,0 %	
Neutral zone	0,00 ... 1.00 pH	
xp*	0,01 ... 70.00 pH	
Tn	0 ... 9999 s	At *[Control] [PID]*
Tv	0 ... 2500 s	At *[Control] [PID]*
control direction	Acid pump	Acid, under one-way control
	pH-raise	Alkali, under one-way control
checkout time	0 ... 999 min	Not for *[Control] [Manual]*
Cut-in interference variable	not active	
	mult.	Multiplicative interference value from *[I in 1]*
	add.	Additive
man. metering	-100,0 ... 100,0 %	under *[Control] [Manual]*
* For definition xp see glossary		

Adjustable variables	Increment	Remarks
Control	active	The control circuit can be switched off independently from the START/STOP key. The START/STOP-key stops all control circuits in the selected system
	not active	
* For definition xp see glossary		

We recommend a pH value of 7.2, as chlorine offers an excellent level of disinfection in this range. In addition, skin tolerance is good at this pH value.

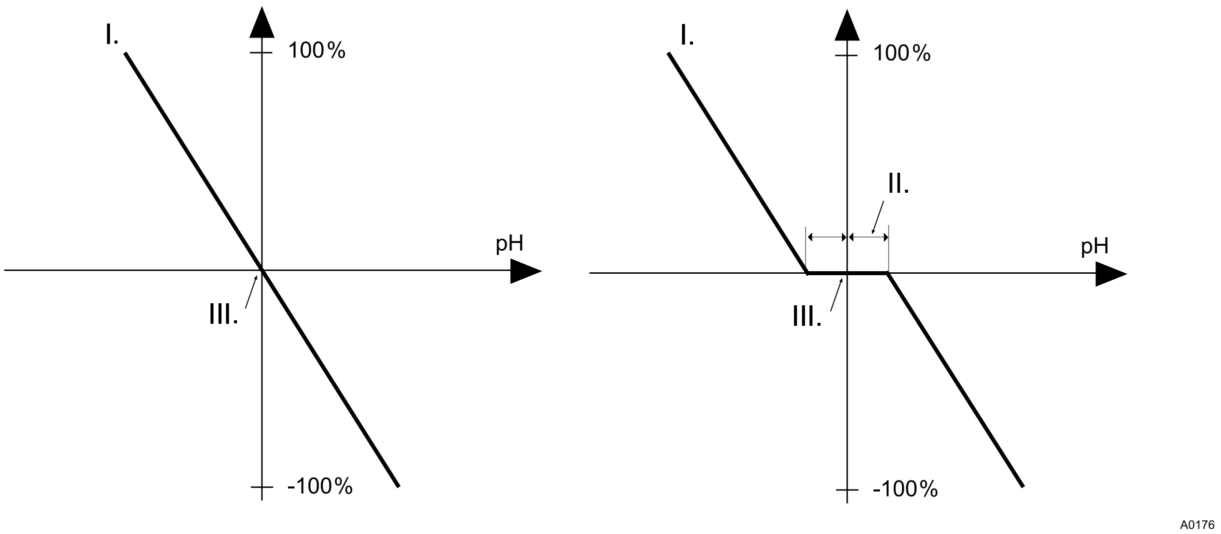


Fig. 60: Control type 2-way PID, without and with neutral zone

I. Actuating variable
II. Neutral Zone
III. Set point

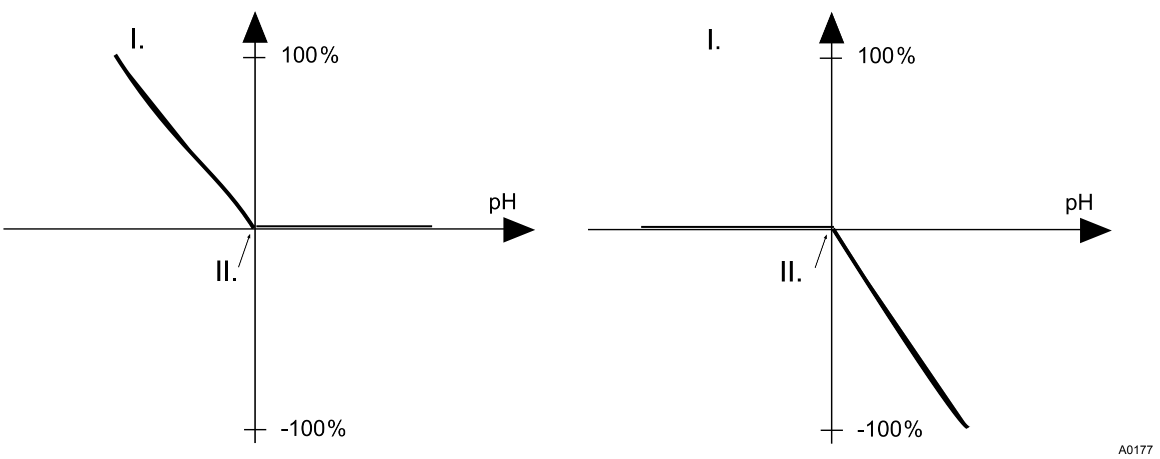


Fig. 61: Control type 1-way PID, direction pH lower and direction pH raiser

I. Actuating variable
II. Set point

9.3.2 Redox control

Redox is not applicable if chlorine is controlled.

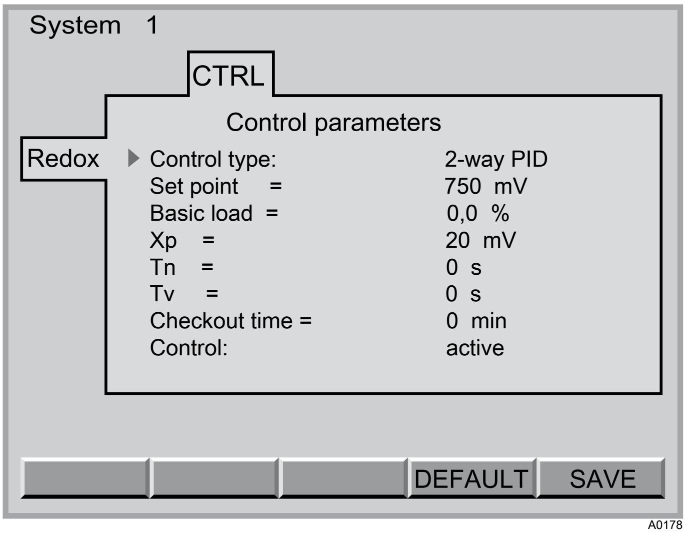


Fig. 62: Redox control

Adjustable variables	Increment	Remarks
Control type	2-way PID	
Disinfection controller	2-way P	
	2-Pt. contact	refer to Fig. 63
	Manual	
Control type	1-way PID	
Swimming pool controller	1-way P	
	2-Pt. contact	refer to Fig. 63
	Manual	
Set point	700 ... 850 mV	
Basic load	0,0 ... 100,0 %	
xp*	1 ... 1000 mV	
Tn	0 ... 9999 s	At *[Control] [PID]*
Tv	0 ... 2500 s	At *[Control] [PID]*
Switch diff. =	0 ... 50 mV	
MIN switch-on time	0 ... 6000 s	
MIN switch-off time	0 ... 6000 s	
checkout time	0 ... 999 min	Not for *[Control] [Manual]*
* For definition xp see glossary		

Adjustable variables	Increment	Remarks
Control	active	The control circuit can be switched off independently from the START/STOP key. The START/STOP-key stops all control circuits in the selected system
	not active	
* For definition xp see glossary		

CAUTION!
Always check if for the settings under *[Control]* or *[control direction]* the requirements have actually been set in the configuration menu.

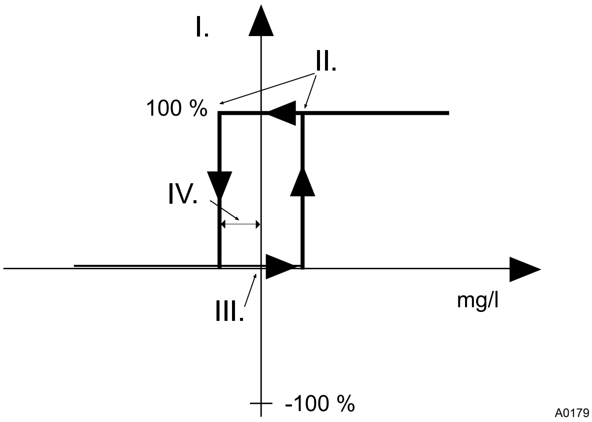


Fig. 63: Example control type 2-point contact

I. Actuating variable
II. Switching points
III. Set point
IV. Switch diff. =

9.3.3 Free chlorine control

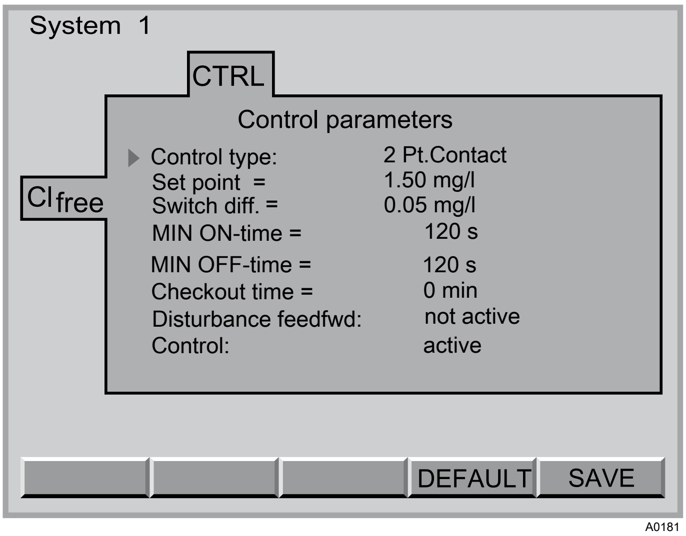


Fig. 64: Free chlorine control

Adjustable variables	Increment	Remarks
Control type Disinfection controller	2-way PID	
	2-way P	
	2-Pt. contact	refer to Fig. 65
	Manual	
Control type Swimming pool con-troller	1-way PID	
	1-way P	
	2-Pt. contact	refer to Fig. 65
	Manual	
Set point	0,00 ... 20.00 mg/l	
Basic load	0,0 ... 100,0 %	
xp*	0,10 ... 99.99 mg/l	
Tn	0 ... 9999 s	At *[Control] [PID]*
Tv	0 ... 2500 s	At *[Control] [PID]*
Switch diff. =	0,00 ... 0.50 mg/l	
MIN switch-on time	0 ... 6000 s	
MIN switch-off time	0 ... 6000 s	
checkout time	0 ... 999 min	Not for *[Control] [Manual]*
Control	active	The control circuit can be switched off independently from the START/STOP key. The START/STOP-key stops all control circuits in the selected system
	not active	
* For definition xp see glossary		

> **CAUTION!**
> Always check if for the settings under *[Control]* or *[control direction]* the requirements have actually been set in the configuration menu.

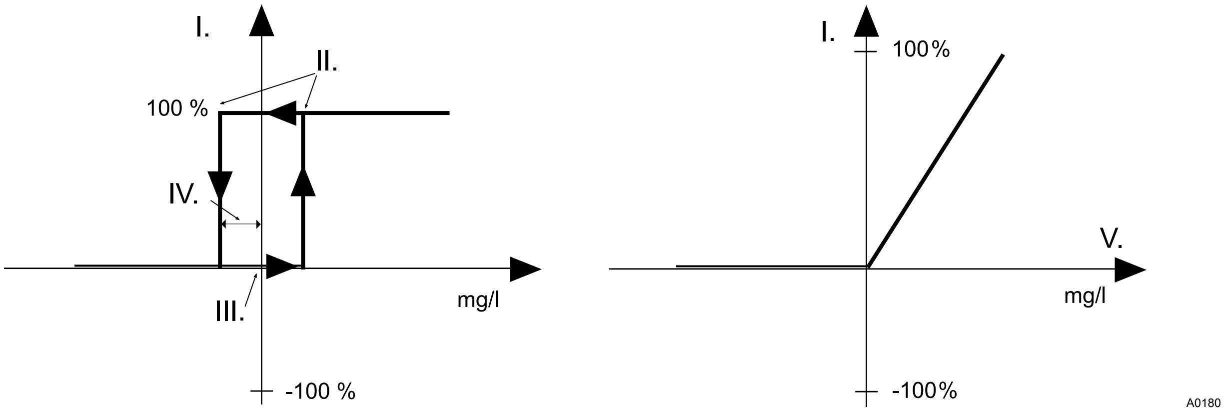


Fig. 65: Example control type 2-point contact and PID controller for chlorine

I. Actuating variable
II. Switching points
III. Set point
IV. Switch diff. =
V Control difference

9.3.4 Control for bound chlorine

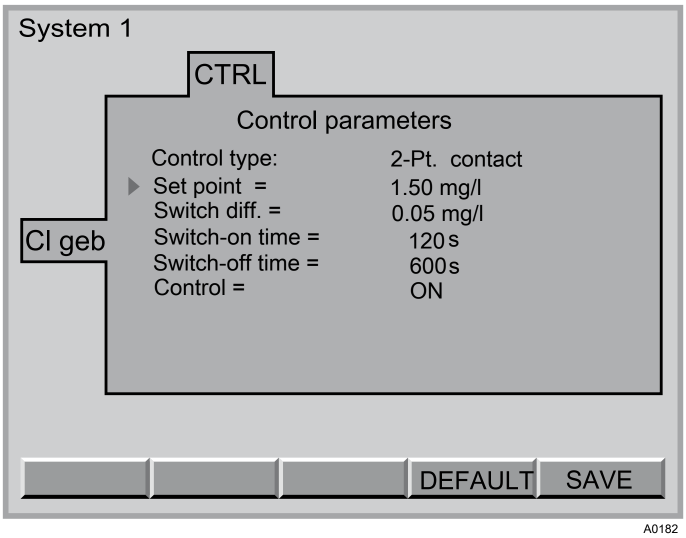


Fig. 66: Control for bound chlorine

Adjustable variables	Increment	Remarks
Switching point	0,00 ... 20.00 mg/l	Relay P4 can switch a UV plant above the switching point
Switch diff. =	0,00 ... 0.50 mg/l	
MIN switch-on time	0 ... 9999 s	
MIN switch-off time	0 ... 9999 s	
Only *[Control type] [2-Pt. contact]* possible		

Adjustable variables	Increment	Remarks
Control	active	The control circuit can be switched off independently from the START/STOP key. The START/STOP-key stops all control circuits in the selected system
	not active	
Only *[Control type] [2-Pt. contact]* possible		

NOTICE!
- A power relay must be configured in order that the entries can make effect
- Control Cl geb serves to minimise the bound chlorine e.g. via a UV plant

For explanation please refer to *[limit value]* in the glossary (the switching point corresponds to *[max. Limit]*.)

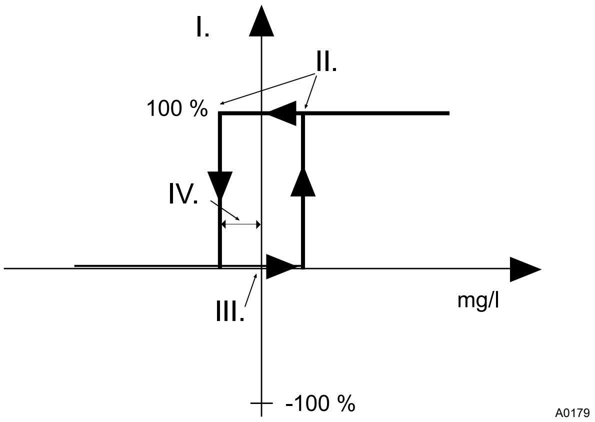


Fig. 67: Example control type 2-point contact

I. Actuating variable
II. Switching points
III. Set point
IV. Switch diff. =

9.3.5 Control temperature

Adjustable variables	Increment	Remarks
Switching point	0,0 ... 40.0 °C	Comparable with set point. Relay P4 can switch the hot water solenoid valve of a heat exchanger
Switch diff. =	0,0 ... 1.5 °C	
MIN switch-on time	0 ... 9999 s	
MIN switch-off time	0 ... 9999 s	
Control	active	The control circuit can be switched off independently from the START/STOP key. The START/STOP-key stops all control circuits in the selected system
	not active	
Only *[Control type] [2-Pt. contact]*possible		

> **NOTICE!**
> – A power relay must be configured in order that the entries can make effect

For explanation please refer to *[limit value]* in the glossary (the switching point corresponds to *[max. Limit]*.)

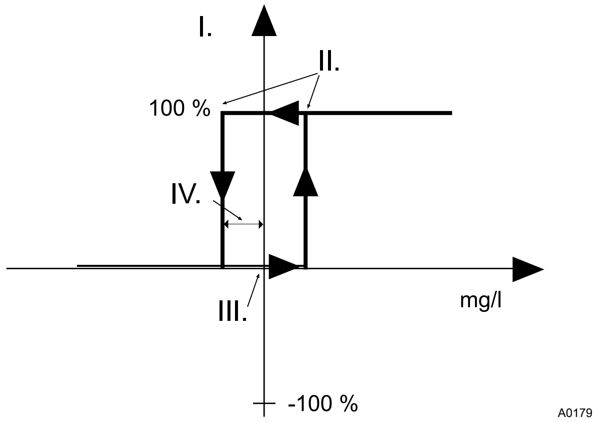


Fig. 68: Example control type 2-point contact

I. Actuating variable
II. Switching points
III. Set point
IV. Switch diff. =

9.3.6 Control flocculants

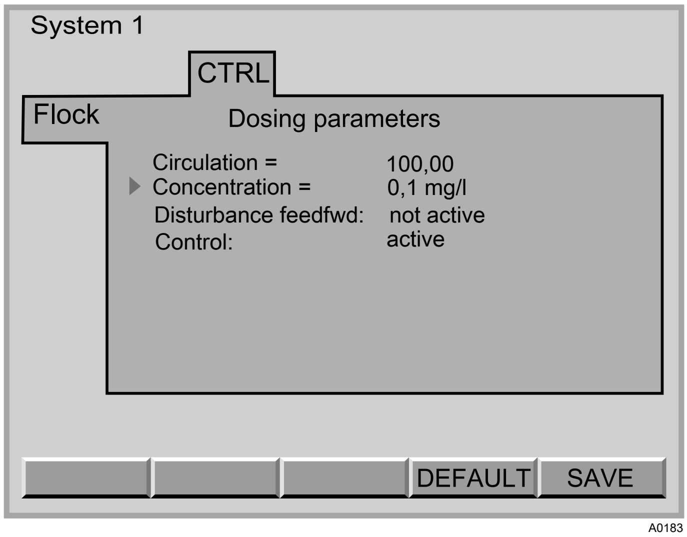


Fig. 69: Control flocculants

Adjustable variables	Increment	Remarks
Circulation	0,0 ... 500.0 m ^{3}/h	
Concentration	0,1 ... 9.9 mg/l	Desired concentration of flocculent
Only *[Control type] [2-Pt. contact]* possible		

Adjustable variables	Increment	Remarks
Control	active	The control circuit can be switched off independently from the START/STOP key. The START/STOP-key stops all control circuits in the selected system.
	not active	
Cut-in interference variable	not active	
	mul.	
Only *[Control type] [2-Pt. contact]* possible		

Pump output

If a flocculent pump is configured, the the DXCa indicates its metering capacity under pump capacity after it has been saved (calculated from circulation and concentration, realised via the stroke rate) - as a percentage of the max. output.

Under max. output, the DXCa indicates the maximum mathematical metering output of the pump type - for the set stroke length, 100% stroke rate and 1.5 bar counter pressure (identical with output in card file P1, P2 or P3 in the configuring menu).

9.3.7 Control fluoride (F^-)

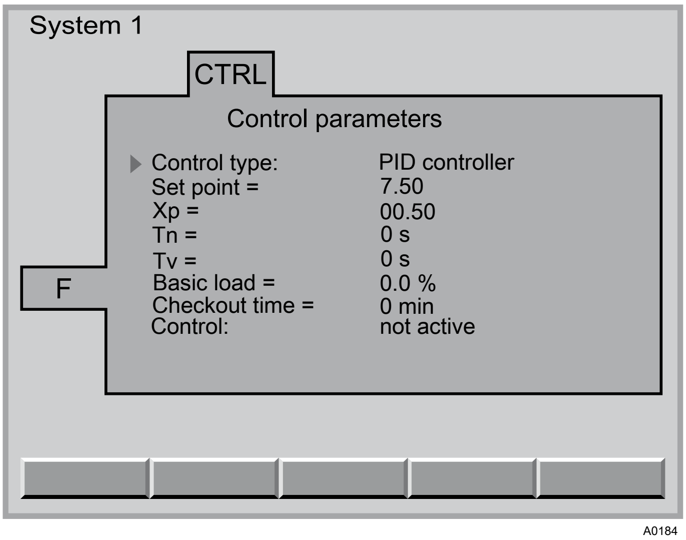


Fig. 70: Control fluoride (F^-)

Adjustable variables	Increment	Remarks
Control type	PID controller	
	P controller	
	2 Pt.Contact	refer to ↳ *on page 136*
	Manual	
Set point	0,00 ... 9.99 ppm	
Basic load	0,0 ... 100,0 %	
xp*	0 ... 1000 ppm	
* For definition xp see glossary		

Adjustable variables	Increment	Remarks
Tn	0 ... 9999 s	At *[Control] [PID]*
Tv	0 ... 2500 s	At *[Control] [PID]*
Switch diff. =	0 ... 50 ppm	
MIN switch-on time	0 ... 6000 s	
MIN switch-off time	0 ... 6000 s	
checkout time	0 ... 999 min	Not for *[Control] [Manual]*
Cut-in interference vari-able	not active	
	mult.	Multiplicative interference value from *[I in 1]*
	add.	Additive interference value from *[I in 1]*
Control	active	Control only with metering pumps with CANopen bus. The control circuit can be switched off independently from the START/STOP key. The START/STOP-key stops all control circuits in the selected system.
	not active	
* For definition xp see glossary		

CAUTION!
Always check if for the settings under *[Control]* or *[control direction]* the requirements have actually been set in the configuration menu.

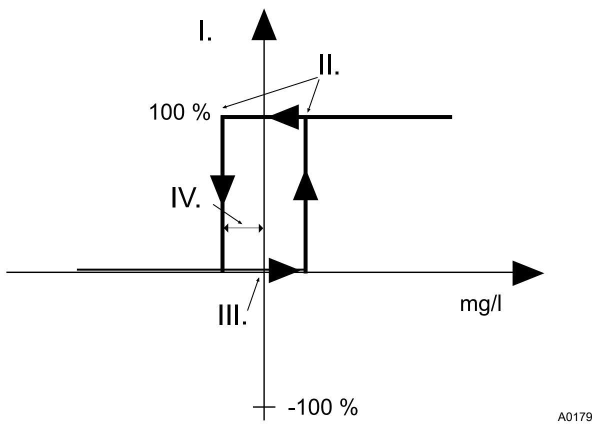


Fig. 71: Example control type 2-point contact

I. Actuating variable
II. Switching points
III. Set point
IV. Switch diff. =

9.3.8 Control chlorine dioxide (ClO_2)

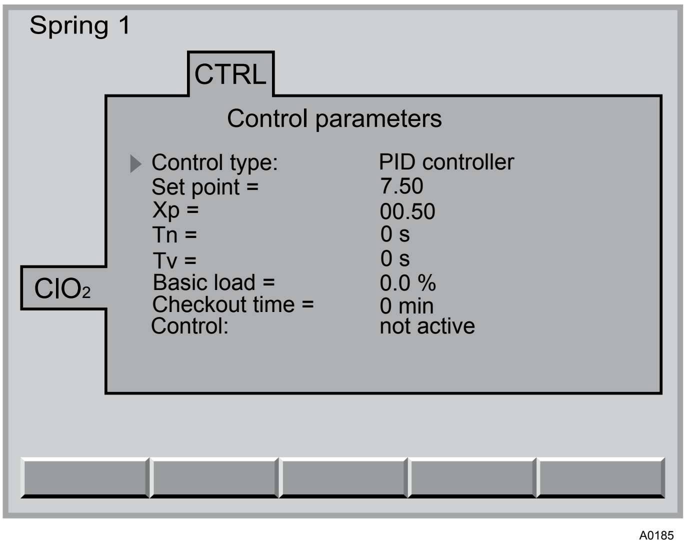


Fig. 72: Control chlorine dioxide (ClO_2)

Adjustable variables	Increment	Remarks
Control type	PID controller	
	P controller	
	2 Pt.Contact	refer to Fig. 73
	Manual	
Set point	0,00 ... 9.99 ppm	
Basic load	0,0 ... 100,0 %	
xp*	0 ... 1000 ppm	
Tn	0 ... 9999 s	At *[Control] [PID]*
Tv	0 ... 2500 s	At *[Control] [PID]*
Switch diff. =	0 ... 50 ppm	
MIN switch-on time	0 ... 6000 s	
MIN switch-off time	0 ... 6000 s	
checkout time	0 ... 999 min	Not for *[Control] [Manual]*
Cut-in interference variable	not active	
	mult.	Multiplicative interference value from *[I in 1]*
	add.	Additive interference value from*[I in 1]*
Control	active	Control only with metering pumps with CANopen bus. The control circuit can be switched off independently from the START/STOP key. The START/STOP-key stops all control circuits in the selected system.
	not active	
*** For definition xp see glossary**		

CAUTION!
Always check if for the settings under *[Control]* or *[control direction]* the requirements have actually been set in the configuration menu.

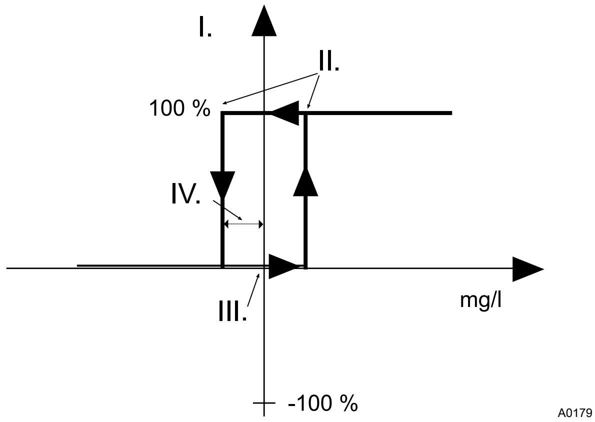


Fig. 73: Example control type 2-point contact

I. Actuating variable
II. Switching points
III. Set point
IV. Switch diff. =

9.3.9 Control H_2O_2

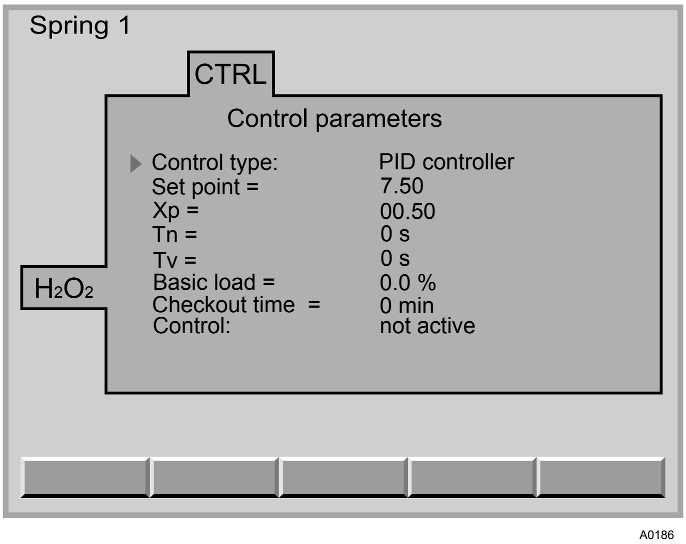


Fig. 74: Control H_2O_2

Adjustable variables	Increment	Remarks
Control type	PID controller	
	P controller	
	2 Pt.Contact	refer to Fig. 75
	Manual	
* For definition xp see glossary		

Adjustable variables	Increment	Remarks
Set point	0,00 ... 1999 ppm	
Basic load	0,0 ... 100,0 %	
xp*	0 ... 1000 ppm	
Tn	0 ... 9999 s	At *[Control] [PID]*
Tv	0 ... 2500 s	At *[Control] [PID]*
Switch diff. =	0 ... 50 ppm	
MIN switch-on time	0 ... 6000 s	
MIN switch-off time	0 ... 6000 s	
checkout time	0 ... 999 min	Not for *[Control] [Manual]*
Cut-in interference variable	not active	
	mult.	Multiplicative interference value from *[I in 1]*
	add.	Additive interference value from *[I in 1]*
Control	active	Control only with metering pumps with CANopen bus. The control circuit can be switched off independently from the START/STOP key. The START/STOP-key stops all control circuits in the selected system.
	not active	
* For definition xp see glossary		

CAUTION!
Always check if for the settings under *[Control]* or *[control direction]* the requirements have actually been set in the configuration menu.

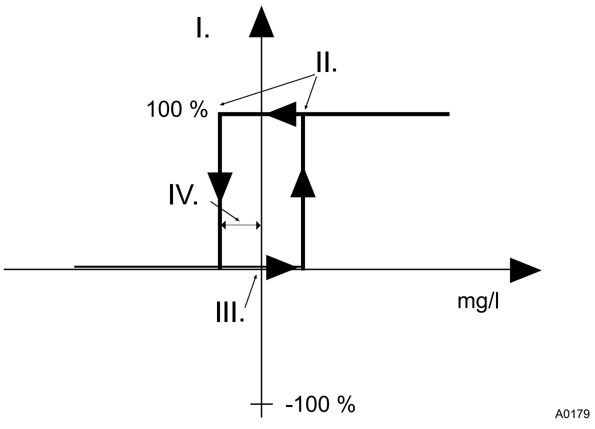


Fig. 75: Example control type 2-point contact

I. Actuating variable
II. Switching points
III. Set point
IV. Switch diff. =

9.4 Set mA output

To be carried out in a uniform manner for all measured variables

Access to settings for mA output

1. **_Back with ESC_**

   You can return back to the previous menu by pressing the ESC key.

   Access to the settings is realised from the central menu item
2. Press the F3 button (PARAM)
3. Select the desired measured variable with the vertical arrow keys
4. Then select file card _[OUTP]_ with the horizontal arrow keys
5. Then press the ENTER button

   ⇨ You are now in the control system settings area.
6. Select the desired parameter with the vertical arrow keys
7. Then press the ENTER button
8. Adjust the parameter with the vertical or horizontal arrow keys
9. Move the cursor to the left or right with the help of the horizontal arrow keys
10. Conclude your entry with the ENTER key
11. Exit the file card without saving: Press the ESC button.

    Exit the file card with saving: press F5 if _[SAVE]_ is visible. Confirm the prompt _[Really save?]_ with the ENTER button.

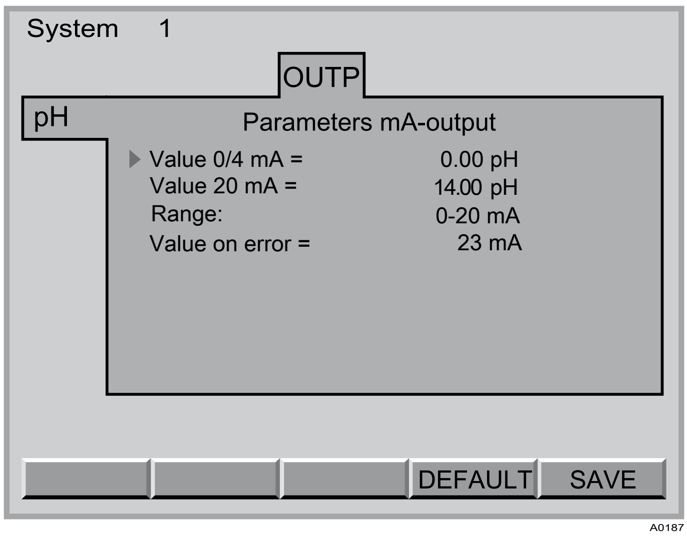


Fig. 76: Set mA output for example pH

Adjustable variables	Increment	Remarks
Value 0/4 mA	0,00 ... xx,xx Y *	mA-value dependent on _[Range]_
Value 20 mA	0,00 ... xx,xx Y *	
* "xx,xx Y" stands for the value and the unit of measurement for a measured variable on this controller		

Adjustable variables	Increment	Remarks
Range	0-20 mA	Not for *[Iout] [free]* (see configuration)
	4-20 mA	
Value on error	23 mA	Not for *[Iout] [free]* (see configuration)
	OFF	
	3.7 mA	
	22 mA	
* "xx,xx Y" stands for the value and the unit of measurement for a measured variable on this controller		

9.5 Alarm settings

To be carried out in a uniform manner for all measured variables

Access to alarm settings

1. *Back with ESC*
   You can return back to the previous menu by pressing the ESC key.

   Access to the settings is realised from the central menu item
2. Press the F3 button (PARAM)
3. Select the desired measured variable with the vertical arrow keys
4. Then select file card *[ALARM]* with the horizontal arrow keys
5. Then press the ENTER button
   ⇨ You are now in the control system settings area.
6. Select the desired parameter with the vertical arrow keys
7. Then press the ENTER button
8. Adjust the parameter with the vertical or horizontal arrow keys
9. Move the cursor to the left or right with the help of the horizontal arrow keys
10. Conclude your entry with the ENTER key
11. Exit the file card without saving: Press the ESC button.

    Exit the file card with saving: press F5 if *[SAVE]* is visible. Confirm the prompt *[Really save?]* with the ENTER button.

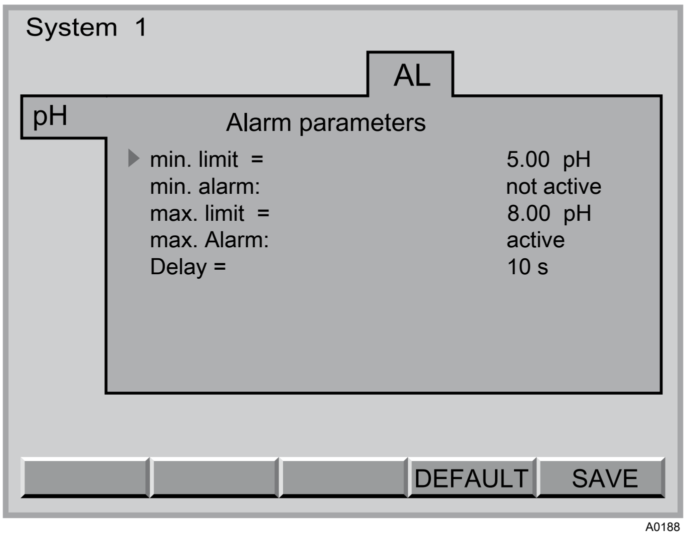


Fig. 77: Set alarm for example pH

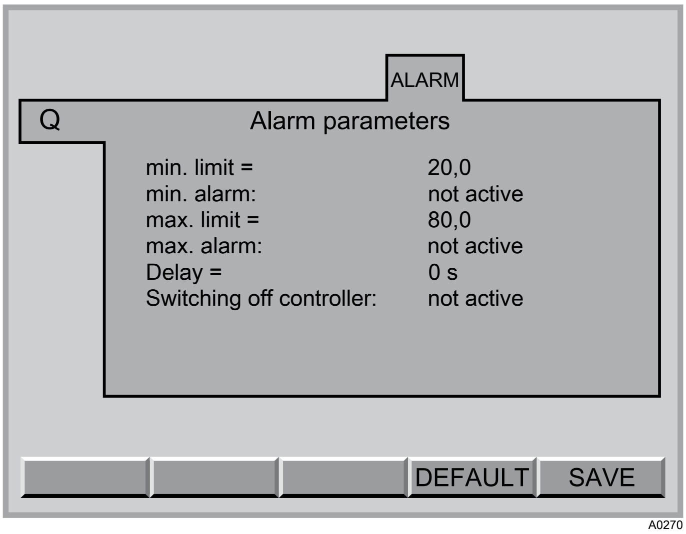


Fig. 78: Set alarm for an example flow meter

Adjustable variables	Increment	Remarks
Min.Limit	0,00 ... xx,xx Y *	
Min.Alarm	Inactive	Only fault alert in the event of error
	Active	In the event of fault, fault alert, signal horn, relay Must be acknowledged
Max.Limit	0,00 ... xx,xx Y *	
Max.Alarm	Inactive	Only fault alert in the event of error
	Active	In the event of fault, fault alert, signal horn, relay Must be acknowledged
Delay	0 ... 3600 s	
* "xx,xx Y" stands for the value and the unit of measurement for a measured variable on this controller		

9.6 Parametric assignment flow meter

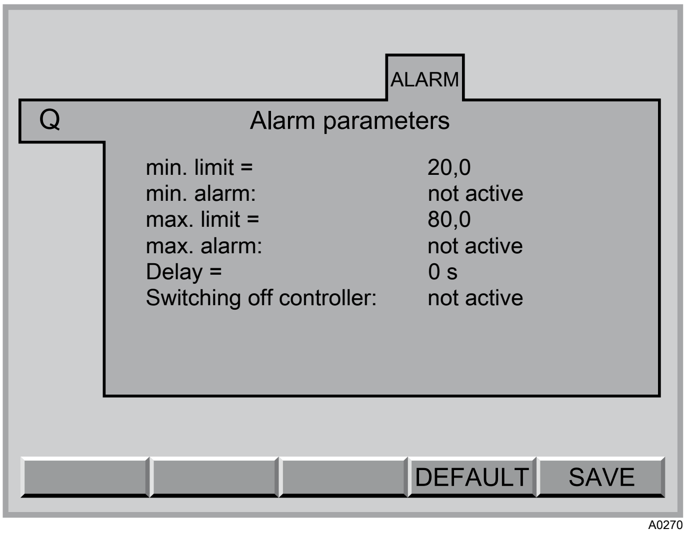


Fig. 79: Alarm flow meter

Adjustable variables	Increment	Remarks
min. Limit	0,00 ... 99.99 m ^{3}/h	
min. Alarm	active not active	
max. Limit	0,00 ... 99.99 m ^{3}/h	
Max. Alarm	active not active	
Delay	0 ... 3600 seconds	
Switching off controller	active not active	

9.7 Setting Eco!Mode

For detailed information about the configurable variables see *Chapter 9.1 'All parameters' on page 120*

Access to settings for ECO mode

1. *Back with ESC*
   You can return back to the previous menu by pressing the ESC key.

   Access to the settings is realised from the central menu item
2. Press the F3 button (PARAM)
3. Select the desired measured variable with the vertical arrow keys
4. Then select file card *[ECO]* with the horizontal arrow keys
5. Then press the ENTER button
   ⇨ You are now in the control system settings area.
6. Select the desired parameter with the vertical arrow keys
7. Then press the ENTER button
8. Adjust the parameter with the vertical or horizontal arrow keys
9. Move the cursor to the left or right with the help of the horizontal arrow keys
10. Conclude your entry with the ENTER key
11. Exit the file card without saving: Press the ESC button.

    Exit the file card with saving: press F5 if *[SAVE]* is visible. Confirm the prompt *[Really save?]* with the ENTER button.

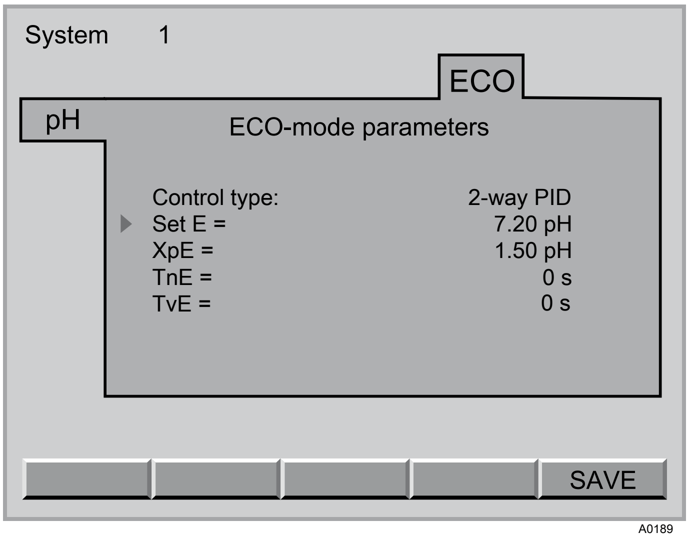


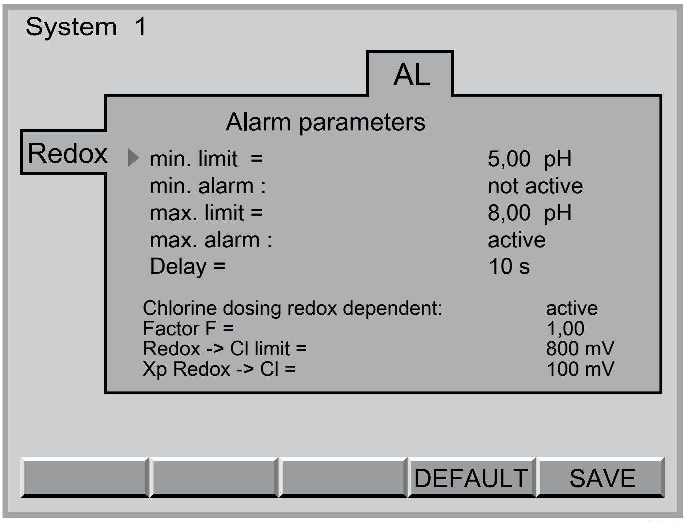
Fig. 80: Setting Eco!Mode

Eco!Mode enables a 2nd set of parameters to be temporarily activated in order to save power. This can, for example, be carried out synchronously with a reduction in the circulating output. Eco!Mode is activated or deactivated as soon as a contact is switched on contact input K3 of the M module. Eco!Mode is available for all M module measured variables, if they are controlled:

- pH
- Redox
- chlorine free
- chlorine bound
- Temperature
- Flocculent

As soon as the 2nd set of parameters is activated, the central menu item indicates a green ECO identifier. In order to activate it, open the file card DXMaM in the configuration menu and set connection K3 to "Eco!Mode".

9.8 Chlorine dosing redox dependent



A0340

Fig. 81: Chlorine dosing redox dependent

This setting under Parameter > Redox > Alarm enables the *‘Chlorine’* metering to be influenced by the *‘Redox’* measured variable.

Example: *‘Chlorine dosing redox dependent’* is active and set value Chlorine is 100%

k=0.5 and redox ➡ "Cl Limit" = 800 mV

- Reading *‘Redox’* is < than redox ➡ *‘Cl Limit’* = 800 mV
  – then the *‘Cl’* set value remains unchanged at 100%
- Reading *‘Redox’* is > than redox ➡ *‘Cl Limit’* = 800 mV
  – then the *‘Cl’* set value is multiplied by *‘k’*
  – ➡ 100 % * 0,50 ➡ 50 % reduction in *‘Cl’* metering

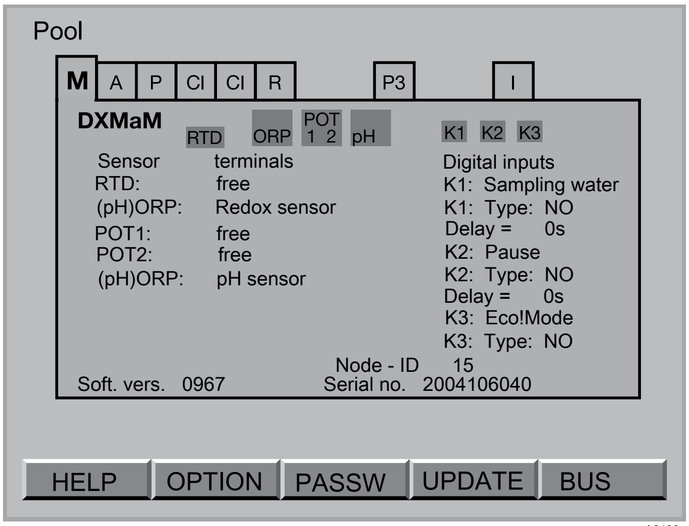
If k=1 then Xp = 100 mV value for proportional metering

- Reading *‘Redox’* is < than redox ➡ *‘Cl Limit’* = 800 mV
  – then the *‘Cl’* set value remains unchanged at 100%
- Reading *‘Redox’* (801 mV) is > than redox ➡ *‘Cl Limit’* = 800 mV
  – then the *‘Cl’* Set value 100 % - (801-800) * 100 % / 100 = 99 %

- Reading *'Redox'* (900 mV) is > than redox ➨ *'Cl Limit'* = 800 mV
  – then the *'Cl'* Set value 100 % - (900-800) * 100 % / 100 = 0 %
- Reading *'Redox'* (910 mV) is > than redox ➨ *'Cl Limit'* = 800 mV
  – then the *'Cl'* Set value 100 % - (910-800) * 100 % / 100 = 0 %

This behaviour enables a reduction in chlorine metering, despite the fact that according to the chlorine measurement, the proportion of 'Chlorine' in the sample water is too low. However, due to the high redox potential, a sufficient level of disinfection is still ensured.

10 Configure



A0190

Fig. 82: Configure

The file cards of the individual CAN modules show the software version of the module on the left-hand side and, to the right, the assigned CAN node number (Node ID) and the serial number (R. no. on the module type plate).

- *The CAN-chlorine sensors and CAN-pumps are also modules*
- *Terminals that are not occupied must be configured as ‘free ’*
- *Each file card indicates the alignment of the module terminals with a coloured background at the top as a mnemonic aid*

Access to configuration settings

1. *Back with ESC*

   You can return to the previous menu by pressing the ESC key.

   Access to the settings is realised from the central menu item
2. Then press the F4 button (CONFIG)
3. Select the desired measured variable with the horizontal arrow keys
4. Then press the ENTER button

   ⇨ You are now in the control system settings area.
5. Select the desired parameter with the vertical / horizontal arrow keys

   ⇨ The selected parameter will be shown with a black background
6. Then press the ENTER button
7. Adjust the parameter with the vertical or horizontal arrow keys
8. Move the cursor to the left or right with the help of the horizontal arrow keys
9. Conclude your entry with the ENTER key

10. Exit the file card without saving: press the ESC key

Exit the file card with saving: Press F5 if *[SAVE]*is displayed. Confirm the query *[Save changes?]* by pressing the ENTER key

10.1 Configuring module DXMaM

M module (measurement module)

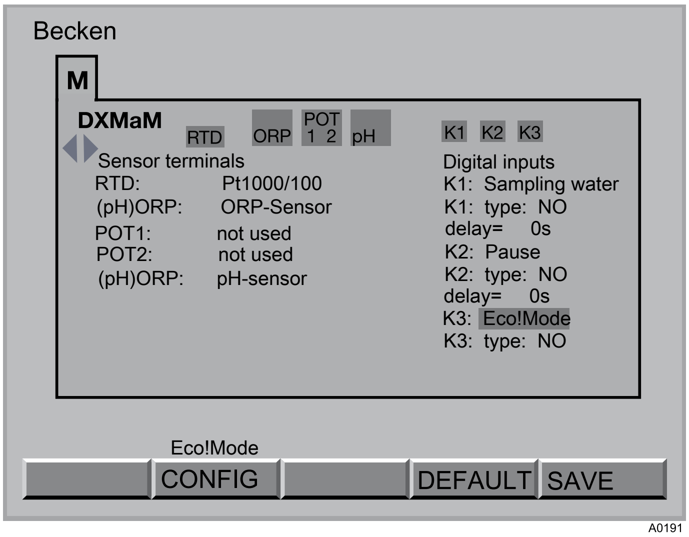


Fig. 83: M module (measurement module)

Sensor terminals

Terminals / adjustable variables	Increment	Remarks
RTD (Temperature)	PT1000/PT100	PT1000/PT100 (self detection) if no chlorine sensor is used
	not used	not occupied
(pH) ORP	ORP sensor	
	free	not occupied
POT1	Flow.potential*	Closed *[(pH) ORP]*
	free	not occupied
POT2	Liquid ref. pot*	Closed *[pH (ORP)]*
	free	not occupied
pH (ORP)	pH sensor	
	free	not occupied
* For equipotential bonding pin. Do not connect to earth! No jumper necessary.		

Digital inputs

Terminals / adjustable variables	Increment	Remarks
K1	Sampling water	Sample water monitoring
K1 type	NC	
K1 – K3 are the digital inputs on the M module DXMaM (the A module DXMaA has the same identifiers!).		

Terminals / adjustable variables	Increment	Remarks
	NO	
Delay (contact)	0 ... 3600 s	
K2	NC	
	NO	
Delay (contact)	0 ... 3600 s	
K3	Eco!Mode	2. Set of parameters for all controlled variables not assigned
	Excess chlorination	
	Excess chlorination & Eco!Mode	
	free	
K3 type	NC	
	NO	
K1 – K3 are the digital inputs on the M module DXMaM (the A module DXMaA has the same identifiers!).		

Filter backflushing

Excess chlorination functional description:

- Filter backflushing is started by an external controller
- The control circuits for pH, chlorine, ORP and flocculent are set to pause via the M module contact K2. *'K2 ACTIVE'*
- M module contact K3 (this must be set to *'Excess chlorination'* or *'Excess chlorination & Eco!Mode'*) serves to force the chlorine actuator *'active'* if K2 and K3 are both *'active'* .
- Controllable with a configurable percentage input (0-100%) and duration limited from 1 - 20 minutes
- This only applies to the chlorine actuating variable - all others are set to pause.
- The control is realised without controller and without consideration of error messages relating to the sample water
- The following message is shown on the display: *'Pool No. "n" chlorine: Excess chlorination'*
- Filter backflushing does not work with the R module
- Stop / start by pressing the STOP/START button, but the time for Excess chlorination continues to run, regardless of whether stop is pressed or not. After start, the remaining time will still be metered.

All messages are written to the 'Event File' .

10.1.1 Configuring module DXMaM ECO mode

1. Select the menu *'Configure'* , see ↪ *'Access to configuration settings' on page 148*
2. Select the menu *'Configuring module DXMaM'* , see ↪ *Chapter 10.1 'Configuring module DXMaM' on page 149*

ECO-mode parameters

3. In the menu *'Configuring module DXMaM'* press key F2 *[Eco!Mode CONFIG]*

   ⇨ The following display appears:

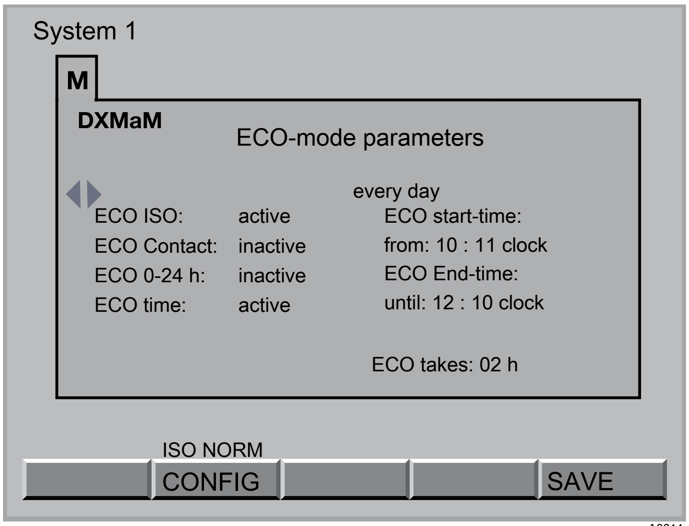


Fig. 84: Display: Configuring DXMaM ECO-mode parameters

4. Select the desired parameter using the vertical/horizontal arrow keys and confirm by pressing the ENTER key

   ⇨ The following display appears:

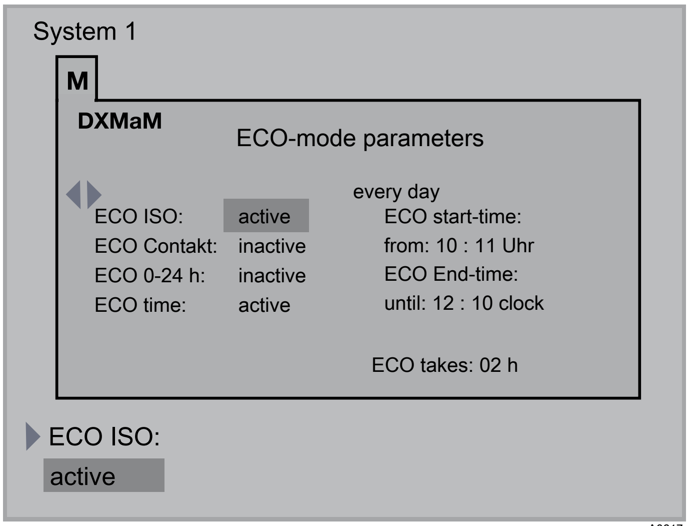


Fig. 85: Parameter adjustment

5. Select the desired state, e.g. active/inactive, using the vertical/horizontal arrow keys and confirm by pressing the ENTER key

⇨ The following display appears:

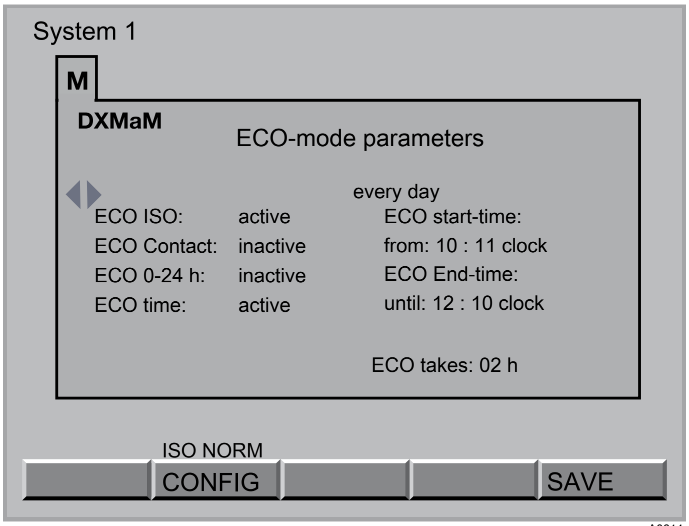


Fig. 86: Display: Configuring DXMaM ECO-mode parameters

You can carry this process out for all displayed parameters

DIN parameter

6. In the ECO-mode parameters menu press key F2*[ISO standard CONFIG]*

⇨ The following display appears:

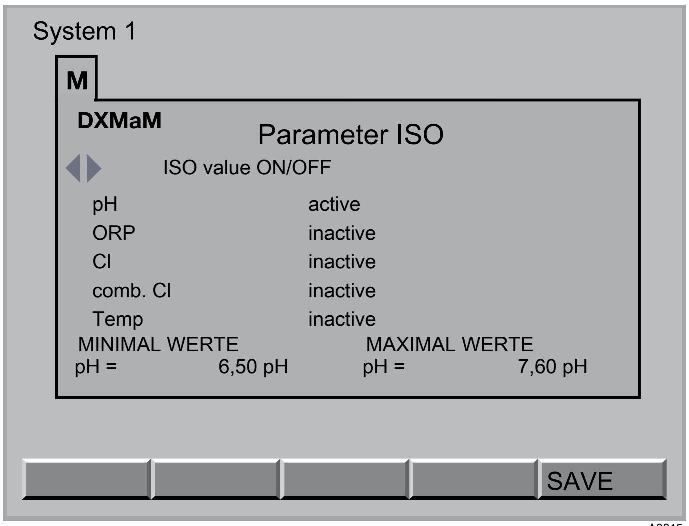


Fig. 87: Display: ISO parameter

7. Select the desired parameter using the vertical/horizontal arrow keys and confirm by pressing the ENTER key

⇨ The following display appears:

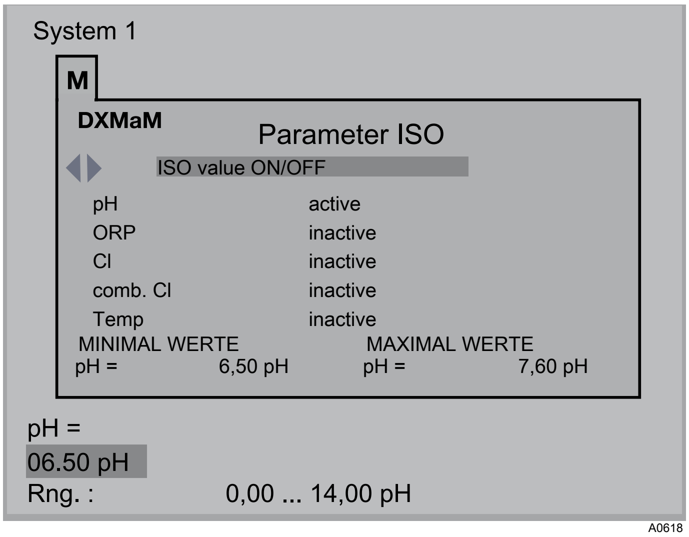


Fig. 88: Parameter adjustment

8. Select the desired value, e.g. 06.51 pH using the vertical/horizontal arrow keys and confirm by pressing the ENTER key

⇨ The following display appears:

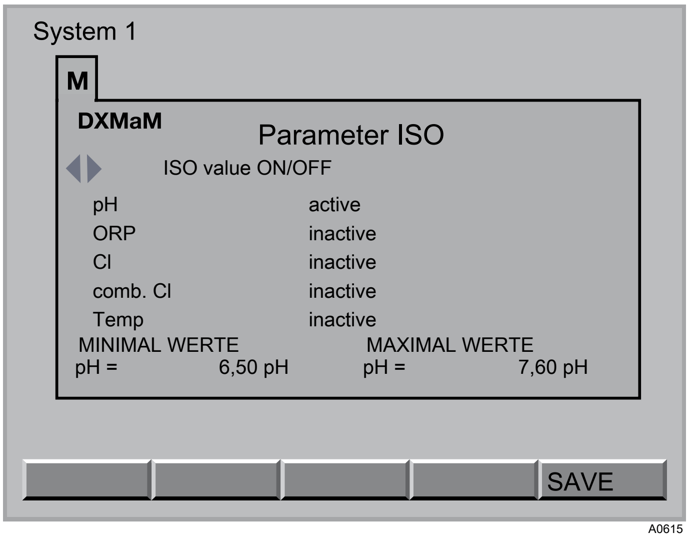


Fig. 89: Display: ISO parameter

9. Further procedure:
   - You can now repeat this process as often as necessary for the selectable parameter
   - or exit the menu by pressing the ESC key, so that the set parameter is not adopted
   - or you can press the F5 *[SAVE]* key, whereupon the set parameters are adopted

   F5 *[SAVE]*: The parameters are written to the controller.

   ⇨ After pressing the ESC or F5 key, the following display appears:

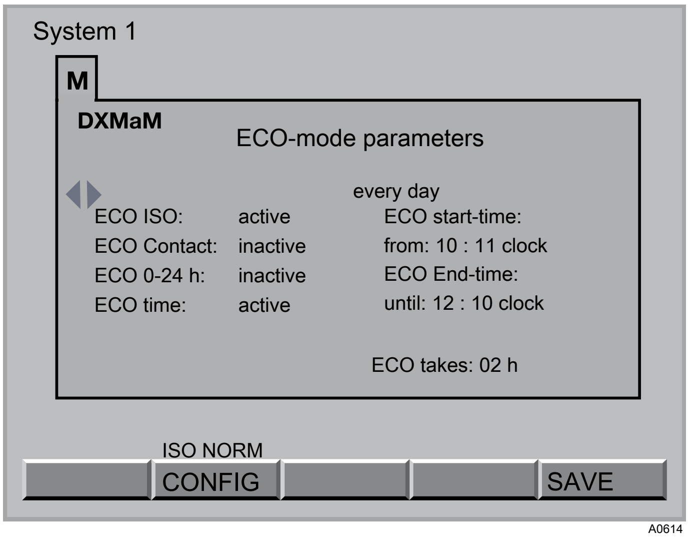


Fig. 90: Display: Configuring DXMaM ECO-mode parameters

10. Further procedure:
    - You can now repeat this process as often as necessary for the selectable parameter
    - or exit the menu by pressing the ESC key, so that the set parameter is not adopted
    - or you can press the F5 *[SAVE]* key, whereupon the set parameters are adopted

    F5 *[SAVE]*: The parameters are written to the controller.

    ⇨ After pressing the ESC or F5 key, you return here *Chapter 10.1 ‘Configuring module DXMaM’ on page 149*

#	Parameter
0	NO ECO
1	ISO + contact +24 h
2	ISO + contact + time
3	ISO + contact
4	ISO + time
5	ISO + 24 h
6	Contact + time
7	Contact + 24 h
8	Contact

#	Parameter
9	Time
10	24 h - not allowed
11	ISO

10.2 Configuring module DXMaA

A module (control module)

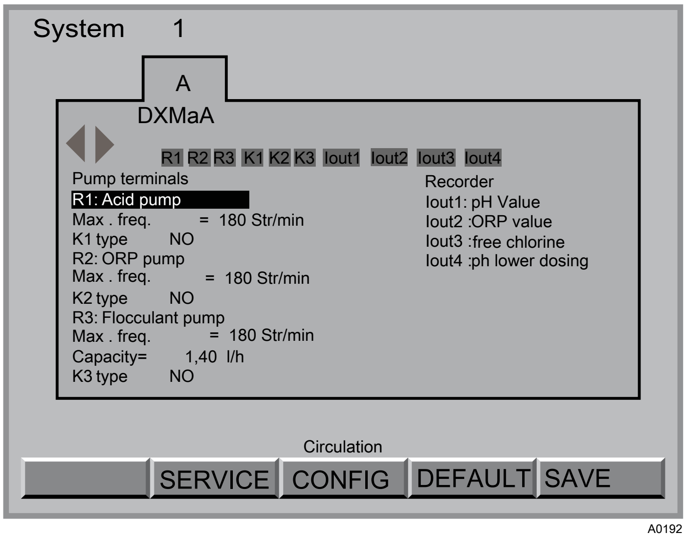


Fig. 91: Configuring module DXMaA

Pump terminals:

Terminals / adjustable variables	Increment	Remarks
R1	Acid pump	For external input acid pump
	Alkaline pump	For external input alkali pump
	free	not occupied
max. freq.	0 ... 500 strokes	Only if the pump is selected
K1 type	NO	Only if the pump is selected
	NC	Only if the pump is selected
	free	not occupied
R2	Chlorine pump	For external input sodium hypochlorite pump
	Acid pump	For external input acid pump
	ORP pump	For external input
	free	not occupied
	Ctrl.out 12 mA	If DXMaI is selected on the bus
max. freq.	0 ... 500 strokes	Only if the pump is selected
	NO	Only if the pump is selected
	NC	Only if the pump is selected
	free	not occupied
R3	Flocculent pump	For external input flocculent pump
	Chlorine pump	For external input sodium hypochlorite pump
	ORP pump	For external input
R1 – R3 are frequency outputs; K1 – K3 are digital inputs. K1 – K3 are the digital inputs of the A module DXMaA (the M module DXMaM has the same identifiers!).		

Terminals / adjustable variables	Increment	Remarks
	free	not occupied
max. freq.	0 ... 500 strokes	Only if the pump is selected
Performance	0,10 ... 18.00 l/h	Only if the pump is selected
K3 type	NO	Only if the pump is selected
	NC	Only if the pump is selected
R1 – R3 are frequency outputs; K1 – K3 are digital inputs. K1 – K3 are the digital inputs of the A module DXMaA (the M module DXMaM has the same identifiers!).		

Outputs 0/4-20 mA (standard signal outputs):

Terminals / adjustable variables	Increment	Remarks
Iout1	pH value	for recorder
	pH lower dosing	Control variable
	pH lift dosing	Control variable
	Cl. dosing	Control variable
	Flocc.dosing	Control variable
	Ctrl. out ORP	Control variable
	Value I2	
	Ctrl.out I2	
	Value I3	
	Cl. dosing	
	ORP dosing	
	free	not occupied
Iout2	ORP value	for recorder
	Variable pH-lower	Setpoint
	Variable pH-raise	Setpoint
	Variable chlorination	Setpoint
	Variable flocculent	Setpoint
	Ctrl. out ORP	Setpoint
	Value I2	
	Ctrl.out 12 mA	
	Value I3	
	Variable chlorination-	
	ORP dosing	
	Dosing circulation	
	frei	nicht belegt
Iout3	Wert Chlor	für Schreiber
	Stell. pH-Senker	Stellgröße
	Stell. pH-Heber	Stellgröße
	Stell. Chlorung	Stellgröße
	Stell. Flockung	Stellgröße
	Ctrl. out ORP	Stellgröße
	Wert I2	
	Ctrl.out I2	
	Value I3	
	Cl. dosing	
	ORP dosing	
	free	not occupied

Terminals / adjustable variables	Increment	Remarks
lout4	Comb. chlorine	for recorder, "Comb. chlorine value" is the difference between the measured values from CLE and CTE
	Stell. pH-Senker	Stellgröße
	Stell. pH-Heber	Stellgröße
	Stell. Chlorung	Stellgröße
	Ctrl. out ORP	Control variable
	Temperat. val.	For recorder (plotting): temperature value comes from the chlorine sensor or PT1000/ PT100
	Value I2	
	Ctrl.out I2	
	Value I3	
	Cl. dosing	
	ORP dosing	
	free	not occupied

10.2.1 Configuring module DXMaA circulation pump

1. Select the menu *'Configure'* , see *'Access to configuration settings' on page 148*
2. Select the menu *'Configuring module DXMaA'* , see *Chapter 10.2 'Configuring module DXMaA' on page 156*

Configure circulation pump parameter

3. In the menu *'Configuring module DXMaA'* press key F3 *[Circulation CONFIG]*
   ⇨ The following display appears:

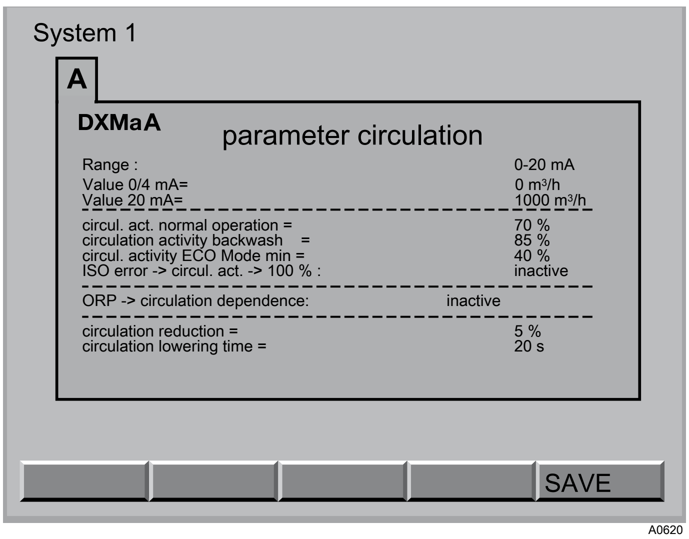
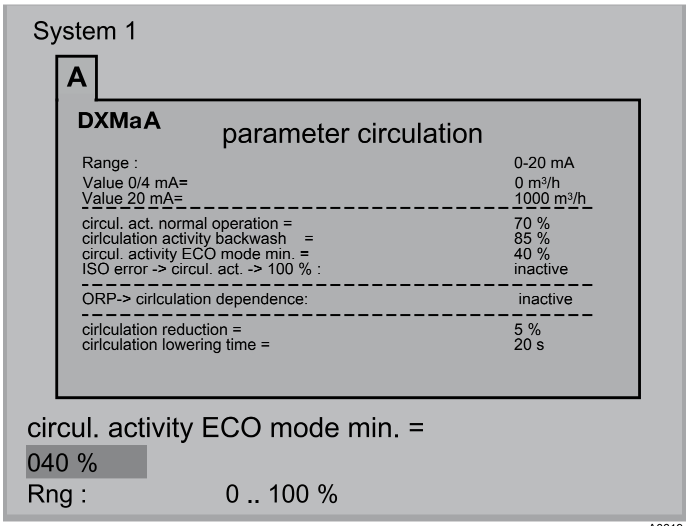


Fig. 92: Display: Configure DXMaA parameter recirculation

4. Select the desired parameter using the vertical/horizontal arrow keys and confirm by pressing the ENTER key

⇨ The following display appears:

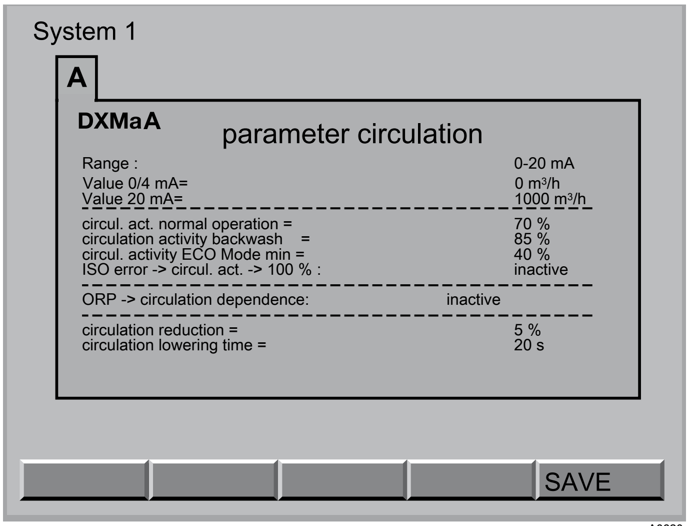


A0619

Fig. 93: Parameter adjustment

5. Select the desired value, e.g. 040 % using the vertical/horizontal arrow keys and confirm by pressing the ENTER key

⇨ The following display appears:



A0620

Fig. 94: Display: Configure DXMaA parameter recirculation

You can carry this process out for all displayed parameters

6. Further procedure:

- You can now repeat this process as often as necessary for the selectable parameter
- or exit the menu by pressing the ESC key, so that the set parameter is not adopted
- or you can press the F5 *[SAVE]* key, whereupon the set parameters are adopted

  F5 *[SAVE]*: The parameters are written to the controller.

⇨ After pressing the ESC or F5 key, the following display appears:

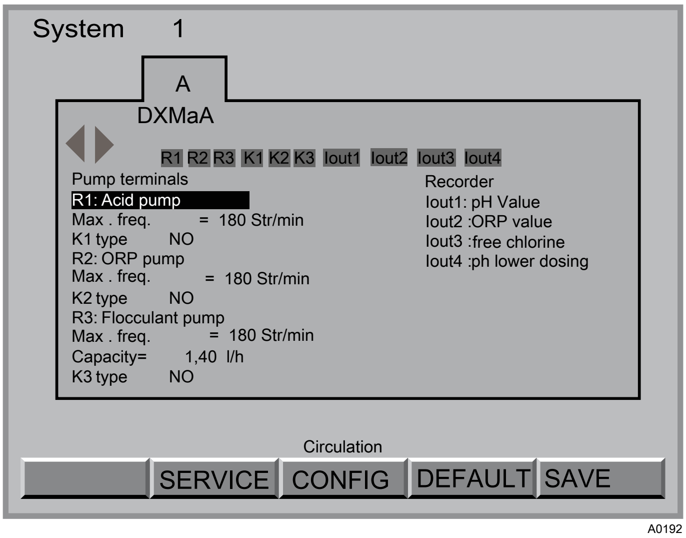


Fig. 95: Configuring module DXMaA

Allowable set values

Parameter	Factory setting	Possible value
Range	4-20 mA	0-20 mA/4-20 mA
Value 0/4 mA	0 m ^{3}/h	0 ... 9,999 m ^{3}/h
value 20 mA	1,000 m ^{3}/h	0 ... 9,999 m ^{3}/h
Circulation capacity normal operation	70 %	0 % ... 100 %
Backwashing circulation capacity	85 %	0 % ... 100 %
ECO circulation capacity	40 %	0 % ... 100 %
Circulation DIN error	Inactive	Active / inactive
ORP circulation	Inactive	Active / inactive
Circulation reduction	5 %	0 % ... 100 %
Circulation reduction time	20 s	0 ... 9999 s

10.3 Configuring module DXMaP

P module (power supply module)

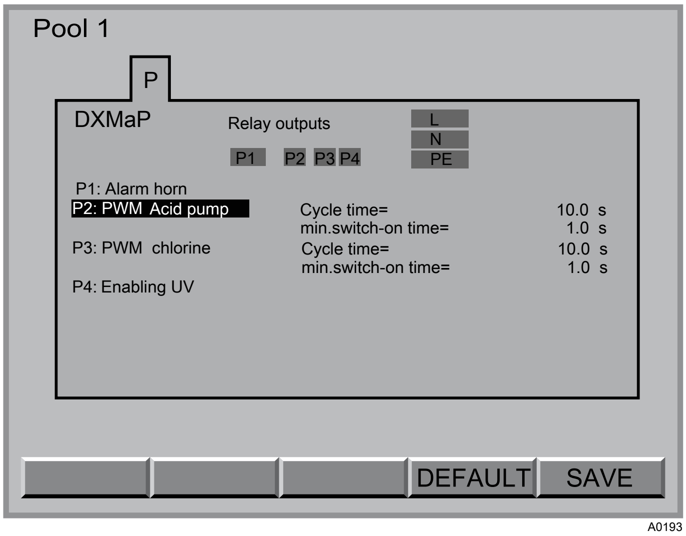


Fig. 96: Configuring module DXMaP

The power relays P1 (alarm) from all P modules always open and close together.

Pump terminals:

Terminals / adjustable variables	Increment	Remarks
P1	Signal horn	
P2	PWM acid	Solenoid valve or activation of pump (acid)
	PWM alkaline	Solenoid valve or activation of pump (alkali)
	free	not occupied
P3	PWM alkaline	Solenoid valve or activation of pump (alkali)
	PWM chlorine	Solenoid valve or activation of pump (sodium hypochlorite)
	PWM ORP	Solenoid valve or activation of pump
	PWM acid	Solenoid valve or activation of pump (acid
	PWM I2 mA	
	Backwashing	
	free	not occupied
P4	UV enable	Releases lock
	PWM chlorine	Solenoid valve or activation of pump (sodium hypochlorite)
	PWM ORP	Solenoid valve or activation of pump
	Heating enable	
	free	not occupied
The cycle times are to be taken into consideration when controlling solenoid valves (PWM = pulse width modulation).		

Terminals / adjustable variables	Increment	Remarks
Cycle time	0.0...999.0 s	
MIN ON-time	0.0..0.500.0 s	
The cycle times are to be taken into consideration when controlling solenoid valves (PWM = pulse width modulation).		

Solenoid valve relay

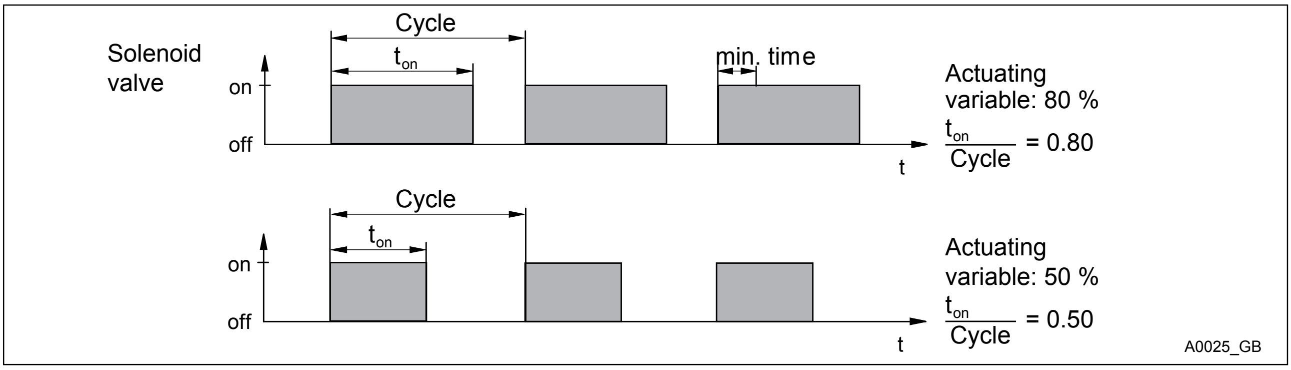


Fig. 97: Solenoid valves

The switching times of the DXCa (solenoid valve) depend on the actuating variable and the *'min. time'* (smallest permissible switch-on time for the connected device). The actuating variable determines the ratio ton/cycle and thus also the switching times (see Fig. 97). The *'min. time'* affects the switching times in two situations:

Theoretical switching time < min. time

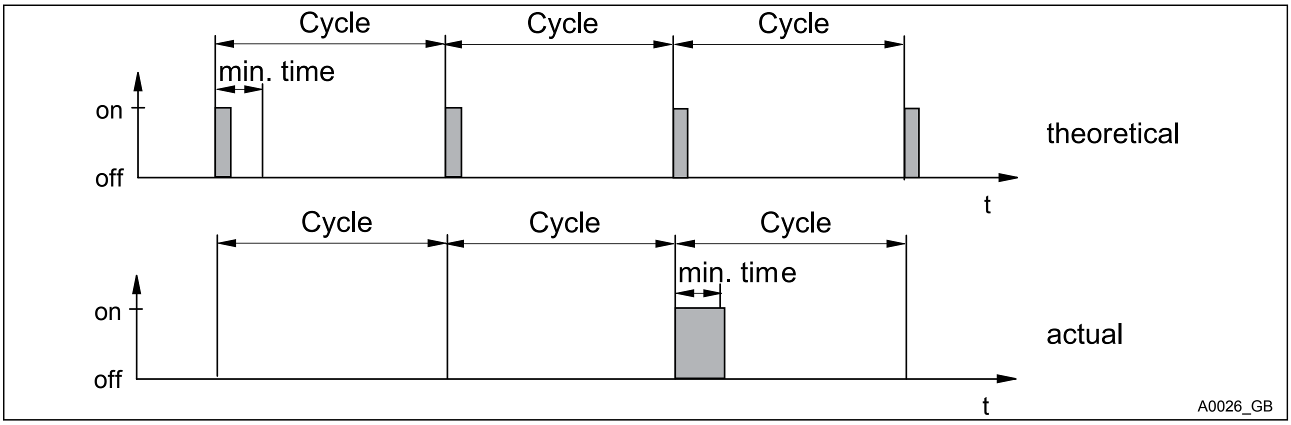


Fig. 98: Theoretical switching time < min. time

DXCa does not switch on for a certain number of cycles until the sum of the theoretical switching times exceeds *'min. time'* . Then it switches for the duration of this total time.

Theoretical switching time > (cycle - min. time) and calculated switching time < cycle

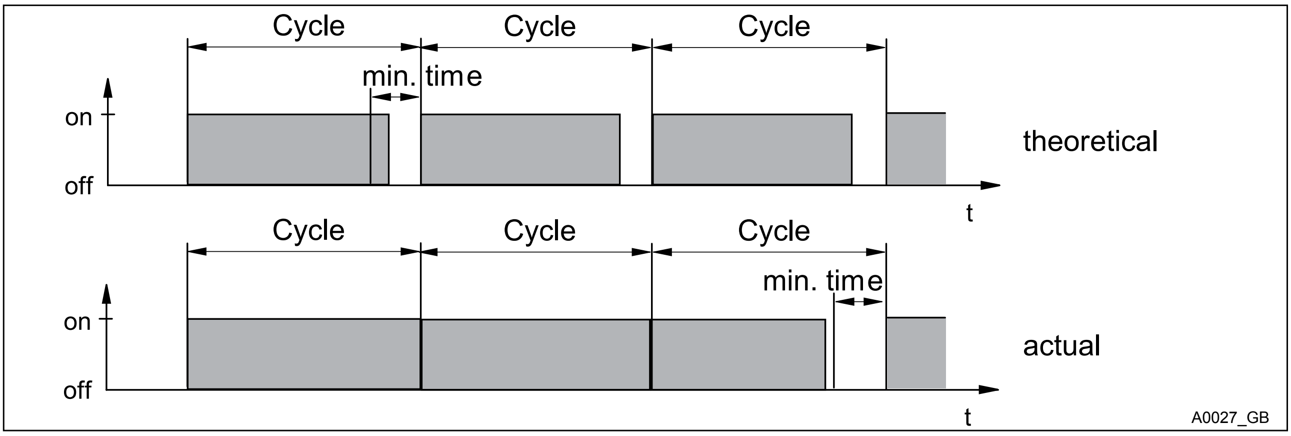


Fig. 99: Theoretical switching time > (cycle - min. time) and calculated switching time < cycle

DXCa does not switch off for a certain number of cycles until the differences between the cycle and the theoretical switching time exceed *'min. time'* .

10.4 Configuration for free chlorine module

Sensor CLE

From software version 3014, the free chlorine sensor CLE3 can be set to a high measurement range of up to 100 ppm. As supplied, the measuring range is up to 10 ppm.

WARNING!

Danger of over-metering

Possible consequence: Fatal or very serious injuries.

Measure: If the high measuring range is activated or deactivated, then the control parameters and alarm threshold must be matched to the changed circumstances.

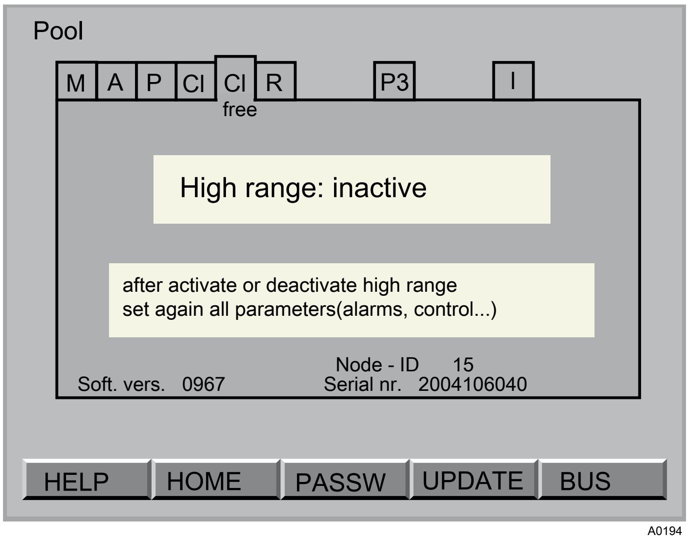


Fig. 100: Module Cl free

The file cards only show the software version, the CAN node number (node ID) and the serial number (R. no. on the module type plate), as the CAN connection of the chlorine sensor does not have to be configured.

10.5 Configuration for total chlorine module

Sensor CTE

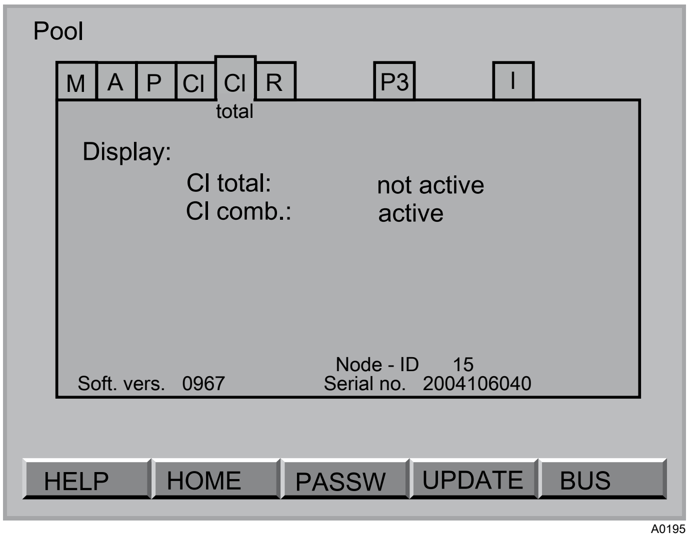


Fig. 101: Configuration for total chlorine module

The file cards only show the software version, the CAN node number (node ID) and the serial number (R. no. on the module type plate). In addition, under *[Display]* you can set which concentration the DXCa should display.

Adjustable variables	Increment	Remarks
Cl total	not active	
	active	
Cl bound	not active	
	active	

10.6 Configuration for chlorine module

Sensor CGE

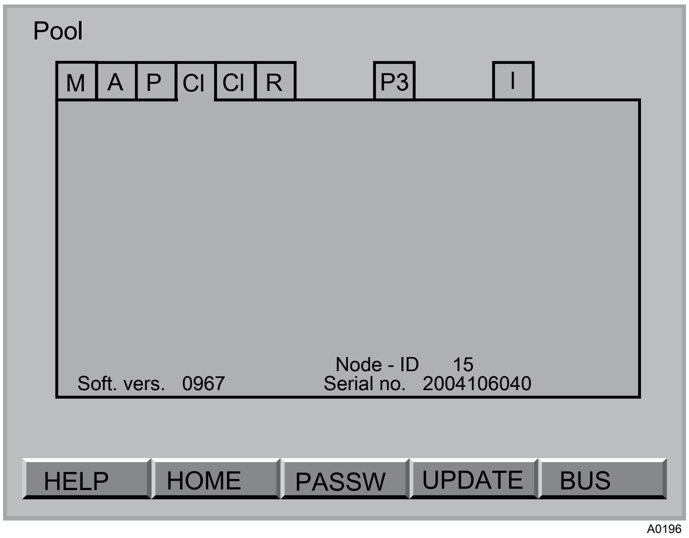


Fig. 102: Configuration for chlorine module

The file cards only show the software version, the CAN node number (node ID) and the serial number (R. no. on the module type plate), as the CAN connection of the chlorine sensor does not have to be configured.

10.7 Configuration of R module (control module for chlorine gas metering device)

Module DXMaR

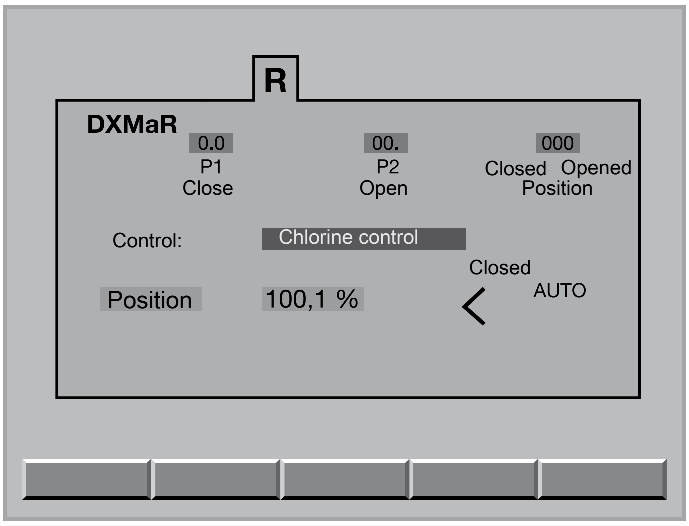


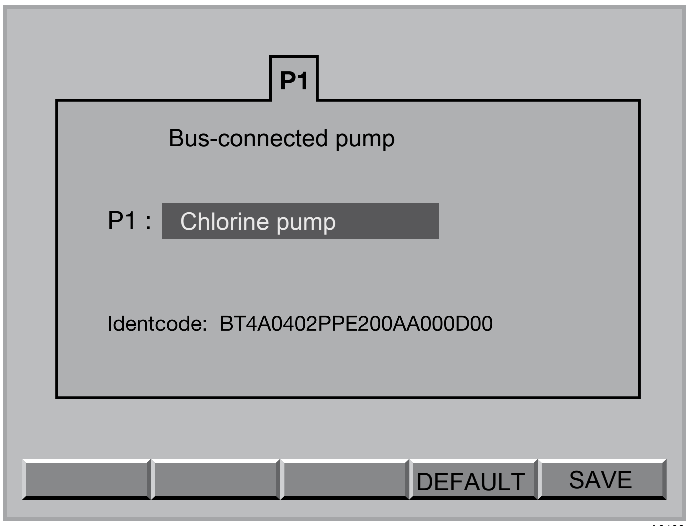
Fig. 103: Configuration of R module (control module for chlorine gas metering device)

Adjustable variable	Increment	Remarks
Control	Chlorine control	
	Redox control	

Error message at the Dulcomarin II	Cause	Remedy
Upper calibration point exceeded	Upper camshaft switch was not triggered	Check mechanism in chlorine gas metering device
Lower calibration point exceeded	Lower camshaft switch was not triggered	Check mechanism in chlorine gas metering device
Potentiometer not connected	No positioning check-back signal to R module	Check the wiring of the potentiometer in the chlorine gas metering device and the wiring in the R module for correct connection
Incorrect direction of rotation	The motor direction of rotation does not correspond with the potentiometer direction of rotation	Check the wiring of the potentiometer and the relay control in the chlorine gas metering device and R module for correct connection
Position not reached	The chlorine gas metering device has not reached the calculated position	Voltage supply interrupted, check wiring, excessive mechanism play
Communication time-out	The M module fails to answer within the allowed time window	Module has not answered, check BUS cabling
Lower stop too low	Camshaft switch was not triggered	Check mechanism, fasten cam
Upper stop too high	Camshaft switch was not triggered	Check mechanism, fasten cam
Calibration cycles unequal	There are differences between the two calibration cycles	Check mechanism, replace cam if necessary
Calibration points outside permissible range	Lower point < 2 %, upper > 98 %	Adjust cam for limit switch.

10.8 Configuration for P1 module (metering pump module)

CAN-Beta®



A0198

Fig. 104: Configuration for P1 module (metering pump module)

Pump utilisation

Adjustable variables	Increment	Remarks
P1	Acid pump	for acid
	Chlorine pump	
	Flocculent pump	
	Pump pH-raise	for alkali
	Redox pump	
	Chlorine pump	
	Chlorine standby pump	only with I module and chlorine sensor
	Pump NH_4OH	only with I module and chlorine sensor
	Redox pump	
	Pump I2	
	Pump F^-	only if configured on I module
	Pump ClO_2	only if configured on I module, without chlorine sensor
	Pump H_2O_2	only if configured on I module, without chlorine sensor
	free	
If there are numerous pumps connected to the CAN bus, a file card is displayed for each pump: P1, P2 and P3.		

The file card also displays the current values for the following variables:

Variable	Increment	Remarks
Pump output	0 ... 100 %	Data about the current, relative pump output
Stroke length	0 ... 100 %	The metering accuracy reduces under 30%
Filling level	> 10 %	Filling level OK

Variable	Increment	Remarks
	< 10 %	Prepare container exchange
	Container empty	Exchange container
Power		Maximum mathematical metering output of the pump type for the set stroke length, 100% stroke rate and 1.5 bar
Pump status	OFF	Multifunctional switch on Beta set to STOP
	ON	Multifunctional switch on Beta not set to STOP
	Bus	Multifunctional switch on Beta set to BUS
	Manual	Multifunctional switch on Beta not set to BUS
	Calibrate pump!	
	Calibration OK!	

CAN pumps must also be assigned to the pool even for systems with only a single pool. The metering output curves are stored for each stroke length at a constant back pressure of 1.5 bar in each Beta/4-CANopen. In the event that the stroke length varies by more than ±10 %, the DXCa signals an alarm and a message is shown on the display. However, the pump continues to operate. After the settings are stored (calibration), the message disappears and the DXCa will match the pump output to the new metering output curve.

Chlorine standby pump

The DXCa can control up to 4 metering pumps with CAN bus connection. It is possible to configure a metering pump for chlorine next to the main chlorine pump as a standby pump.

In this case, the screen writer must be activated and an SD card must be inserted, as this stores the operating states in an event file on the SD card (see supplementary instructions screen writer).

The following situations cause switchover to the standby pump:

- Fault in the main chlorine pump
- Chlorine chemical reservoir on the main pump is empty
- The multifunctional switch on the main pump is set to *'Stop'* .

However, a power failure or disconnection of the bus connection to the main pump will not cause switchover to the standby pump.

Pump NH_4OH

In the event that CAN-pumps are configured for chlorine regulation, then a pump can also be configured via "Pump NH_4OH" for purposes of chloramination. In order to do so, an ammonia solution is metered in parallel to the chlorine solution. In order to achieve the correct stoichiometry, the concentration of the ammonia solution and the stroke length of the ammonia pump must be matched to the chlorine concentration in the treated water.

10.9 G module (limit value module) configuration

Module DXMaG

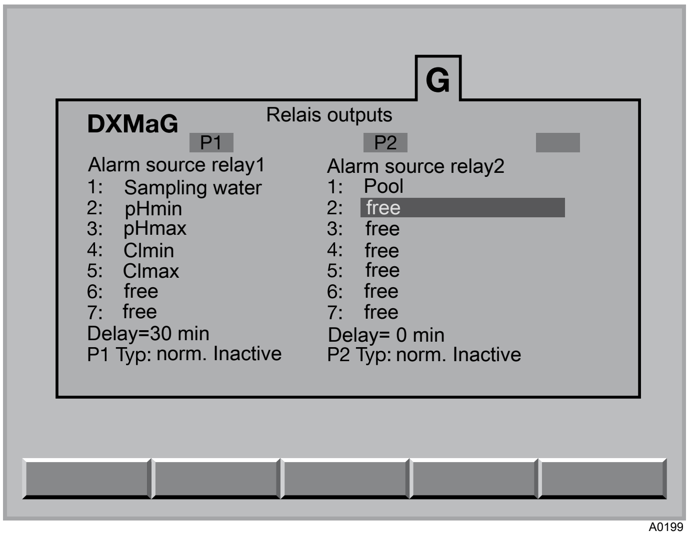


Fig. 105: G module (limit value module) configuration

Variable	Increment	Remarks
Alarm sources	Pool	With *'Pool'* it is possible to select all alarm sources. Only for alarm source 1
	Sampling water	Sample water monitoring
	pH min	
	pH max	
	Cl min	
	Cl max	
	I1 min	
	I1 max	
	I2 min	
	I2 max	
	I3min	
	I3 max	
	free	
Delay (error)	0 ... 999 min	
P1 type	norm. Inactive (NO)	Power relay P1 all
	norm. active (NC)	P module
P2 type	norm. Inactive (NO)	Power relay P2 all
	norm. active (NC)	P module
It is possible to select up to 7 alarm sources per power relay (the alarm sources are then OR linked).		

10.10 I module (current input module) configuration

Module DXMaI

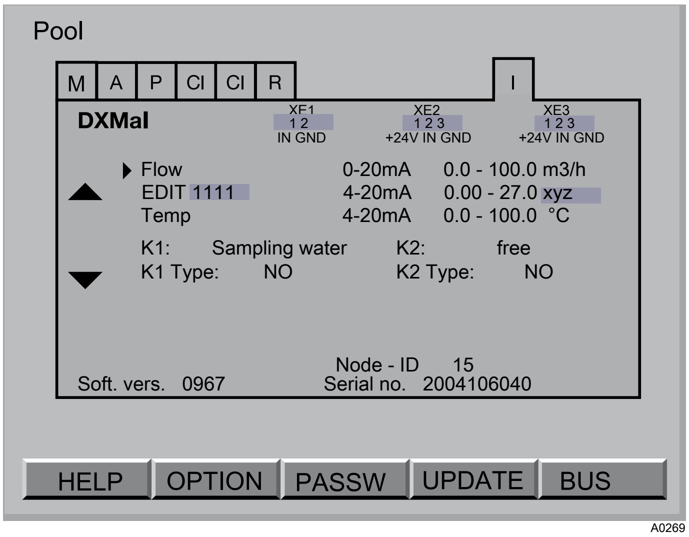


Fig. 106: Flow configuration

Adjustable variables	Increment	Remarks
Measured variable	Sampling water	Only on K1
	Pause	Only on K2
	Flow Q	only on *'I in 1'*; can be used for measured variables *'I in 2'* as interference value
	Turbidity	only on *'I in 1'* or *'I in 3'*
	Conductivity	only on *'I in 2'*
	F^-	only on *'I in 2'*
	O_2	only on *'I in 2'*
	ClO_2^-	only on *'I in 2'* or *'I in 3'*
	H_2O_2	only on *'I in 2'*
	UV	only on *'I in 3'*
	Temp.	only on *'I in 3'*
	PES	only on *'I in 3'*; peracetic acid
Range	0-20 mA	
	4-20 mA	

Unit / adjustable variables	Increment	Remarks
Flow Q	m^3/h	
	l/h	
Turbidity	NTU	
	FNU	
	FTU	
	FAU	

Unit / adjustable variables	Increment	Remarks
	EBC	
Conductivity	µS/cm	
	mS/cm	
	S/cm	
UV	W/m^2	
	mW/cm^2	
Others	mg/l	For F^-, O_2, ClO_2, ClO_2^-, H_2O_2, PES
	ppm	

Adjustable variables	Increment	Value range for	
		0/4 mA	20 mA
Decimal points	0	0...9000	0...9999
	1	0...900,0	0...999,9
	2	0...90,00	0...99,99
	3	0...9,000	0...9,999

Unit / adjustable variables	Increment	Remarks
Value 0/4 mA	0...9999	for 0 decimal points
	0...999,9	for 1 decimal points
	0...99,99	for 2 decimal points
	0...9,999	for 3 decimal points
Value 20 mA	0...9999	for 0 decimal points
	0...999,9	for 1 decimal points
	0...99,99	for 2 decimal points
	0...9,999	for 3 decimal points

Configuration of measured variables

The I module can be used to process signals from sensors or devices which supply an mA standard signal for the following measured variables:

Measured variable	Sensor or device
Fluoride (F^-)	Transducer 4-20 mA FP V1
dissolved oxygen (O_2)	DULCOMETER® controller type D1C for dissolved oxygen
Chlorine dioxide (ClO_2	DULCOTEST® amperometric sensor
Chlorite (ClO_2^-)	DULCOTEST® amperometric sensor
Ammonia (NH_3)	Transducer 4-20 mA A V1

Measured variable	Sensor or device
Hydrogen peroxide (H_2O_2)	DULCOTEST® amperometric sensor
Peracetic acid (PES)	DULCOTEST® amperometric sensor
Conductive conductivity	DMT transducer
Temperature	Transducer 4-20 mA Pt 100 V1
Flow	Suitable third-party device
UV intensity (UV)	Suitable third-party device
Turbidity	Suitable third-party device

Displays and limit values

The signals are displayed and can be monitored by means of limit values (PARAM - AL).

Temperature compensation

For fluoride you can select temperature compensation under PARAM - MESS. In order to do so, you have to connect a temperature sensor to input *' I in 3'* .

Configure

All of the selectable measured variables are subdivided over 3 lines which can be selected by means of the arrow keys. The sensors for the measured variables in line 1 must be connected to terminal XE1, the sensors for the measured variables in row 2 must be connected to terminal XE2, etc. .

Configuring a sensor or a device:

1. Select the correct line corresponding to the terminal (arrow key UP/DOWN; for KE1 - row 1, etc.) and press the ENTER button
   ⇨ A display appears for selecting the measured variables
2. Press the ENTER button
3. Select the correct measured variable and press the ENTER key
4. Accept the settings with F5 ACCEPT
   ⇨ A progress bar appears. Default settings will now be loaded for the new measured variable. Possibly change certain parameters in the configuration:
5. Select under *'Range'* the correct range for the standard signal
6. Select the next parameter block with the RIGHT key
7. Select under *'Unit'* the correct unit
8. Select under *'Decimal points'* the desired number of decimal places after the decimal point that should be displayed.
9. Select the next parameter block with the RIGHT key
10. Under *'0/4 mA'* set the correct zero point for the measured variable.
11. Under *'20 mA'* set the correct maximum value for the measured variable.
12. Store all of the settings with F5 SAVE
13. Press the enter button in the following dialog for *'Yes'*

14. Check whether there are still parameters in the PARAM menu that have to be matched up, such as alarms or temperature compensation.

⇨ You must now calibrate the new measured variable.

Editing the names of the mA inputs

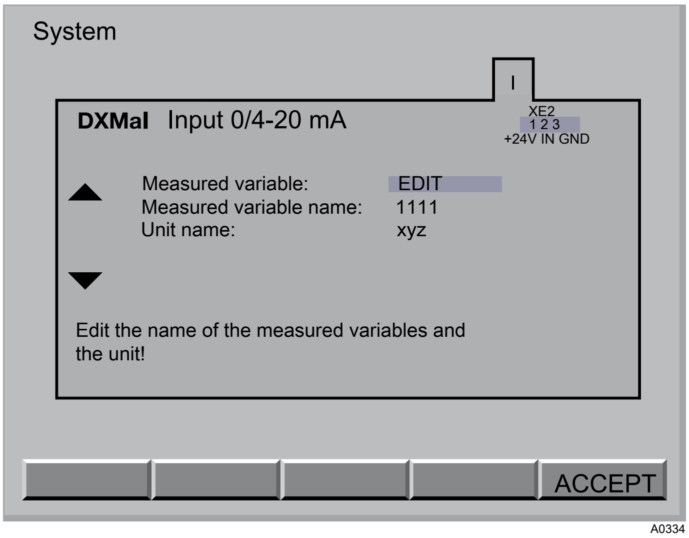


Fig. 107: Editing the names of the mA inputs

The names of all three mA inputs as shown in the display can be edited.

Unit / adjustable variables	Increment	Remarks
Measured variable	EDIT	
	no sensor	
	F-	Fluoride (F^-)
	O2	dissolved oxygen (O_2)
	ClO2	Chlorine dioxide (ClO_2
	ClO2-	Chlorite ($ClO_2{}^-$)
	H2O2	Hydrogen peroxide (H_2O_2)
	NH3	Ammonia (NH_3)
Name measured variable	freely editable to 4 places	All numerals, letters and special characters are available
Name unit	freely editable to 4 places	All numerals, letters and special characters are available

11 Maintenance

Maintenance work DXCa

> ***Maintenance timer***
>
> *The DXCa is equipped with a maintenance timer. This timer serves to indicate pending maintenance tasks.*
>
> *In this case, the contact details of the authorised engineer are also displayed.*

Fig. 108: INFO Maintenance timer reminder

F1 Confirm service!:	Confirms the service work carried out and reset the maintenance timer (password required)
ESC remind again:	Suppresses the message. The message is displayed again after one week.

11.1 Configure maintenance timer

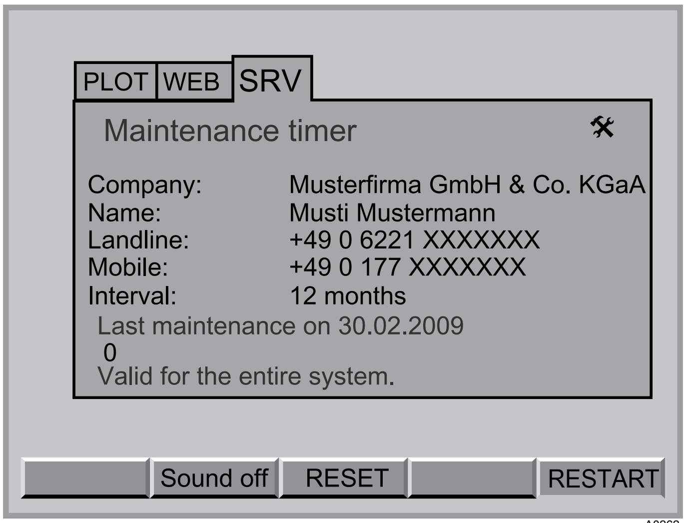
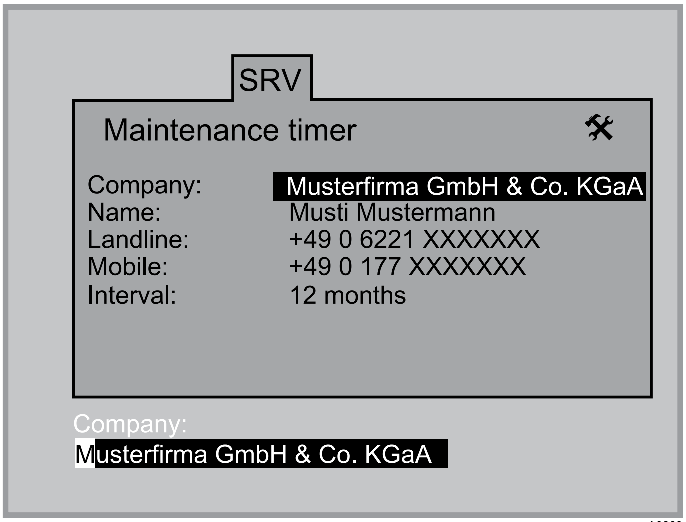


Fig. 109: Configure maintenance timer

Maintenance timer configuration

1. Press the F4 button (CONFIG) in the central menu item
   ⇨ The configuration menu appears

2. Press the F2 key (OPTION)
   ⇨ The options menu appears
3. Select the file card *[SRV]* with the horizontal arrow keys
4. Press the ENTER button
5. Enter the password *[PW Installation]* on
   ⇨ The display with the configurable parameters appears.
6. Select the parameter which you want to change with the horizontal arrow keys.
   ⇨ The selected parameter will be shown with a black background.
7. Press the ENTER button



A0268

Fig. 110: Maintenance timer change display

8. The parameter to be changed appears at the bottom left-hand side
9. Adjust the parameter with the horizontal and vertical arrow keys
   ⇨ Confirm the changes with the ENTER button
10. Repeat the process from point 6 until all of the respective parameters have been changed
11. Press F5 (SAVE) in order to save all of the changes
12. You can return to the central menu item by pressing the ESC key

Adjustable variables	Increment	Remarks
Interval	Inactive	Switches the maintenance timer off
	1 month	
	3 months	
	6 months	
	9 months	
	12 months	

12 Troubleshooting

The number shown before the error message on Dulco Net indicates the pool number (system number) of the respective pool (system).

You can display the pH value, the sensor current and the temperature at the time of pressing the button with F4 (MESS).

In the event that an error message is shown when calibrating a chlorine sensor, you can call up detailed information with F3 INFO. This data will also help when discussing the matter with a technical consultant.

Error messages central menu item and remedies

Fault Messages	Reaction DXCa and remedy
Fault sample water	Metering on basic load, measured values incorrect, check sample water flow
pH sensor defective	Metering on basic load, measured values incorrect, replace sensor
pH value too low	Metering on basic load, locate cause of fault, possibly switch over to manual metering
pH–value too high	Metering on basic load, locate cause of fault, possibly switch over to manual metering
pH-input short circuited	Metering on basic load, measured values incorrect, identify cause (incorrect connection)
pH sensor not connected	Metering on basic load, measured values incorrect, identify cause (incorrect connection
Fault pump pH lower	Check container, check pump, vent, measured value OK
pH lower container empty	Replace container, vent, measured value OK
Fault pump pH-raise	Check container, check pump, vent, measured value OK
pH raise container empty	Replace container, vent, measured value OK
Redox sensor defective	Measured values incorrect, metering on basic load (if redox control active)
Redox value too low	Measured values incorrect, metering on basic load (if redox control active)
Redox value too high	Measured values incorrect, metering on basic load (if redox control active)
Redox input short circuited	Measured values incorrect, metering on basic load (if redox control active)
Redox sensor not connected	Measured values incorrect, metering on basic load (if redox control active
Free chlorine CLE - sensor faulty	Measured value incorrect, replace sensor
Free chlorine CLE - value too low	Metering on basic load, locate cause of fault, possibly switch over to manual metering

Fault Messages	Reaction DXCa and remedy
Free chlorine CLE - value too high	Metering on basic load, locate cause of fault, possibly switch over to manual metering
Free chlorine CLE - sensor not connected	Connect sensor
Free chlorine CLE - correction temp missing	Metering on basic load, measured values incorrect, replace sensor
Free chlorine CLE - correction value missing	No pH-sensor, switch pH-correction to manual pH
Fault chlorine pump	Check container, check pump, vent, measured value OK
Chlorine container empty	Replace container, vent, measured value OK
Total chlorine CTE - sensor faulty	Measured value incorrect, replace sensor
Bound chlorine - value too low	Recalibrate the chlorine sensor
Bound chlorine - value too high	Fresh water supply required
Total chlorine CTE - correction temp missing	Measured value incorrect, replace sensor
Total chlorine CTE - correction value pH missing	No pH-sensor, switch pH-correction to manual
Total chlorine CTE - sensor not connected	Connect sensor
Temperature - sensor defective	Measured value incorrect, replace PT1000 (100)
Temperature - value too low	Identify cause
Temperature - value too high	Identify cause
Temperature - input short circuited	Metering incorrect, identify cause (incorrect connection)
Temperature - sensor not connected	Metering incorrect, identify cause (incorrect connection)
Fault flocculent pump	Check container, check pump, vent
Flocculent container empty	Replace container, vent
DXMaM module bus error	Contact customer service
DXMaA module bus error	Contact customer service
DXMaP module bus error	Contact customer service
Free chlorine CLE - sensor bus error	Contact customer service
Total chlorine CLE - sensor bus error	Contact customer service
Pump MANUAL	Manual is not allowed. Pump stopped (it will run again if disconnected from bus)
Pump STOP	Manual is not allowed. Pump stopped
Pump TEST	Manual is not allowed. Pump runs
Pump stroke length adjustment	Stroke length adjusted >10 %
Servo motor not ready	Basic load? For further information see "Specific errors..." ⇨ *'Specific servomotor errors in file card "Operating errors"' Table on page 179*

Error messages in the fields for measured variables and remedies

Fault Messages	Reaction DXCa and remedy
Sensor fault	Identify cause, replace sensor if necessary
Calibrate sensor	Calibrate sensor

Rectify servo motor fault

Write down the servo motor calibration data prior to calling ProMinent Service: In order to do so, in the file card 'R module' press the F1 key (HELP) - the table containing the calibrated values appears

1. In the event the the error message *'Servomotor: not ready'* appears in the permanent display, press the F4 key (FAULT) in the R module file card
   ⇨ *'Operating error'* appears.
2. Make a note of the specific error message for the servomotor
3. Rectify the fault in accordance with *'Specific servomotor errors in file card "Operating errors"' Table on page 179* .
4. Press the F2 key (RESET) in order to exit the menu and acknowledge the fault.

Specific servomotor errors in file card "Operating errors"

Error message	Cause	Remedy
Upper calibration point exceeded	Upper camshaft switch has not triggered	Check mechanism in chlorine gas metering unit
Lower calibration point exceeded	Lower camshaft switch has not triggered	Check mechanism in chlorine gas metering unit
Potentiometer not connected	No positioning check-back signal to R module	Check the wiring of the potentiometer in the chlorine gas metering unit and the wiring in the R module for correct connection
Incorrect direction of rotation	The servomotor direction of rotation does not correspond with the potentiometer direction of rotation	Check the wiring of the potentiometer and the relay control in the chlorine gas metering unit and the wiring in the R module for correct connection
Position not reached	The servomotor has not achieved the calculated position	Voltage feed interrupted, check wiring, excessive mechanism play
Communication time-out	The R module fails to answer within the specified period of time	Check BUS-connection for M module
Heartbeat time-out	Module not correctly connected	Check BUS cabling
Lower stop too low	Camshaft switch has not triggered	Check mechanism, fasten cam
Upper stop too high	Camshaft switch has not triggered	Check mechanism, fasten cam

Error message	Cause	Remedy
Calibration cycles unequal	There are differences between the two calibration cycles	Check mechanism, replace cam if necessary
Motor too fast	Potentiometer or mechanism jumps	Replace potentiometer or mechanism

Metering characteristics for various controller states

metering	STOP START	Parameter Menu Control: OFF	Sample water Error	Pause contact	Sample water Error	Display	metering	Remarks
Controller						metering 60 %	Actuating variable	
	X					metering OFF	0 %	for all measured variables of the displayed pool
		X				metering OFF	0 %	for a measured variable
			X			metering OFF Error message	0 %	
				X		metering Pause	0 %	
					X	metering 10%	Basic load	Configurable
Manual						man. metering 20 %	Configured value	Configurable
	X					man. metering OFF	0 %	for all measured variables of the displayed pool
		X				man. metering OFF	0 %	for a measured variable

metering	STOP START	Parameter Menu Control: OFF	Sample water Error	Pause contact	Sample water Error	Display	metering	Remarks
			X			man. metering OFF Error message	0 %	
				X		man. metering	0 %	
					X	man. metering	Configured value	Configurable

Left LED (device LED)

Colour	Flash code	Cause	Consequence	Remedy
red	illuminated	any	Warning or acknowledged fault messages	For troubleshooting see ⇨ *'Error messages central menu item and remedies' Table on page 177*
red	flashing	unacknowledged error message	Alarm	Acknowledge alarm, rectify fault
green	illuminated	No device error pending	Normal Mode DXCa	-

Right LED (CANopen LED)

Colour	Flash code	Cause	Consequence	Remedy
green	illuminated	Bus status OPERATIONAL	Normal bus mode	-
green	flashing	Bus status PRE-OPERATIONAL	currently no measured value communication	Wait briefly

Ignore the flash codes for approx. 2 minutes after connecting the DXCa. Acknowledge possibly occurring alarms.

If the LEDs keep repeating the same sequence of flash codes, then the bus must be supplying too many devices. In this case, add an (additional) N or P module into the bus (see part 1 of the operating instructions).

Contact customer service in the event of all other flash codes.

Flash code LEDs DXCa (central unit DXCa)

Left LED (device LED)

Colour	Flash code	Cause	Consequence	Remedy
red	illuminated	Electronic fault	Sensor defective	Return the sensor or contact customer service
red	flashing*	Start-up phase	no measured value communication	Wait briefly
red	Single flashing**	Calibration is faulty	Measured value is incorrect	Re-calibrate
red	Double flashing***	0 ppm > measured value > 10 ppm	Measured value too high / too low	Check the chlorine content of the sample water
		Reading ≠ limit value	Limit value transgres-sion	Clarify cause; poss. set new values
		No pH correction value transferred	pH correction value missing	Check parameters and configuration. Check pH sensor
green	illuminated	No device error pending	Normal mode sensor	-
-	off	No supply voltage	Sensor not func-tioning	Check cable con-nections

Fig. 111: Flash code

Flash code LEDs DXCa (central unit DXCa)

Right LED (CANopen LED)

Colour	Flash code	Cause	Consequence	Remedy
red	any	Bus-error	no measured value communication	Contact customer service
green	illuminated	Bus status OPERATIONAL	Normal bus mode	-
green	flashing	Bus status PRE-OPERATIONAL	Currently no meas-ured value communi-cation	Bus-error

Ignore the flash codes for approx. 2 minutes after connecting the sensor. Acknowledge possibly occurring alarms.

If the LEDs keep repeating the same sequence of flash codes, then the bus must be supplying too many devices. In this case, add an (additional) N or P module into the bus (see part 1 of the oper-ating instructions).

Contact customer service in the event of all other flash codes.

LEDs on the power supply module

The two LEDS (LED 1 and LED 2) (see power supply module supplementary instructions) indicate the load of the 24V power supply for the CAN bus.

Flash code LEDs power supply monitoring DXCa (N and P module)

Mode	LED 1	LED 2	Power	Remarks
	(H2, power)	(H3, power)		
Normal	off	green	< 1.1 A	All OK
Limit load	red	off	> 1.1 A	Insert another power supply module into the loop
Overload / short circuit	red, flashing	off	> 1.35 A	Check wiring

13 Glossary of technical terms

Abbreviations for control-relevant values:

x: Control variable, actual value e.g. pH value)

K_{PR}: Proportional coefficient

x_p: 100 %/K_{PR} (reciprocal proportional coefficient)

X_{max}: Maximum actual value of control (e.g. pH 14)

y: Actuating variable (e.g. pulse frequency - pump)

Y_h: Actuating range (e.g. 180 pulses/min)

y_p: Actuating variable of proportional controller [%]

w: Primary variable or set point (e.g. pH 7.2)

e: Control difference, e = w-x

x_w: Control deviation, xw = x-w

T_N: Reset time of I-control [s]

T_V: Derivative time of D-control [s]

Access code (password)

Access to the device can be granted in steps by setting up an access code. Refer also to: *Chapter 5.2 'Access code (password)' on page 70*

Actuating variable

An actuating variable is considered to be the value (e.g. frequency, mA signal) that the controller emits to the actuator e.g. a metering pump in order to achieve the set point again (at actuating variable 100% a pump will run at full power).

Additive interference variable

The additive interference variable switch is suitable for metering tasks, in which the metering volume is dependent in the first place on the interference variable (e.g. flow) and requires only minimal recorrection. This nature of interference variable processing is used, for example, in the chlorination of water with approximately constant chlorine uptake.

An interference value-related base load metering value will be added or subtracted from the first "determined actuating variable" from the controller. The actuating variable can be a maximum of 100 %.

Actuating variable to actuator [%] = (recorded actuating variable [%] +max. additive actuating variable [%]*current interference variable [mA]) / nominal interference variable [mA]

Legends: The maximum additive interference variable indicates which maximum interference variable is to be added (where current interference variable = nominal interference variable). For further legends see *'multiplicative interference value'*.

CAUTION: If there is no current interference variable (flow = 0), but a recorded actuating variable of the PID control, then the final actuating variable corresponds to the recorded actuating variable of the PID control. If a current interference variable (flow = 0) is given and the detected interference value of the PID controller is the same *'0'*, then the final actuating variable will correspond to the 2nd term from the above formula:
(max. additive actuating variable * current interference variable) / nominal interference variable

Calibration

Transducers require calibration (alignment of the zero point and slope).

For 1-point calibration, this is undertaken with a buffer solution pH 7. I.e. only the zero point is calibrated in this case.

For 2-point calibration it is necessary to select a second value in order to calibrate the slope: e.g. pH 4 or pH 10. The second value is dependent on the actual measurement range (alkali or acid).

In swimming pool technology it is sufficient to carry out a zero point calibration (at pH 7) and merely to check the sensor function with a buffer solution at pH 4 or pH 10. As the measurement is undertaken around the zero point, moderate errors in the slope are immaterial

The slope of the sensor can change as a result of aging and soiling.

checkout time

CAUTION: The function *'checkout time control'* can be confused with *'Control time of reading'* on the DULCOMETER® D1C!

The function *'checkout time control'* offers a protection option against the risk of over-metering. It switches the respective control circuit to metering 0% after expiration of the checkout time and triggers an error message if:

On a pure P control: the P proportion of the actuating variable is greater than 40%.

for PID control: the PID actuating variable Y is greater than 90%.

Press the start / stop button twice in order to restart the respective control circuit and to delete the error message for the control circuit.

Control equations:

Normal

A measured value is compared with a set point. In the event of a control difference (difference of set point minus actual value), an actuating value is determined which will counter the control difference.

Controller

The DXCa controller be used as a P-, PI-, or PID-controller. This depends on the settings of the control parameters.

The actuating variable is calculated once per second.

This controller cannot be used in control circuits that require quicker reactions to control deviations (less than 30 seconds).

The control function (output of actuating variables) can be switched off by means of the Pause control input.

Actuating variable calculation is resumed as soon as Pause is ceased.

Control variable (measured value, actual value)

The control variable is the variable which is to be measured and recorded (e.g. pH value, redox value).

Delay (alarm limits)

In the event that the alarm threshold is violated, the DXCa will trigger an error message only after the configured delay set here. This means that brief alarm threshold violations will not trigger an error message.

Delay (contact)

As soon as a contact is connected to a contact input K of the M module, the DXCa sets the actuating outputs to *'0'* for as long as the contact is made and for a subsequent delay period (contact) (if it has been configured). While the contact is made, the DXCa suppresses error treatment. As soon as the contact is opened, the DXCa commences with error treatment again - after the delay period has expired (contact) (if it has been configured). Once the contact has been opened, the actuating outputs remain - for the duration of the delay (contact) - at *'0'*. The delay (contact) has to be set in such a way that, for example, during this time sample water with the current concentration relative to the process flows to the sensor. The delay (contact) from "pause control" has a higher priority that the delay (contact) from *' Sampling water'*. The 0/4-20 mA outputs (standard signal outputs) for the reading or correction value are unaffected by this function.

Delay (error)

In the event of a limit value violation, the limit value relay of the G module will trip after the delay period entered here has elapsed. This means that brief limit value violations will not trigger an error message.

Determining the checkout time

Prerequisites:

The system has achieved the set points for chlorine concentration (0.45 mg/l) and pH value.

Stop the system using the Start/Stop key.

Wait until the chlorine concentration has dropped to 0.1 mg/l.

Restart the controller using the Start/Stop key.

Measure the time needed until the set point has been achieved.

Enter this time multiplied by 1.5 as the checkout time for chlorine concentration.

If the pump capacities are correctly selected, then this checkout time can also be entered for the pH value.

Eco!Mode

'Eco!Mode' enables a 2nd set of parameters to be temporarily activated in order to save power. This can, for example, be carried out synchronously with a reduction in the circulating output. As soon as a contact is switched on contact input K3 of the M module, *'Eco!Mode'* is activated or deactivated. Eco!Mode is available for all M module measured variables, if they are controlled:

pH

Redox

chlorine free

chlorine bound

Temperature

Flocculent

As soon as the 2nd set of parameters is activated, the central menu item indicates a green ECO identifier.

Interference value

The controller can process a signal from a flow measurement on the analogue input *'I in 1'* of the DXMaI module as an interference value for the controlled measured variables of the I module. This interference value influences the actuating variables calculated by the controller in relation to the external signal.

Depending on the nature of the effect on the actuating variable, it is referred to either as a

multiplicative interference variable (flow-proportional effect) or an

additive interference variable (interference variable-related effect)

When *'Commissioning'* the zero point signal of the flow gauge has to be checked without flow (must be ≥ 0).

Limit values

'min. limit' means that the limit criterion has been transgressed by dropping below the lower limit

'max. limit' means that the limit criterion has been transgressed by exceeding the upper limit

Multiplicative interference variable

This type of interference variable processing is used, for example, with flow neutralisation. The actuating variables determined by the controller are multiplied by a factor F. The factor lies in the range of 0 ≤ F ≤ 1 (0 ~= 0 %, 1 ~= 100 %). The actuating variable can therefore be a maximum of 100 %.

Actuating variable to
actuator [%] = recorded actuating variable [%] * current interference variable [mA] / nominal interference variable [mA]

A *'current interference variable'* greater than or equal to the *'Interference variable nominal value'* does not affect the control variable.

Legends: The determined actuating variable is the actuating variable which is issued by the controller without an interference value. The nominal interference variable limits the range that can be used.

Example: A flow meter is used, for example, which can measure a maximum flow of Q = 250 m^3/h. The analogue output of the flow meter supplies a signal corresponding to 4 mA = 0 m3/h, 20 mA = 250 m^3/h. The maximum flow that can be achieved in the application is however only 125 m^3/h. If the standard signal-output signal of the flow meter is now not adjusted to the 4...20 mA range of the D1C (possible with the majority of flow meters), then the standard signal at 125 m^3/h is only12 mA. Is this value then to be entered into the *'interference value menu?'* Enter under *'Interference variable nominal value'* .

The interference variable is the current analogue flow, which the flow meter supplies. The final actuating variable is transferred to the actuator.

The multiplicative interference value is not designed to permanently switch off the actuating variable! In this case you should realise deactivation via the pause function.

Pause

When the Pause contact is closed, the DXCa sets all actuating outputs to *'0'* for as long as the pause contact is closed. While the Pause contact is closed, the DXC records the P-proportion in the background.

pH value

pH-value refers to a measurement for the concentration (activity) of hydrogen ions or, put simply, is a measurement for the acidity or alkalinity of water.

The pH value is of great importance in terms of swimming pool water treatment. It influences:

the degree of disinfection: the disinfection effect of chlorine reduces as the pH value rises

the flocculent: every flocculent has only a certain pH range in which it is able to work optimally

the corrosiveness: the corrosiveness of the water increases as the pH value drops. Mechanical materials will corrode

The skin tolerance: The acidic protection layer of our skin is pH 5.5. Excessive pH values in the swimming pool water attack the protective layers of skin and this leads to skin irritation.

An excessively low pH value increases the likelihood of trichloramine formation. This can lead to eye irritation (inflamed, stringing eyes) and mucous membrane irritation (e.g. coughing). For these reasons, the pH value of swimming pool water should always be in the range between 6.5 and 7.6 (optimal: pH-optimum of the flocculent used). In private swimming pools, where generally no flocculants are uses, the pH value should lie between 7 and 7.2.

On the other hand, the pH measurement is influenced by the following factors:

chlorination: all chlorine products will change the pH value

the water distribution: carbon dioxide (CO_2) outgassing from the pool water will raise the pH value. This effect can be amplified by an unfavourable water distribution or by aerators, fungi or similar.

For these reasons, the pH value must be constantly measured and controlled.

Redox voltage

The redox voltage is dependent on the sum total of reductive and oxidising substances contained in the water. It represents a measurement for the disinfecting efficiency of the water. The higher the concentration of oxidising substances, the greater the redox voltage (oxidation = disinfection).

In a swimming pool, hypochlorous acid is the determining oxidising substance. Contaminating substances are minimised.

pH-value and temperature have the following influences on the redox value:

Increasing pH-value--> decreasing redox voltage

Increasing temperature--> increasing redox voltage

A stable pH value is extremely important!

There is no unequivocal relationship between disinfectant concentration and redox voltage. At a redox voltage of 750 mV it is assured that introduced microorganisms are destroyed or made inactive in a matter of seconds. At values lower than 600 mV the disinfection period can amount to minutes or hours.

Set point

Set point refers to a value which is to be maintained at a constant level by means of the controllers in a process.

Slope / sensitivity

This value is, for example, given in mV/pH at 25 °C.

Types of controller:

P controller:

Is used in controlled systems which work in an integrated manner (e.g. batch neutralisation).

PI controller:

Can be used in non-integrated controlled systems (e.g. flow neutralisation).

PID controller:

Is used in controlled systems where peaks occur that have to be compensated for.

With dead zone:

With dead zone control (neutral zone control) two set points have to be specified. If the reading is located within the dead zone, then no control variable will be issued.

Set point 2 must be greater than set point 1!

Manual

ATTENTION: The controller will not exit this mode automatically. Manual mode may only be used for commissioning and for test purposes.

There is no control. An actuating variable will be specified manually:

Actuating variable: 0...+100 % (actuating output rise active)
Actuating variable: -100...0 % (actuating output lower active)

This function is used to monitor actuators.

Additive basic load:

A basic load is added to the current actuating variable. The additive basic load means that, for example, constant attrition can be compensated for.

$Y_{Tot} = Y_p + 15\ \%$ (additive basic load = 15 %)

Example 1 (one-way control): Y_{Tot} = 85 % + 15 %; Y_{Tot} = 100 %

Example 2 (one-way control): Y_{Tot} = -75 % + 15 %; Y_{Tot} = -60 %

xp value

This value influences the proportional control behaviour. For example, an xp of 1.4 pH with a deviation of +1.4 pH leads to an actuating variable of -100% or at a deviation of -1.4 pH to an actuating variable of +100%. In other words, if a deviation occurs to the size of xp, then an actuating variable of 100% follows.

Zero point

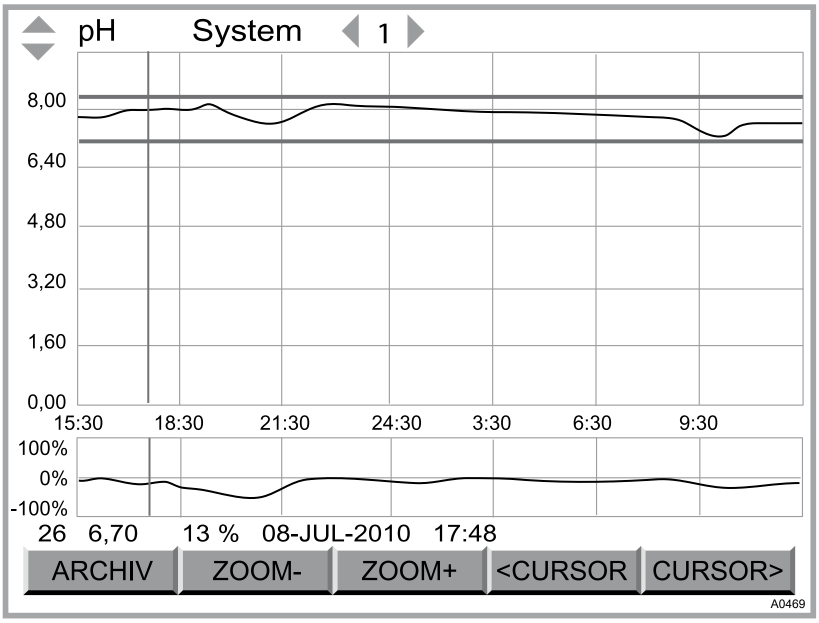
This refers to, for example, the voltage that a pH sensor emits at pH value 7. The zero point of the sensor can change as a result of aging and soiling.

The zero point of pH sensors is theoretically 0 mV. In practical terms, a zero point between -30 mV and +30 mV is acceptable for good sensor operation. New sensors have a zero point tolerance of max. ±30 mV.

14 Index

Operating instructions

DULCOMARIN® II, Screen Plotter Operation



Please carefully read these operating instructions before use! · Do not discard!
The operator shall be liable for any damage caused by installation or operating errors!
Technical changes reserved.

Part no. 986790

BA DC 068 02/11 EN

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Further applicable documents

These operating instructions and supplementary instructions are only valid in combination with the following operating and supplementary instructions:

- Multi-channel measuring and control system operating instructions DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa Part 2: Operation
- Supplementary instructions DULCOMARIN® II M-module product type: DXMaM (measurement module for pH, redox, temperature)
- Supplementary instructions DULCOMARIN® II I-module product type: DXMaI (current input module, standard signal inputs mA)

Table of contents

1 About this product

The screen plotter for the swimming pool controller DULCO-MARIN® II is a software solution, which makes an expensive additional device superfluous. It is designed as a 16-times 2 x 5 channel plotter. It displays the measured values for pH value, redox value, free Cl and combined Cl and the temperature, as well as the corresponding control variables (not for temperature), and this for up to 16 pools. Without an SD-card it can save measurement results for 24 h, with an SD-card it can save measurement results from 35 days up to 12 years, dependent on requirements.

Single TXT files from the SD card can be copied to a PC and, for example, processed with EXCEL to create graphics.

1.1 Storage and transport

CAUTION!
– Store and transport the card reader and the SD card in their original packaging
– Protect the entire DXCa update kit against moisture and the effects of chemicals.

The scope of supply of the DXCa update kit comprises:

- SD card
- Card reader

Ambient conditions for storage and transportation

- Temperature: 0 °C ... 45 °C
- Air humidity: 10 % ... 90 % relative air humidity, non-condensing

2 Setting up the screen plotter

Boot-up routines

Only after the DULCOMARIN® II has completed the boot-up routine (duration approximately 4 minutes), does the screen plotter start to operate.

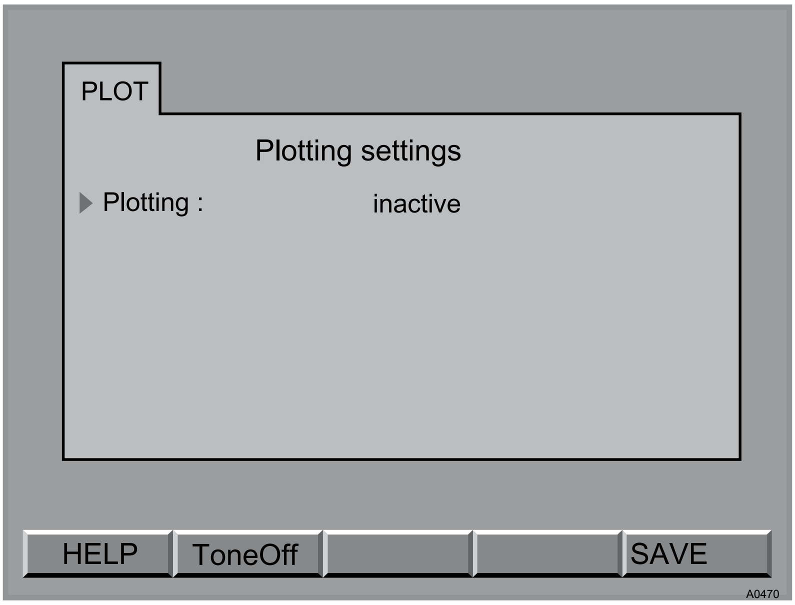


Fig. 1: The file card [PLOT] with inactive screen plotter

If the symbol for the screen plotter at the extreme left in the central menu item is not available, it is necessary to proceed as follows:

1. Press the *[F4 CONFIG]* key in the central menu item
2. Press the *[F2 OPTION]* key in the configure menu
3. In the file card *[PLOT]* press the *[ENTER]* key (if necessary, enter the access code)
4. Using the arrow keys *[UP]* or *[DOWN]* select *'active'* and press the *[ENTER]* key
5. Press the function key *[F5 SAVE]*
6. Press the *[ESC]* key to jump back to the central menu item

Adjusting the interface of the screen plotter

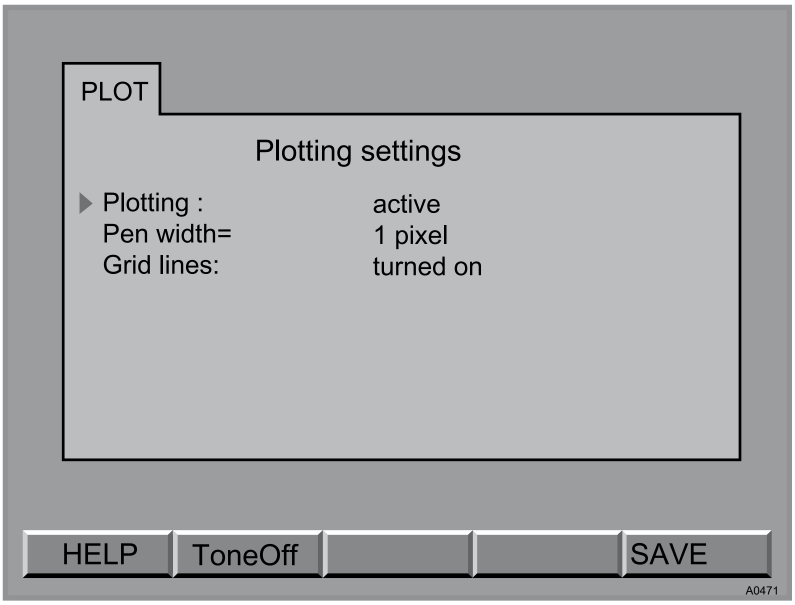


Fig. 2: The file card [PLOT] with inactive screen plotter

1. Press the *[F4 CONFIG]* key in the central menu item
2. Press the *[F2 OPTION]* key in the configure menu
3. In the file card *[PLOT]* select either *'Line thickness '* or *'Grid lines'* (arrow keys) (if necessary, enter the access code)
4. Press the *[ENTER]* key
5. Using the arrow keys *[UP]* and *[DOWN]* make the required selection and then press the *[ENTER]* key
6. Press the function key *[F5 SAVE]*
7. Press the *[ESC]* key to jump back to the central menu item

Viewing the charts

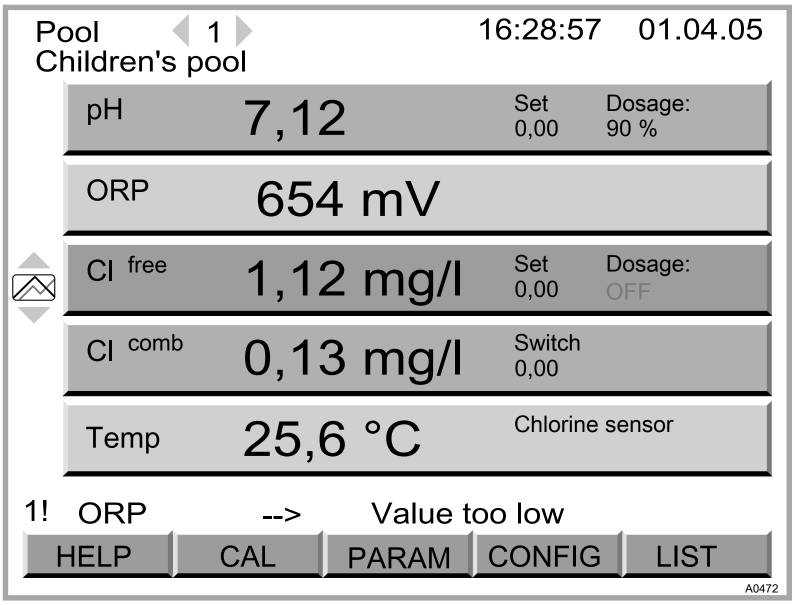


Fig. 3: The central menu item with active screen plotter

- In the central menu item, press the arrow keys *[UP]* or *[DOWN]*
  - ⇨ The charts for pH-value appear first.

3 Layout and function of the screen plotter

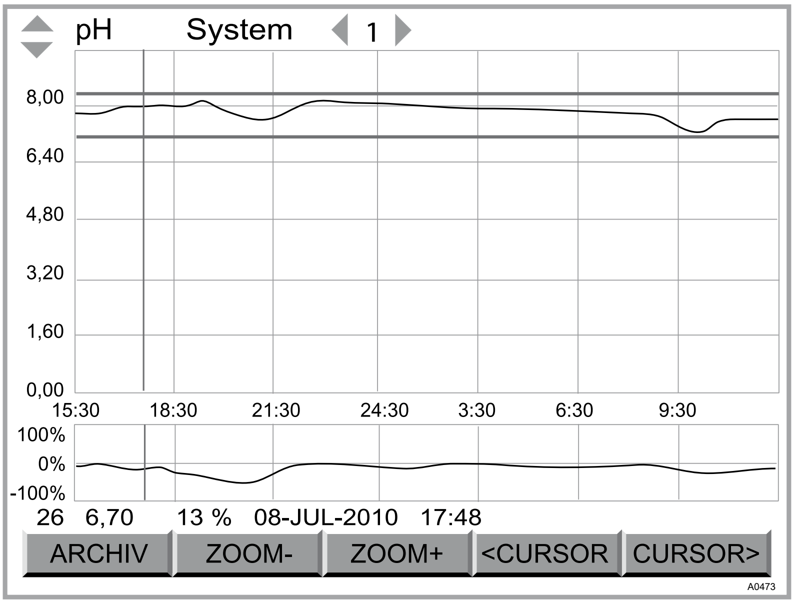


Fig. 4: Plotter window layout

The screen plotter comprises:

- Name of the measured variable
- Pool number and pool name (with more than one pool)
- Chart for the measured variable
- Chart for the control variable of the measured variable
- Information line for the selected measured value
- Bar with function keys

Name of the measured variable

Select the measured variable with the arrow keys *[UP]* and *[DOWN]*.

Pool number and pool name

Select the pool with the arrow keys *[LEFT]* and *[RIGHT]*.

Measured variable chart

The measured variable chart shows the y-axis and units on the extreme left. The time axis (x-axis) is located between the measured variable chart and the control variable chart. It always shows 24 hours. It only shows hour times where there are measured values. Otherwise it shows *'00:00'*.

The red lines indicate the set limit values (in the parameter menu: Parameter Alarm). If the measured values exceed the limit values, the measurement curve appears red in this position.

The blue line is a cursor, with which individual measured values can be approached, so that their precise value can be read off (see under *'Info line for the selected measured value'* and *'Bar with function keys'*). Initially it is positioned exactly on the y-axis.

Chart for the control variable of the measured variable

The chart for the control variable of the measured variable shows the y-axis on the extreme left with *'%'* units. The time axis (x-axis) is located between the chart for the measured variable and the chart for the control variable. It always shows 24 hours.

Information line for the selected measured value

The information line for the selected measured value shows its precise value. You select a measured value using the cursor (see under *‘Bar with function keys’*).

The sequence of displayed values is:

- No. of the measured value
- Measured value
- Control variable value
- Date of the measurement
- Time of the measurement
- (Display number)

Bar with function keys

> *Normal view*
>
> *If the plotter takes the next measured value, the view jumps back to the normal view (after no more than 5 minutes). Each change to another display resets the view to the normal view.*

Using the function key *[ARCHIVE]* you can check historical measured values on the DULCOMARIN® II (values going back up to a week). For this, you require an SD card. The function key bar contains the *[ARCHIVE]* function key as well as the function key pairs *[F2 ZOOM-]* / *[F3 ZOOM+]* and *[F4 <CURSOR]* / F5 CURSOR>:

The function key pair *[F2 ZOOM-]* / *[F3 ZOOM+]* is used to zoom the y-axis for the measured variable.

The function key pair *[F4 <CURSOR]* / *[F5 CURSOR>]* is used to move the blue cursor in the measured variable chart (it may possibly initially be located on the y-axis).

More information

The time interval over which the DULCOMARIN® II plots the measured values is 5 minutes. If the measurement curve has reached the chart width, then for each new value on the right, an old value disappears on the left.

The DULCOMARIN® II saves the measured values for the current day. The DULCOMARIN® II saves the measured values of the last day from 00:00 to 24:00 h as a file for each measured variable and for each pool.

If an SD card is inserted, then the DULCOMARIN® II saves these files on the SD card until it is full.

Using the function key *[ARCHIVE]* you can check historical measured values on the DULCOMARIN® II, for periods going back up to a week. In the archive you can use the function keys *[<<]* and *[>>]* to jump from day to day. The display shows the numbers of the days in the top right corner.

4 Using an SD card

NOTICE!
Before expiry of the number of maximum savable days you must replace the full SD card for an empty SD card.

Otherwise, the data for further days are lost, as the DULCOMARIN® II cannot delete the data on the SD card.

Requirement
A PC with at least WIN98 and a USB port.

If the measured values of the plotter are to be saved for longer than 24 h, you must use an SD card.

The screen plotter shows the measured values for the last 24 h. You can call up older measured values using the [ARCHIVE] function key or load them on a PC

The required memory capacity depends on the number of days and pools.

Memory capacity	32 MB	64 MB	128 MB	256 MB
Number of pools	days	days	days	days
1	564	1128	2256	4512
2	282	564	1128	2256
3	188	376	752	1504
4	141	282	564	1128
5	112	224	448	896
6	94	188	376	752
7	80	160	320	640
8	70	140	280	560
9	62	124	248	496
10	56	112	224	448
11	51	102	204	408
12	47	94	188	376
13	43	86	172	344
14	40	80	160	320
15	37	74	148	296
16	35	70	140	280
SD card format: FAT 16 or FAT 32		File name format: JJMMDDBB.txt		
where JJ = year, MM = month, DD = day, B or BB = pool number				

SD card insertion

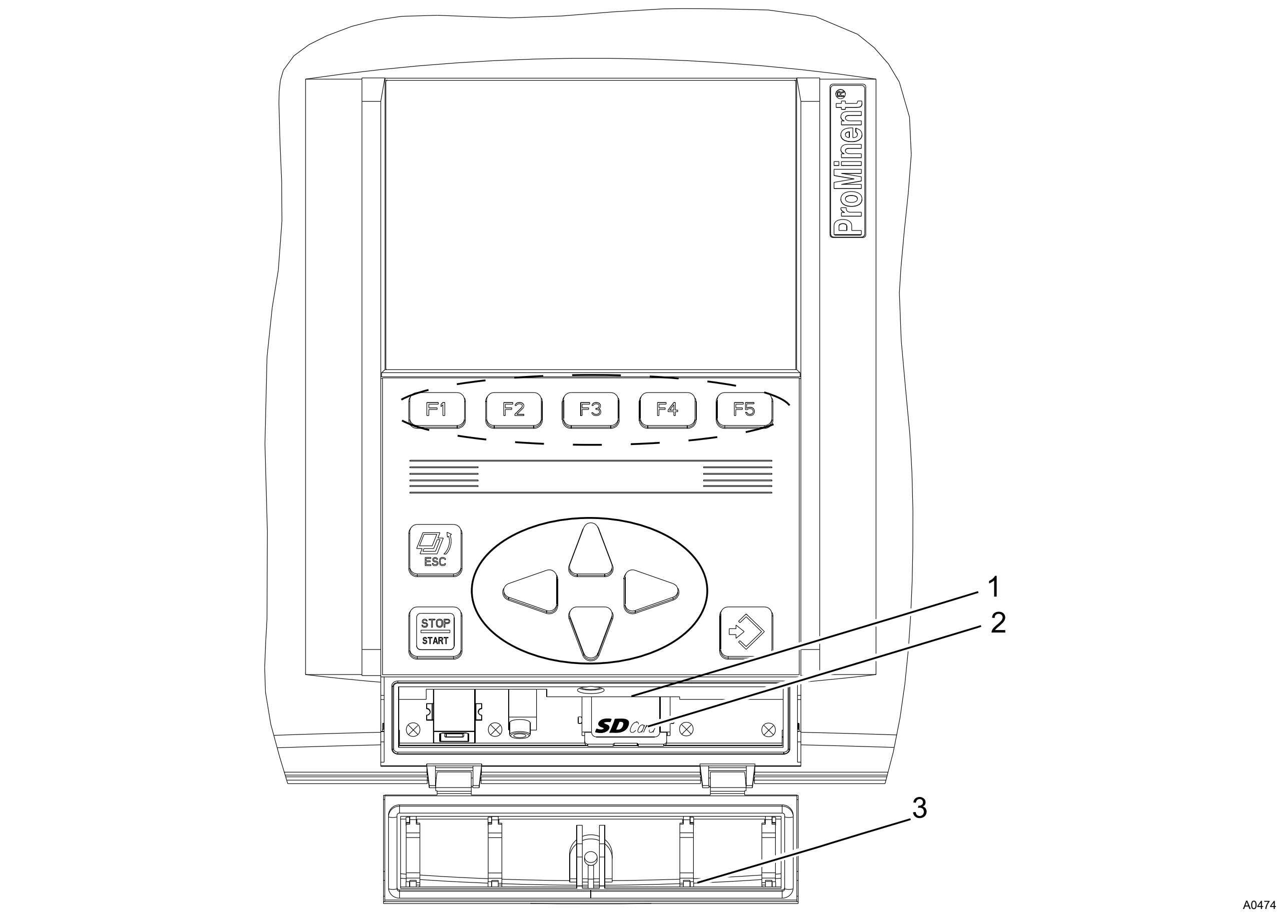


Fig. 5: The interfaces with the interface cover of the DXCa shown open

1. Card slot
2. SD card
3. Interface cover

1. To insert the SD card, open the transparent interface cover (3) at the bottom of the DXC housing of the DULCOMARIN® II (shown Fig. 5 opened)

2. *If you want to change one SD card for another, then you must without fail carry out a reset prior to the insertion.*

   If you forget to carry our a reset prior to the insertion, you must completely delete the SD card contents and then carry out the reset.

   Sequentially press: *[F4 CONFIG]*, *[F2 OPTION]* and *[F3 RESET]*.

3. If the DULCOMARIN® II has already saved data, then it copies the files of the last day and the measured values of the current day upon recording of the next measured value to the SD card (waiting time up to 5 min) - the identifier *'SD'* appears, highlighted in red

   ⇨ Do not pull out the SD card!

> *Protection class IP 65*
>
> *The transparent interface cover (3) in Fig. 5 must be screwed in place again so that it is moisture-proof. Otherwise the IP 65 rating is not achieved.*

Evaluation of the SD card files

1. To remove the SD card open the transparent interface cover (3) at the bottom of the DXC housing of the DULCOMARIN® II (shown Fig. 5 opened)
2. Only pull out the SD card (2) from the card slot (1), if the identifier *'SD'*, at the top right on the LCD screen is highlighted in green. Not when it is highlighted in red! The plotter is then saving data. In this case wait briefly.
   ⇨ Once you have pulled out the SD card, the identifier *'SD'* at the top right of the LCD screen disappears. Moreover the error message *'! Please insert SD card !!'* appears in the continuous display and in the central menu item.
3. Copy the files contained in the SD card to a PC via a card reader and then delete the the SD card contents.
4. Push the SD card (2) into the card slot (1) until it engages
   ⇨ Then at the top right on the LCD screen, the *'SD'* identifier appears highlighted in green. Moreover, the error message *'! Please insert SD card !'* disappears.

> *To protect the data, the DULCOMARIN® II saves the files with 'write protection'. When working, only use copies and clear the file write-protection on the PC under 'Properties'.*
>
> *If you have changed the clock of the DULCOMARIN® II from or to summer time, bear this in mind during data evaluation.*

5 Troubleshooting

Fault message	Cause	Remedy
! Please insert SD card!!	Plotter is activated, but no SD card is inserted	Insert SD card
! SD card unformatted!!	SD card formatting is not FAT 16 or FAT 32	Format SD card using FAT 16 or FAT 32 This will delete all files on the SD card!
! SD card write-protected!!	The slider on the side of the SD card is set to *'LOCK'*	Push the slider on the side of the SD card away from *'LOCK'*
! SD card full. Please replace!!	SD card is full	Copy all files from the SD card to the PC and delete the card contents
After changing the SD card, the values directly after 24:00 hours are missing on the measurement curves	Before changing the SD card, no reset was carried out	Carry out a reset. Press the following sequentially:*[F4 CONFIG]*, *[F2 OPTION]* and *[F3 RESET]*

6 Technical data and accessories

Technical data

Potter type: 16-times 2x5-channel plotter (16 pools, measured variable and control variable, 5 measured variables)

Ambient conditions for storage and transportation: Update kit DXCa

- Temperature: 0 °C ... 45 °C
- Air humidity: 10 % ... 90 % relative air humidity, non-condensing

Ambient conditions for operation: Card reader

- Temperature: 0 °C ... 45 °C
- Air humidity: 20 % ... 85 % relative air humidity, non-condensing

Ambient conditions for operation: SD card

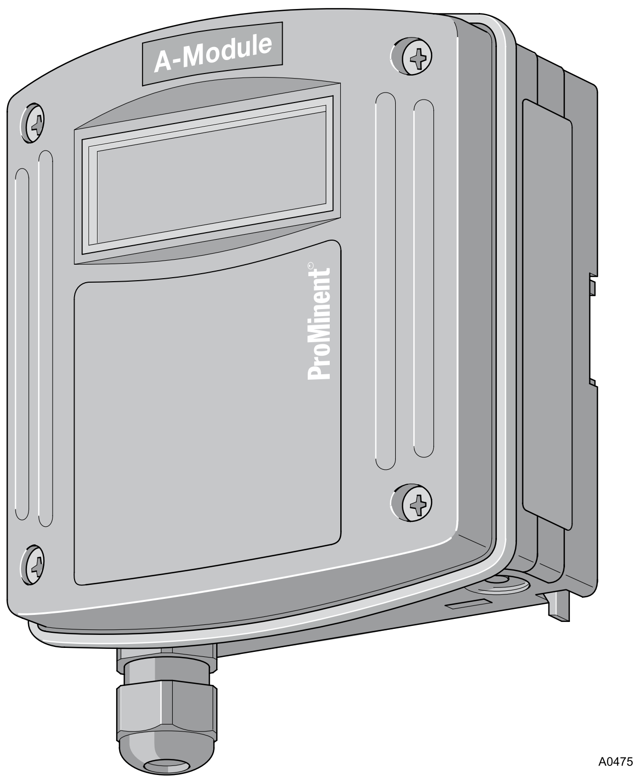
- Temperature: -25 °C ... 85 °C

Accessories

Accessories	Part number
Update-Kit DXCa (in scope of supply), comprising SD card and card reader	1025885
SD memory card 64 MB or greater	732483

Assembly and operating instructions

DULCOMARIN® II, A-Module
(Control Module, Pump and Standard Signal Outputs mA) DXMaA



Please enter the identity code of your device here! DXMa _ _ _ _ _ _ _ _ _ _ _ _ _

Please carefully read these operating instructions before use! · Do not discard!
The operator shall be liable for any damage caused by installation or operating errors!
Technical changes reserved.

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986906, 1, en_GB

Further applicable documents

These operating instructions and supplementary instructions are only valid in combination with the following operating and supplementary instructions:

- Multi-channel measuring and control system operating instructions DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa Part 1: Assembly and installation
- Multi-channel measuring and control system operating instructions DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa Part 2: Operation

Table of contents

1 Identity code

The identity code describes the external modules for the DULCOMARIN® II, series DXM

Only the M module of mounting type 'W' 'Wall mounting' can be ordered with operating elements and with different languages.

DXMa	External modules for the DULCOMARIN® II, series DXM						
		Module:					
	M	M module, measuring module: pH, redox, temperature					
	A	A module, control module: 3 pumps and 4 analog outputs					
	R	R module, control module: Chlorine gas metering device with feedback [1) 2)]					
	N	N module, power supply module without relay [1) 2)]					
	P	P module, power supply module without relay, only mounting type *'0)'* [2)]					
	I	I module, current input module, 3 mA inputs, 2 digital inputs					
			Mounting type:				
		0	Without housing, only P-module (IP 00)				
		W	Wall mounted (IP 65)				
		H	Mounting rail (IP 20)				
		E	Upgrade module (insert module for DXCa, IP 20)				
				Version:			
			0	With controls			
			2	Without controls			
			3	Without controls (only mounting type *'E'*)			
					Application:		
				0	Standard		
				S	Swimming pool (only m module)		
						Language:	
					00	No controls [2)]	
					DE	German	
					EN	English	
					ES	Spanish	
					FR	French	
					IT	Italian	
							Certification:
						00	No certification, only P-module without housing
						01	CE mark

[1] only mounting type W wall mounting / [2] only in version *‘2’* without controls

2 About this device

The control module DXMaA allows the DULCOMARIN® II to control 3 metering pumps by pulse frequency, e.g. to increase or lower the pH value or to meter disinfectant.

The DXMaA control module has the following outputs:

- Four standard signal outputs 0/4...20 mA, freely programmable and scalable for measured values, e.g. of pH value, redox voltage, the concentration of free chlorine or total chlorine or combined chlorine or temperature.
- Three frequency outputs for controlling metering pumps e.g. to increase or lower the pH value or to meter disinfectant

and the following inputs:

- Three contact inputs for evaluating the fault indicating relay of the metering pumps and monitoring the container fill level

2.1 Safety chapter

The DXMaA control module must only be used as part of the DULCOMARIN® II.

The installation must only be carried out by technically trained personnel.

2.2 Storage and transport

CAUTION!
Protect the module against moisture and the effects of chemicals, even while still packaged.

Store and transport the module it its original packaging.

Ambient conditions for storage and transportation:

- Temperature: -10 °C ... 70 °C
- Max. permissible relative humidity: 95 %, non-condensing (DIN IEC 60068-2-30)

3 Assembly and installation

> **NOTICE!**
> The installation must only be carried out by technically trained personnel.
>
> When assembling and installing this device, observe the instructions in the operating instructions "Multi-channel measuring and control system DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa Part 1: Assembly and installation".

> *Incorrect measured values*
> *The standard signals can be falsified, possibly with consequences for the process.*
>
> *You may only directly connect devices with autonomous galvanic isolation of the individual standard signal inputs to the standard signal outputs (e.g. the standard signal inputs of a plotter,...)!*
>
> *If you want to connect a multi-channel standard signal input module of a PLC to several standard signal outputs of the DXMaA module, then you must route each standard signal wire via a 3-way standard signal isolator. A 3-way standard signal isolator galvanically isolates the input, the output and the supply voltage from each other.*
>
> *Where there are several standard signal wires, a multi-channel isolating amplifier can be used. ProMinent recommends 4-channel isolating amplifiers of type LC-TV-4I.4I as supplied by Rinck www.rinck-electronic.de or of type 6185D supplied by PR Electronics www.prelectronics.de for the connection of up to 4 standard signal wires.*

Make the CAN connection according to the "Multi-channel measuring and control system operating instructions DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa Part 1, Assembly and Installation".

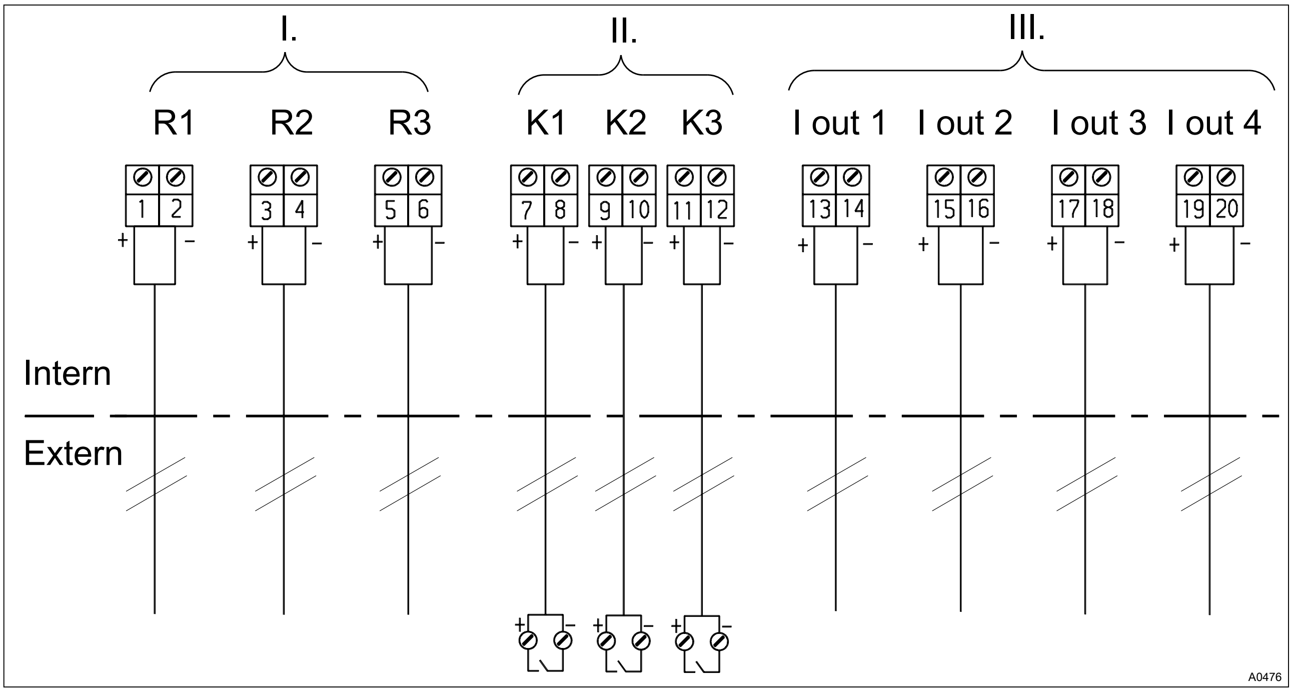


Fig. 1: Terminal Wiring Diagram

I. Small voltage relay outputs
II. Contact inputs DXMa A
III. Standard signal outputs 0/4 - 20 mA

Terminal allocation

Description	Terminal identifier	Terminal no.	Pole	Function
Frequency output 1	R 1	1	+	pH lowering pump (control)
		2	-	pH raising pump
Frequency output 2	R 2	3	+	Chlorine pump (control)
				ORP pump
		4	-	pH lowering pump
Frequency output 3	R 3	5	+	Flocculent pump
				ORP pump
		6	-	Chlorine pump
Contact input 1	K 1	7	+	Pump error
		8	-	
Contact input 2	K 2	9	+	Pump error
		10	-	
Contact input 3	K 3	11	+	Pump error
		12	-	
I out 1		13	+	pH value
Current output 0/4-20 mA 1		14	-	Control variable pH-lower
				Control variable pH-raise
				Control variable chlorination
				Control variable flocculent

Description	Terminal identifier	Terminal no.	Pole	Function
				Control variable ORP
				(Plotter connection)
				Control circulation
Current output 0/4-20 mA **2**	I out 2	15	+	ORP value
		16	-	Control variable pH-lower
				Control variable pH-raise
				Control variable chlorination
				Control variable flocculent
				Control variable ORP
				(Plotter connection)
Current output 0/4-20 mA **3**	I out 3	17	+	Chlorine value
		18	-	Control variable pH-lower
				Control variable pH-raise
				Control variable chlorination
				Control variable flocculent
				Control variable ORP
				(Plotter connection)
Current output 0/4-20 mA **4**	I out 3	19	+	chlorine bound
		20	-	Control variable pH-lower
				Control variable pH-raise
				Control variable chlorination
				Control variable flocculent
				Control variable ORP
				(Plotter connection)

4 Technical data

Electrical data

Frequency outputs (Opto-MOS-relay) for pump control (R1, R2, R3):

- Type of contact: N/O with interference-suppressed series inductances
- Load capacity: 400 V peak, 250 mA switching current, max. 0.8 W
- Maximum frequency: 8.33 Hz (500 strokes/min)
- Closing time/opening time: 5 ms

Contact inputs (K1, K2, K3) (term. 9 – 14):

- Galvanically isolated from each other
- Insulation voltage: 500 V
- Max. contact frequency: 2 kHz
- Connectable contacts: mechanical relay
- Max. connectable cable length: 20 m

Standard signal outputs mA (I out 1 - I out 4):

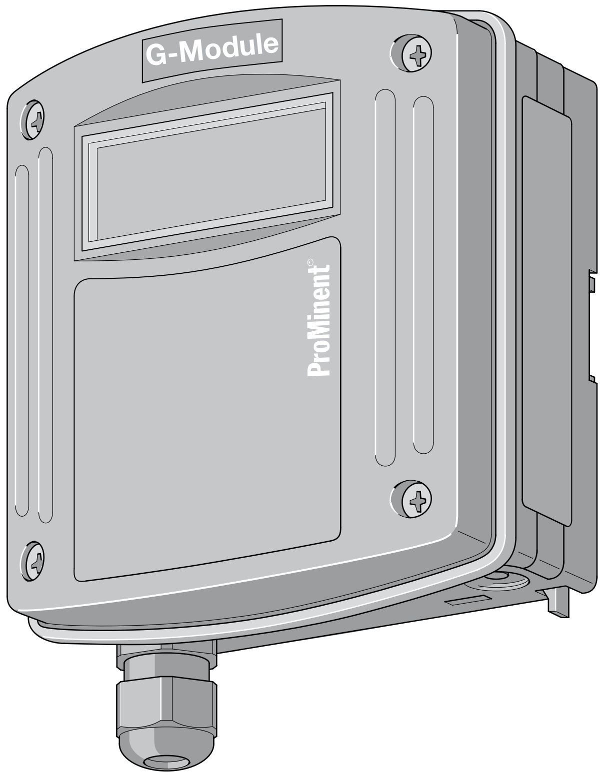
- Insulation voltage: 500 V
- Output range: 0/4-20 mA (programmable)
- 23 mA for error messaging
- Maximum apparent ohmic resistance: 400 Ω
- Accuracy: 0.5 % of output range

Material

Housing: PPE-GF 10

Installation instructions

DULCOMARIN® II, G-Module
(Limit Value and Alarm Generator Module DXMaG)



A0787

Please enter the identity code of your device here! DXMa _ _ _ _ _ _ _ _ _ _ _ _ _

Please carefully read these operating instructions before use! · Do not discard!
The operator shall be liable for any damage caused by installation or operating errors!
Technical changes reserved.

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986049, 1, en_GB

Further applicable documents

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- Multi-channel measuring and control system operating instructions DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa Part 1: Assembly and installation
- Multi-channel measuring and control system operating instructions DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa Part 2: Operation
- Supplementary instructions DULCOMARIN® II, M-Module (measuring module for pH, redox [ORP], temperature) DXMaM operation
- Supplementary instructions DULCOMARIN® II, I-Module (current input module, standard signal inputs mA) DXMaI

Table of contents

1 Identity code

The identity code describes the external modules for the DULCOMARIN® II, series DXM

DXMa	**External modules for the DULCOMARIN® II, series DXM**						
		Module:					
	G	G-module, limit value and alarm module [1] [2]					
			Mounting type:				
		W	Wall mounted (IP 65)				
				Version:			
			2	Without controls			
					Application:		
				0	Standard		
						Language:	
					00	No controls [2]	
							Certification:
						01	CE mark

[1] only mounting type W wall mounting / [2] only in version *'2'* without controls

2 About this device

The limit value and alarm generator module DXMaG with two limit or alarm relays signals alarm overshoots, general errors and sample water errors.

2.1 Safety chapter

The DXMaG limit value and alarm generator module must only be used as part of the DULCOMARIN® II.

The installation must only be carried out by technically trained personnel.

2.2 Storage and transport

CAUTION!
Protect the module against moisture and the effects of chemicals, even while still packaged.

Store and transport the module it its original packaging.

Ambient conditions for storage and transportation:

- Temperature: -10 °C ... 70 °C
- Max. permissible relative humidity: 95 %, non-condensing (DIN IEC 60068-2-30)

3 Assembly and installation

G module, DXMaG description

The G module is a limit value or alarm generator module. It has two potential-free changer relays for signalling alarm states.

Each of the two relays has different setting options, which can influence the relay effects.

Both relays offer the same setting options.

Hence through the use of different delay periods, pre-warning or shut-down signals can be generated.

NOTICE!

The installation must only be carried out by technically trained personnel.

When assembling and installing this device, observe the instructions in the operating instructions "Multi-channel measuring and control system DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa Part 1: Assembly and installation".

Create the CAN connection in accordance with the Operating instructions DULCOMARIN ® II Swimming Pool Controller and Disinfection Controller DXCa , Part 1: Assembly and installation".

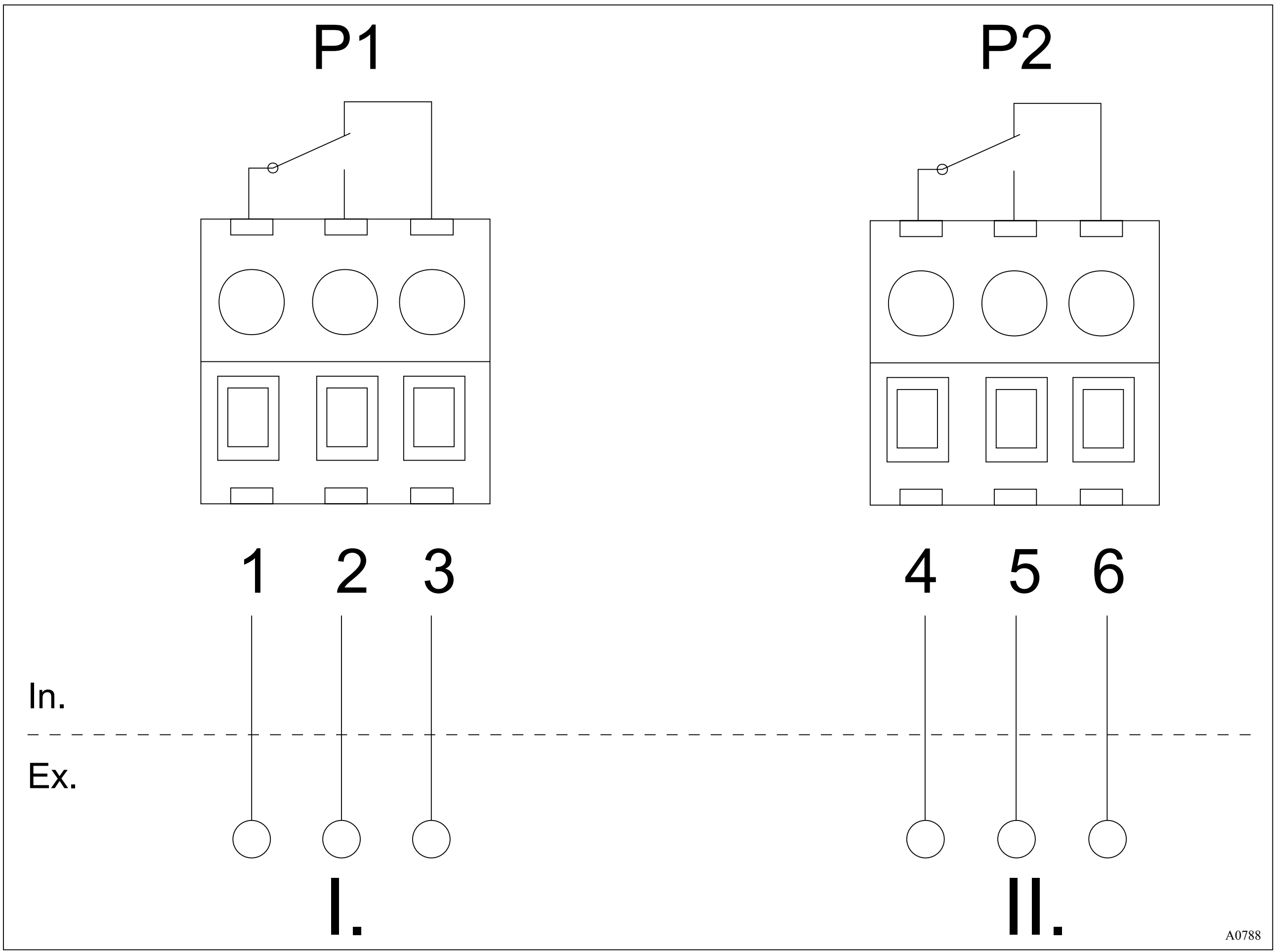


Fig. 1: Wiring diagram, G module / power relay outputs

I. Limit value / alarm generator 1
II. Limit value / alarm generator 2

Terminal allocation

Description	Terminals Identifier	Terminals number	Pole	Function
Power relay output 1	P1	1	C	Limit value / alarm generator 1
		2	to select NO	
		3	NC	
Power relay output 2	P2	1	C	Limit value / alarm generator 2
		2	to select NO	
		3	NC	
The XR terminals have no function.				

4 Technical data

Electrical data

Power relay output (P1, P2):

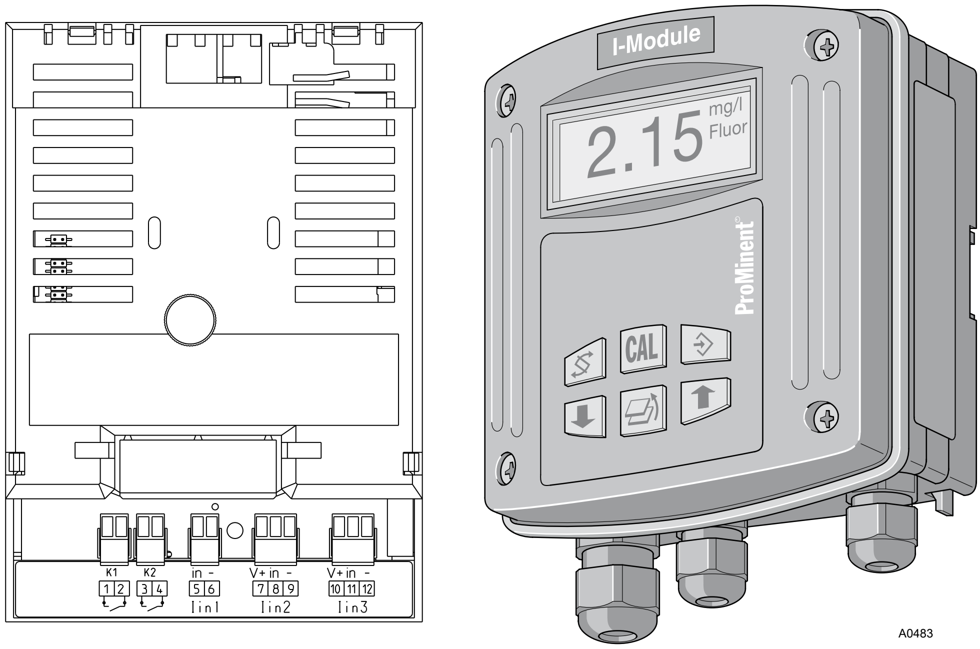
- Type of contact: Changeover contact with interference-suppressed varistors
- Load capacity: 250 V AC, 3 A max., 700 VA
- Contact operational lifetime: > 20 x 10^5 switching operations

Material

Housing: PPE-GF 10

Operating instructions

DULCOMARIN® II, I-Module (Current Input Module, Standard Signal Inputs mA) DXMaI



Please enter the identity code of your device here! DXMA _ _ _ _ _ _ _ _ _ _ _ _ _

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Technical changes reserved.

Part no. 986463

BA DC 071 02/11 EN

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- Multi-channel measuring and control system operating instructions DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa Part 2: Operation
- Supplementary instructions DULCOMARIN® II Screen writer operation

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							Module:
	M						M module, measuring module: pH, redox, temperature
	A						A module, control module: 3 pumps and 4 analog outputs
	R						R module, control module: Chlorine gas metering device with feedback 1) 2)
	N						N module, power supply module without relay 1) 2)
	P						P module, power supply module without relay, only mounting type *'0)'* 2)
	I						I module, current input module, 3 mA inputs, 2 digital inputs
							Mounting type:
		0					Without housing, only P-module (IP 00)
		W					Wall mounted (IP 65)
		H					Mounting rail (IP 20)
		E					Upgrade module (insert module for DXCa, IP 20)
							Version:
			0				With controls
			2				Without controls
			3				Without controls (only mounting type *'E'*)
							Application:
				0			Standard
				S			Swimming pool (only m module)
							Language:
					00		No controls 2)
					DE		German
					EN		English
					ES		Spanish
					FR		French
					IT		Italian
							Certification:
						00	No certification, only P-module without housing
						01	CE mark

[1] only mounting type W wall mounting / [2] only in version *'2'* without controls

2 About this device

The current input module DXMaI allows the DULCOMARIN® II to connect 2 switches / relays and 3 sensors via 0/4...20 mA inputs.

The DXMaI control module has the following inputs:

- Contact inputs for sample water monitoring and pause
- 3 standard signal inputs 0/4...20 mA

The mA values of the sensors for flow, turbidity, UV-intensity, conductive conductivity, dissolved oxygen and ammonia are received already processed (compensated and calibrated).

The mA values for ClO2, H2O2, PES, fluoride and chlorite can be temperature compensated. To do this, a PT1000 sensor with mA transformer must be connected to an mA input.

2.1 Safety chapter

The DXMaI current input module must only be used as part of the DULCOMARIN® II.

The installation must only be carried out by technically trained personnel.

2.2 Storage and transport

CAUTION!
Protect the module against moisture and the effects of chemicals, even while still packaged.

Store and transport the module it its original packaging.

Ambient conditions for storage and transportation:

- Temperature: -10 °C ... 70 °C
- Max. permissible relative humidity: 95 %, non-condensing (DIN IEC 60068-2-30)

3 Assembly and installation

> **NOTICE!**
> The installation must only be carried out by technically trained personnel.
>
> When assembling and installing this device, observe the instructions in the operating instructions "Multi-channel measuring and control system DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa Part 1: Assembly and installation".

Make the CAN connection according to the "Multi-channel measuring and control system operating instructions DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa Part 1, Assembly and Installation".

Terminal allocation

<table>
<tr><th>Description</th><th>Terminal identifier</th><th>Terminal no.</th><th>Pol</th><th>Function</th></tr>
<tr><td rowspan="2">Contact input 1</td><td rowspan="2">K 1</td><td>1</td><td>-</td><td rowspan="2">Fault sample water</td></tr>
<tr><td>2</td><td>+</td></tr>
<tr><td rowspan="2">Contact input 2</td><td rowspan="2">K 2</td><td>3</td><td>-</td><td rowspan="2">Pause control (e.g. back-washing)</td></tr>
<tr><td>4</td><td>+</td></tr>
<tr><td rowspan="2">Analog input 1</td><td rowspan="2">I in 1</td><td>5</td><td>in</td><td rowspan="2">Flow (turbidity)</td></tr>
<tr><td>6</td><td>GND (-)</td></tr>
<tr><td rowspan="3">Analog input 2</td><td rowspan="3">I in 2</td><td>7</td><td>V+</td><td rowspan="3">Fluoride
O_2, ClO_2, ClO_2^-,
H_2O_2, NH_4OH)</td></tr>
<tr><td>8</td><td>in</td></tr>
<tr><td>9</td><td>GND (-)</td></tr>
<tr><td rowspan="3">Analog input 3</td><td rowspan="3">I in 3</td><td>10</td><td>V+</td><td rowspan="3">Temperature
(UV, turbidity,
conductivity, ClO_2^-)</td></tr>
<tr><td>11</td><td>in</td></tr>
<tr><td>12</td><td>GND (-)</td></tr>
</table>

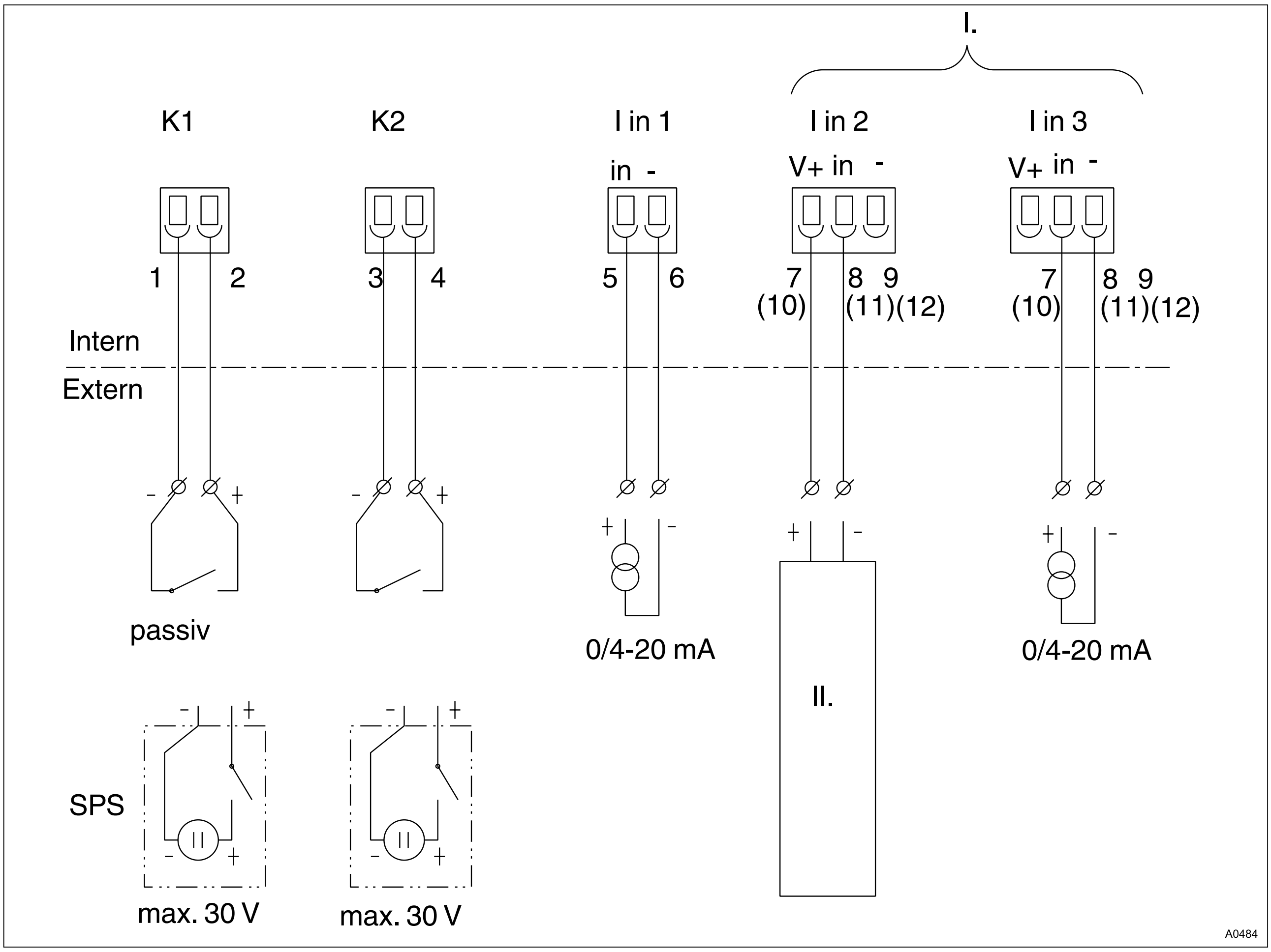


Fig. 1: Terminal Wiring Diagram

I. Assignment variants
II. ProMinent® Transducer/Sensor
SPS PLC Programmable logic controller

For the measured variables, which are input through terminal "I in 2", the following functionalities are available in the software:

	F^-	O_2	ClO_2	ClO_2^-	H_2O_2
Regulate ∗	-	-	X	X	X
Calibrate	X	-	X	-	X

∗ For this a pump must be previously configured (see "Operating instructions Multi-channel measuring and control system DULCOMARIN® II Disinfection Controller DXCa, Part 2: Operation").

4 Technical data

Electrical data

Digital inputs (K1 - K2):

- 2 inputs: for contacts, switching transistors and for PLC analog outputs as per DIN EN 61131-2
- Insulation voltage: 500 V
- Input resistance: 3.5 kΩ
- Open circuit voltage: 10 V ... 12 V
- Switching point:
  - Passive: 1750 Ω, typical
  - Active: 3.15 mA, typical
- Input current:
  - 4 mA (0 V)
  - 5.8 mA (30 V)
- Input capacity: 100 nF
- Switching hysteresis: 20 µA
- Max.switching frequency: 1 kHz

Standard signal outputs mA (I in 1 - I in 3):

- 3 inputs: 0/4 ... 20 mA, isolated
- Insulation voltage: 500 V
- Input resistance: 50 Ω
- Load capacity: 30 mA
- 2 inputs with 2-wire connector (sliding supply) (I in 2, I in 3): Supply voltage 22.0 V- 25.0 V
- Measuring accuracy: ± 0.5 % of the measuring range (at 25 °C)
- Resolution: 1/215

Ambient conditions

Storage temperature: -10...70 °C

Protective system:

- Degree of protection: as Internet module IP 20
- as external module, wall mounted IP 65, according to IEC 60529, DIN EN 60529, VDE 0470
- as external module, control panel mounted IP 54, according to IEC 60529, DIN EN 60529, VDE 0470

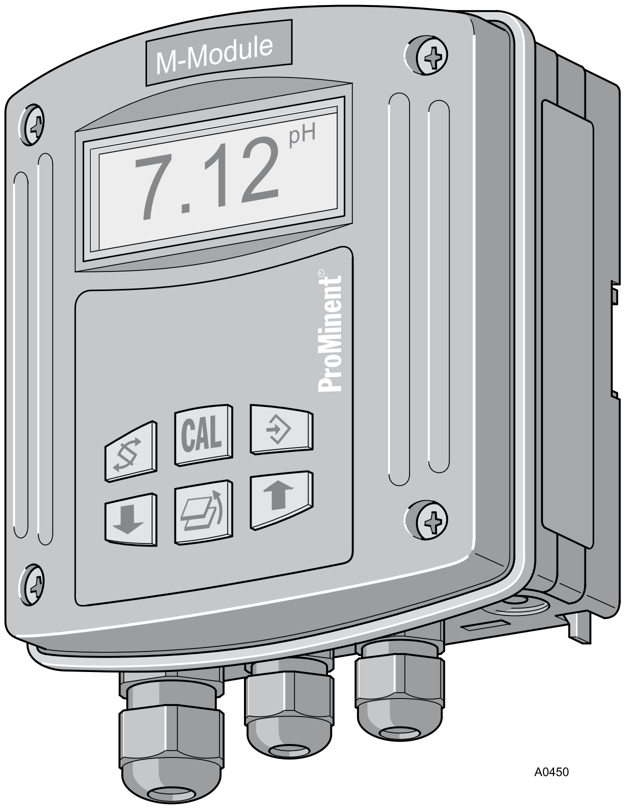
Material

Housing: PPE-GF 10

Assembly and operating instructions

DULCOMARIN® II, M-Module

DXMaM (Measurement Module for pH, Redox, Temperature)



Please enter the identity code of your device here! DXMA _ _ _ _ _ _ _ _ _ _ _ _ _

Please carefully read these operating instructions before use! · Do not discard!
The operator shall be liable for any damage caused by installation or operating errors!
Technical changes reserved.

Part no. 985989 BA DC 072 02/11 EN

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Further applicable documents

These operating instructions and supplementary instructions are only valid in combination with the following operating and supplementary instructions:

- Multi-channel measuring and control system operating instructions DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa Part 2: Operation
- Supplementary instructions DULCOMARIN® II Screen plotter operation

Table of contents

1 Identity code

> *The identity code describes the external modules for the DULCOMARIN® II, series DXM*
>
> *Only the M module of mounting type ‘W’ ‘Wall mounting’ can be ordered with operating elements and with different languages.*

DXMa	External modules for the DULCOMARIN® II, series DXM						
		Module:					
	M	M module, measuring module: pH, redox, temperature					
	A	A module, control module: 3 pumps and 4 analog outputs					
	R	R module, control module: Chlorine gas metering device with feedback [1) 2)]					
	N	N module, power supply module without relay [1) 2)]					
	P	P module, power supply module without relay, only mounting type *‘0)’* [2)]					
	I	I module, current input module, 3 mA inputs, 2 digital inputs					
			Mounting type:				
		0	Without housing, only P-module (IP 00)				
		W	Wall mounted (IP 65)				
		H	Mounting rail (IP 20)				
		E	Upgrade module (insert module for DXCa, IP 20)				
				Version:			
			0	With controls			
			2	Without controls			
			3	Without controls (only mounting type *‘E’*)			
					Application:		
				0	Standard		
				S	Swimming pool (only m module)		
						Language:	
					00	No controls [2)]	
					DE	German	
					EN	English	
					ES	Spanish	
					FR	French	
					IT	Italian	
							Certification:
						00	No certification, only P-module without housing
						01	CE mark

[1] only mounting type W wall mounting / [2] only in version *'2'* without controls

2 Safety and responsibility

About this device

The measurement module DXMaM typically allows the DULCO-MARIN® II to:

- measure and control the pH value
- measure and display the redox potential (optional controller)
- measure and display the temperature of the sample water
- monitor the sample water flow

The DXMaM measurement module has the following inputs:

- One Pt1000 temperature input (Pt100, automatic sensor detection)
- Two sensor inputs for pH or redox measurement with potential equalisation
- Three contact inputs for pause, parameter set switching, sample water monitoring

Safety

NOTICE!

Further applicable documents

These operating instructions are only valid in conjunction with the "Operating instructions DULCOMARIN® II, Part 1: Assembly and installation".

All the safety instructions and explanations contained therein must be observed without exception.

WARNING!

Danger of malfunctions

Only trained personnel may install the DXMaR M module. Only then can it be ensured that all components of the control circuit are matched to each other and operating correctly

NOTICE!

Registering and unregistering components to the CAN bus

The chlorine sensor must be registered to the CAN bus. You can find further information in the "Operating instructions DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa Part 2: Operation".

3 Handling the device

Storage and transport

> CAUTION!
> Protect the module against moisture and the effects of chemicals, even while still packaged!

Store and transport the module it its original packaging.

Ambient conditions for storage and transport:

- Temperature: -10 °C ... 70 °C
- Max. permissible relative humidity: 95 %, non-condensing (DIN IEC 60068-2-30)

Assembly and installation

> WARNING!
> **Danger of malfunctions**
> Only trained personnel may install the M module DXMaM. Only then can it be ensured that all components of the control circuit are matched to each other and operating correctly

> NOTICE!
> **Terminal Wiring Diagram**
> The wiring diagram can be found at the end of these operating instructions, see .

Create the CAN connection in accordance with the operating instructions "DULCOMARIN® II, Part 1: Assembly and installation".

4 Terminal Wiring Diagram

Sensor "combination probe"

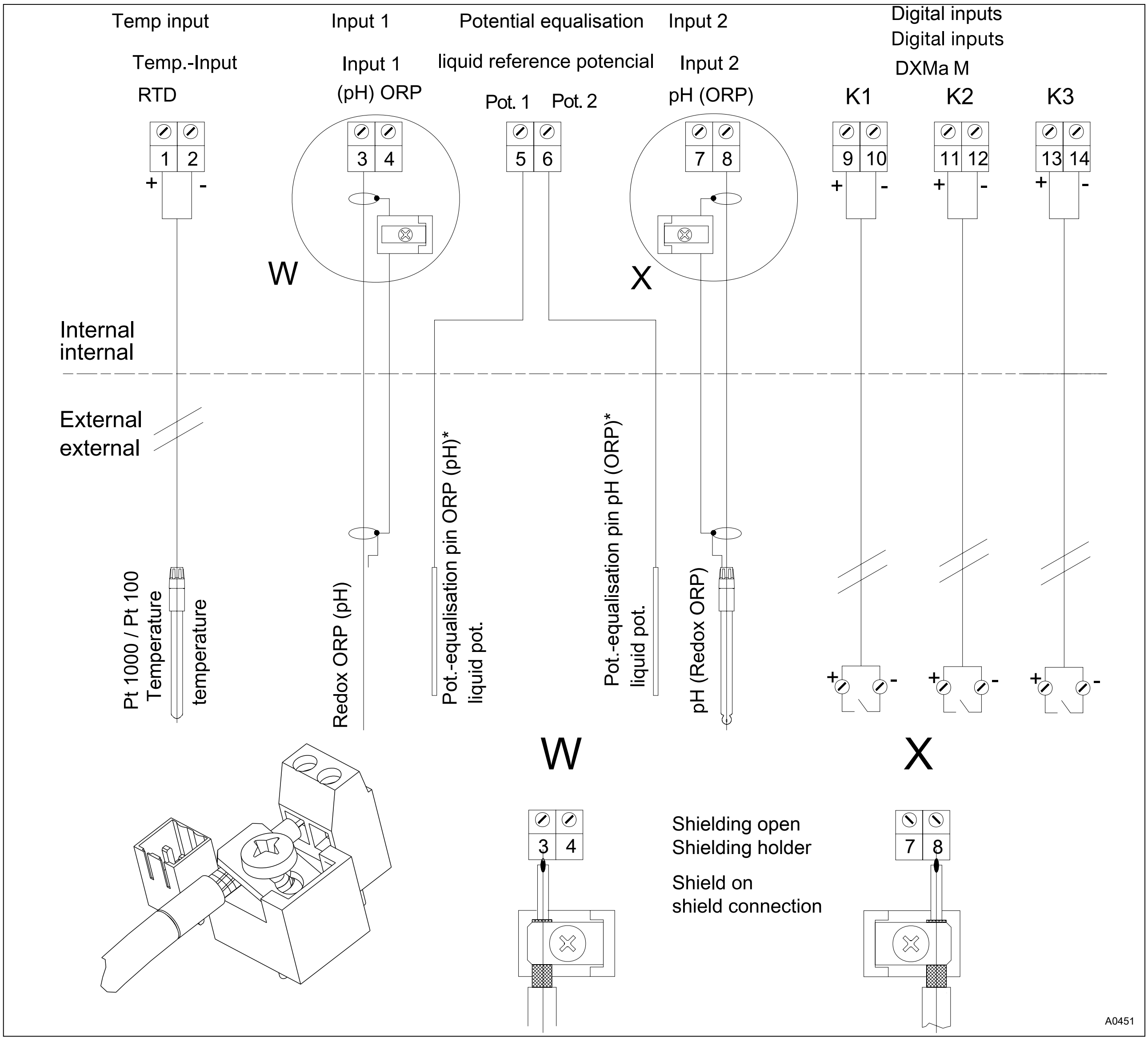


Fig. 1: Sensor "combination probe"

∗ The "Potential equalisation" function must be activated in the software

Sensor: "Separate probe"

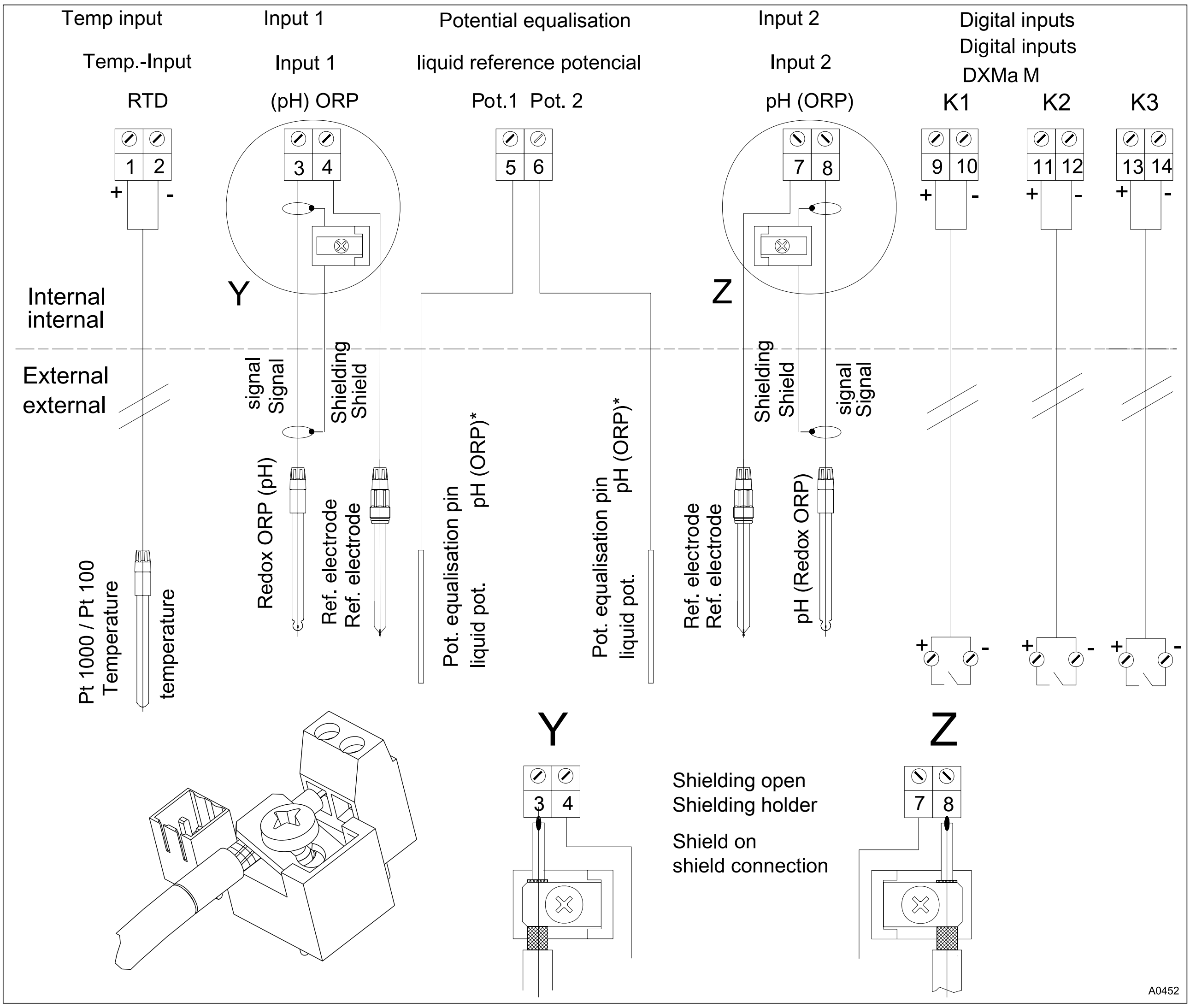


Fig. 2: Sensor: "Separate probe"

∗ The "Potential equalisation" function must be activated in the software

Terminal allocation

Description	Terminal identifier	Terminal no.	Pol.	Function
Temp. input Pt1000/100	RTD	1	+	Pt1000(100 (temp. sensor)
		2	-	
pH/redox input 1	pH (ORP)	3	Ref.	ORP sensor
		4	meas sig.	
Potential equalisation 1	POT 1	5		
Potential equalisation 2	POT 2	6		pH sensor
pH/redox input 2	pH (ORP)	7	Ref.	
		8	meas sig.	
Contact input 1	K 1	9	+	Sample water (error)
		10	-	

Description	Terminal identifier	Terminal no.	Pol.	Function
Contact input 2	K 2	11	+	Pause control (back-washing)
		12	-	
Contact input 3	K 3	13	+	ECO!MODE
		14	-	

Electrical data

Pt1000/Pt100 input (RTD) (Term. 1, 2):

- Input range: -20 ... 150 °C
- Accuracy: ± 0.5 °C
- Resolution: 0.1 °C

Sensor input (ORP) (term. 3, 4) for redox:

- Input resistance: > 10^{12} Ohm
- All reference electrodes with diaphragms can be connected.
- Input range: Redox: -1200 mV ... +1200 mV
- Accuracy: 0.5 % of input range
- Resolution: 1 mV (0.01 pH)
- Reference electrode connection via shielding connection
- Connecting option for a equipotential bonding probe

Sensor input (pH) (term. 7, 8) for pH:

- Input resistance: > 10^{12} Ohm
- Input range: pH: -1 ... 15 (0 ... 100 °C)
- Resolution: 0.01 pH
- Further data such as *'Sensor input (ORP)'*.

Contact inputs (K1, K2, K3) (term. 9 – 14):

- Galvanically isolated from each other
- Insulation voltage: 500 V
- Max. contact frequency: 2 kHz
- Connectable contacts: mechanical relay
- Max. connectable cable length: 20 m

Ambient conditions

Storage temperature: -10...70 °C

Protection rating: IP 20 (within the DXM housing: IP 65)

Climate: Permissible relative humidity: 95 %, non-condensing (DIN IEC 60068-2-30)

Material

Housing: PPE-GF 10

5 Control elements

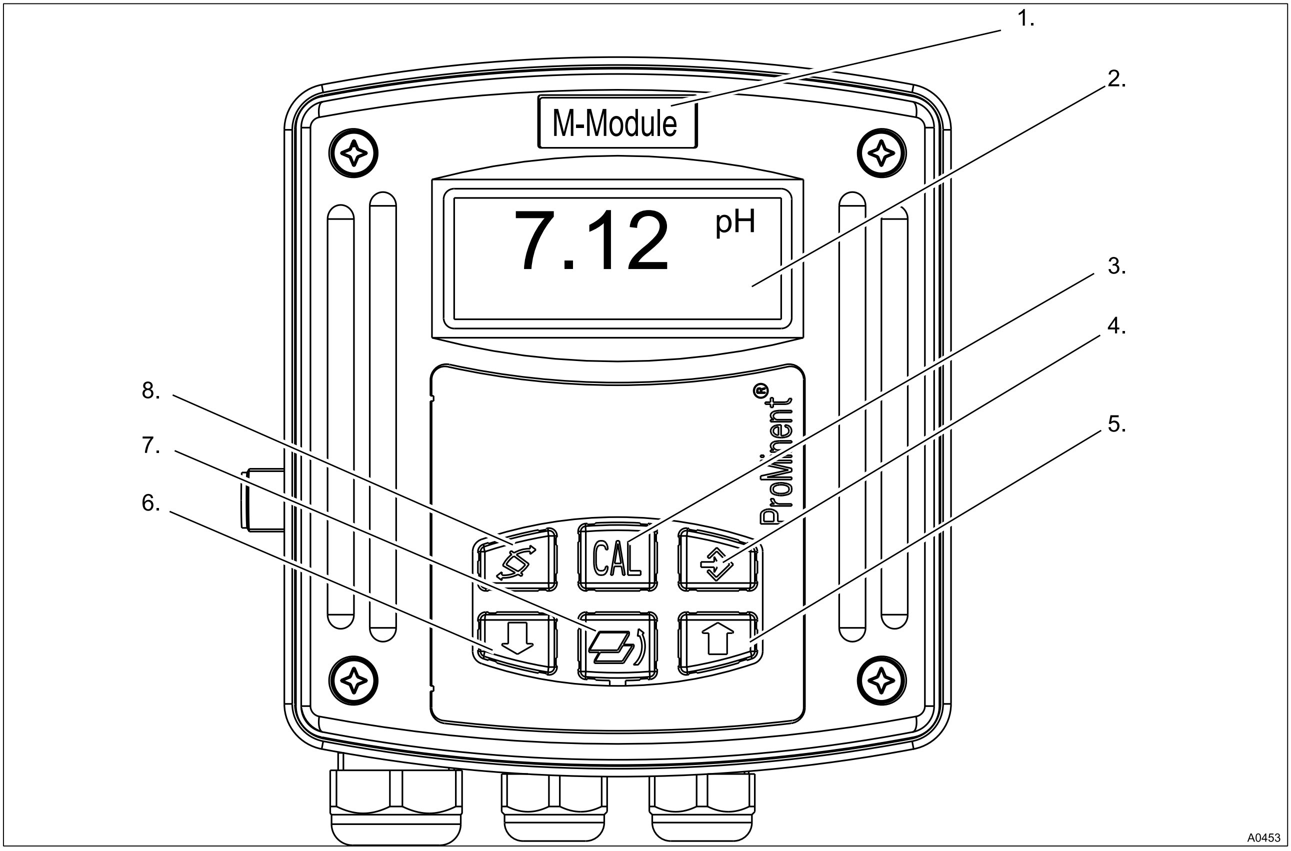


Fig. 3: Control elements

1. Module type label
2. LCD display
3. CAL key
4. ENTER key
5. UP key
6. DOWN key
7. ESC key
8. Change key

Functions of the keys

You can use the keys to change the DULCOMARIN® II settings.

The keys have the following functions:

Key	In the continuous display or in the info displays	In the menu items
Change key	Change between continuous displays	Change between the adjustable variables of the current menu item
ESC key	Jump back from the info displays to the continuous displays	Jump back to the info display without saving of the adjustable variables
Enter key	Change to a menu item (from an info display)	Save the adjustable variables of the current menu item and change to the info display
CAL key	Change to an info display of the calibration menu (from the continuous display)	Execution of the calibration step in the calibration menu (only for pH)
Down key Up key	------	Changing of an adjustable variable

5.1 Layout of the operating menu

The operating menu comprises:

- the continuous displays (continuous display level)
- the info displays (info level) for the display of the set calibration parameters or basic settings
- the calibration menu
- the menu items (adjustment level) for changing the calibration parameters or basic settings

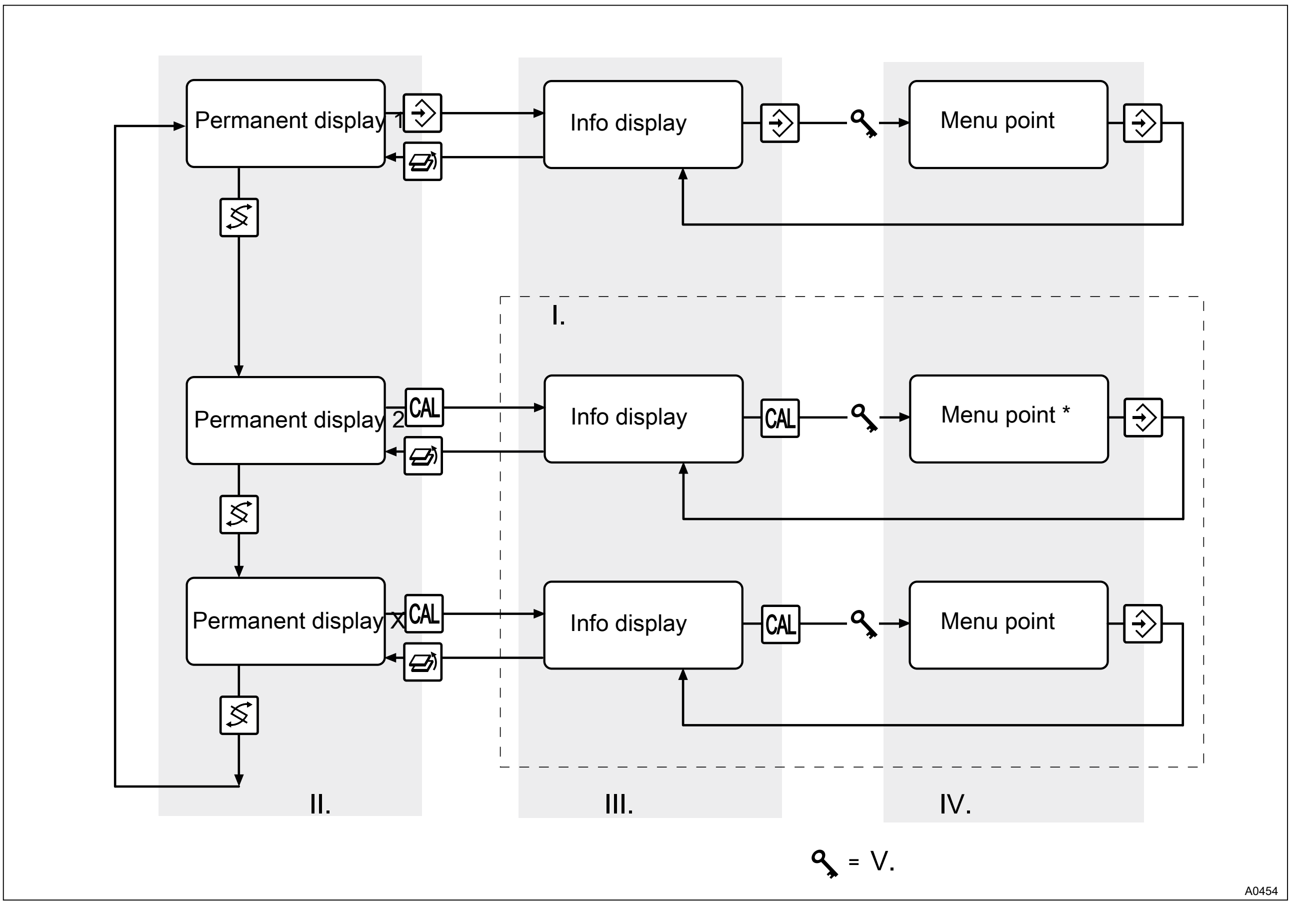


Fig. 4: Layout of the operating menu

I. Calibration menu
II. Continuous displays
III. Info level
IV. Adjustment level
V. Querying of the access code (only if activated by the user)

Navigation through the operating menu

Using the ESC key it is essentially possible to abort the current selection in any window of the operating menu. Irrespective of where you are located in the operating menu, a jump back to the corresponding continuous display or info display occurs.

If no key is pressed for 5 minutes, the display automatically jumps back to the continuous display (without saving the adjustable variables).

If an access code has been activated by the user, the menu items of the adjustment level are first locked. For *'Unlocking'*, the access code must be entered in the corresponding query and confirmed with the Enter key. As soon as the DXMaM is again in a continuous display, this *'Unlocking'* is removed. The access code is set to *'0000'* ex-works and is thus inactive.

Continuous displays

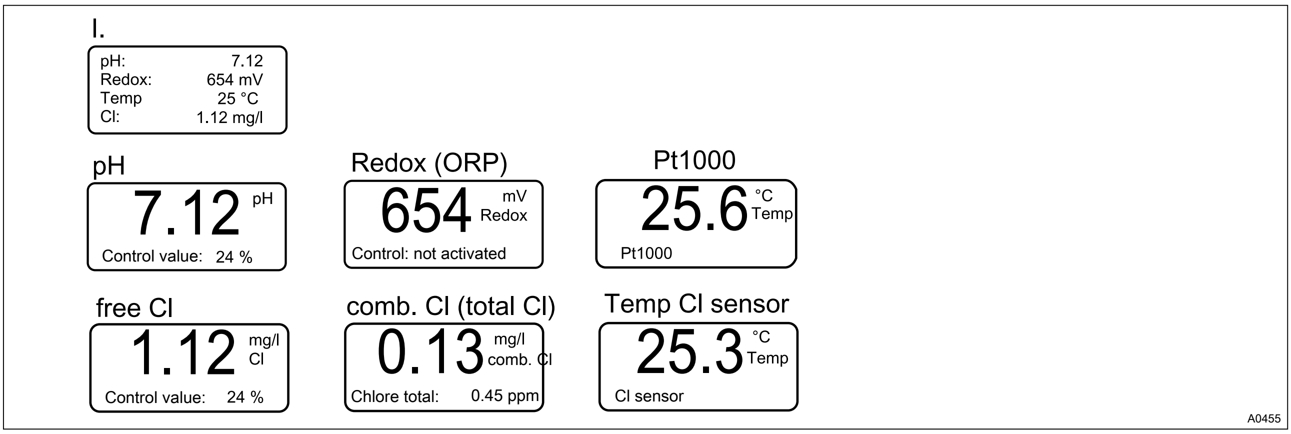


Fig. 5: Continuous displays

I. Continuous Display 1

During operation you can monitor the measured values of the corresponding pools via the continuous displays. Which continuous displays of the DXMaM are shown depends on which sensors are connected to the DULCOMARIN® II and configured. Continuous display 1 can display up to four measured variables. Alongside this, each measured variable has a further continuous display of its own.

The continuous displays can display the following:

- Measured variables *[pH]*, *[Redox]*, *[Free chlorine]*, *[Cl comb]* (*[Cl tot]* in the footer), temperature (separate Pt1000 and Cl sensor)
- Activity of the controller for a measured variable and correspondingly the control variable

Info displays

By pressing the Enter key or the CAL key in a continuous display, you enter the corresponding info display (info level).

Calibration menu

By pressing the CAL key in a continuous display, you enter the corresponding calibration menu

Menu items

By pressing the Enter key in the info displays, you enter the corresponding menu items (adjustment level)

Navigation in the menu item

- *Your entries become effective and are permanently saved at the moment you press the Enter key*
- *If you do not want to save the set variables, then exit the menu item by pressing the ESC key: You move back to the corresponding info display*

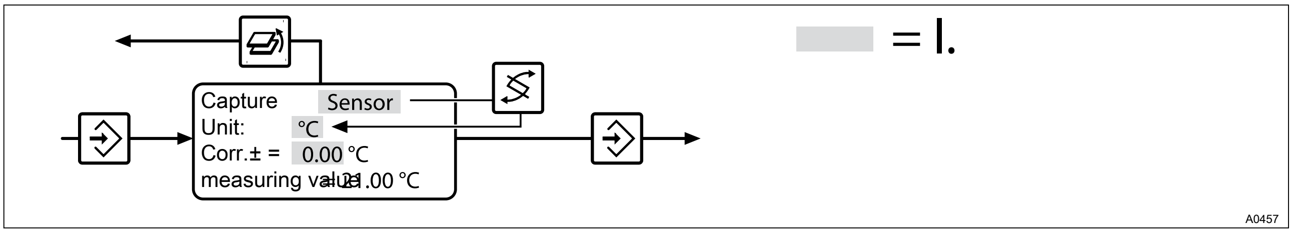


Fig. 6: Navigation in the menu item

I. Adjustable numerical value/expression flashes

In a menu item, you can activate each adjustable variable with the ESC key. If the adjustable variable flashes, then it can be adjusted. Using the arrow keys, you can change the numerical values or expressions.

Where:

- 1x short press means that a numerical value will be decreased/increased by 1 step or an expression changed
- longer pressing causes changing of the numerical values to take place more quickly.
- You can save the set variables of the menu item by pressing the Enter key. Simultaneously you change back to the info display.

6 Adjustment

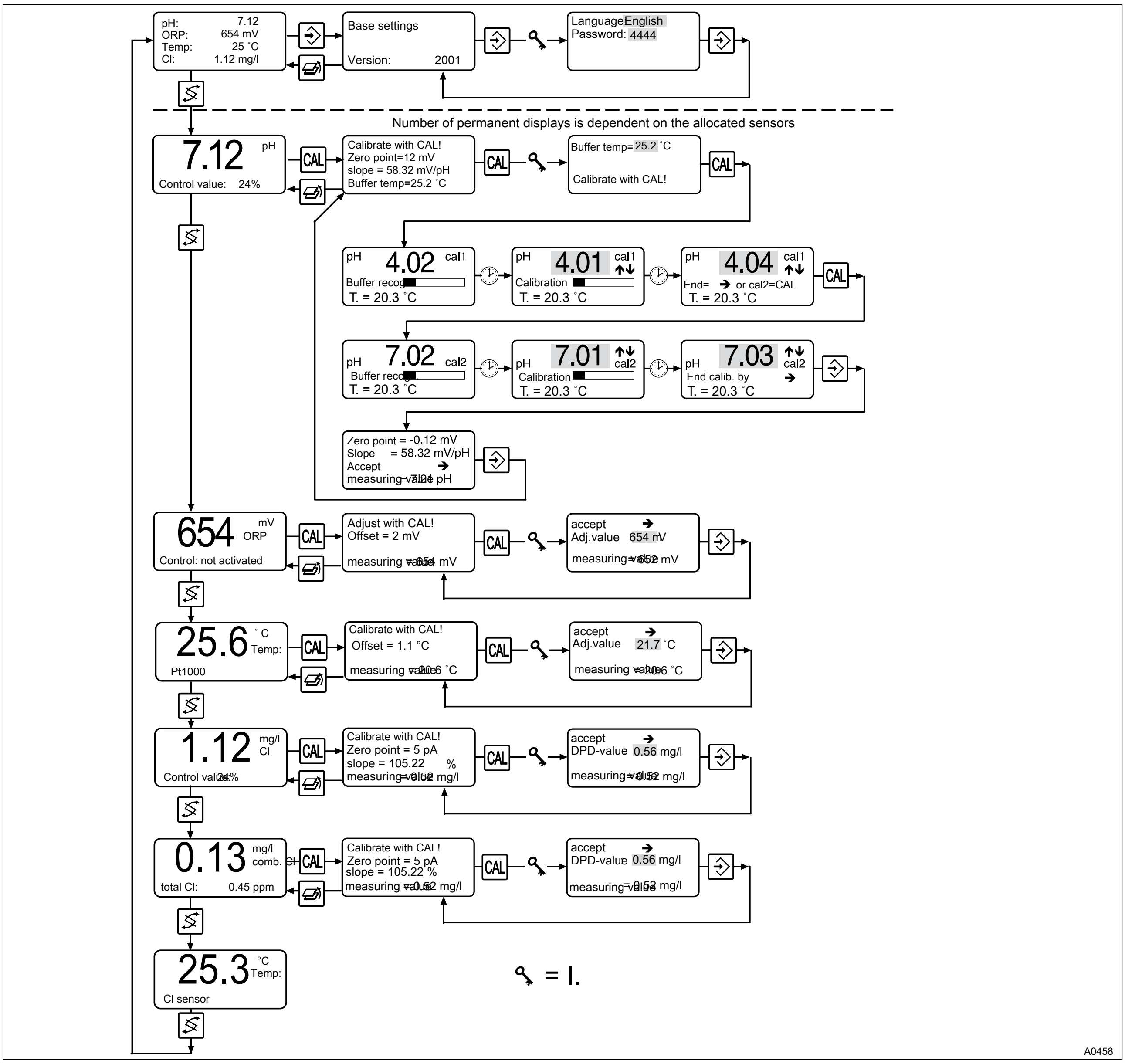


Fig. 7: Menu overview

I. Querying of the access code (only if activated by the user)

6.1 Basic settings

NOTICE!

Factory-set access code

Replace the factory-set access code with your own access code. Otherwise protection of the following menus will be extremely weak.

When jumping back in a continuous display the DULCOMARIN® II automatically removes the authorised access.

> *Access code (password)*
> *You can limit access to the device by setting an access code.*

Language and access code settings can be made in the *'Basic settings'* menu:

1. In continuous display 1 press the Enter key 2x
2. Under *'Language'* set the desired language using the arrow keys
3. Change to the selection *'Password'* by pressing the Change key
4. Under *'Password'* set the desired access code using the arrow keys
5. Press the ENTER key to accept the values or press the ESC key if you do not want to save the values
   ⇨ The display changes to the info display.
6. Jump back to the continuous display by pressing the ESC key
   ⇨ The menus are then password protected again

6.2 Calibration

6.2.1 pH calibration

Calibration of pH measurement

> *Automatic buffer detection*
> *The condition of a pH sensor is decisive for the quality of the measurement. Therefore each pH sensor must periodically be recalibrated using buffer solutions. The DXMaM has an automatic buffer detection system for the buffer solution being used.*

The following buffer table is stored in the program memory:

Buffer temperature in °C	pH		
0	4.05	7.13	10.26
5	4.04	7.07	10.17
10	4.02	7.05	10.11
15	4.01	7.02	10.05
20	4.00	7.00	10.00
25	4.00	6.98	9.94
30	4.00	6.98	9.90
40	4.00	6.97	9.82
50	4.00	6.96	9.75
60	4.00	6.97	9.68
It is recommended that only ProMinent® buffer solutions are used for calibration.			

Buffer temperature in °C	pH		
70	4.01	6.98	9.62
80	4.02	6.99	9.55
It is recommended that only ProMinent® buffer solutions are used for calibration.			

Sequence of the pH calibration

- *Using the ESC key you can always abort a calibration from any menu item in the calibration menu. The screen jumps back to the continuous display*
- *The control variable is frozen for the duration of the calibration at the last value (HOLD)*
- *Unallowable values make the currently running calibration invalid. The previous calibration values are retained*
- *Dispose of the used buffer solution*

Calibration menu overview

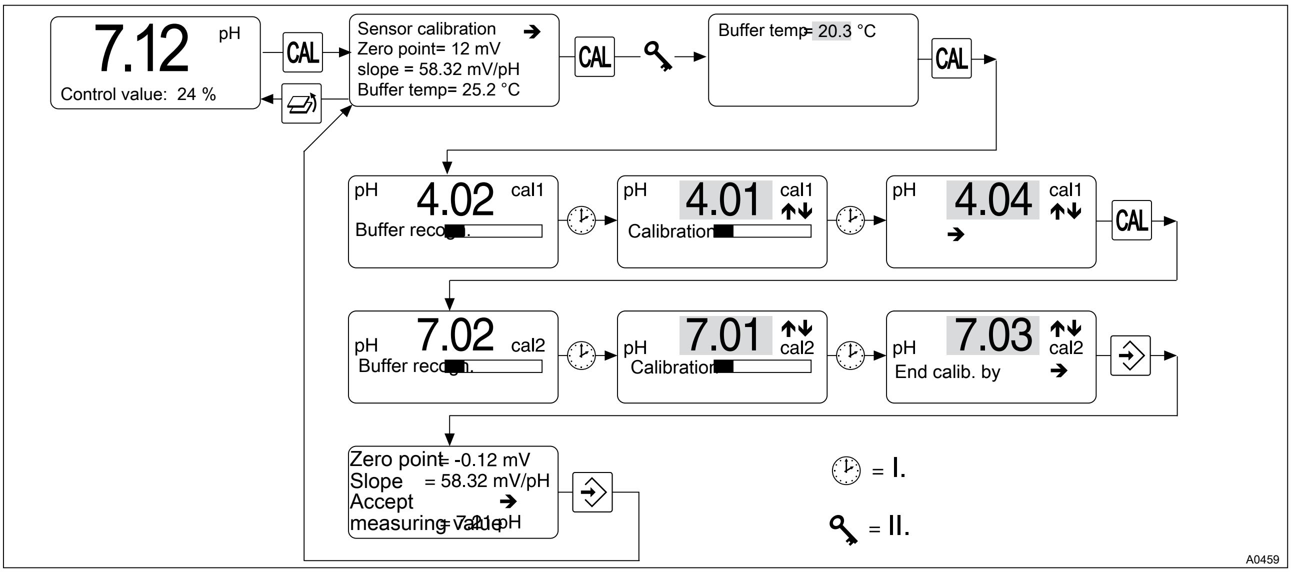


Fig. 8: 2 point calibration

I. The display change only takes place once the time bar is completely solid
II. Querying of the access code (only if activated by the user)

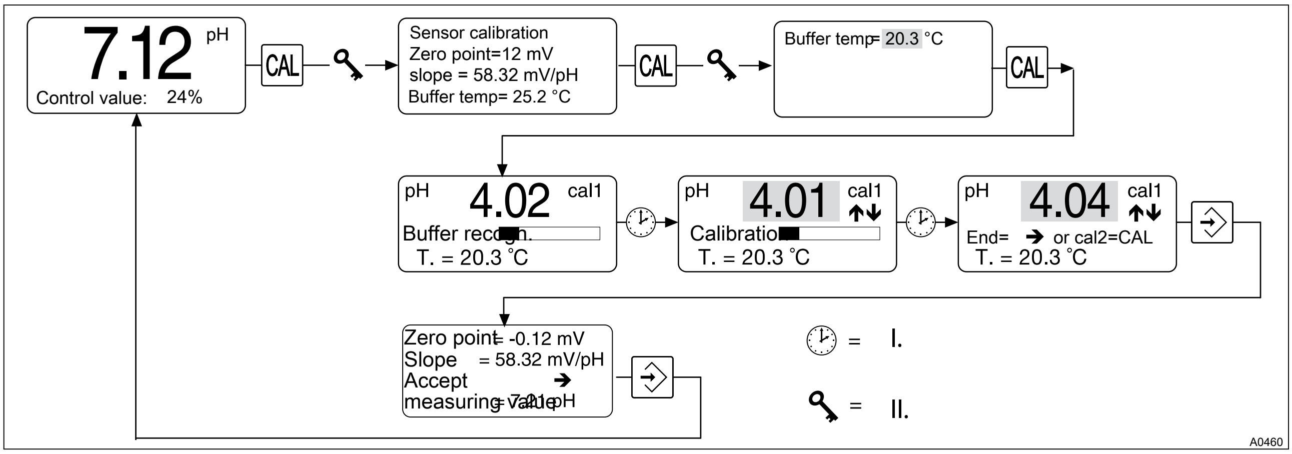


Fig. 9: 1 point calibration

I. The display change only takes place once the time bar is completely solid
II. Querying of the access code (only if activated by the user)

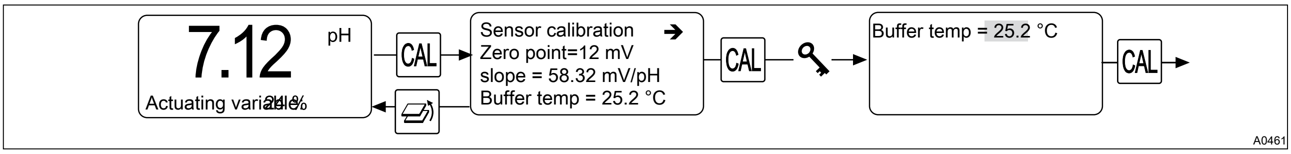


Fig. 10: To call the calibration menu, proceed as follows:

Start the calibration

1. In the *'pH'* continuous display press the CAL key 2x, while the pH sensor is still in the sample water
2. Under *'Buffer temp.'* set the buffer temperature using the arrow keys
   ⇨ This setting is only valid during the calibration procedure.
3. Take the pH sensor out of the sample water, rinse and immerse in the first buffer solution (here pH 4)

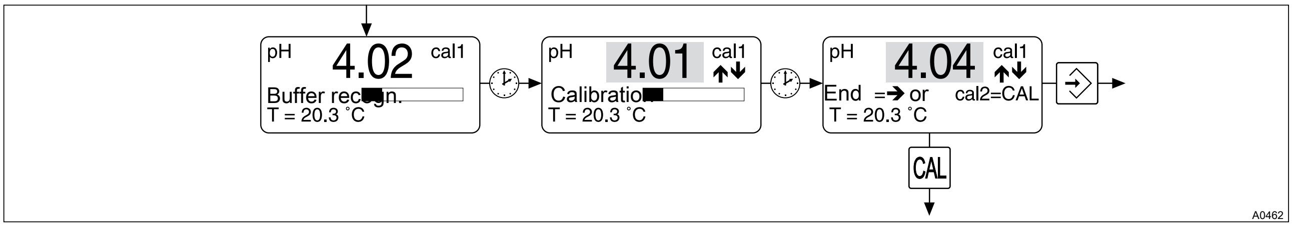


Fig. 11: Automatic buffer detection

4. Press the CAL key to start the automatic buffer detection
   ⇨ The progress of the buffer detection is shown by a time bar.

> *The manually set buffer temperature is displayed under 'T'.*

5. After buffer detection, calculation of the calibration parameters starts automatically (Calibration). This is likewise shown by a time bar

You can correct the buffer value during the calibration using the arrow keys. If the sensor signal is unstable, the time bar remains stationary until it becomes stable. After the calibration, the concluding menu item of the 1-point calibration appears. Once again you can correct the buffer value here using the arrow keys.

The following procedure then depends on whether you wish to carry out a 1-point calibration or a 2-point calibration (recommended!).

1 point calibration

1. Press the ENTER key to end the 1-point calibration
   ⇨ The zero point is calibrated if the buffer values lies between 5.5 and 8.0 pH.

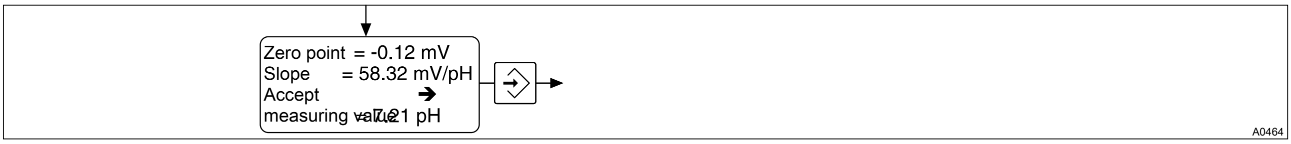


Fig. 12: Zero Point and Gradient

2. The calibration values (zero point and gradient) are now displayed

> *The check of the actual pH value is displayed under ‘Measured value’.*

3. Press the ENTER key to accept the values or press the ESC key if you do not want to save the values
   ⇨ The display changes to the info display, the calibration is completed.
4. Jump back to the continuous display by pressing the ESC key
   ⇨ The menus are then password protected again

2 point calibration

1. For a 2-point calibration, take the pH sensor out of the first buffer solution, rinse in clean water and immerse it in the second buffer solution

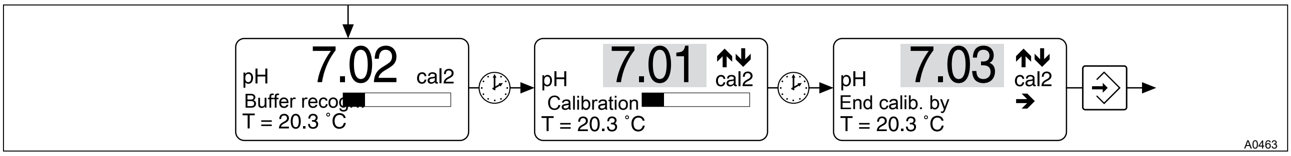


Fig. 13: Automatic buffer detection

2. Press the CAL key to start the automatic buffer detection
3. After the calibration, the concluding menu item of the 2-point calibration appears.
   ⇨ Once again you can correct the buffer value using the arrow keys.
4. Press the ENTER key to end the 2-point calibration

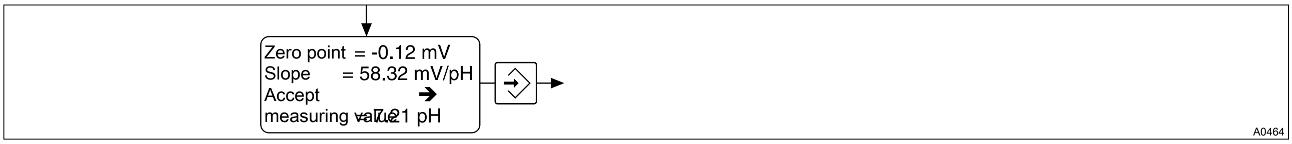


Fig. 14: Zero Point and Gradient

5. The calibration values (zero point and gradient) are now displayed

> *The check of the actual pH value is displayed under 'Measured value'.*

6. Press the ENTER key to accept the values or press the ESC key if you do not want to save the values
   ⇨ The display changes to the info display, the calibration is completed.
7. Jump back to the continuous display by pressing the ESC key
   ⇨ The menus are then password protected again

Error messages

> *Unallowable values make the currently running calibration invalid. The previous calibration values are retained.*

Fault message	Cause	Effect
Zero point < -60 mV !!! Calibr. invalid	N < -60 mV	Old zero point and gradient remain Replace sensor
Zero point > 60 mV !!! Calibr. invalid	N > +60 mV	Old zero point and gradient remain Replace sensor
Slope < 40 mV/pH ! Calibr. invalid	S < 47 mV/pH	Old zero point and gradient remain Replace sensor
Slope > 65 mV/pH ! Calibr. invalid	S > 63 mV/pH	Old zero point and gradient remain Replace sensor
Buffer gap too small! Calibr. invalid	Δ buffer < 2 pH	Calibrate buffer 2 again

6.2.2 Checking the redox sensor

> **NOTICE!**
> **No controller**
> The control variable is frozen for the duration of the checking of the redox sensor at the last value (HOLD)

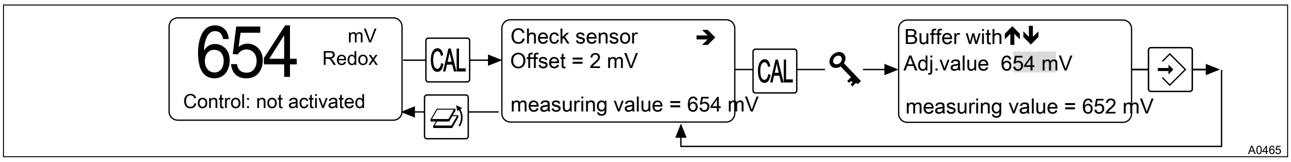


Fig. 15: Checking the redox sensor

You can check the sensor by measuring the redox voltage in a buffer solution

1. In the "Redox" continuous display press the CAL key
2. If the *'measured value'* is stable, press the CAL key
3. Under *'Adjust. Value'* enter the specified redox voltage for the buffer solution (arrow keys)
4. Press the ENTER key - the buffer value is compared in the device with the measured value and the *'Offset'* displayed in the next menu item. The offset may not be greater than ± 40 mV
5. Jump back to the continuous display by pressing the ESC key

   ⇨ The menus are then password protected again

Fault message	Cause	Effect
Calibration invalid Offset too high	Redox voltage difference > 40 mV	Replace sensor

6.2.3 Calibrating a temperature sensor

> **!** NOTICE!
> The temperature sensor of the chlorine sensor need not be calibrated (this continuous display does not appear with chlorine sensors).
>
> You should only calibrate the temperature sensor if:
>
> – you are using a type PT100 temperature sensor
> – you have a precise reference instrument
>
> Do not change the temperature sensor during the calibration:
>
> – The temperature measured value can only be adjusted within a range of ± 4 °C about the ex-works calibration value
> – The continuous display *'Temperature, Cl-Sensor'* does not have a calibration menu

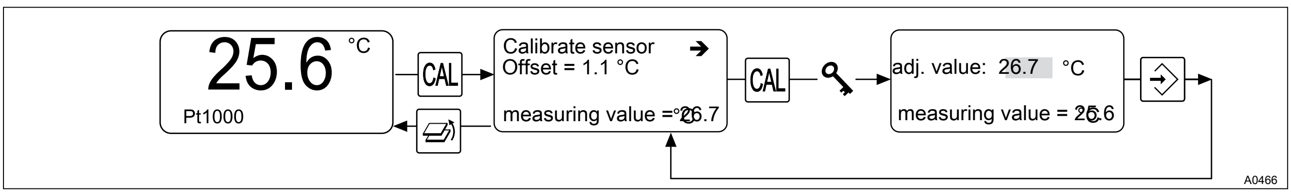


Fig. 16: Calibrating a temperature sensor

To call the calibration menu, proceed as follows:

1. In the *'Temperature, Pt1000'* continuous display press the CAL key
2. Take a water sample of at least 250 ml

> *Carry out the measurement immediately after sampling before the temperature of the water sample changes.*

3. Immerse the external PT100 temperature sensor of the DULCOMARIN® II and that of the reference instrument into the water sample
4. Once the *'measured value'* is stable, press the ENTER key
5. Under *'Adjust. Value'* enter the value of the reference instrument (arrow keys) and press the ENTER key
6. Jump back to the continuous display by pressing the ESC key
   ⇨ The menus are then password protected again

Fault message	Cause	Effect
Calibration invalid Offset too high	Temperature difference > 4 °C	Replace sensor

6.2.4 Calibrating a chlorine sensor for free chlorine

> **NOTICE!**
> **Measurement quality**
> The condition of a chlorine sensor is decisive for the quality of the measurement. Therefore each chlorine sensor must periodically be recalibrated using a DPD measuring set.

> **NOTICE!**
> **Further applicable documents**
> Please also observe the operating instructions for the sensor and in-line probe housing!

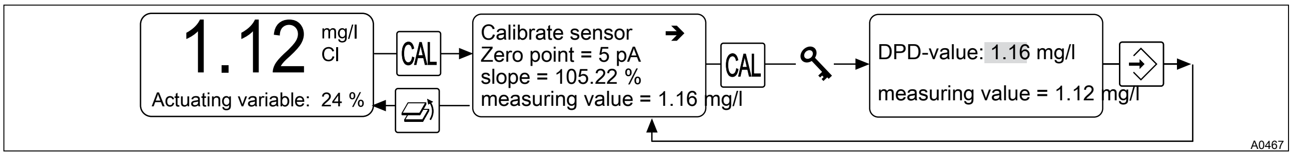


Fig. 17: Calibrating a chlorine sensor for free chlorine

To call the calibration menu, proceed as follows:

1. Block the sample water
2. In the *'Cl'* continuous display press the CAL key

3. If the *'measured value'* is stable, press the CAL key
4. Immediately afterwards, take a water sample from the flow gauge
5. Immediately afterwards, determine the chlorine content of the sample water with a photometer and a suitable measuring set, e.g. DPD 1 for free chlorine (CLE sensor)
6. Enter the determined chlorine content immediately under *'DPD value'* (arrow keys)
7. Press the ENTER key

   ⇨ - now the new calibration values are displayed.
8. Press the ESC key to jump back to the continuous display

   ⇨ the menus are then password protected again.
9. If total chlorine is also being measured, then also immediately calibrate this measured variable

Repeat the calibration after one day.

10. Open the stopcocks again for the sample water

Fault message	Cause	Effect
Calibration invalid	Error upon calibration	Old zero point and gradient remain, recalibrate

6.2.5 Calibrating a chlorine sensor for total chlorine

NOTICE!

Measurement quality

The condition of a chlorine sensor is decisive for the quality of the measurement. Therefore each chlorine sensor must periodically be recalibrated using a DPD measuring set.

NOTICE!

Here you calibrate the CTE sensor for total chlorine.

The DULCOMARIN® II calculates the displayed value for combined chlorine as the difference between the measured values for free chlorine and total chlorine

The chlorine sensor for free chlorine must be a CLE 3.1 for differential measurement

> **NOTICE!**
> **Further applicable documents**
> Please also observe the operating instructions for the sensor and in-line probe housing!

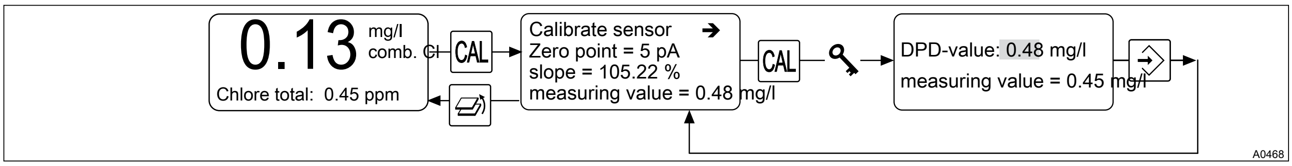


Fig. 18: Calibrating a chlorine sensor for total chlorine

To call the calibration menu, proceed as follows:

1. Block the sample water
2. In the *'Cl comb'* continuous display press the CAL key
3. If the *'measured value'* is stable, press the CAL key
4. Immediately afterwards, take a water sample from the flow gauge
5. Immediately afterwards, determine the chlorine content of the sample water with a photometer and a suitable measuring set, e.g. DPD 1 for free chlorine (CLE sensor)
6. Enter the determined chlorine content immediately under *'DPD value'* (arrow keys)
7. Press the ENTER key

   ⇨ - now the new calibration values are displayed.
8. Press the ESC key to jump back to the continuous display

   ⇨ the menus are then password protected again.
9. If total chlorine is also being measured, then also immediately calibrate this measured variable

> *Repeat the calibration after one day.*

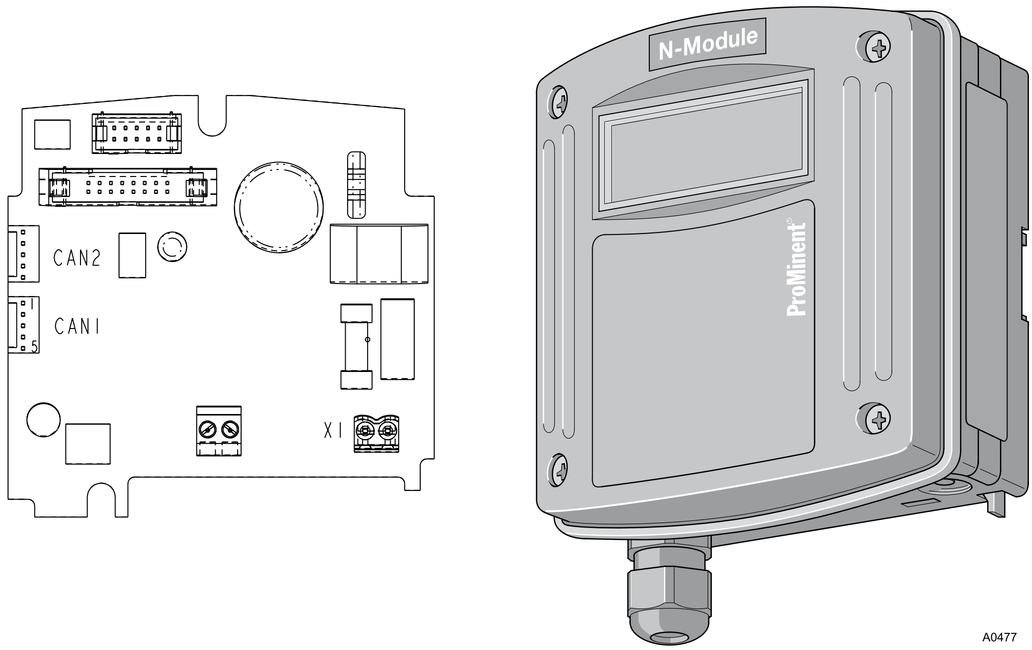
10. Open the stopcocks again for the sample water

6.2.6 Chlorine sensor temperature

There is only one continuous display for the chlorine sensor. The temperature sensor of the chlorine sensor cannot be calibrated, no calibration menu follows from the continuous display.

Assembly and operating instructions

DULCOMARIN® II, N-Module (Power Supply Module without Relay) DXMaN



A0477

Please enter the identity code of your device here! DXMa _ _ _ _ _ _ _ _ _ _ _ _ _

Please carefully read these operating instructions before use! · Do not discard!
The operator shall be liable for any damage caused by installation or operating errors!
Technical changes reserved.

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986528, 1, en_GB

Further applicable documents

These operating instructions and supplementary instructions are only valid in combination with the following operating and supplementary instructions:

- Multi-channel measuring and control system operating instructions DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa Part 1: Assembly and installation

Table of contents

1 Identity code

> *The identity code describes the external modules for the DULCOMARIN® II, series DXM*
>
> *Only the M module of mounting type ‘W’ ‘Wall mounting’ can be ordered with operating elements and with different languages.*

DXMa	External modules for the DULCOMARIN® II, series DXM						
		Module:					
	M	M module, measuring module: pH, redox, temperature					
	A	A module, control module: 3 pumps and 4 analog outputs					
	R	R module, control module: Chlorine gas metering device with feedback 1) 2)					
	N	N module, power supply module without relay 1) 2)					
	P	P module, power supply module without relay, only mounting type *‘0)’* 2)					
	I	I module, current input module, 3 mA inputs, 2 digital inputs					
			Mounting type:				
		0	Without housing, only P-module (IP 00)				
		W	Wall mounted (IP 65)				
		H	Mounting rail (IP 20)				
		E	Upgrade module (insert module for DXCa, IP 20)				
				Version:			
			0	With controls			
			2	Without controls			
			3	Without controls (only mounting type *‘E’*)			
					Application:		
				0	Standard		
				S	Swimming pool (only m module)		
						Language:	
					00	No controls 2)	
					DE	German	
					EN	English	
					ES	Spanish	
					FR	French	
					IT	Italian	
							Certification:
						00	No certification, only P-module without housing
						01	CE mark

[1] only mounting type W wall mounting / [2] only in version *'2'* without controls

2 About this device

The N-module DXMaN (power module without relay) supplies the modules of a DULCOMARIN® II system with electrical power.

2.1 Safety chapter

The DXMaN module must only be used as a power supply for the DULCOMARIN® II.

The DXMaN module must only be used as part of a DULCOMARIN® II.

Only trained personnel may install the N module DXMaN.

2.2 Storage and transport

CAUTION!
Protect the module against moisture and the effects of chemicals, even while still packaged.

Store and transport the module it its original packaging.

Ambient conditions for storage and transportation:

- Temperature: -10 °C ... 70 °C
- Max. permissible relative humidity: 95 %, non-condensing (DIN IEC 60068-2-30)

3 Assembly and installation

NOTICE!

The installation must only be carried out by technically trained personnel.

When assembling and installing this device, observe the instructions in the operating instructions "Multi-channel measuring and control system DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa Part 1: Assembly and installation".

The central unit does not allocate the N modules any *'NodeIDs'*. They do not form an active part of the bus system.

Make the CAN connection according to the "Multi-channel measuring and control system operating instructions DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa Part 1, Assembly and Installation".

WARNING!

Mains voltage

Possible consequence: Fatal or very serious injuries.

External fuse necessary.

If mains voltage is connected to the device, then the fuse carrier is also under mains voltage.

Before working on the device, disconnect the device from the mains voltage and secure to prevent switching back on.

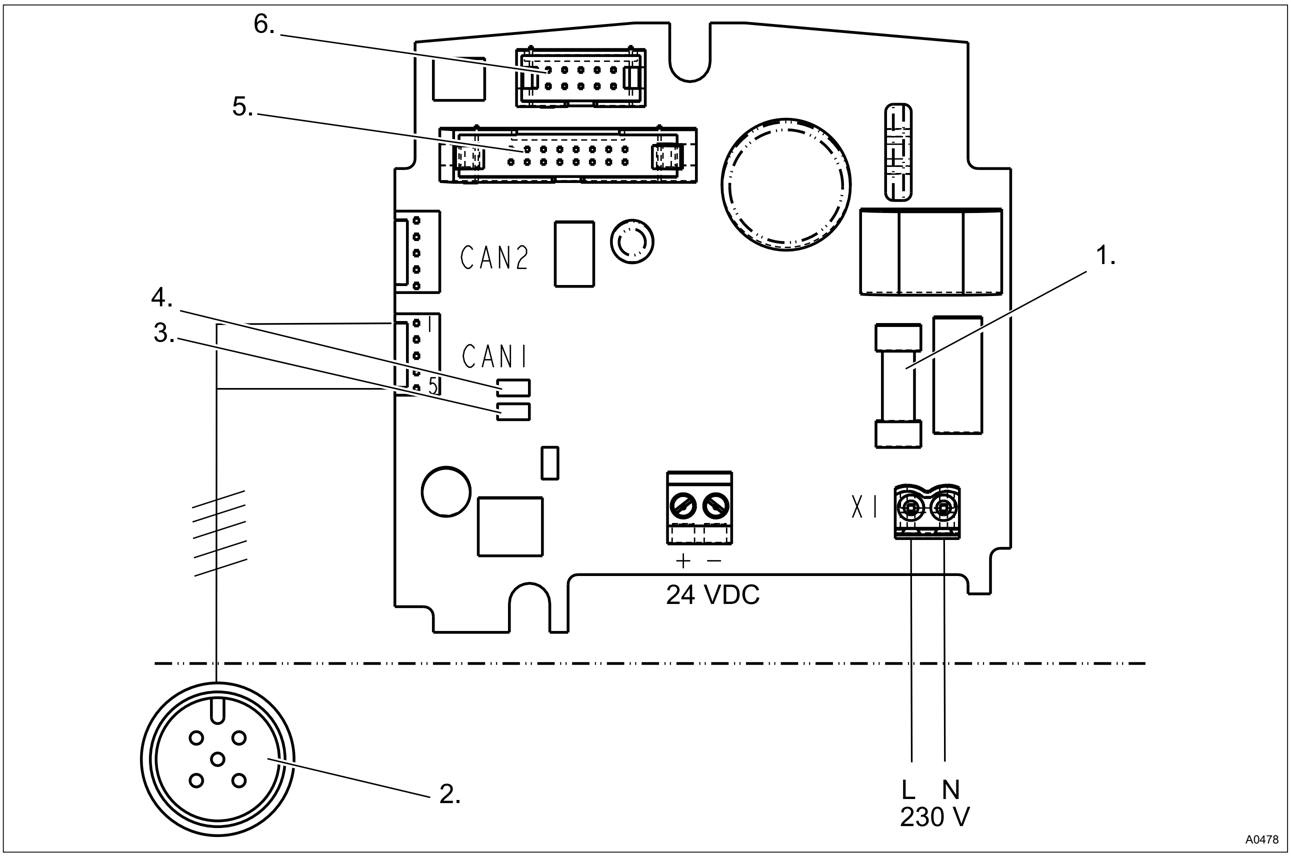


Fig. 1: Terminal Wiring Diagram

1. Fuse 5x20 slow-acting
2. CAN connector plug M12 5 pole.
3. LED 2
4. LED 1
5. Connector for central unit∗
6. CAN bus connector to the modules∗

∗ If used as an Internet module

Terminal allocation

Description	Terminal identifier	Terminal no.	Pol
Mains	X1	11	N
		12	L(1)

The two LEDS (LED 1 and LED 2) indicate the load of the 24V power supply for the CAN bus.

Flash code LEDs power supply monitoring DULCOMARIN® II (N and P module)

Operating status	LED 1 (H2, power)	LED 2 (H3, power)	Power	Remarks
Normal	off	green	< 1.1 A	All OK
Limit load	red	off	> 1.1 A	Insert another power supply module into the loop
Overload / short circuit	red, flashing	off	> 1.35 A	Check wiring

Power supply module

Locate the power supply module in the CAN bus backbone (DULCOMARIN® II DULCO-Net)

The central unit always contains a power supply module.

Number of pools	Additional N- or P-modules	Number of pools	Additional N- or P-modules
1	-	9	4
2	-	10	5
3	1	11	5
4	2	12	6
5	2	13	6
6	3	14	7
7	3	15	7
8	4	16	8
(Exception: number of pools = 2)			

Electrical data

- Nominal voltage (X1): 90 - 253 V AC (50/60 Hz)
- Maximum power consumption: 500 mA at 90 V AC // 180 mA at 253 V AC
- Internal fusing with: Micro fuse 5 x 20 mm, 630 mA, 250 V, slow-acting

The N module DXMaN is a 24 V direct current power supply module (24 V DC, 1 A). Degree of protection: IP 20 (within the DXM housing: IP 65)

3.1 Repairs (fuse change only)

WARNING!

Mains voltage

Possible consequence: Fatal or very serious injuries.

External fuse necessary.

If mains voltage is connected to the device, then the fuse carrier is also under mains voltage.

Before working on the device, disconnect the device from the mains voltage and secure to prevent switching back on.

NOTICE!

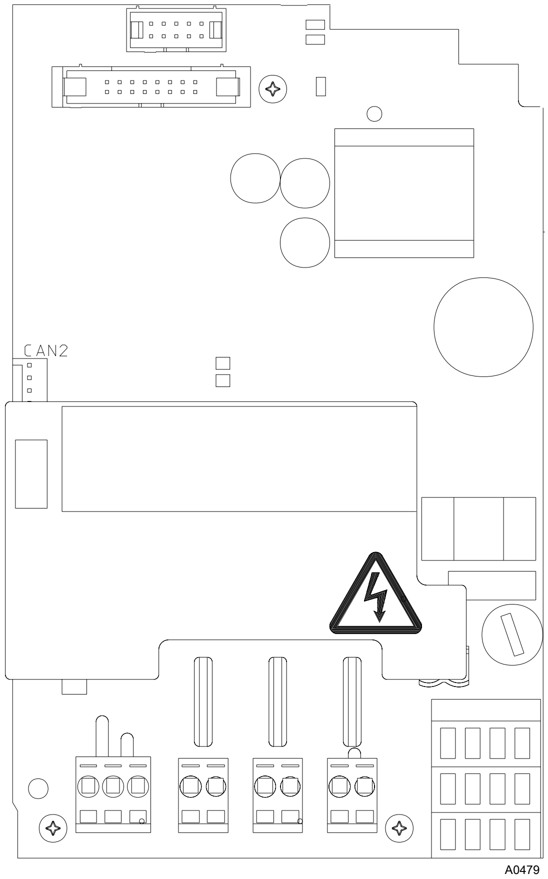
The fuse only may be replaced by technically trained personnel. All other repair work may only be carried out by Customer Service.

Otherwise, general safety regulations apply.

Use only original fuses: Micro fuse 5 x 20 mm, 630 mA, 250 V, slow-acting (Order No. 712030).

Assembly and operating instructions

DULCOMARIN® II, P-Module
(Power Supply Module with Relay) DXMaP



Please enter the identity code of your device here! DXMa _ _ _ _ _ _ _ _ _ _ _ _ _

Please carefully read these operating instructions before use! · Do not discard!
The operator shall be liable for any damage caused by installation or operating errors!
Technical changes reserved.

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Internet: www.prominent.com

986903, 1, en_GB

Further applicable documents

These operating instructions and supplementary instructions are only valid in combination with the following operating and supplementary instructions:

- Multi-channel measuring and control system operating instructions DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa Part 1: Assembly and installation
- Multi-channel measuring and control system operating instructions DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa Part 2: Operation

Table of contents

1 Identity code

The identity code describes the external modules for the DULCOMARIN® II, series DXM

Only the M module of mounting type ‘W’ ‘Wall mounting’ can be ordered with operating elements and with different languages.

DXMa							External modules for the DULCOMARIN® II, series DXM
							Module:
	M						M module, measuring module: pH, redox, temperature
	A						A module, control module: 3 pumps and 4 analog outputs
	R						R module, control module: Chlorine gas metering device with feedback [1) 2)]
	N						N module, power supply module without relay [1) 2)]
	P						P module, power supply module without relay, only mounting type *‘0)’* [2)]
	I						I module, current input module, 3 mA inputs, 2 digital inputs
							Mounting type:
		0					Without housing, only P-module (IP 00)
		W					Wall mounted (IP 65)
		H					Mounting rail (IP 20)
		E					Upgrade module (insert module for DXCa, IP 20)
							Version:
			0				With controls
			2				Without controls
			3				Without controls (only mounting type *‘E’*)
							Application:
				0			Standard
				S			Swimming pool (only m module)
							Language:
					00		No controls [2)]
					DE		German
					EN		English
					ES		Spanish
					FR		French
					IT		Italian
							Certification:
						00	No certification, only P-module without housing
						01	CE mark

[1] only mounting type W wall mounting / [2] only in version *'2'* without controls

2 About this device

The power supply module with relay DXMaP with alarm relay and solenoid valve relay supplies the DULCOMARIN® II compact with mains voltage and allows it to control 3 solenoid valves or hose pumps via pulse frequency e.g. to:

- raise / lower the pH value
- meter disinfectant
- meter flocculant
- minimise combined chlorine

The DXMaP power supply module has the following outputs:

- power relay for alarm output
- power relay output for solenoid valve or hose pump (pH correction)
- power relay output for solenoid valve or hose pump (disinfectant)
- power relay output for hose pump (flocculant) or relay output (minimising of combined chlorine)
- one mains input

2.1 Safety chapter

CAUTION!
Safety when using the P module

- The DXMaP power supply module with relay must only be used to control alarm horns, solenoid valves and hose pumps as well as to provide the power supply for the DULCOMARIN® II DXCa.
- The DXMaP power supply module with relay must only be used as part of the DULCOMARIN® II.
- The installation must only be carried out by technically trained personnel.

2.2 Storage and transport

CAUTION!
Protect the module against moisture and the effects of chemicals, even while still packaged.

Store and transport the module it its original packaging.

Ambient conditions for storage and transportation:

- Temperature: -10 °C ... 70 °C
- Max. permissible relative humidity: 95 %, non-condensing (DIN IEC 60068-2-30)

3 Assembly and installation

NOTICE!
The installation must only be carried out by technically trained personnel.

When assembling and installing this device, observe the instructions in the operating instructions "Multi-channel measuring and control system DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa Part 1: Assembly and installation".

Make the CAN connection according to the "Multi-channel measuring and control system operating instructions DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa Part 1, Assembly and Installation".

Terminal allocation

Description	Terminal identifier	Terminal no.	Pol	Function
Alarm relay	P1	1		Alarm horn (control)
		2		
		3		
Power relay 1	P2	4		PWM pH-lowerer (control solenoid valve DULCO®flex)
		5		PWM pH-raiser (control)
Power relay 2	P3	6		free
		7		PWM chlorine PWM ORP PWM alkaline PWM acid Backwashing
Power relay 3	P4	8		UV system enable
		9		PWM chlorine (control) PWM ORP (control) Heating enable
Power supply	X1	10	PE	
		11	N	
		12	L(1)	

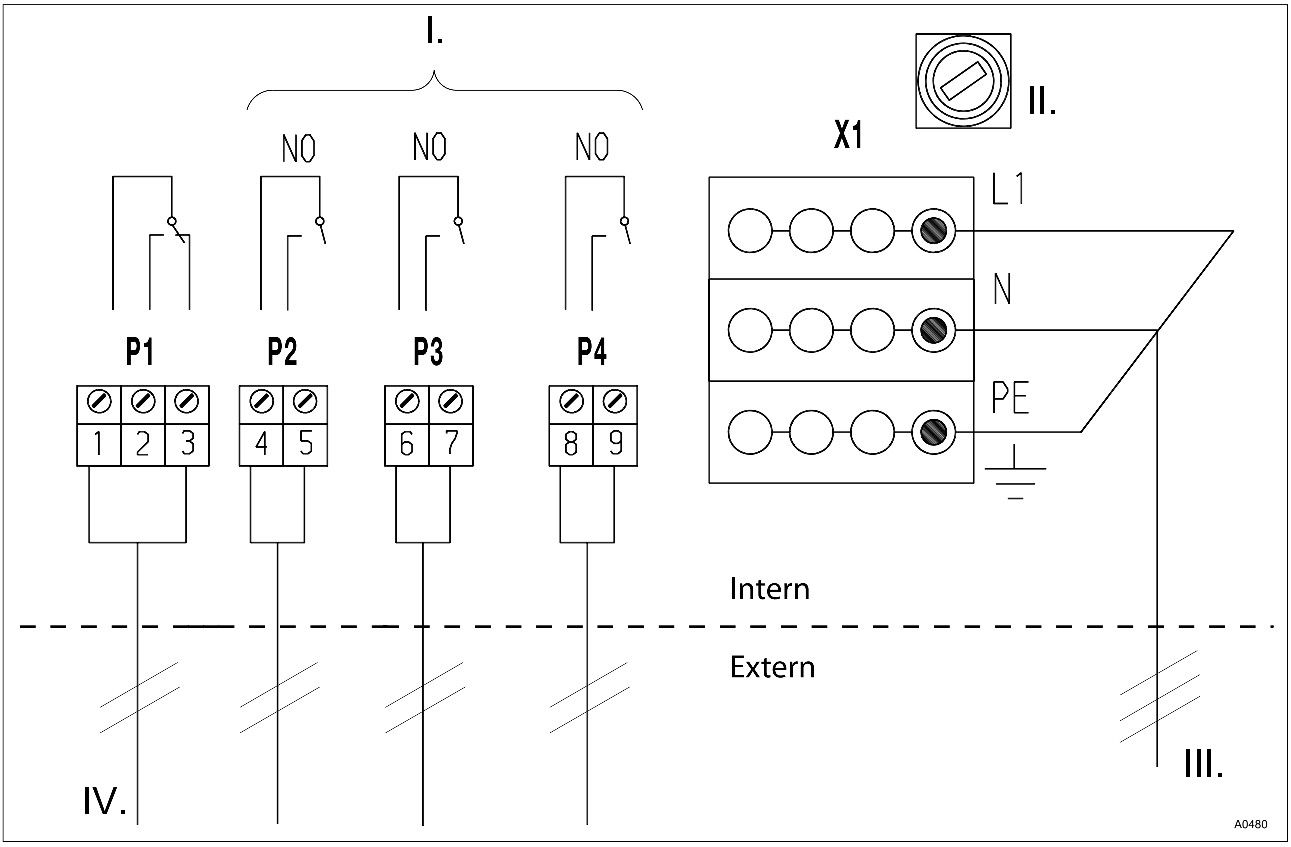


Fig. 1: Terminal Wiring Diagram

I. Power relay
II. Fuse 0.63 A, slow-acting
III. Supply Voltage
IV. Alarm (horn)

Power supply module

Locate the power supply module in the CAN bus backbone (DULCOMARIN® II DULCO-Net)

The central unit always contains a power supply module.

Number of pools	Additional N- or P-modules	Number of pools	Additional N- or P-modules
1	-	9	4
2	-	10	5
3	1	11	5
4	2	12	6
5	2	13	6
6	3	14	7
7	3	15	7
8	4	16	8
(Exception: number of pools = 2)			

The two LEDS (LED 1 and LED 2) indicate the load of the 24V power supply for the CAN bus.

Flash code LEDs power supply monitoring DULCOMARIN® II (N and P module)

Operating status	LED 1 (H2, power)	LED 2 (H3, power)	Power	Remarks
Normal	off	green	< 1.1 A	All OK
Limit load	red	off	> 1.1 A	Insert another power supply module into the loop
Overload / short circuit	red, flashing	off	> 1.35 A	Check wiring

3.1 Repairs (fuse change only)

WARNING!
Mains voltage
Possible consequence: Fatal or very serious injuries.

External fuse necessary.

If mains voltage is connected to the device, then the fuse carrier is also under mains voltage.

Before working on the device, disconnect the device from the mains voltage and secure to prevent switching back on.

NOTICE!
The fuse only may be replaced by technically trained personnel. All other repair work may only be carried out by Customer Service.

Otherwise, general safety regulations apply.

Use only original fuses: Micro fuse 5 x 20 mm, 630 mA, 250 V, slow-acting (Order No. 712030).

3.2 Arrangement of LEDs

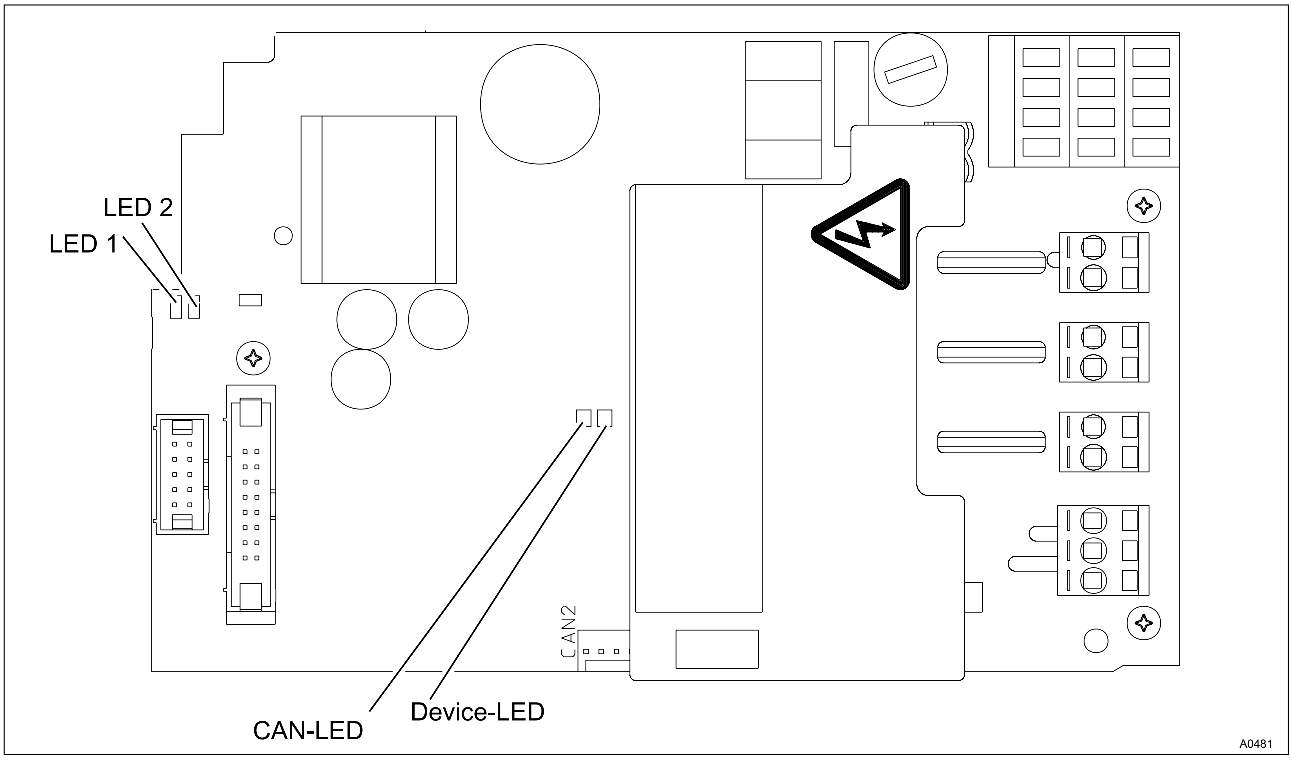


Fig. 2: Arrangement of LEDs

3.3 Example for connection of a solenoid valve

WARNING!
External fuse necessary

Example for connection of a solenoid valve (or hose pump DULCO®flex DF2a or alpha motor-driven metering pump).

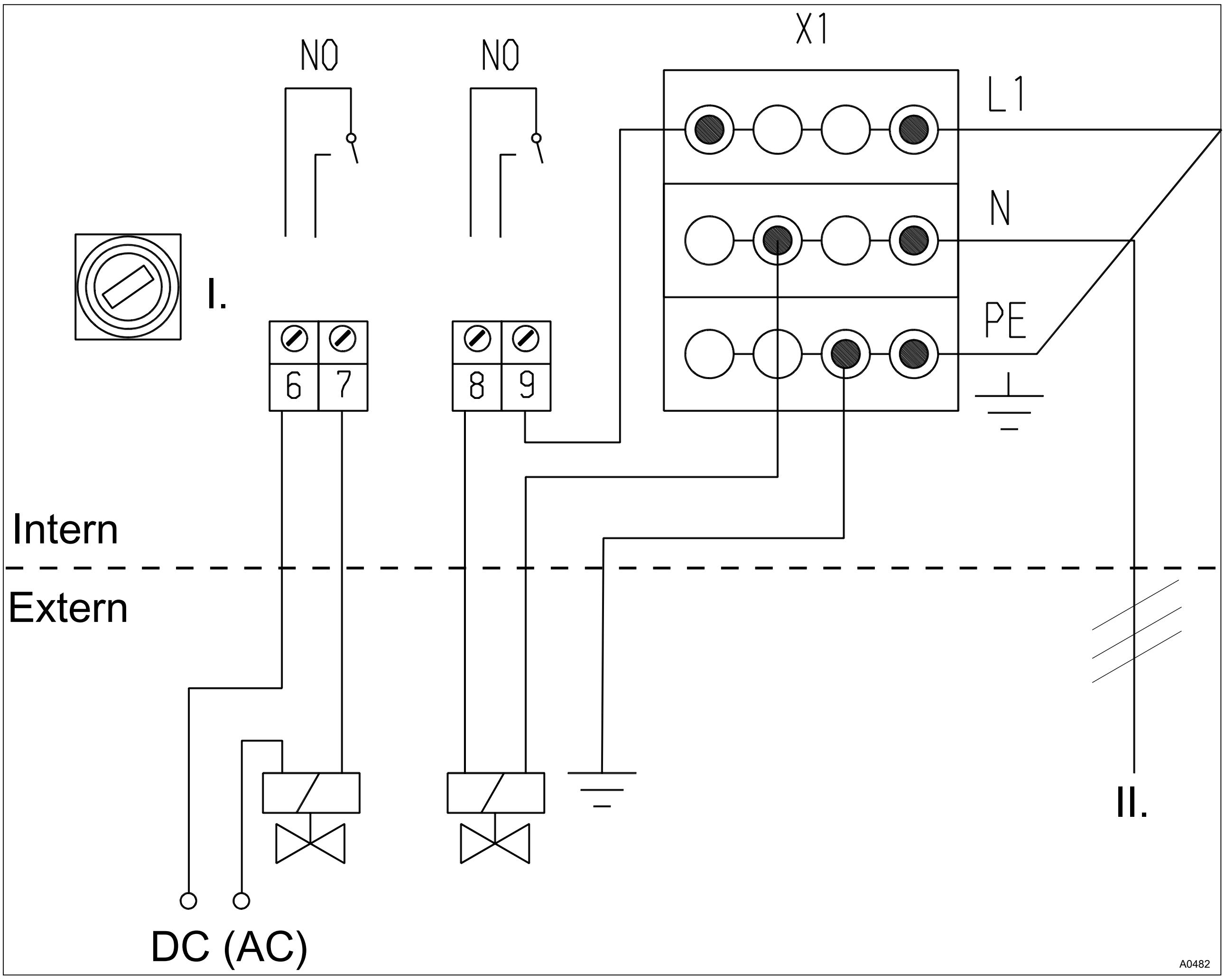


Fig. 3: Example for connection of a solenoid valve

I. Fuse 0.63 A, slow-acting
II. Mains connection

4 Technical data

Electrical data

The DXMaP power supply module with relay contains the 24 V DC, 1 A direct current power supply unit.

Power relay for alarm output (P1):

- Type of contact: Changeover contact with interference-suppressed varistors
- Load capacity: 250 V AC, 3 A max., 700 VA
- Contact lifespan: > 10^5 switching operations (at 3 A)

Power relay output for control variable output or limit value reporting (P2 - P4):

- Type of contact: N/O contact with varistors, interference-suppressed
- Load capacity: 250 V AC, 3 A max., 700 VA
- Contact lifespan: > 20 x 10^6 switching operations

Nominal voltage (X1):

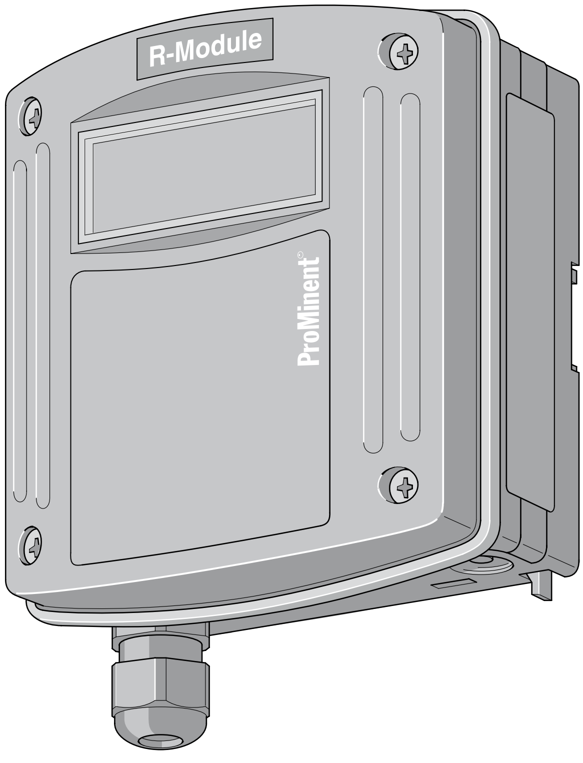
- 90 - 253 V AC (50 / 60 Hz)
- Maximum power consumption: 500 mA at 90 V AC // 180 mA at 253 V AC
- Internal fusing with: Micro fuse 5 x 20 mm, 630 mA, 250 V, slow-acting
- Electrical power consumption: 30 W

Degree of protection: IP 20

Ambient conditions: Storage temperature: -10...70 °C

Assembly and operating instructions

DULCOMARIN® II, R-Module (Control Unit for Chlorine Gas Metering Device) DXMaR



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Please enter the identity code of your device here! DXMA _ _ _ _ _ _ _ _ _ _ _ _ _ _

These operating instructions are only valid in conjunction with the "Operating instructions DULCOMARIN® II, Part 1: Assembly and installation".

Please carefully read these operating instructions before use! · Do not discard!
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Technical changes reserved.

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Table of contents

1 Identity code

> *The identity code describes the external modules for the DULCOMARIN® II, series DXM*
>
> *Only the M module of mounting type ‘W’ ‘Wall mounting’ can be ordered with operating elements and with different languages.*

DXMa							External modules for the DULCOMARIN® II, series DXM
							Module:
	M						M module, measuring module: pH, redox, temperature
	A						A module, control module: 3 pumps and 4 analog outputs
	R						R module, control module: Chlorine gas metering device with feedback [1) 2)]
	N						N module, power supply module without relay [1) 2)]
	P						P module, power supply module without relay, only mounting type *‘0)’* [2)]
	I						I module, current input module, 3 mA inputs, 2 digital inputs
							Mounting type:
		0					Without housing, only P-module (IP 00)
		W					Wall mounted (IP 65)
		H					Mounting rail (IP 20)
		E					Upgrade module (insert module for DXCa, IP 20)
							Version:
			0				With controls
			2				Without controls
			3				Without controls (only mounting type *‘E’*)
							Application:
				0			Standard
				S			Swimming pool (only m module)
							Language:
					00		No controls [2)]
					DE		German
					EN		English
					ES		Spanish
					FR		French
					IT		Italian
							Certification:
						00	No certification, only P-module without housing
						01	CE mark

[1] only mounting type W wall mounting / [2] only in version *'2'* without controls

2 Safety and responsibility

NOTICE!

Further applicable documents

These operating instructions are only valid in conjunction with the "Operating instructions DULCOMARIN® II, Part 1: Assembly and installation".

All the safety instructions and explanations contained therein must be observed without exception.

NOTICE!

Correct and proper use

- You many only use the DXMaR R module to control a servomotor
- You many only use the DXMaR R module as part of a DULCOMARIN® II
- Any other uses or module conversions are prohibited

WARNING!

Danger of malfunctions

Only trained personnel may install the DXMaR R module. Only then can it be ensured that all components of the control circuit are matched to each other and operating correctly

3 Handling the device

Storage and transport

> CAUTION!
> Protect the module against moisture and the effects of chemicals, even while still packaged!

Store and transport the module it its original packaging.

Ambient conditions for storage and transport:

- Temperature: -10 °C ... 70 °C
- Max. permissible relative humidity: 95 %, non-condensing (DIN IEC 60068-2-30)

Assembly and installation

> WARNING!
> Danger of malfunctions
> Only trained personnel may install the DXMaR R module. Only then can it be ensured that all components of the control circuit are matched to each other and operating correctly

> NOTICE!
> Terminal Wiring Diagram
> The wiring diagram can be found at the end of these operating instructions, see ↯ *Chapter 4 ‘Terminal Wiring Diagram’ on page 302*.

Create the CAN connection in accordance with the *‘Operating instructions DULCOMARIN ® II, Part 1: Assembly and installation.’*.

4 Terminal Wiring Diagram

> **WARNING!**
>
> **Danger to life due to chlorine gas**
>
> Large quantities of chlorine gas can escape if an uncontrolled chlorine gas metering device is set to *'ON'*. Chlorine gas can escape into the swimming pool hall.
>
> Possible consequence: Fatal or very serious injuries
>
> Measure: Lock the power supply to the chlorine gas metering device to allow for a power failure occurring; do likewise with the power supplies to the booster pump and the circulating pump, to ensure these pumps remain inactive.

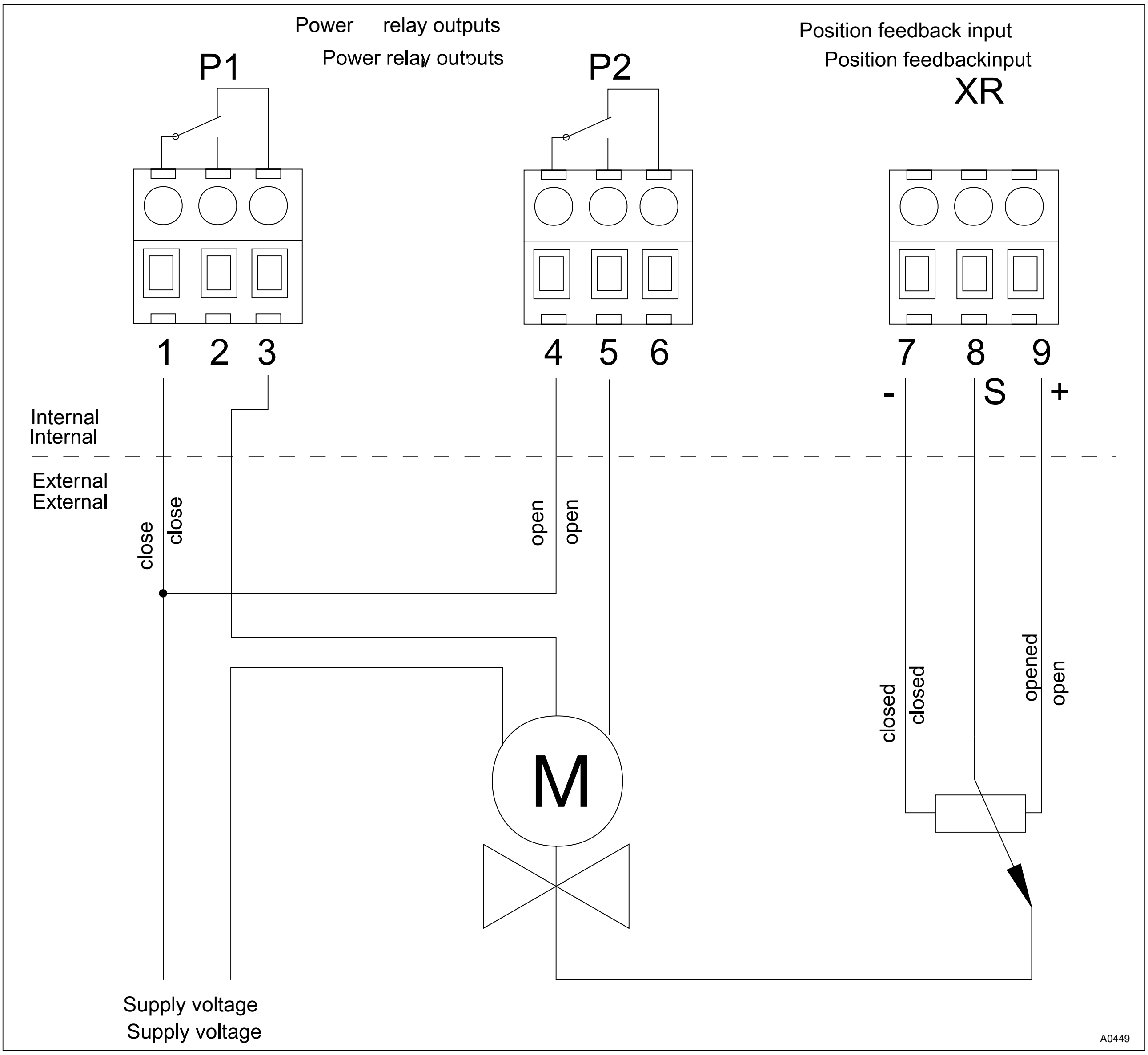


Fig. 1: Terminal Wiring Diagram

Terminal allocation

Description	Terminal identifier	Terminal no.	Pol.	Function
Power relay output 1	P1	1	C	Servomotor shut
		2	NO	
		3	NC	
Power relay output 2	P2	4	C	Servomotor open
		5	NO	
		6	NC	
Response signal input	XR	7	-	Feedback servomotor position
		8	S	
		9	+	

Electrical data

Power relay output (P1, P2):

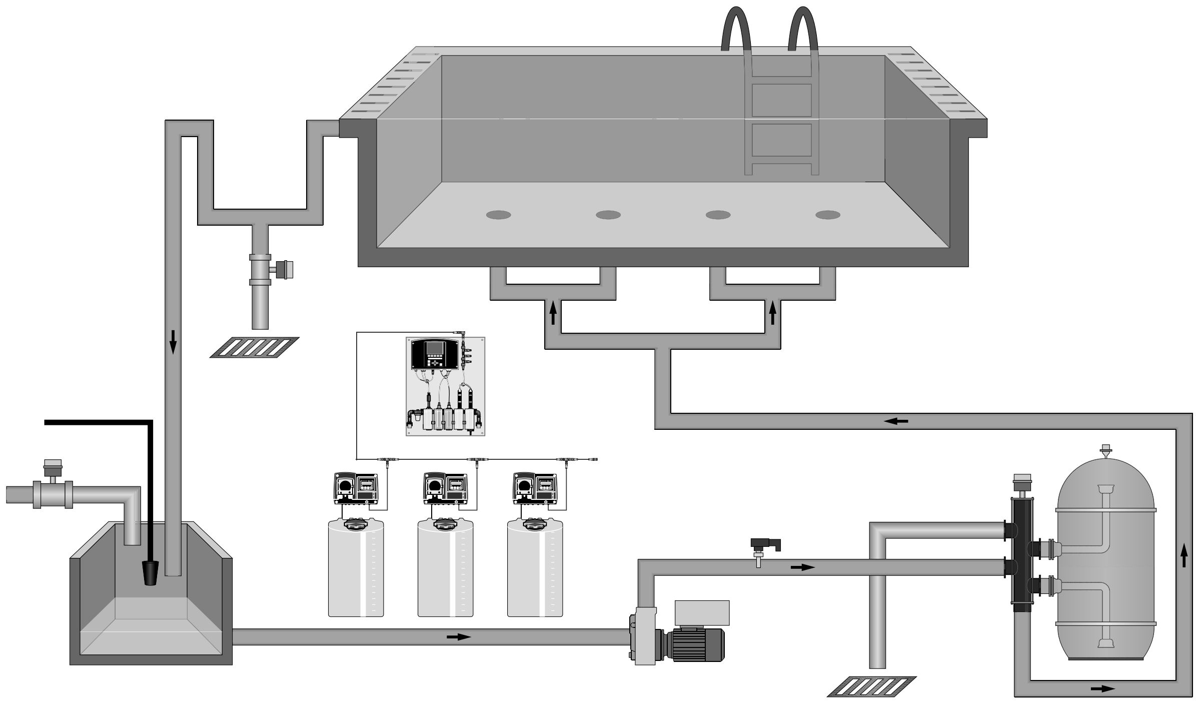
- Type of contact: Changeover contact with interference-suppressed varistors
- Load capacity: 250 V AC, 3 A max., 700 VA
- Contact lifespan: > 20 x 10^5 switching operations

Position feedback input: XR

- Galvanically isolated from the power relay contacts
- Insulation voltage: 500 V
- Potentiometer to be connected: 0 Ω ... 1 kΩ
- Accuracy (without potentiometer errors): 1 % of input range
- Resolution: 0.5 % of input range
- Manipulating time: min.: 25 s / max.: 180 s

Supplementary instructions

DULCOMARIN® II
Function extension with M, A and P module



Please carefully read these operating instructions before use! · Do not discard!
The operator shall be liable for any damage caused by installation or operating errors!
Technical changes reserved.

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General non-discriminatory approach

In order to make it easier to read, this document uses the male form in grammatical structures but with an implied neutral sense. It is aimed equally at both men and women. We kindly ask female readers for their understanding in this simplification of the text.

Supplementary information

Please read the supplementary information in its entirety.

The following are highlighted separately in the document:

- Enumerated lists

→ Instructions

⇨ Outcome of the instructions

Information

This provides important information relating to the correct operation of the device or is intended to make your work easier.

Safety information

The safety information includes detailed descriptions of the hazardous situation.

Table of contents

1 Function MAP

Function extension with M, A and P module

With the standard modules M, A, and P it is possible to activate the following additional functions:

- Water level (4) with topping up (5)
- Sensor cap (3) with/without paddle switch (2)
- Automatic backwashing (1)
- Heating control (7)
- Gutter cleaning function (6)

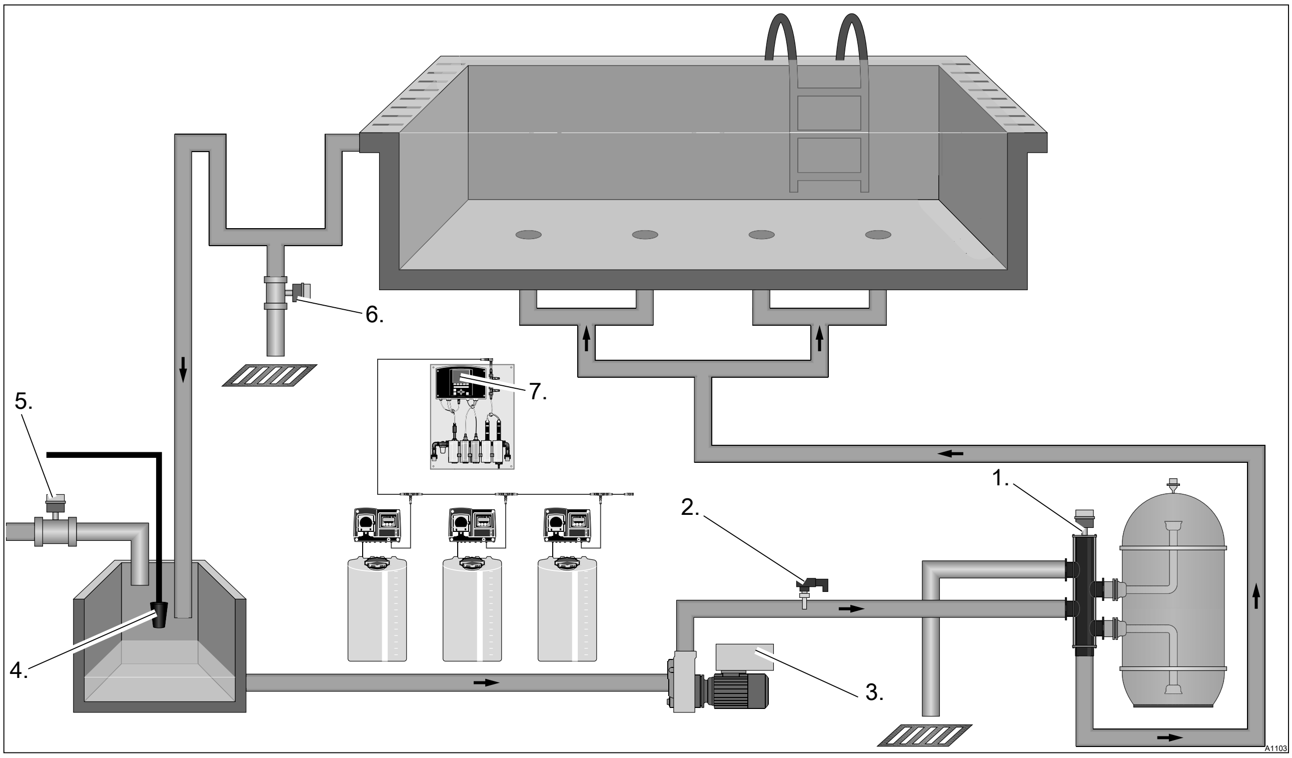

Fig. 1: Function extension with M, A and P module

The following software versions (from and including) must be installed so that these functions can be activated:

- DXCa 3021
- M-Module 3010
- A-Module 3010
- P-Module 3000

2 Circulation quantity allocation

The following circulation operating points are specified under this menu item.

The setting options in this menu item include:

- Normal mode
- Backwashing
- *[ECO min]* circulation

For an efficient and ecological operation you must match the data of the circulating pump to the analog signal.

Configuring module DXMaA

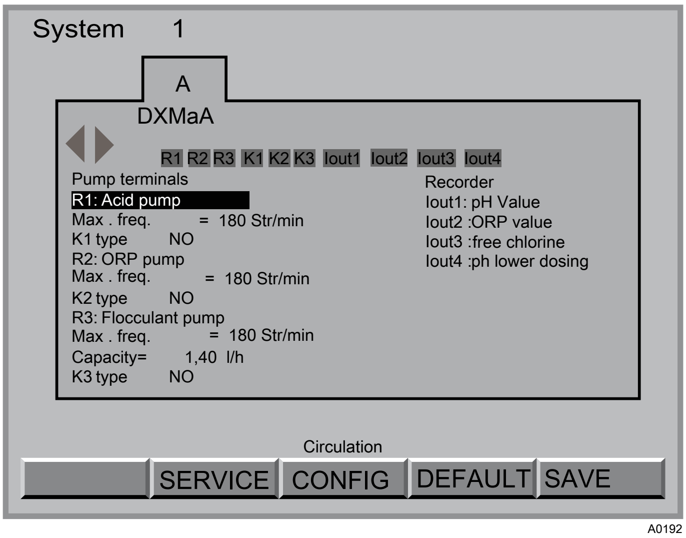

Fig. 2: Configuring module DXMaA (configuration menu)

1. In the *[continuous display]* press the *[ENTER]* key
   ⇨ You can now see the *[Central menu item]*.
2. In the *[Central menu item]* display press the *[F4] [CONFIG]* key
   ⇨ The configuration menu is now displayed.
3. Using the horizontal arrow keys, select the *[A]* tab and then press the *[ENTER]* key
   ⇨ You must now enter your password.
4. Using the arrow keys enter your password and then press the *[ENTER]* key
   ⇨ The configuration menu for your A module is now displayed.

Now you must first activate the analog outputs:

- *Analog output 2 [Iout2] for circulation 1 (UW1)*
- *Analog output 4 [Iout4] for circulation 2 (UW1)*

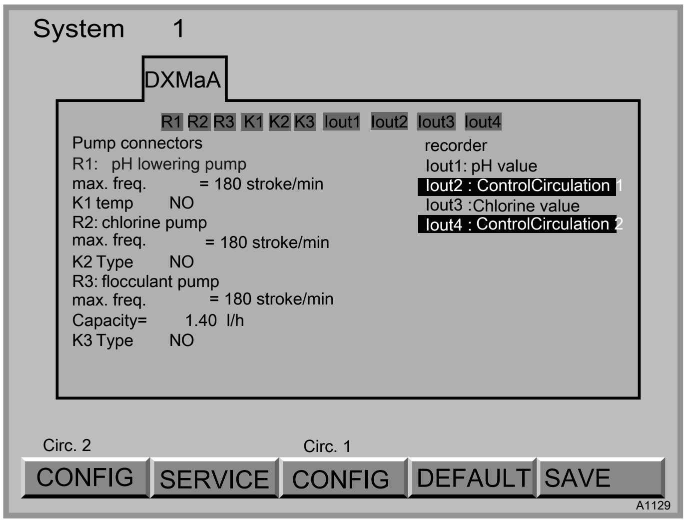

Fig. 3: Configuring module DXMaA (configuration menu)

5. If analog output 2 *[Iout2]* and analog output 4 *[Iout4]* have not yet been activated for the circulating pumps, this must be done now. Move to the analog output *[Iout]* to be set using the arrow keys and then press the *[ENTER]* key

   ⇨ The adjustment display for the analog output *[Iout]*, which is to be set, appears.

6. Using the vertical arrow keys, set the corresponding control output *[Iout2]* or *[Iout4] [ControlCirculation]* (1 or 2) and then press the *[ENTER]*key

   ⇨ The configuration menu for your A module is now displayed.

7. Now press the *[F5]* key *[BACK-UP]* and answer the following query by pressing the *[ENTER]* key

   ⇨ A controller writes the values of the changed parameters into its control.

8. Now press the *[ENTER]* key

   ⇨ The configuration menu for your A module is now displayed.

9. Using the *[F3]* key now select the circulating pump 1 *[Parameter circulation 1]* or select circulating pump 2 *[Parameter circulation 2]* using the *[F1]* key

   ⇨ You can now see the configuration menu of the selected circulating pump

10. Select the desired parameters using the arrow keys and then press the *[ENTER]* key

    Make the following adjustments:

    - Range: 0-20 mA / 4-20 mA
    - Value 0/4 mA: minimum circulation capacity of the installed circulating pump 1 or 2 in m^3/h
    - Value 20 mA: maximum value circulation capacity of the installed circulating pump 1 or 2 in m^3/h

2.1 Specification of the respective circulating operating conditions

The additional circulating operating conditions:

- Circulation capacity normal operation
  - in %, adjustable 0 ... 100 %
- Backwashing circulation capacity
  - in %, adjustable 0 ... 100 %
- ECO Mode min circulation capacity
  - in %, adjustable 0 ... 100 %
- DIN error ➡ Circulation ➡ 100 %:
  - Active / inactive
- *[Redox ➡ Circulation (dependency) cor.: inactive]*
  - Active / inactive
- Circulation reduction =
  - in %, adjustable 0 ... 100 %
- Circulation reduction time =
  - 0 ... 9999 seconds

> **CAUTION!**
> **Thermal overloading of the pump motor**
> Consequence: The pump motor and its surroundings could be damaged
>
> Measure: Provide the pump motor and/or the frequency converter with a suitable thermal protection switch and possibly a fan.
>
> In this respect observe the peculiarities of your local ambient conditions and your national regulations and standards.

The operating mode *[ECO Mode min. circulation capacity]* specifies how far the circulation capacity of the circulating pumps is reduced in *[ECO Mode]*.

Operating mode *[DIN Error ➡ 100%]*, immediately sets the circulation operating mode to *[normal mode]* if the active ECO limit value settings are breached. Otherwise the circulation increases in parallel with the values of the reduction mode.

Operating mode *[Redox ➡ Circulation (dependency) cor.: active]*: In this operating mode, the reduction rate is influenced by the actual redox value Start and end redox values are defined. Reduction mode is started from the start Redox value. Reduction mode lowers the circulating pump capacity in steps up until the End redox value the *[ECO Mode min]* value is reached. If the water redox value falls below the start redox value, then the circulation starts again at 100% capacity.

Operating mode *[Redox ➡ Circulation (dependency) cor.: inactive]*: In this operating mode, the reduction rate *[Circulation reduction %]* and the time period *[Circulation reduction time = seconds]* are set. This reduction *[Step reductions]* is continued downwards until the set value *[ECOMode min]* is reached.

The operating mode *[Circulation reduction in %]* in which the time period in *[sec]* is set. This reduction *[Step reductions]* is continued until the set *[ECO Mode min]* value is reached.

3 Flow control [water flow]

NOTICE!

Alarm during logical checking

Cause: Alarm during logical checking.

Fault: The flow control reports that a water flow exists, although the circulating pump is off.

Measure: The controller triggers an alarm. The flow control must be checked.

NOTICE!

No flow

Cause: No flow in the water circulation system.

Fault: There is for example no water in the system or a ball valve is closed.

The controller switches the circulating pump off and triggers an alarm.

Timer adjustments with two circulating pumps

If two circulating pumps are connected, then they must always be started simultaneously via the time. A delayed switching on of the pumps, resulting in switching on at different times, is not permitted because this leads to an error message at the control so that consequently the second circulating pump does not start.

Example: Both circulating pumps are stopped by the timer. The pool has status [Stop] and consequently the paddle switch signals are not evaluated by the controller. If the timer now starts Circulating pump 1, then within 30 seconds paddle switch [1] must deliver feedback relating to the water flow. The paddle switch [2] delivers the signal [no water flow] (which is indeed correct), but the control reports the error [No flow]. Hence the circulating pump [2] cannot be automatically started by the timer.

Remedy: Adjust the timer so that both circulating pumps are started simultaneously. This prevents one of the two circulating pumps from not starting.

The flow control *[Water flow]* monitors the circulating pump flow. The *[Flow Control]* is used with a paddle switch or a thermo switch.

The *[Water flow]* flow control should prevent running dry of the system or delivery from the circulating pump against a closed gate valve. If the *[water flow]* flow control is activated in the A module, then a closed *[NC]* contact is necessary, to make possible continuous operation of the circulation.

The two core cable of the flow checking device (paddle switch or thermo switch) must be connected in the A-module to the *[R2]* terminal. If the contact remains set on *[passive]* during circulating pump control, then the circulating pump is stopped after a delay period and the control produces an error message. This error message can only be deleted in manual operating mode.

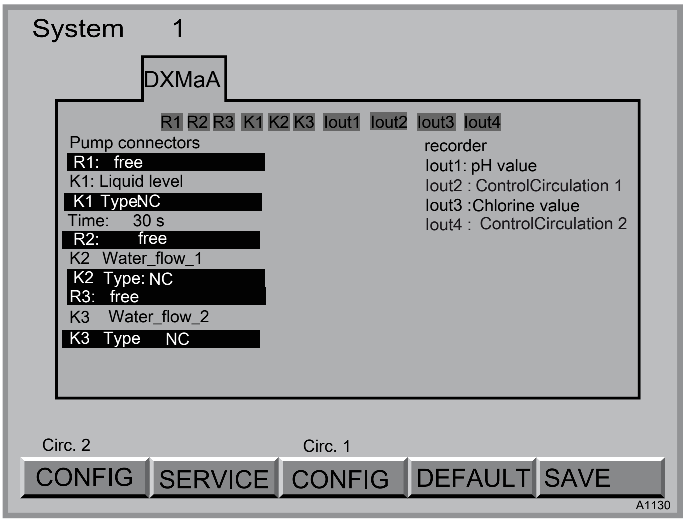

Fig. 4: R1, R2 and R3 to [free] and K1 type, K2 type and K3 type to [NC]

Necessary parameters of the terminals and relays

Relay		Terminal		Terminal type	
R1	free	K1		K1 type	NC
R2	free	K2	Water_flow_1	K2 type	NC
R3	free	K3		K3 type	NC

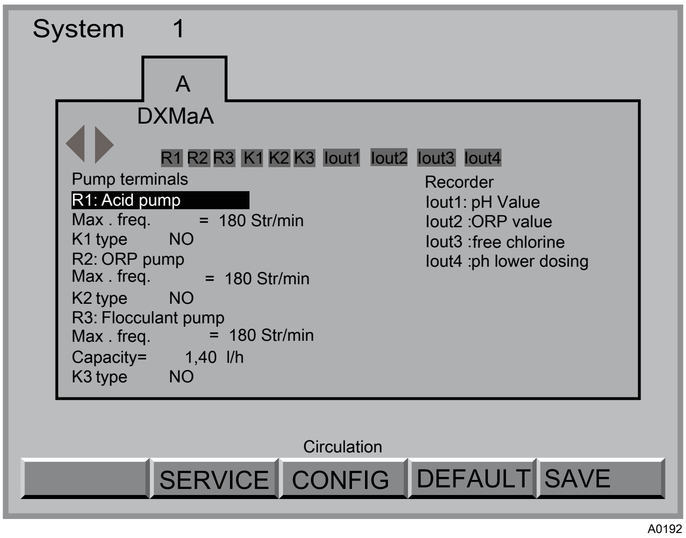

Fig. 5: Configuring module DXMaA

1. In the *[continuous display]* press the *[ENTER]* key

   ⇨ You can now see the *[Central menu item]*.

2. In the *[Central menu item]* display press the *[F4] [CONFIG]* key

   ⇨ The configuration menu is now displayed.

3. Using the horizontal arrow keys, select the *[A]* tab and then press the *[ENTER]* key

   ⇨ You must now enter your password.

4. Using the arrow keys enter your password and then press the *[ENTER]* key
   ⇨ The configuration menu for your A module is now displayed.
5. Select the desired parameters to be changed using the arrow keys and then press the *[ENTER]* key
   ⇨ The adjustment display for the parameter to be set appears.
6. Using the vertical arrow keys enter the corresponding value and then press the *[ENTER]* key
   ⇨ The configuration menu for your A module is now displayed.
7. Now press the *[F5]* key *[BACK-UP]* and answer the following query by pressing the *[ENTER]* key
   ⇨ A controller writes the values of the changed parameters into its control.
8. Now press the *[ENTER]* key
   ⇨ The configuration menu for your A module is now displayed.
9. Repeat this process for all parameters that are to be changed.

4 Timer settings

Cause: Timer setting, this means the circulation is only active if the operator activates this circulation for bathing/swimming operation.

The operating status of your overall system can change at any time during the automatic operation of the controller. In this respect for example, the circulating pump, heating etc., can start or stop at any time.

The functions and operating times, circulation and backwashing can be set at any time using via the timer setting.

In operating mode *[Actuator module]* under *[Options]*, in operating mode *[Circulation]* the various timer adjustments can be made by activating circulation.

When setting the timer, you must check that you save the settings after each timer adjustment. If timers 1 ... 6 are set and then saved, then only timer 6 is saved.

There are 12 timer functions available for a pool circuit:

- Timer 1 ... 6 when using Circulation 1
- Timer 7 ... 12 when using Circulation 2

Timer configuration

Timer adjustments with two circulating pumps

If two circulating pumps are connected, then they must always be started simultaneously via the time. A delayed switching on of the pumps, resulting in switching on at different times, is not permitted because this leads to an error message at the control so that consequently the second circulating pump does not start.

Example: Both circulating pumps are stopped by the timer. The pool has status [Stop] and consequently the paddle switch signals are not evaluated by the controller. If the timer now starts Circulating pump 1, then within 30 seconds paddle switch [1] must deliver feedback relating to the water flow. The paddle switch [2] delivers the signal [no water flow] (which is indeed correct), but the control reports the error [No flow]. Hence the circulating pump [2] cannot be automatically started by the timer.

Remedy: Adjust the timer so that both circulating pumps are started simultaneously. This prevents one of the two circulating pumps from not starting.

1. In the *[continuous display]* press the *[ENTER]* key
   ⇨ You can now see the *[Central menu item]*.
2. In the *[Central menu item]* display press the *[F4] [CONFIG]* key
   ⇨ The configuration menu is now displayed.
3. Using the horizontal arrow keys, select the *[A]* tab and then press the *[F2]* key *[OPTION]*
   ⇨ You must now enter your password.

4. Using the arrow keys enter your password and then press the *[ENTER]* key
   ⇨ You can now see the configuration menu of the A module *[OPTION]*
5. Select the desired file card *[Circ.]* using the horizontal arrow keys and then press the *[ENTER]* key
   ⇨ You can now see the file card *[Circ.]*

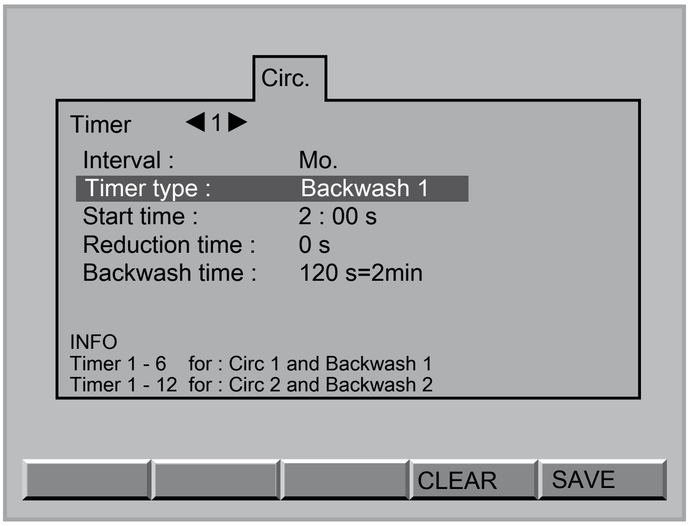

Fig. 6: A1105

6. Using the horizontal arrow keys, you can now select the desired timer (1 ... 12)
7. Using the vertical arrow keys, you can now select the desired parameters dependent on the selected [Timer Type] and select with the [- key]:
   - *[Interval]*\
     – Each weekday
     – free
     – Mo. - Fr.
     – Sa. - Su.
     – Mo. - Su.
   - *[Timer type]*
     – free
     – Circulation 1 or 2
     – Backwashing 1 or 2
   - *[Start time]*
     – 0 ... 24
   - *[Stop time]*
     – 0 ... 24
   - *[Reduction time]*
     – 0 ... 50
   - *[Backwashing time]*
     – 0 ... 480 seconds in a total of 33 steps
8. Using the *[F4] [Delete]* key your can delete all entries *[Status = free]* or using the *[F5] [Save]* key you can save the entries in the controller Save = *[Record parameters!!!]*
9. Using the *[ESC]* key you can now jump back into the menu display up to the *[Continuous display]*

5 Water top-up

An automatic water top-up can be carried out in the skimmer or surge water tank using a level contact.

Please note that the drinking water connection may not be connected to the pool circuit. See the corresponding DVGW (German Gas and Water Association) or FIGAWA (German Federal Association of Gas and Water Companies) regulations or your own national regulations.

1. Connect the single-stage level switch in the A module to terminal *[K1 7/8]*
2. In configuration on the A module set terminal *[R1]* to *'free'*
3. Thereafter terminal *[K1]* can be activated as a water level
4. *If the [TIME] [water level] is set to [0 s], then after 10 seconds constantly at the minimum level, the Level evaluation unit reacts by opening the water supply solenoid valve. After 10 seconds constantly at the maximum liquid level, the solenoid valve for the water supply is closed. If a [TIME] [water level] of for example [30 s] is set, then for this 30 seconds water continues to be supplied, so that the maximum liquid level is reached after this time.*

   The *[TIME] [water level]* can be set from 0 ... 480 seconds in steps
5. To actuate a solenoid valve with 230 V, it is necessary to connect this solenoid valve to the PCB of the P module on terminal 2 (with one circulation) or terminal 1 (with two circulations)
6. Program the configuration menu of this relay using the function *[Water top-up]*

   ⇨ *If water is topped up for longer than 180 minutes the controller enters fault mode and stops the topping up.*

   This this function is active
7. If the control time has elapsed and the controller is in fault mode, then you must press the *[F3]* key for *[Reset]* in the A module configuration menu under service *[F2]*. This restarts water top-up in operating mode *[AUTO]*

6 Control of the backwashing valves

NOTICE!

The default state of the backwashing valves is deenergised (voltage free)

Fault: No backwashing is possible if the backwashing valves cannot be controlled.

Consequence: The hygiene parameters worsen and the hydraulic resistance of the filter increases.

Measure: Regularly check (dependent on the application) the operation of filter backwash.

An automatic 6-way valve cannot be used.

For backwashing there is, for example, the option of controlling a Besgo® rod valve.

To do this, the rod valve must be connected to terminal P3 in the P module. If two circuits are in operation, the second rod valve must be connected to terminal P2.

To activate this function, the function *[Backwash 1]* or *[Backwash 2]* must be activated in the P module.

Setting of the backwashing times is described under Timer setting ↬ *Chapter 4 'Timer settings' on page 317*.

- Which day or which sequence
- Which backwashing, 1 or 2
- Start time
- Reduction time
- Duration of the backwashing backwash time

7 Index