Assembly instructions

Multi-Channel Measuring and Control System

DULCOMARIN® II Swimming Pool Controller and Disinfection Controller DXCa

Part 1: Assembly and installation

A0507

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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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 DULCOMARIN® 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 outputs					
							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

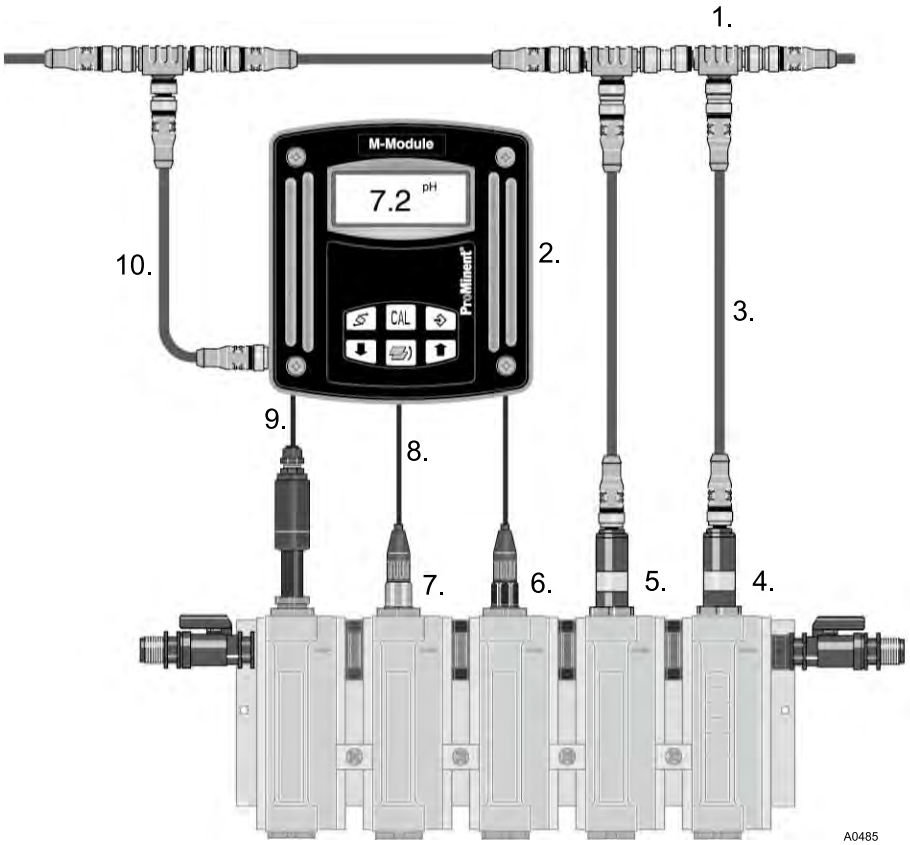


Fig. 1: A typical complete measuring point could appear as shown:

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

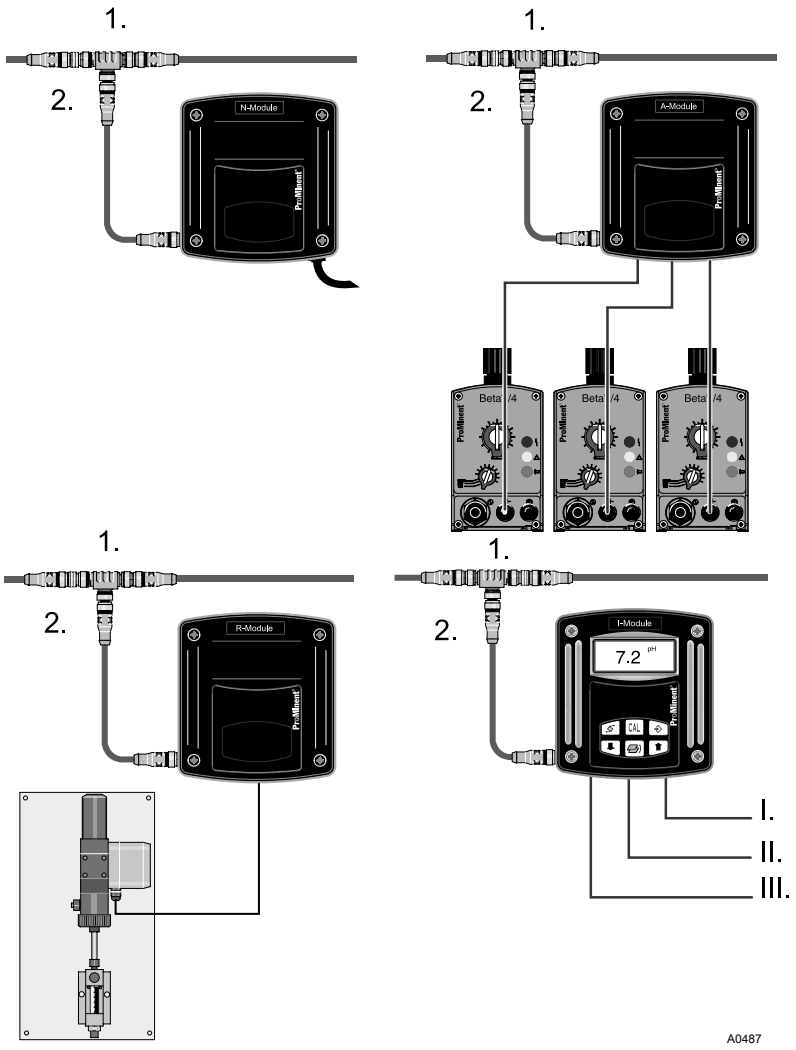


Fig. 3: External modules DXMa

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

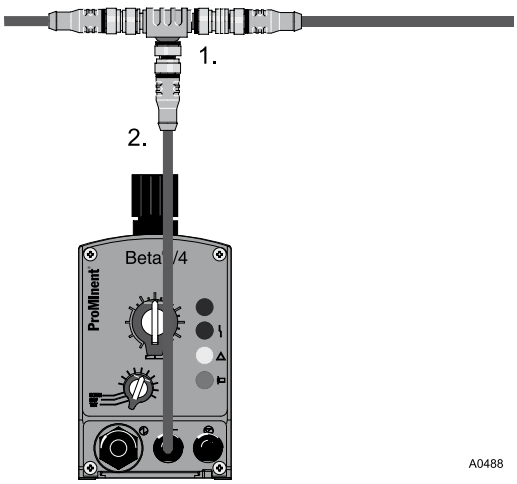


Fig. 4: Beta/4 CANopen

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

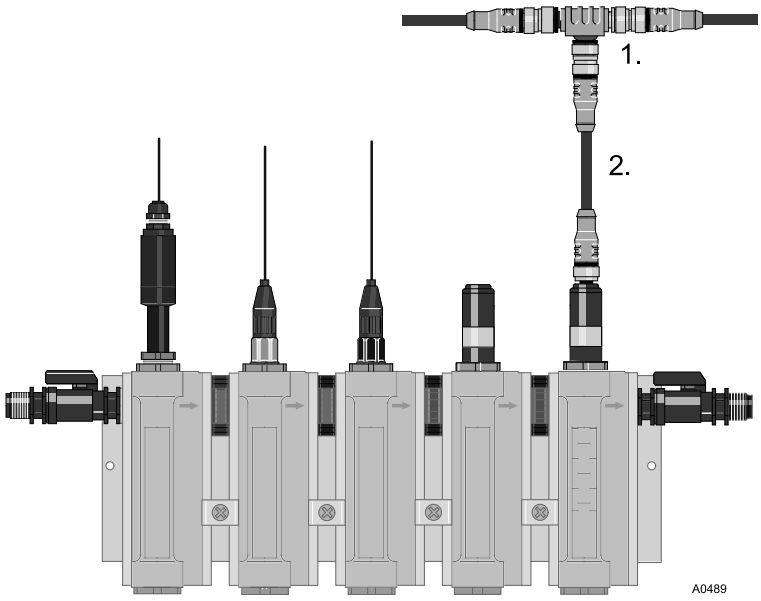


Fig. 5: Sensors DXUa

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 (DULCOMARIN® II DULCO-Net)' on page 18*
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

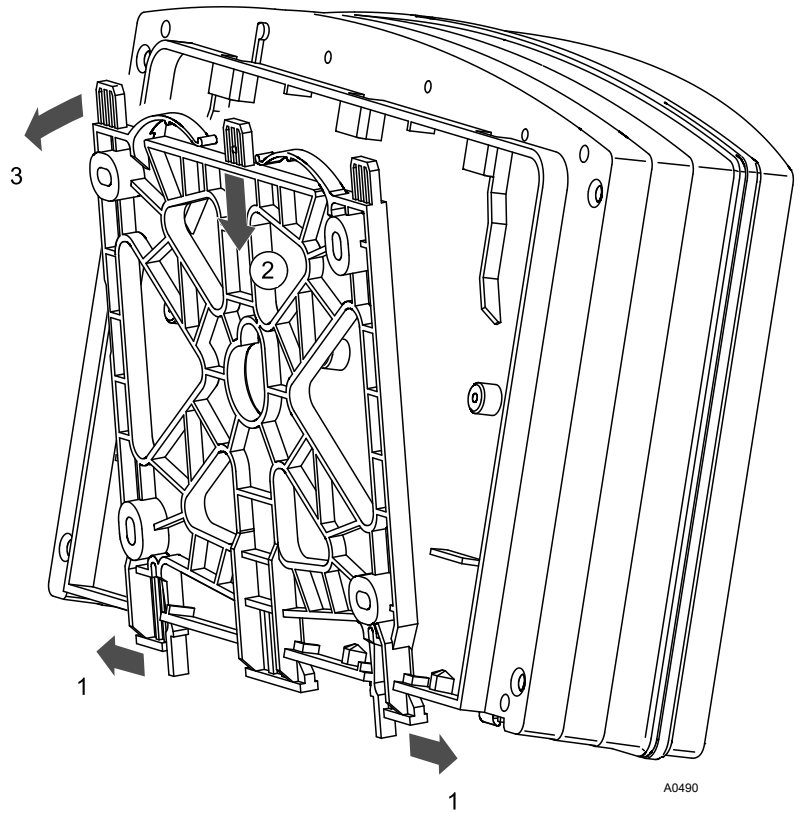


Fig. 6: Removing the wall bracket

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

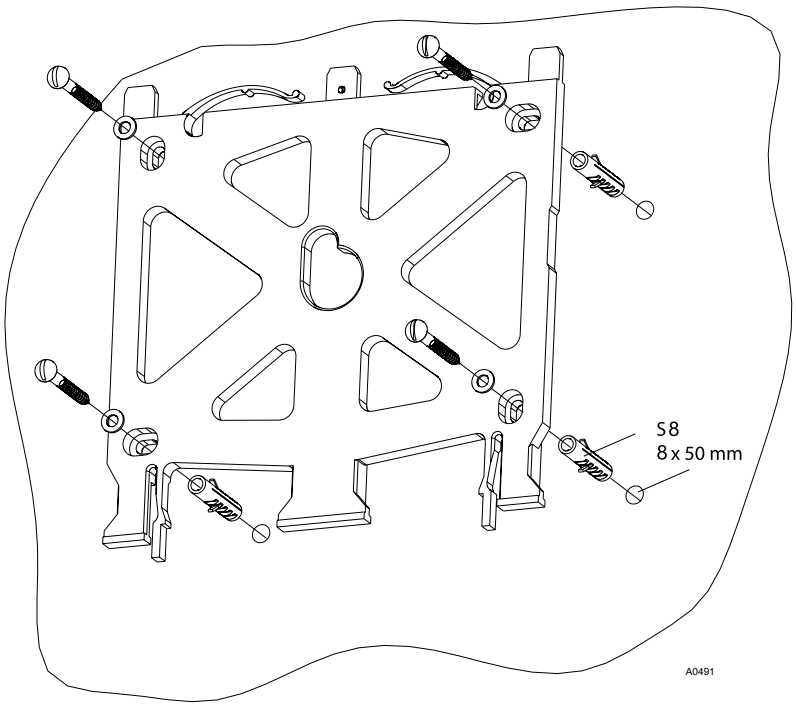


Fig. 7: Fitting the wall bracket

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

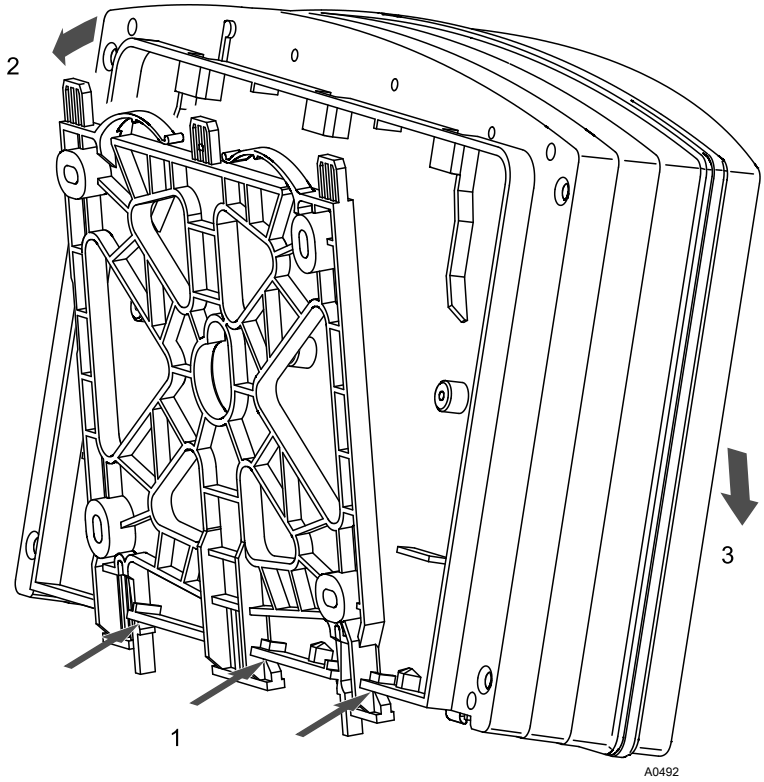


Fig. 8: Fitting the wall bracket

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.

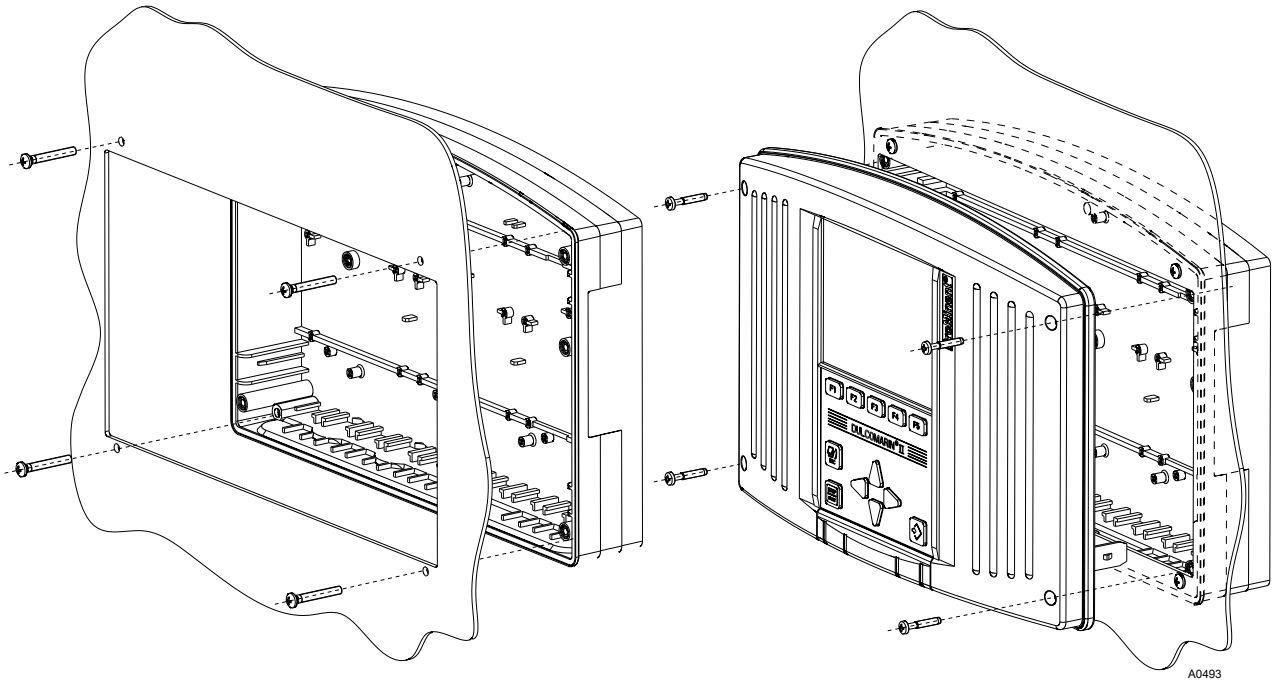


Fig. 9: Control panel mounting

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 23*
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.

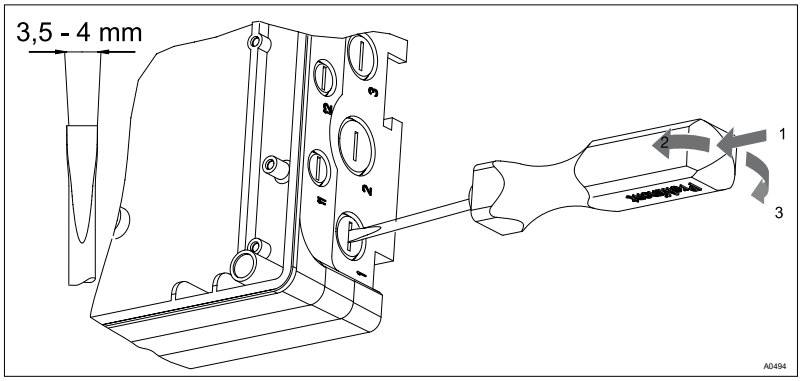


Fig. 10: Breaking out threaded holes

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

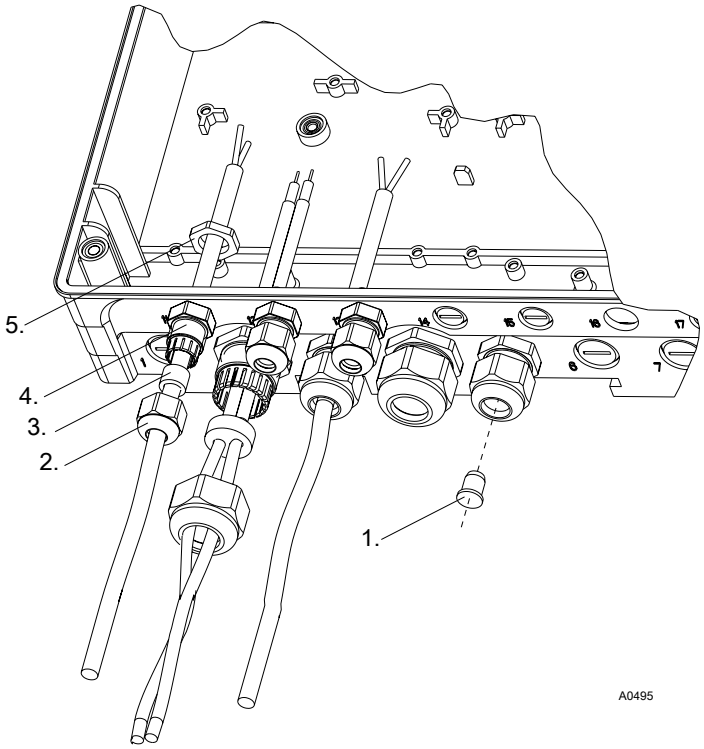


Fig. 11: Fitting the threaded cable glands

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 26* and *Chapter 5.1.5 'Connecting the terminals' on page 26*.
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

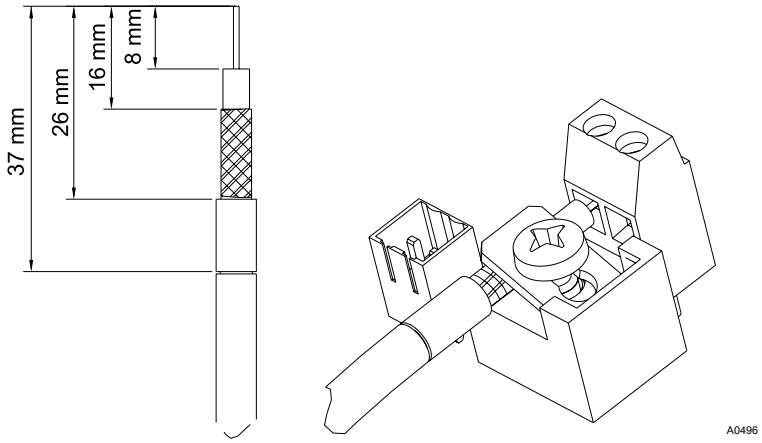


Fig. 12: Removing the cable insulation

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.

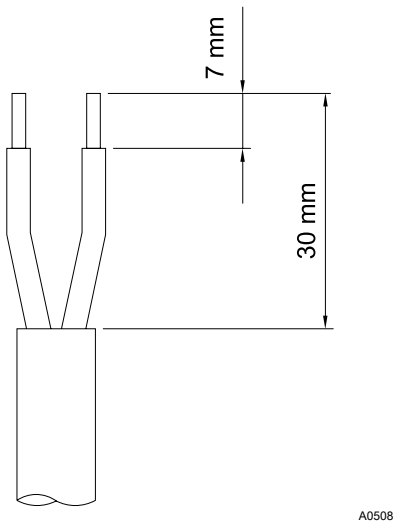


Fig. 13: Removing the cable insulation

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

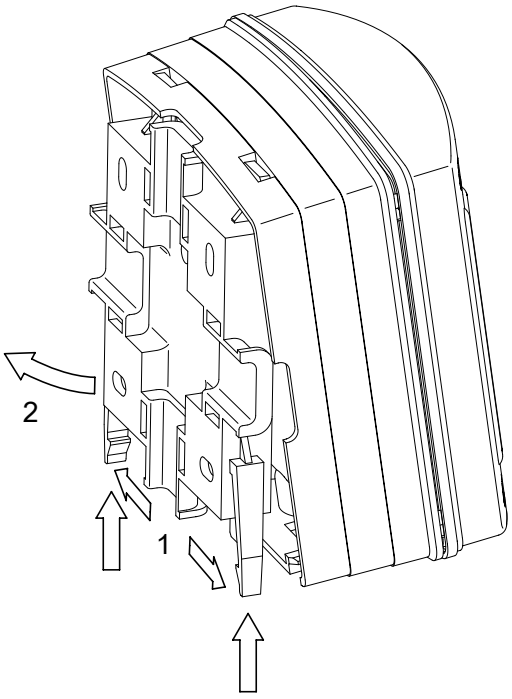
5.2 Procedure with DXM housing (small)

5.2.1 Mounting (mechanical)

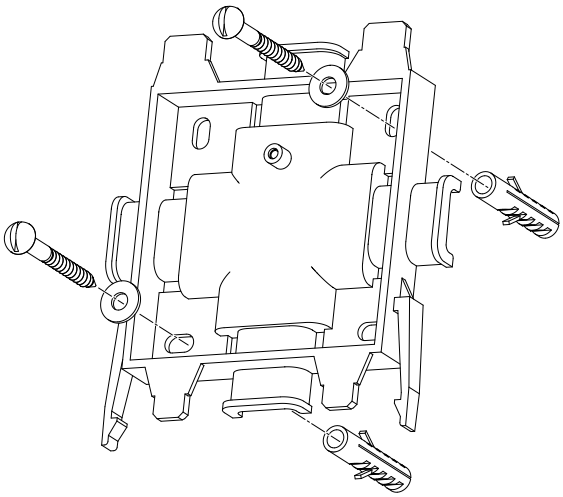
For wall mounting, please observe the following steps:

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)



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.

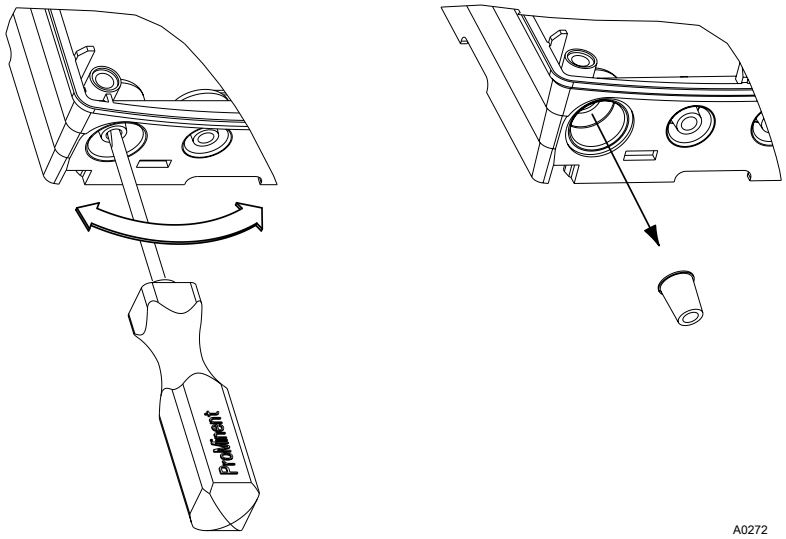
Observe the technical data in these instructions.

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

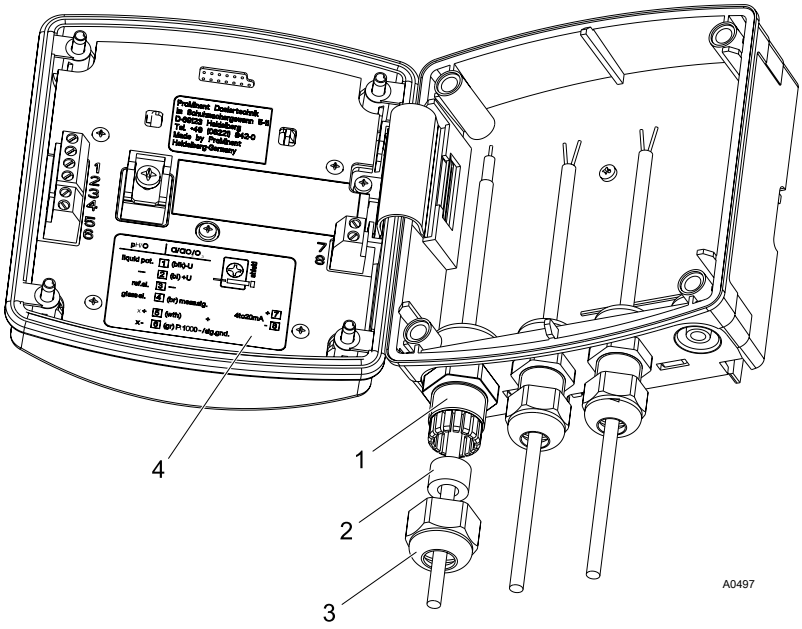


Fig. 14

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 26* and *Chapter 5.1.5 'Connecting the terminals' on page 26*

   ⇨ 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 26* and *Chapter 5.1.5 'Connecting the terminals' on page 26*

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).

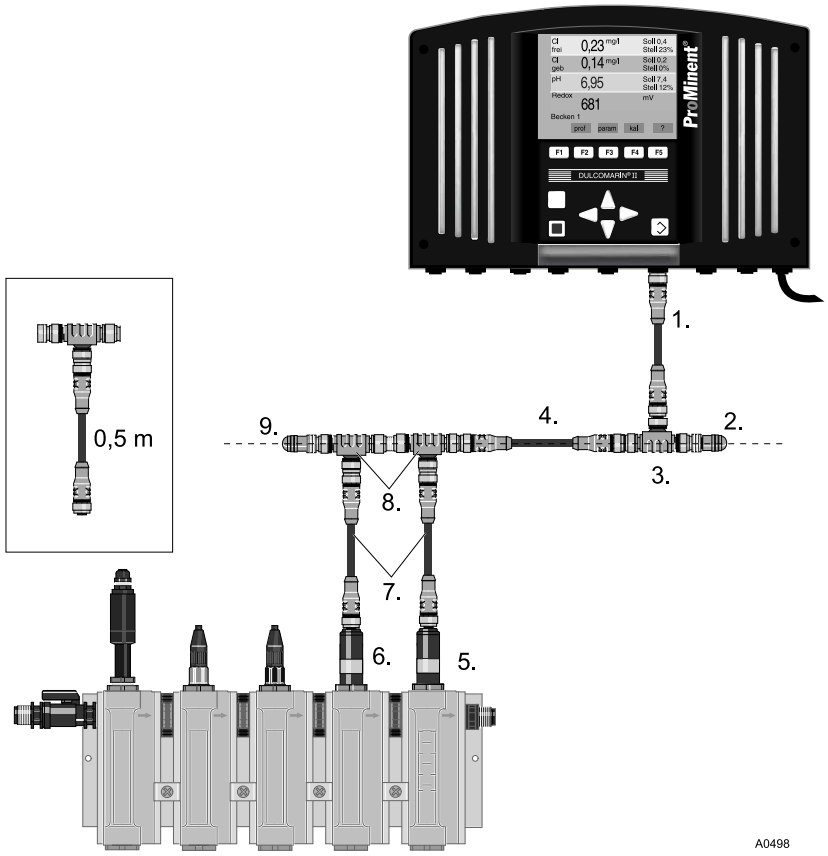


Fig. 15: Inserting modules in the CAN bus line, compact version

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

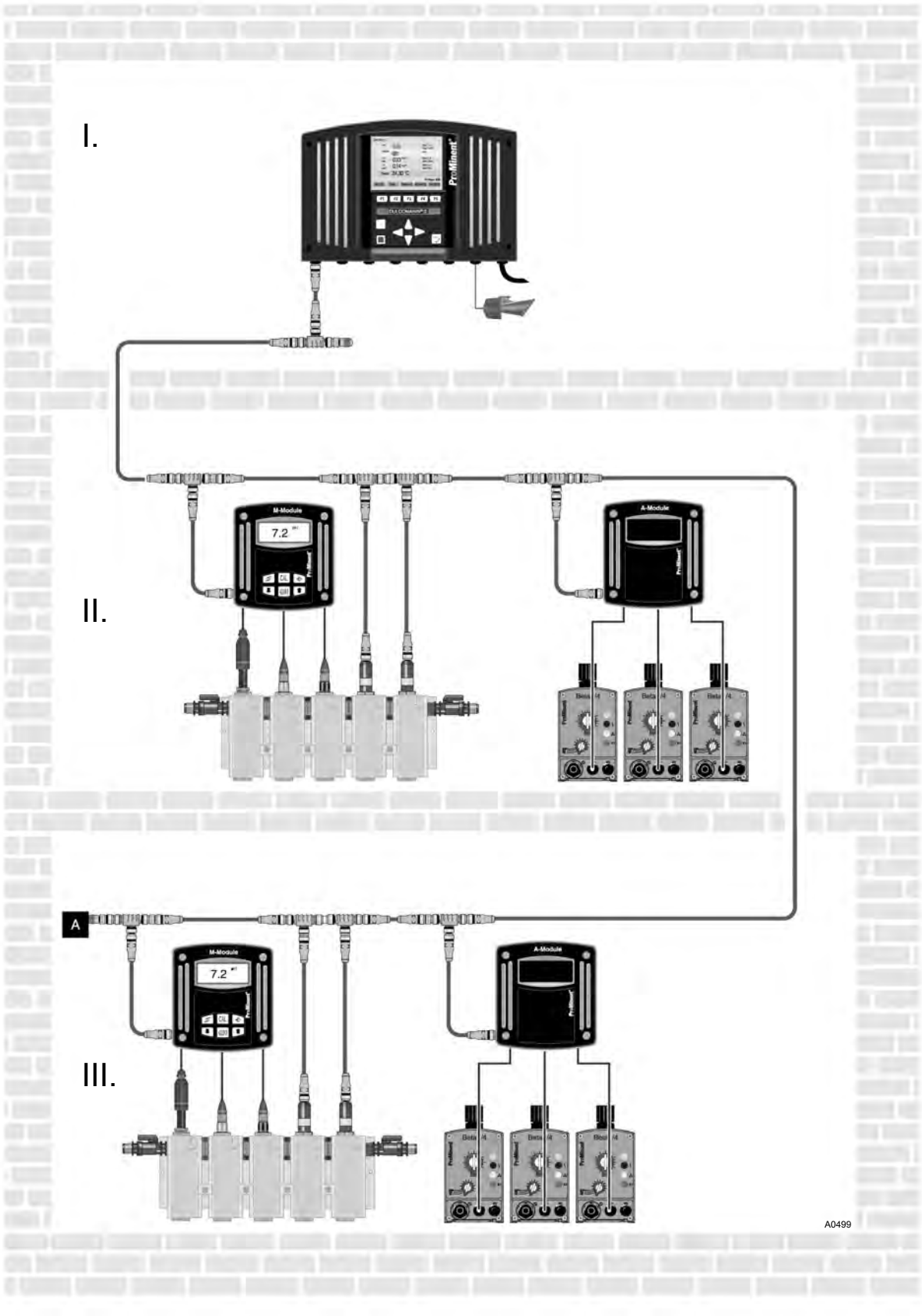


Fig. 16: Inserting modules in the CAN bus line

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)

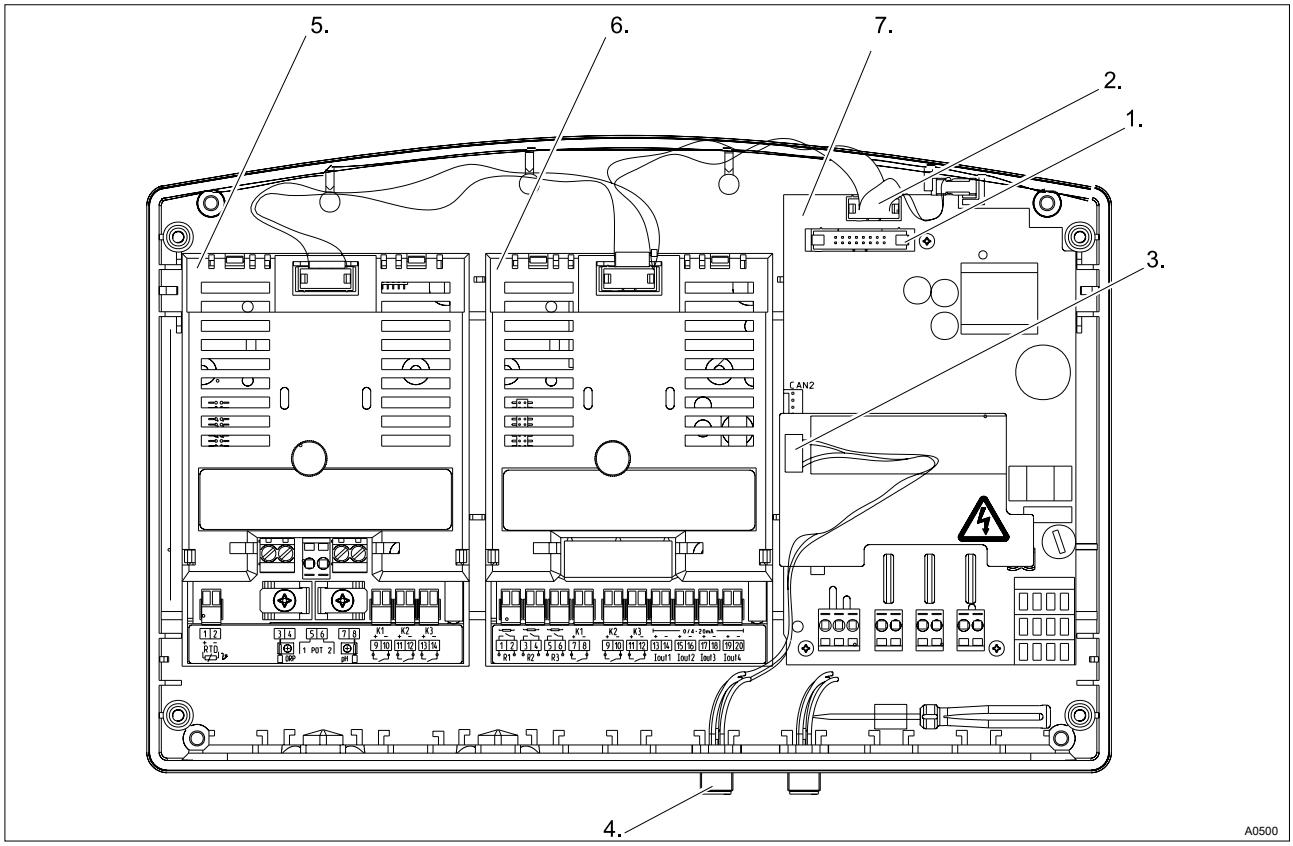


Fig. 17: CAN cabling inside the DXC housing

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

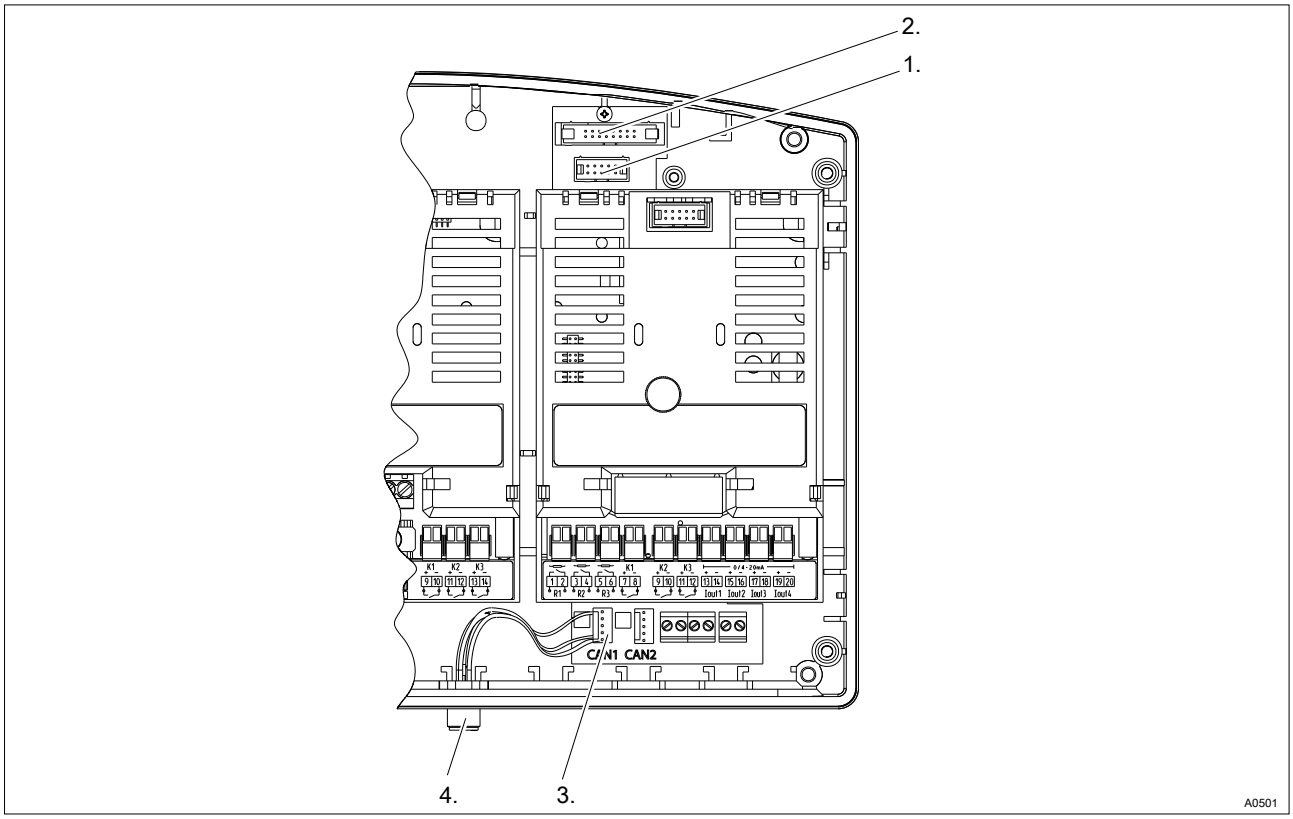


Fig. 18: Use of an L circuit board

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

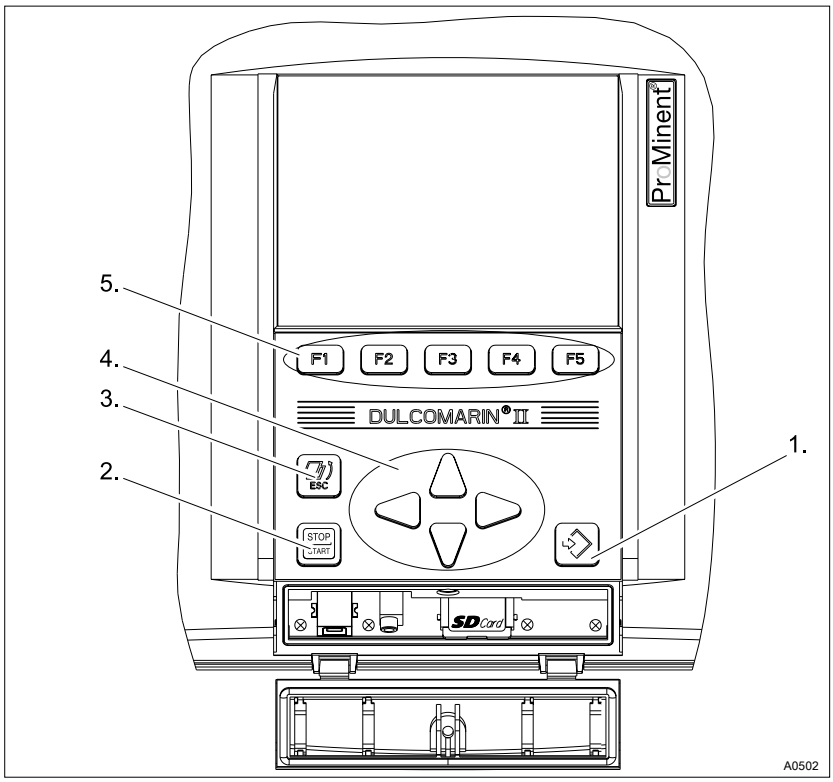


Fig. 19: Keys

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

Displays

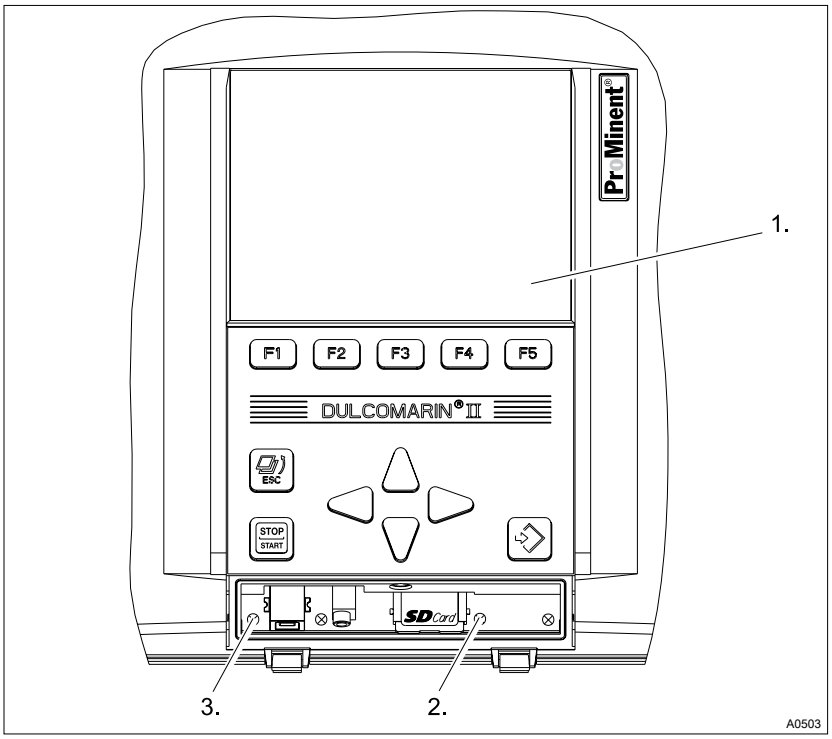


Fig. 20: Displays

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

7 Functional description (general)

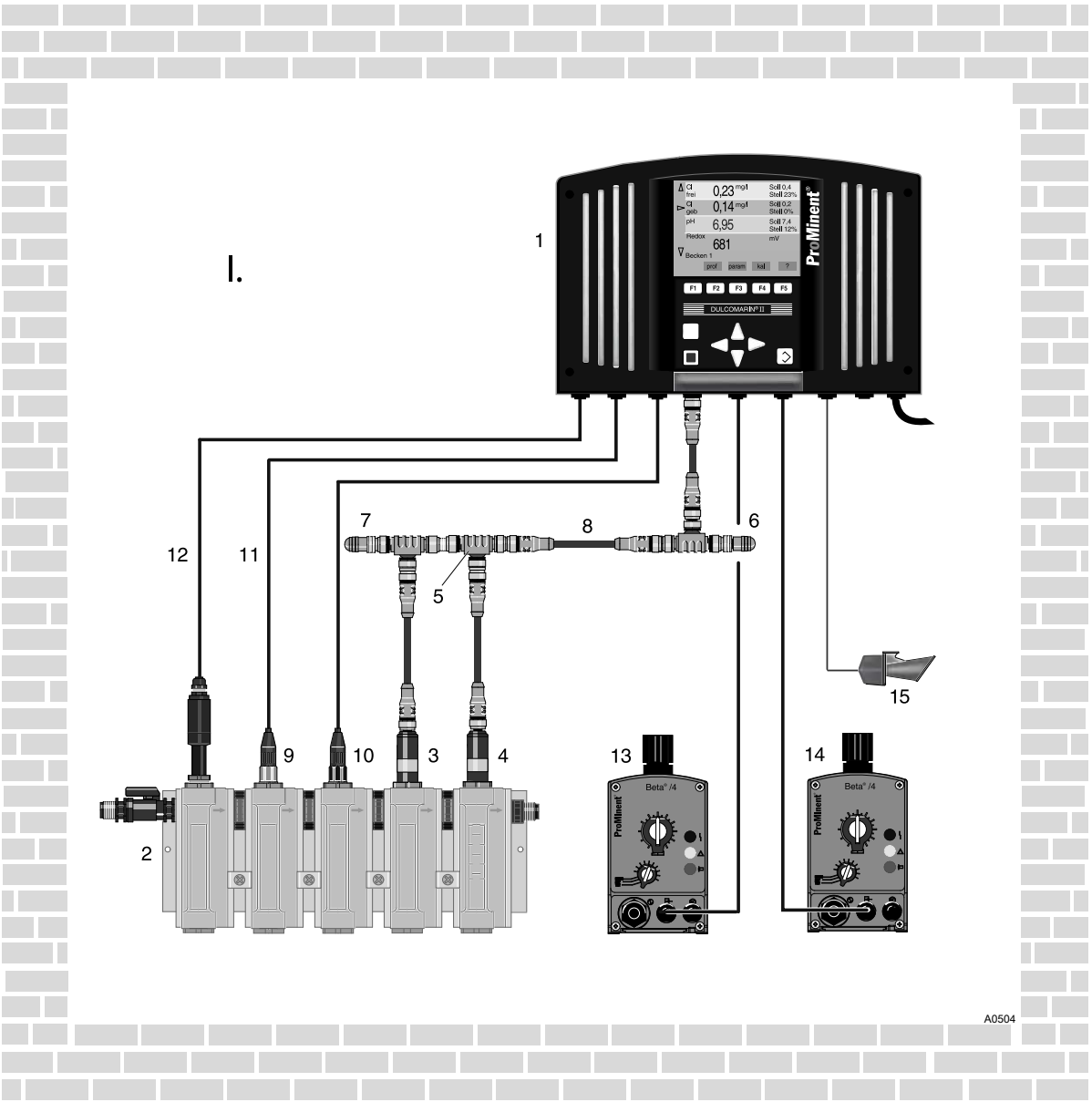


Fig. 21: Measurement and control system for a filter circuit

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.

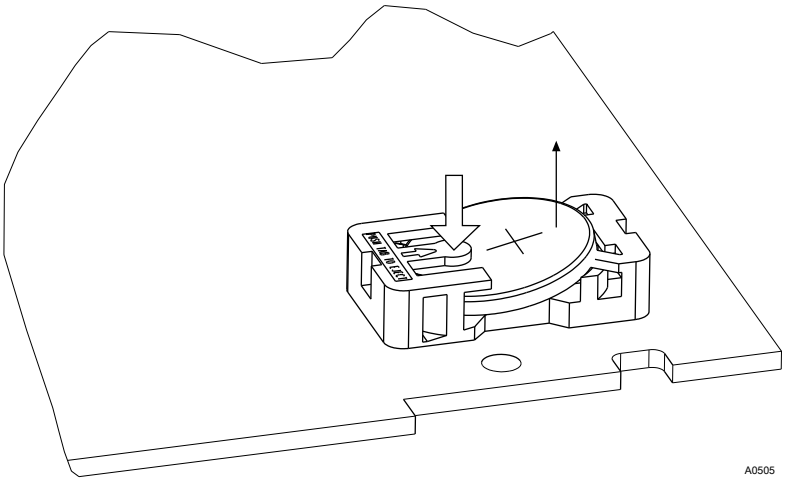


Fig. 22: Removing the battery

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 9*

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

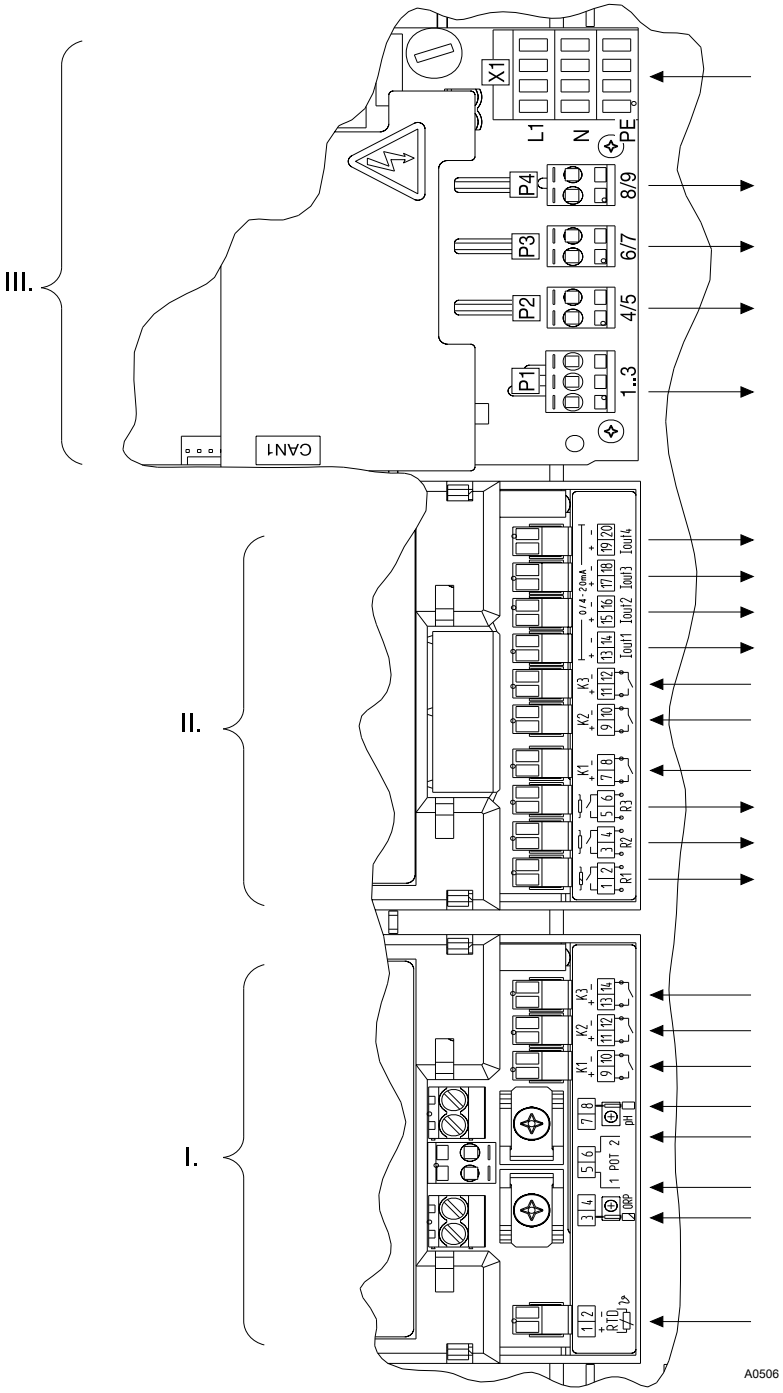


Fig. 24: Wiring diagram DULCOMARIN® II compact (typical arrangement of modules)

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	Terminal 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 connection	d4	6/M16	Guide 2 cables through multiple seal inserts 2x4
		14	-				
Current output 0/4-20mA 2	I out 2	15	+	Redox plotter connection	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