Operating Instructions

DULCOMETER® D2C

Part 1: Wall Mounting and Installation

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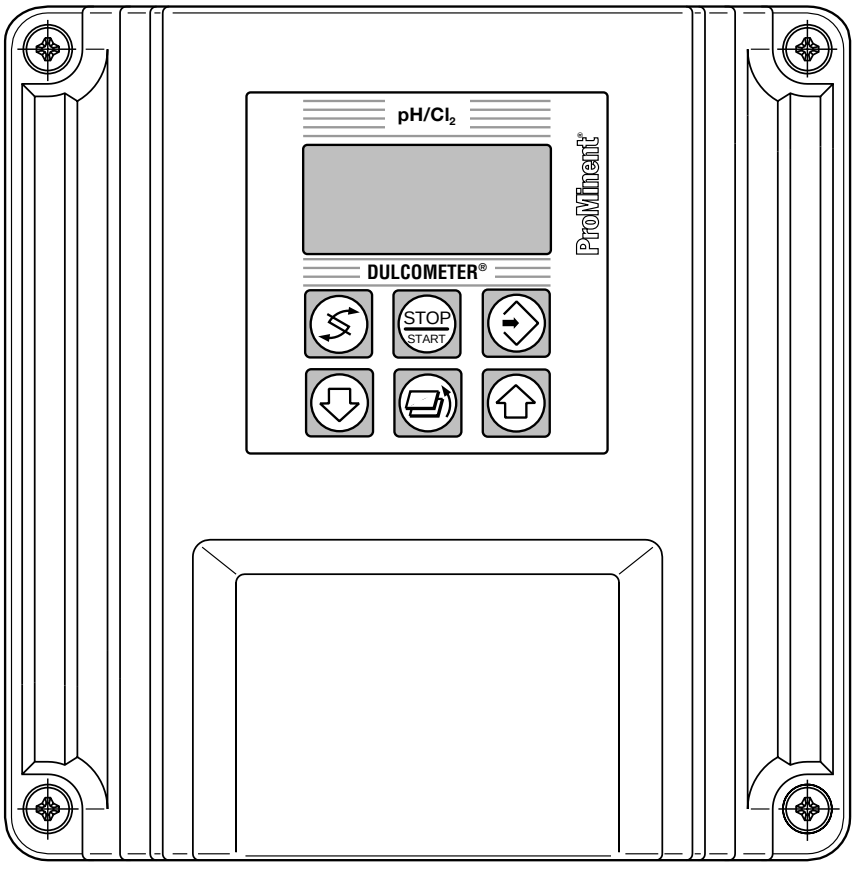


3141-4

Please completely read through these operating instructions first · Do not discard!
The warranty shall be invalidated by damage caused by operating errors !

BA DM 045 4/98 GB / Part No. 987857

ProMinent Dosiertechnik GmbH · D-69123 Heidelberg · Germany

1 Device Identification / Identity Code

D2C A	**DULCOMETER controller Series D2C**
W	**Wall mounting**

	Operating voltage
0	230 V 50/60 Hz
1	115 V 50/60 Hz
4	24 V AC/DC

	Measured variable
PC	pH (0-14 pH) / Chlorine (0...0,5/2/10/20 ppm)
PP	pH / pH (0-14 pH)
PR	pH (0-14 pH) / ORP (0...1000 mV)

	Connection of meas. variable 1 (connection meas. variable 2: 4-20 mA)
1	Terminal standard signal 4–20 mA (signal converters are necessary)
2	SN6 plug connector
5	Terminal mV

	Correction variable (only for pH/pH)
0	None
2	Temperatur via terminal
4	Manual temperature entry

	Disturbance variable connection
0	None

	Signal output
0	None
4	2 programmable 0/4-20 mA standard signal outputs

	Power control
A	Alarm relay
G	Alarm and 2 limit relays
M	Alarm and 2 solenoid valve relays (pulse length control)
R	Alarm relay and actuator with feedback (3P)

	Control characteristic
1	Proportional control
2	PID control

	Protocol output
0	None

	Language
D	German (E, F, S)
E	English (D, F, S)
F	French (D, E, S)
S	Spanish (D, E, F)

D2C A	**W**	___	___	___	___	___	___	___	___	___	___

Please enter the identity code of your device here!

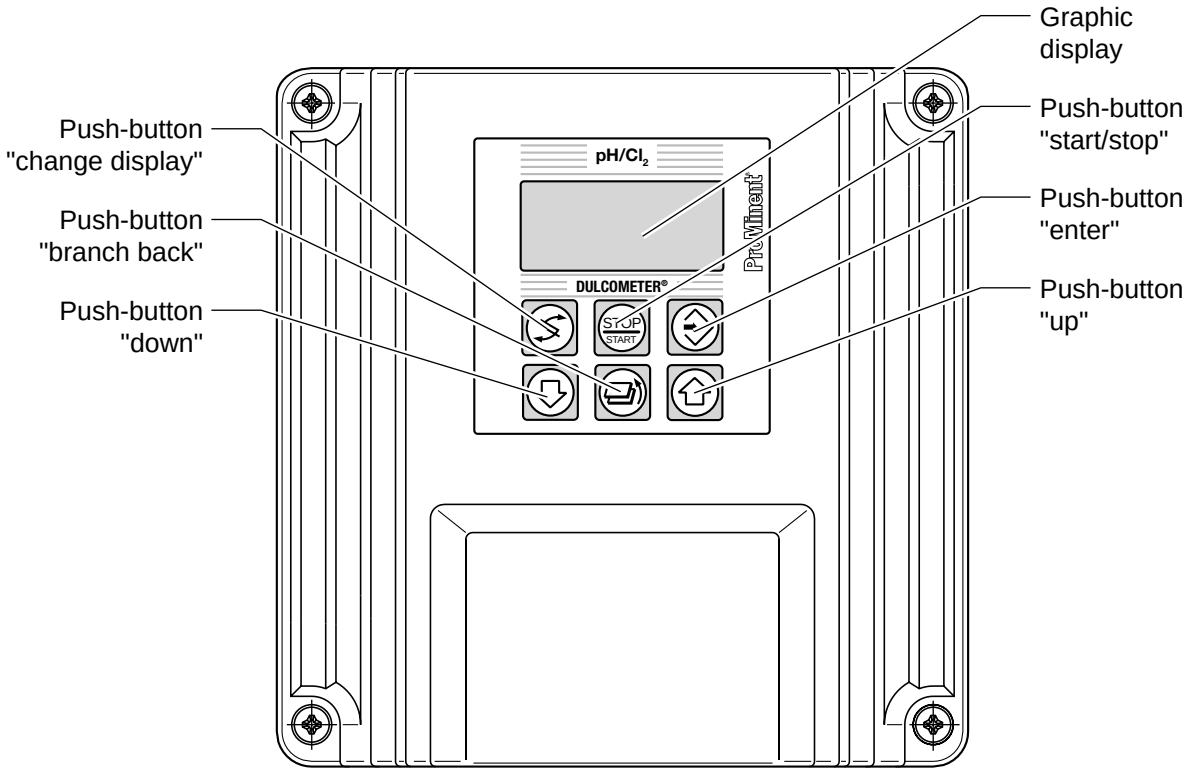
2 Contents / General User Information

General User Information

These operating instructions describe the technical data and function of the series DULCOMETER® D2C controller, provide detailed safety information and are divided into clear steps. The activities to be carried out are identified by bold bullets (•).

⚠ ***IMPORTANT:*** *Please observe the parts of these operating instructions applicable to your particular version! This is indicated in the section "Device Identification / Identity Code".*

3 Device Overview / Controls



DED2C1W002

	CHANGE DISPLAY menu button To change over within a menu level and to change from one variable to another within a menu point.
STOP START	START/STOP menu button Start/stop of control and metering function.
	ENTER menu button To accept, confirm or save a displayed value or status. For alarm acknowledgement.

	UP menu button To increase a displayed numerical value and to change variables (flashing display).
	BRANCH BACK menu button To exit operating menu (back to start of relevant setting).
	DOWN menu button To decrease a displayed numerical value and to change variables (flashing display).

4 Functional Description

4.1 Brief Functional Description

The DULCOMETER® D2C W is a microprocessor-controlled device for measuring, displaying and controlling two measured variables.

The measured variables that can be processed are:

- pH/Chlorine
- pH/Redox
- pH/pH

4.2 Mechanical Design

The DULCOMETER® D2C is suitable for wall mounting or installation in a control panel (control panel installation kit: Part number 79.29.08). The robust plastic housing is made up of an upper and lower section. The graphic display and a transparent display window are located in the upper section. The processor, power supply and option pc-board is located in the lower section. The connection to the display is made by means of a ribbon cable. Electrical connection is made by means of originally closed break-out cable leadthroughs on the underside of the device. On devices with an SN 6 input (depending on identity code), the standard SN 6 socket is located on the left-hand side. A wall bracket is provided at the rear of the housing to facilitate simple wall mounting.

4.3 Electrical Design

The device processes two input signals on the basis of operator entries. The result is displayed and made available to other devices via 2 standard signals or a serial interface.

Equipped with actuators, the device undertakes control functions. Provisions are provided for activating metering pumps, solenoid valves, actuator with feedback as well as mA standard signal. This activation variable is recalculated every second.

The device has no mains power switch. It is immediately ready for operation after being connected to the mains power supply.

These devices fulfil relevant requirements for electrical equipment. The following standards are complied with for this purpose:

- Supply voltage in accordance with - DIN IEC 38
- Electrical safety in accordance with - EN 61010-1
- Electromagnetic emitted interference in accordance with - EN 55011 Gr. 1/Cl. A

5 Mounting / Installation

5.1 Safety Notes

With regard to its design, the device is only suitable for wall mounting or installation in a control panel. The device must not be operated without being mounted/installed in this way.

Important:
Generally applicable safety precautions for installation must be observed! The corresponding national regulations must be observed for installation abroad!

Important:
The operating instructions must be carefully read through before starting installation and initial operation.

Important:
Only qualified personnel with corresponding qualifications are permitted to carry out electrical installation of the device!

Important:
The mains power connection ratings specified on the device must agree with the mains power supply!

Important:
The power connection line and the signal lines must not be laid together with lines prone to interference. In particular, the control lines for inductive loads such as solenoid valves, contactors or actuators should be routed in special cable ducts and wherever possible not parallel with signal lines over longer distances. Excessively large disturbances and interference can lead to malfunctions or even destruction of the device. Special interference suppression measures must be taken wherever low-interference electrical conditions cannot be maintained - e.g. additional mains filters.

Important:
Voltage-carrying cables should only be freed from their insulation to such an extent that the free end of the cable cannot come in contact with low voltage components when a screw connection is released.

5.2 Mounting Description, Mechanical

Important:
The device should be located in a favourable position for reading off the display and operation at eye level.

Please remove the protection-foil from graphic display.

5.2.1 Wall Mounting

The device can be screwed directly to the wall with the aid of the wall mounting bracket provided (hole drilling template provided).

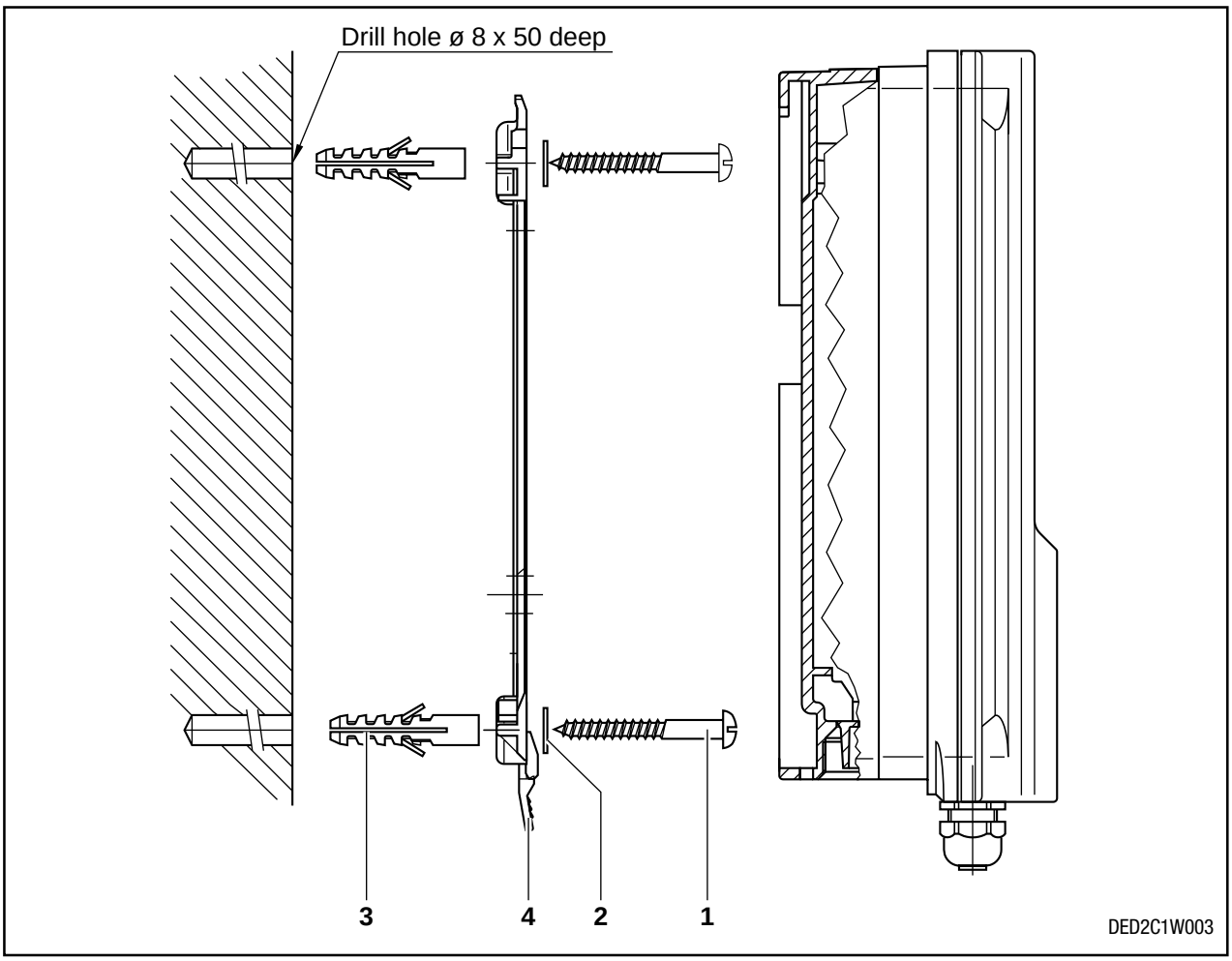
Material for wall mounting:

- Item **1** 3 round head screws 5 x 45
- Item **2** 3 U-washers 5.3
- Item **3** 3 plastic wall plugs d8

The wall mounting bracket **(4)** can also be used as a drilling aid. For this purpose, align the mounting bracket in the chosen position on the wall.

Important:
Take particular care when aligning the bracket to ensure that there is sufficient clearance for installing the cables. A clearance of approx. 120 mm must be left at the top for the "park position".

Mark the holes and drill. Press in wall plugs **(3)** and secure the mounting bracket with screws **(1)** and U-washers **(2).** Fit device at top of wall mounting bracket, press lightly against wall and push up by approx. 4 mm until it is distinctly heard to lock in position.



5.2.2 Control Panel Installation

The perimeter of the housing features a 4 mm wide flange to act as a stop for the control panel, with an additional groove to accept a rubber seal. When mounted in the control panel, the entire front plane protrudes by approx. 35 mm out of the control panel. The device is mounted from the outside in an aperture provided in the control panel for this purpose. The device can be secured from the inside to the control panel with the securing material.

Material for control panel installation:

- Item **1** 1 cellular rubber seal d3
- Item **2** 6 galvanized steel retaining brackets
- Item **3** 6 galvanized PT self-tapping screws

Procedure

With the aid of the punch template provided, first set up the exact position of the device on the control panel. If possible, this position should be at eye level. Also ensure that there is sufficient clearance at the top for the “park position”. Mark the corners and drill. Drill diameter 12–13 mm.

Caution:
Dimensions can deviate by photocopying the punch template.

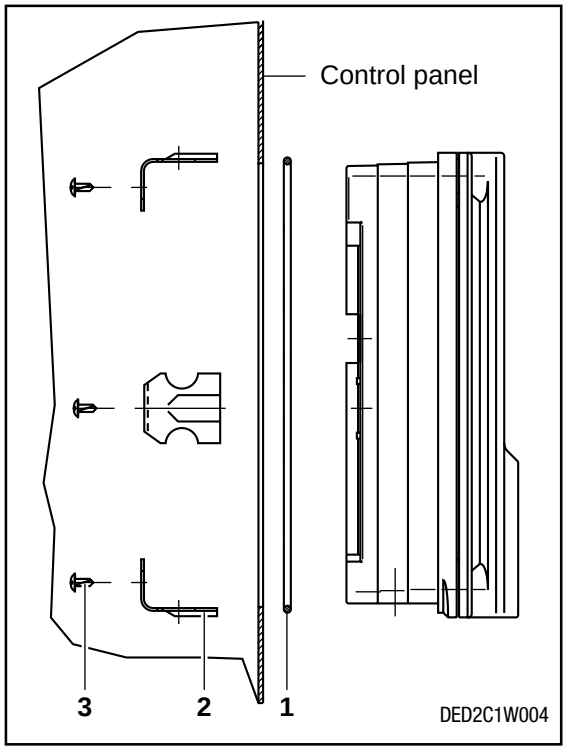
Then cut out the aperture as shown in the drawing with the aid of a punch or compass saw. The thickness of the control panel should be 2–3 mm. Before fitting the device in the aperture, evenly press the seal into the groove on the outside of the device. The controller can now be secured in the control panel from behind, if necessary with the aid of a second person, with the retaining brackets and screws.

Mounting with SN6 socket (corresponding to identity code)

Corresponding to the order, an SN6 input socket is preassembled on the device. Trus socket must first be removed to facilitate installation in the control panel. For this purpose, open the device as described in Section 5.3.

- Disconnect connection cable from terminals No. 11 and 12 while at the same time pressing the orange lever.
- Unscrew SN6 socket (WAF 22) complete with O-ring.
- After installing the device in the control panel, the SN6 socket can be reinstalled with the coaxial cable and O-ring.

Caution:
Ensure the O-ring is fitted in the correct position!



- Reconnect the cable at terminals No. 11 and 12.

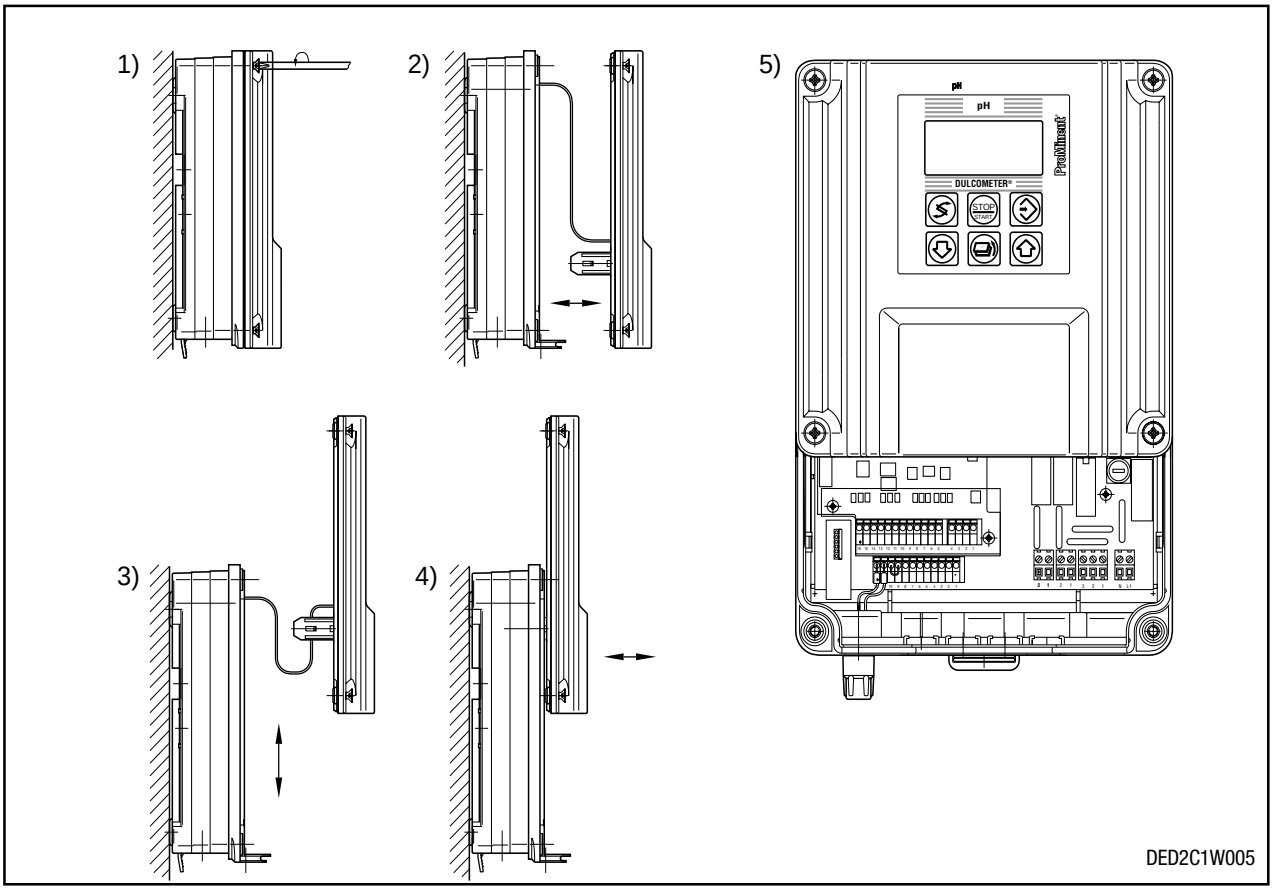
5.3 Electrical Installation

Important:
Electrical connection must only be carried out after the device has been mounted/ installed!

Important:
The mains power supply must be switched off when working on the connection cables!

Opening the device

- Generally, the device must only be opened by qualified personnel.
- Particular care must be taken before opening the device for any service work to ensure that no voltage is applied to the device and voltage cannot be connected while carrying out this work.
- The device should only be opened when wall mounted or installed in a control panel.
- To open the device, first release the four captivated countersunk screws.
- In addition, the upper section is locked to the lower section by means of snap hooks. The device can be opened by pulling the upper section forward to release the snap hooks.
- With the aid of the two guide tracks, the upper section can be moved into the approx. 100 mm higher slide-in position - the “park position”. The fuse and all connection terminals are freely accessible in this park position.



5.3.1 Electrical Installation for Wall Mounting

Initially, the threaded holes corresponding to the number of cables must be broken out.

- Break-out tools are provided to break out the individual threads.
- The following tools are used for this purpose:

Rear row (Fig. 1): Screwdriver DIN 5262-B, size 1 (ø 4.5 mm)

Front row (Fig. 2): Screwdriver DIN 5265-B, size 0 (ø 3.0 mm)

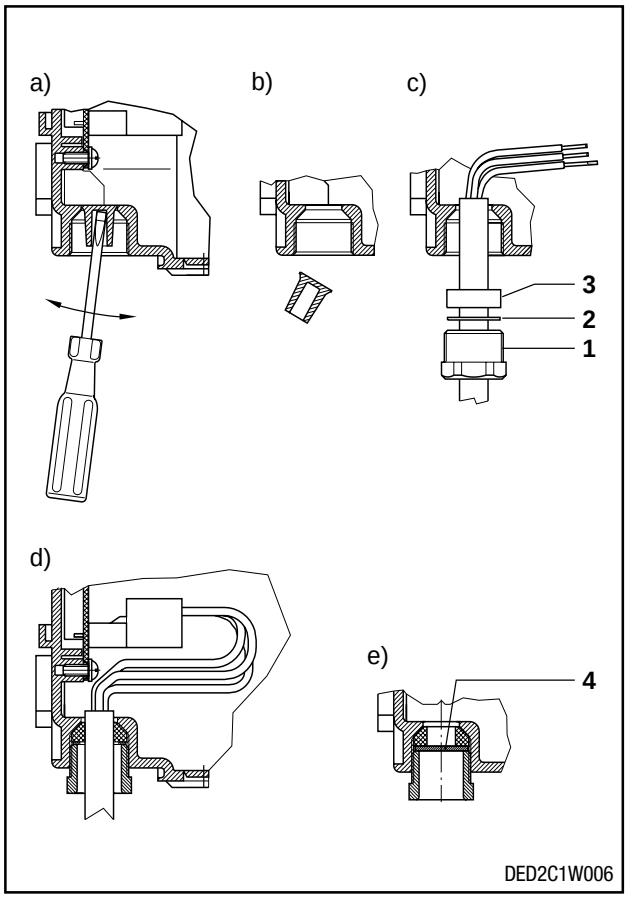


Fig. 1: Rear row

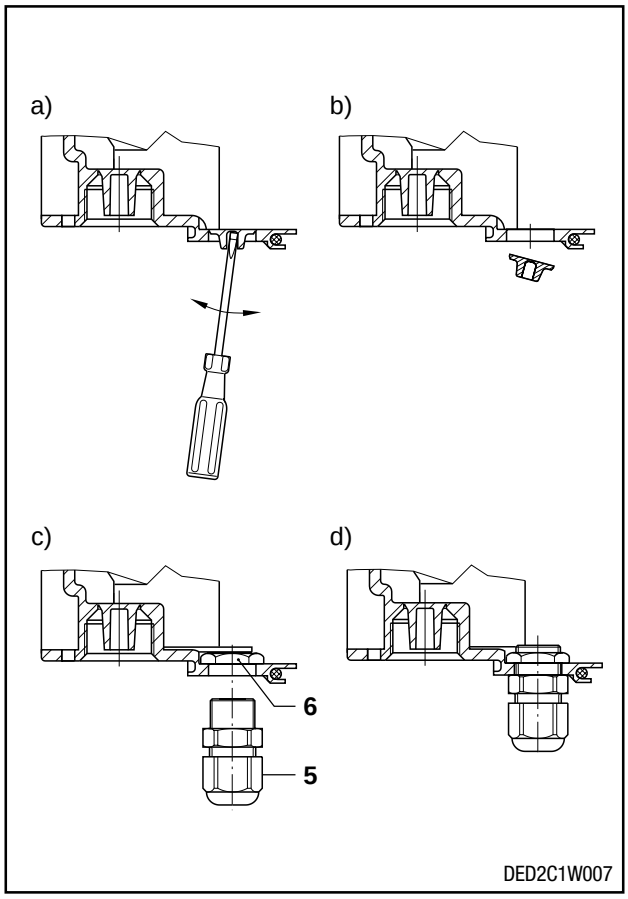


Fig. 2: Front row

- Strip cable insulation sleeve to a sufficient length (depending on position of terminals). Fit screwed glands **(1)**, thrust ring **(2)** and seal **(3)** over cable and insert in threaded hole.
- Screw in screwed glands and tighten with WAF 19 spanner. Shorten stranded wires to exact total length then strip insulation by approx. 7 mm and route to the terminals corresponding to the electrical connection diagram.
- Core end sleeves must be used for the stranded wires. If too many threaded holes are broken out, they can be closed off again with the dummy discs PG11 **(4)** provided.
- If provided (depending on identity code), the SN6 input socket is located in the rear row on the left side in a PG11 threaded hole. Any ProMinent coaxial SN6 cable combination can be connected here.

Packing list cable screwed gland

5 screwed gland	PG11	Item **(1)**
5 thrust rings	PG 11	Item **(2)**
5 seals	PG11 inside ø 9 mm	Item **(3)**
3 seals	PG11 inside ø 7 mm	Item **(3)**
3 seals	PG11 inside ø 5 mm	Item **(3)**
2 seals	PG11 inside ø 4 mm	Item **(3)**
5 seals	PG11 2 x ø 5 mm	Item **(3)**
2 seals	PG11 2 x ø 4 mm	Item **(3)**
3 dummy discs	PG11	Item **(4)**
4 screwed glands	PG7	Item **(5)**
4 lock nuts	PG7 nickel plated brass	Item **(6)**

The four additional apertures in the front row can be used for PG7 screwed glands. All commercially available PG7 screwed glands (suitable for type of protection IP 65) with lock nuts (nickel plated brass) can be used as the cable glands.

Available from ProMinent under:

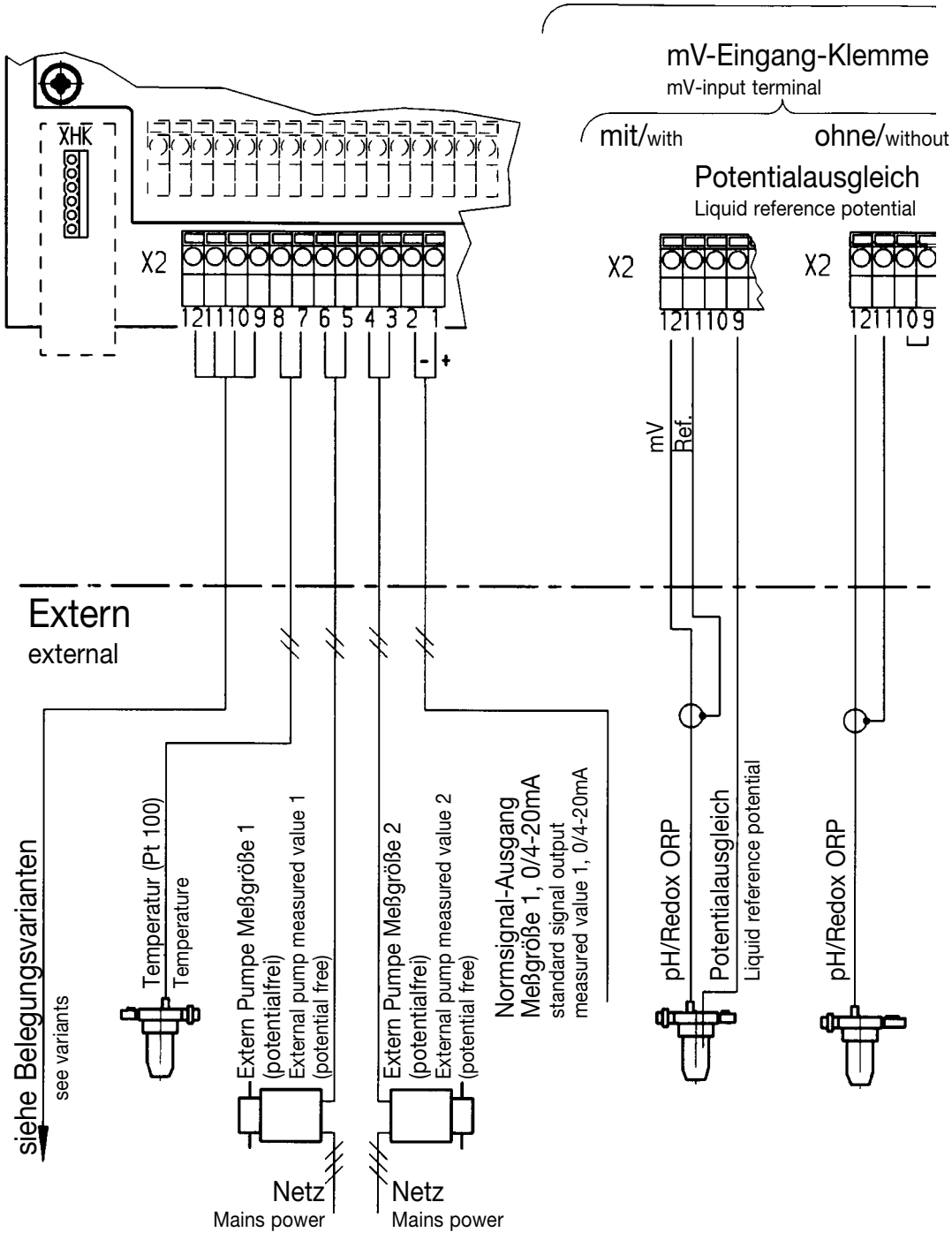
1 cable gland PG7, black	Part No. 703896
1 lock nut PG7, nickel plated brass	Part No. 703819

- Fit lock nut PG7 **(6)** on inside and mount PG7 screwed gland **(5)** from outside and firmly tighten (WAF 15).

5.3.2 Electrical Installation for Control Panel Installation

Normally, only the rear row of threaded holes should be used for electrical installation in a control panel. The front row (PG7 apertures) is located outside the control panel. The cable glands supplied with the device are not required for control panel installation. In this case, the individual stranded wires (without pull relief and seal) are passed directly through the holes and routed to the terminals corresponding to the electrical connection diagram. The holes are broken out as described in Section 5.3.1.

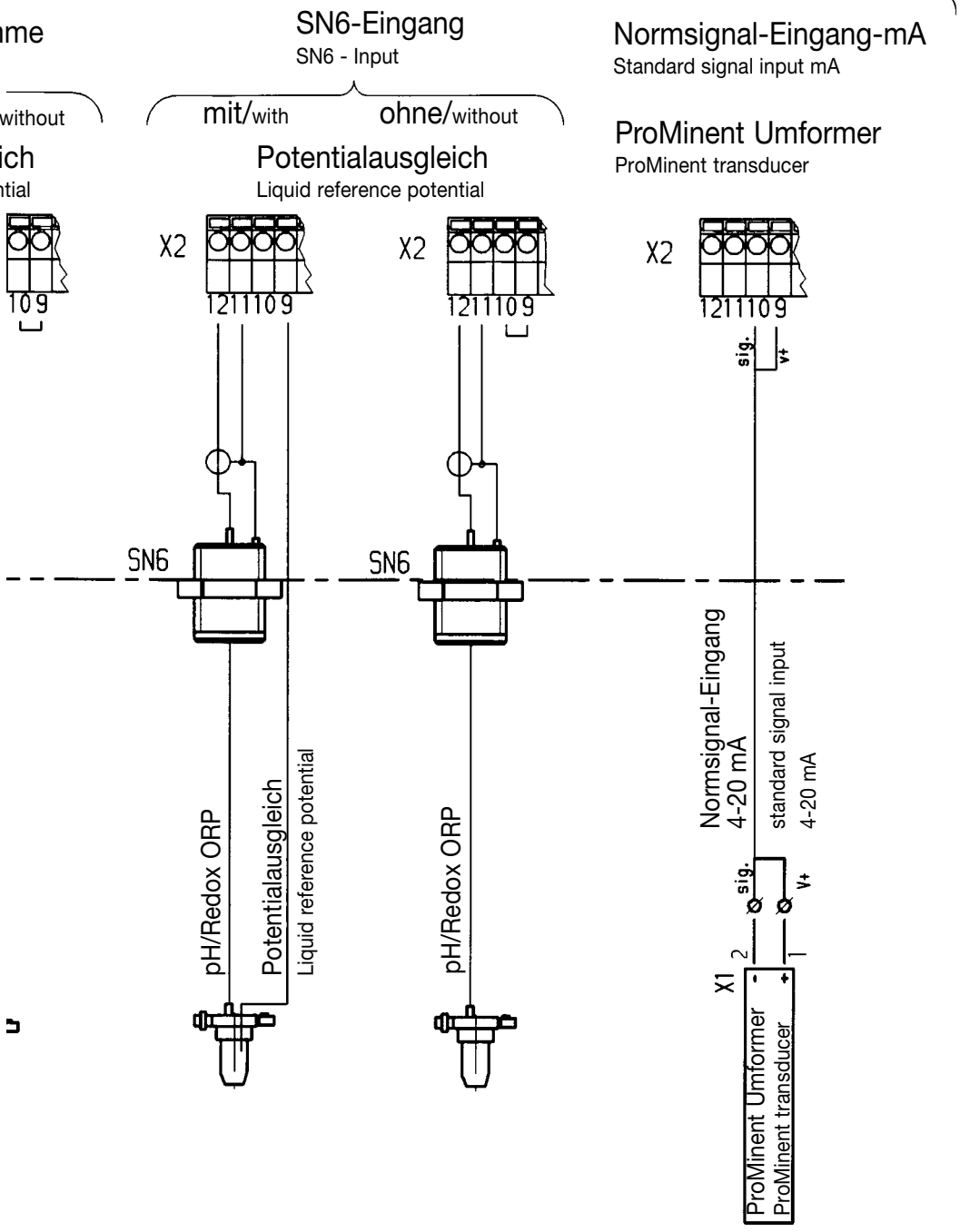
Terminal Connection Diagram for Terminal Block X2



ACHTUNG: Bei Anschluß der Sonde ohne Potentialausgleich sind die Klemmen X

Attention: When connecting the electrode without liquid reference potential clamp terminal X2 9 and 10 have to be

Belegungsvarianten Meßwert-Eingang 1
Assignment variants measured value input



ie Klemmen X2 9 und 10 zu brücken.
and 10 have to be closed.

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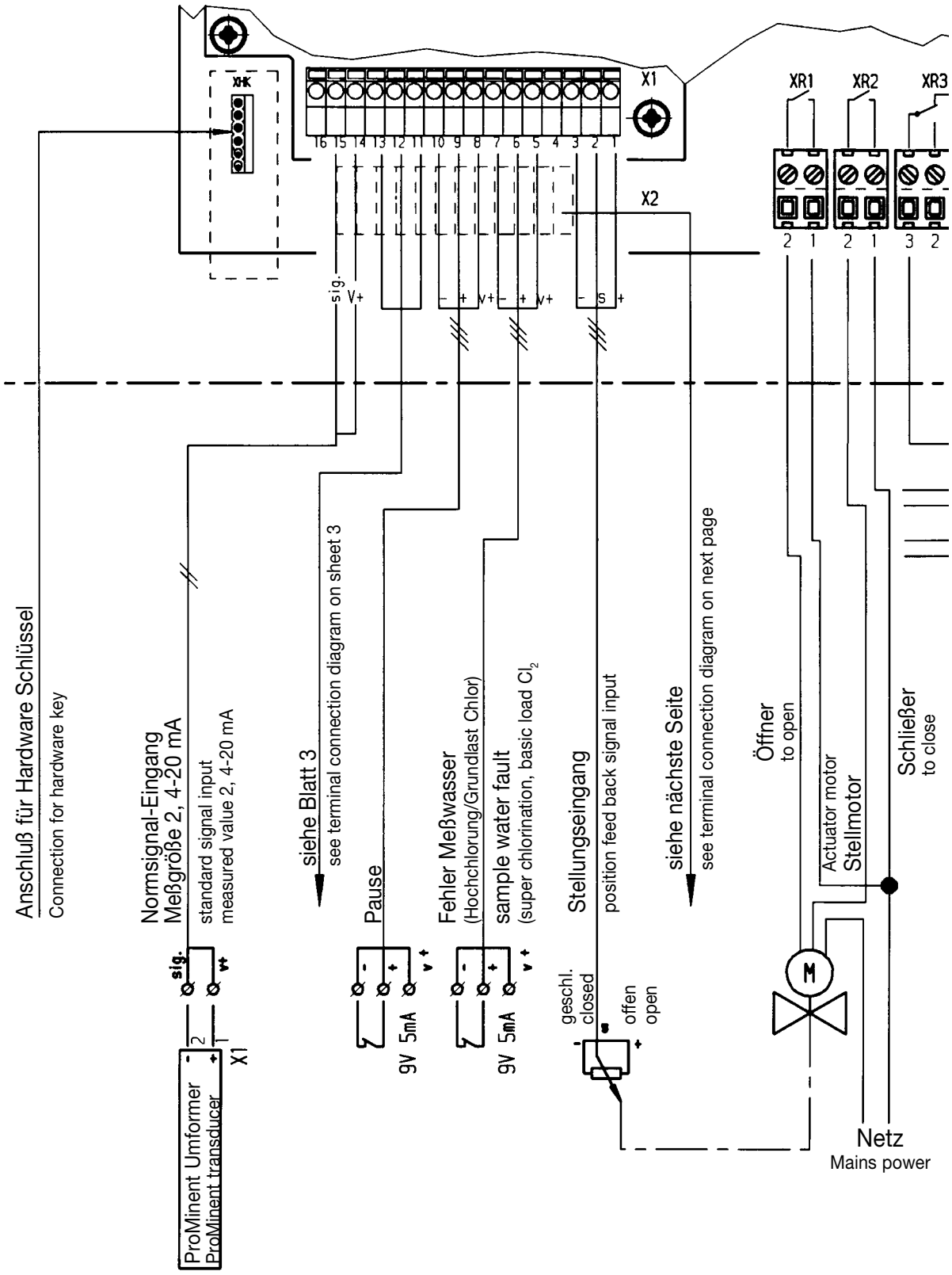
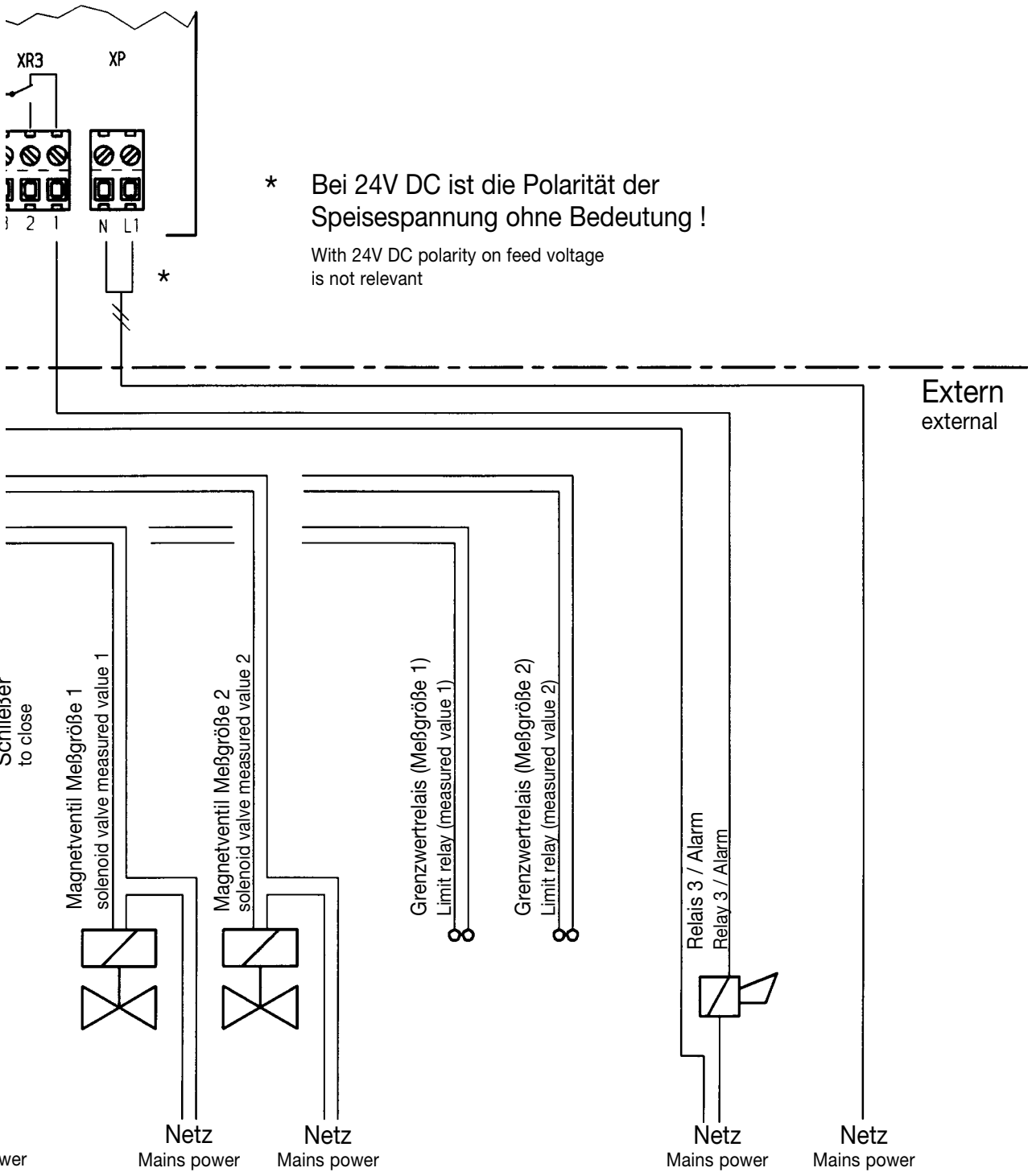
Terminal Connection Diagram for Terminal Block X1, XR and XP



Meßwerteingang 2
measured value input 2



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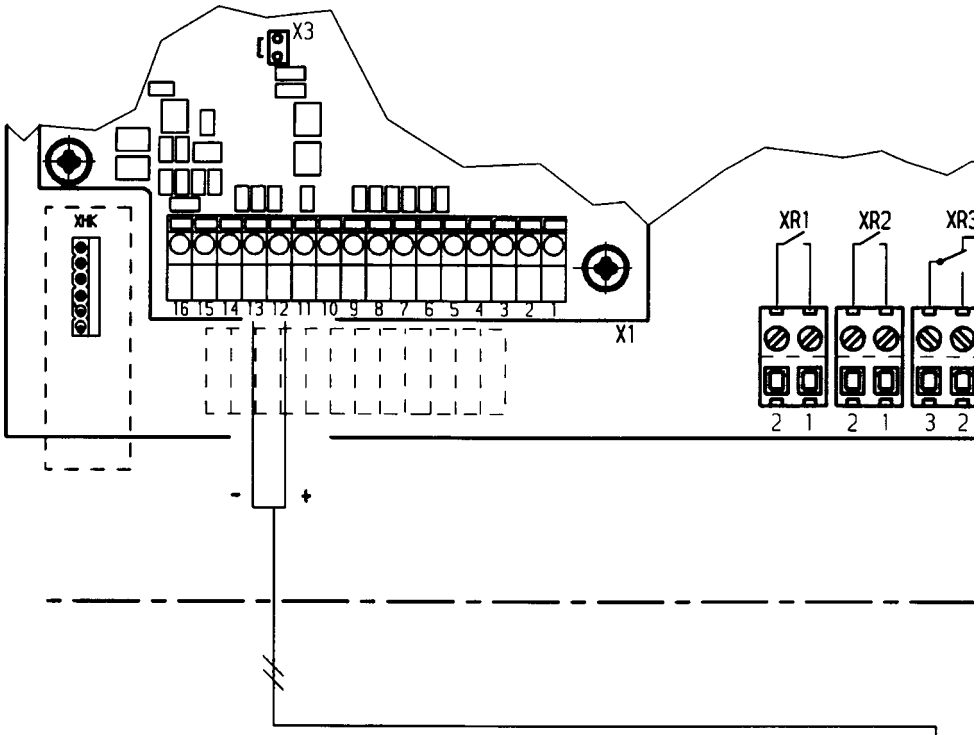
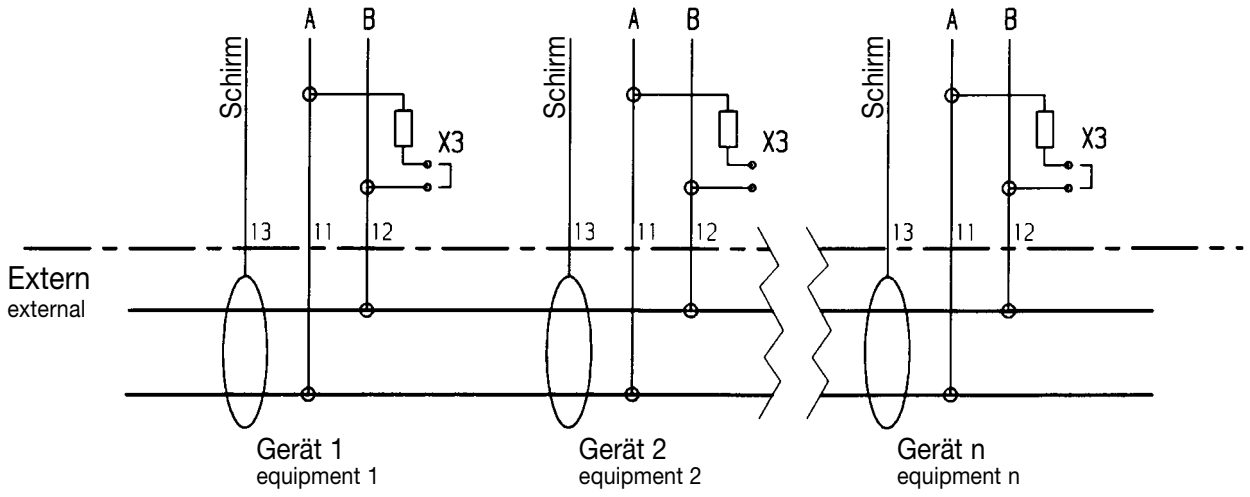
Terminal Connection Diagram for Terminal Block X1



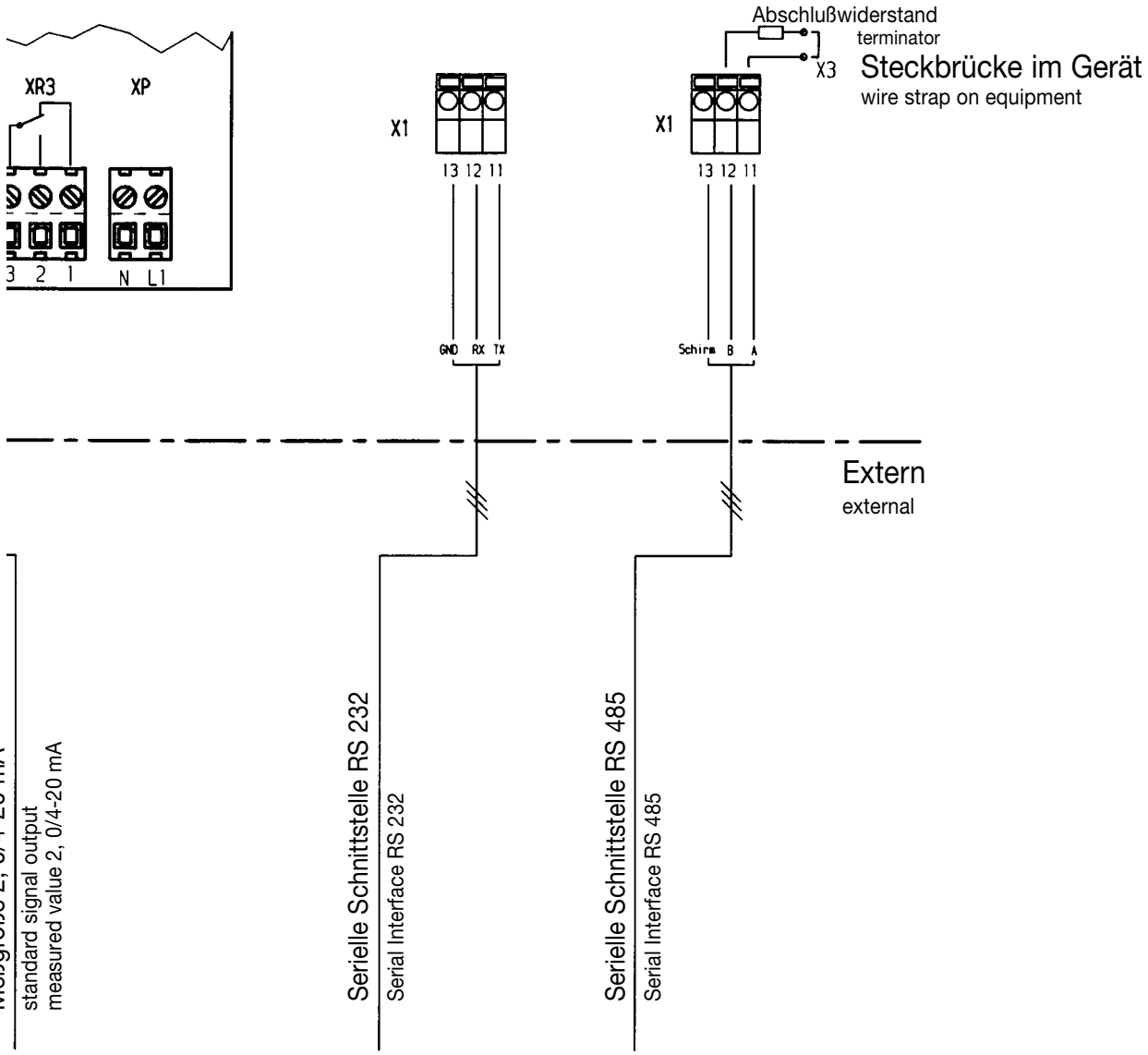
Normsignal-Ausgang
Meßgröße 2, 0/4-20 mA
standard signal output
measured value 2, 0/4-20 mA

Schaltschema bei RS 485
diagram of connections



Belegungsvarianten Normsignal-Ausgang

Assignment variants standard signal output



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6 Technical Data

6 Technical Data

Temperature specifications

Permissible ambient temperature	–5 °C…40 °C
Permissible storage temperature	–10 °C…70 °C

Material specifications/chemical resistance

Part	Material
Housing	Luranyl PPE-GF10
Membrane keypad	Polyester film PET
Housing seal	Cellular rubber CR
Outer seal	Cellular rubber CR
Retaining bracket	Galvanized steel
M5 screws	A2

Chemical resistance:
The device is resistant to normal atmospheres in technical installation rooms.

Dimensions and weights

198 x 200 x 76	(W x H x D) Wall mounting
198 x 200 x 35	(W x H x D) Control panel installation, outside
198 x 200 x 38	(W x H x D) Control panel installation, inside
Weight of device without packing:	approx. 1.2 kg
Gross weight of device with packing:	approx. 2.0 kg

Electrical data

Rated voltage:	115/230 V AC, 50/60 Hz	
Max. power intake:	120 mA at 115 V 60 mA at 230 V	
Internal fuse protection:	Fine-wire fuse 5 x 20 mm 160 mA, 250 V slow-blow	
Rated voltage:	24 V DC or 24 V AC, 50/60 Hz (operation only with safety low voltage!)	
Internal fuse protection:	Fine-wire fuse 5 x 20 mm 315 mA, 250 V slow-blow	
Probe input pH via SN6 socket:	Input resistance:	$>10^{12}\ \Omega$
	Input resistance of reference electrode with respect to ground:	$<1\ k\Omega$
	Input range:	± 1 V
	Accuracy:	± 0.5 % of input range
	Resolution:	0.0625 % of input range
	Connection facility for liquid reference potential (alternatively, two connection terminals can be connected with a wire jumper).	
Probe input pH via terminals:	Input resistance:	$> 5 \times 10^{11}\ \Omega$
	Other data same as “Probe input via SN6 socket”	

Technical Data

Standard signal input all measured variables:	Input range:	4...20 mA
	Input resistance:	~50 Ω
	Accuracy:	0.5 % of input range
	Resolution:	0.014/0.012 mA
	Supply voltage and current for external electronics:	19 V ±1.5 V, 20 mA
PT100 input:	Input range:	0 °C...100 °C
	Accuracy:	±0.5 °C
	Resolution:	0.1 °C
Digital inputs:	Common reference potential among each other and with RS232 interface, but galvanically isolated from remaining inputs and outputs	
	Insulation voltage:	500 V
	– Pause	
	– sample water fault (alternative superchlorination or basic load Cl_2)	
Position feedback input:	Galvanically isolated from remaining inputs and outputs	
	Insulation voltage:	500 V
	Connectable potentiometer:	900 Ω...10 kΩ
	Accuracy (without potentiometer error):	1 % of input range
	Resolution:	0.5 % of input range
Standard signal outputs mA:	Galvanically isolated from remaining inputs and outputs	
	Insulation voltage:	500 V
	Output range:	0/4...20 mA (programmable)
	Max. load:	600 Ω (output 1)
		400 Ω (output 2)
	Accuracy:	0.5 % of output range with respect to displayed value
Frequency outputs (Reed relay) for pump activation:	Type of contact:	N/O contact interference suppressed with varistors
	Load bearing capacity:	25 V peak, 0.100 A switching current
	Contact service life:	>50 x 10^6 switching operations at contact load 10 V, 10 mA
	Max. frequency:	8.33 H (500 strokes/min)
	Closing time:	100 ms
Power relay output for alarm triggering:	Type of contact:	Changeover contact interference suppressed with varistors
	Load bearing capacity:	250 V AC, 3 A, 700 VA
	Contact service life:	>20 x 10^6 switching operations

6 Technical Data

Power relay output for forwardfeed variable output or limit signalling:	Type of contact:	N/O contact interference suppressed with varistors
	Load bearing capacity:	250 V AC, 3 A, 700 VA
	Contact service life:	>20 x 10^6 switching operations
Serial interface:	RS 232, RS 485	
	Baudrate:	4800, 9600 Bd (programmable)
	other parameter:	1 stopbit no parity bit 8 bit data length
	control:	XON/XOFF

7 Maintenance / Repair

Safety Notes

The device or the system must be disconnected from the power supply before starting any maintenance work! The DULCOMETER® D2C has no separate mains power switch! The power supply must therefore be disconnected by means of an external master switch or by the main fuse! All standard safety regulations apply!

Mains voltage can be applied at terminals XR 1-3 even when the voltage supply is switched off!

Important
Only use a corresponding original fuse to replace the fuse!

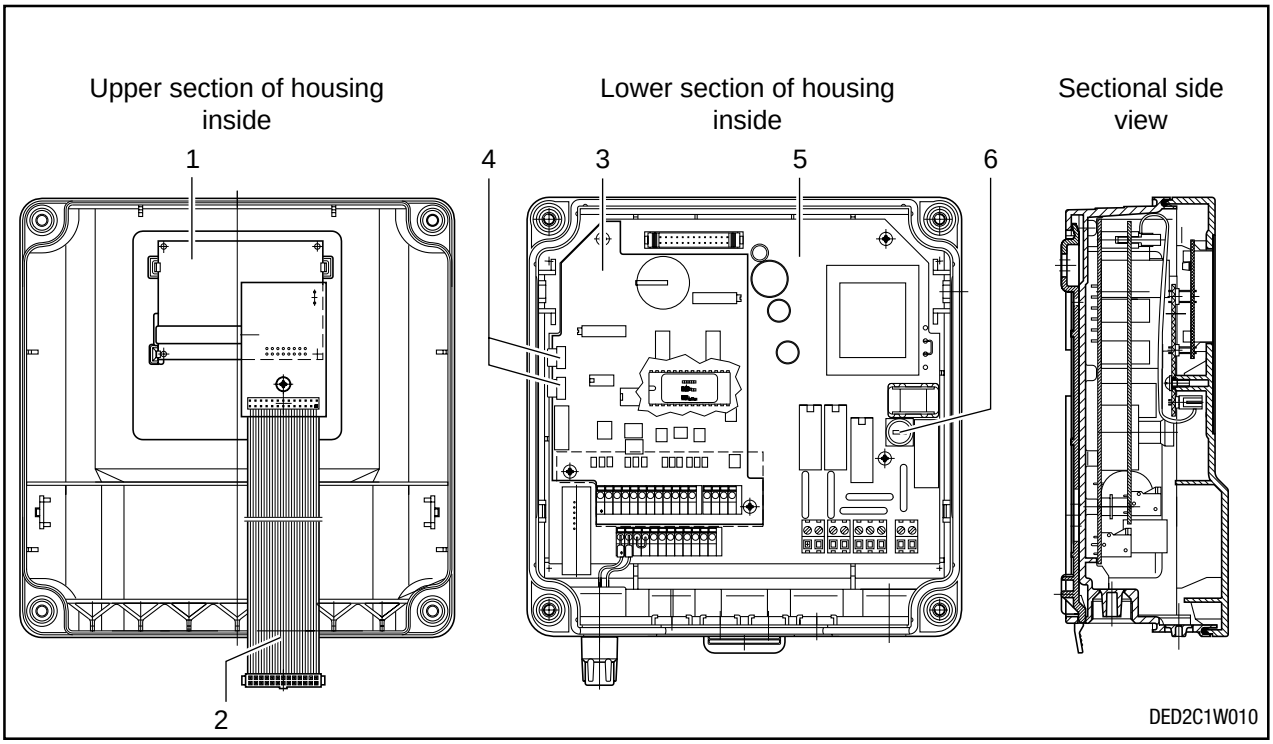
Caution:
Only use fuses supplied by the manufacturer!
Only use a 5 x 20 mm fine-wire fuse!
Fuse rating at mains voltage 100...240 V: 0.160A slow-blow, Part No. 71.20.48
24 V: 0.315 A slow-blow, Part No. 71.20.26

Changing fuse:

- The safety measures as specified above must be implemented (disconnection from mains power supply!) before replacing the device fuse.

The mains fuse is located in a closed fuse holder **(6)** in the terminal compartment.

- Open device and set in “park position”.
- Release bayonet catches of fuse holder
- Remove fuse and insert new fuse
- Lock bayonet catch and close housing



Item **(1)** Electrical display assembly
Item **(2)** Ribbon cable
Item **(3)** Electrical I/O/S assembly
Item **(4)** Ribbon cable
Item **(5)** Electrical processor assembly
Item **(6)** Fuse holder

8 Types of Protection/Standards
9 Spare Parts / Accessories; 10 Parts Disposal

8 Types of Protection/Standards

8.1 Contact and Moisture Protection (IP)

Device with housing closed, type of enclosure IP 65 in accordance with DIN VDE 0470 corresponding to EN 60529 and IEC 529 outer seal (control panel installation) type of enclosure IP 54 in accordance with DIN VDE 0470 corresponding to EN 60529 and IEC 529

8.2 Electrotechnical Safety / Radio Interference Protection

EC low voltage directive (73/23/EEC) subsequently 93/44/EEC

EC EMC directive (89/336/EEC) subsequently 92/31/EEC

Supply voltage in accordance with DIN IEC 38

Electrical safety in accordance with EN 61010-1

Electromagnetic emitted interference in accordance with EN 55011 Gr. 1/Cl. B

Noise immunity in accordance with IEC 801-2, -3, -4 or DIN VDE 0843, Part 2, Part 3, Part 4 or EN 50082-2

EN 60335-1	Safety of electrical devices for domestic use
EN 50081-1	EMC, emitted interference, residential
EN 50082-2	EMC, noise immunity, industrial
EN 60555-2	EMC, reactions in power supply networks, harmonics
EN 60555-3	EMC, reactions in power supply networks, voltage fluctuations

8.3 Load in Moist Changeable Climate

Moist changeable climate in accordance with FW DIN 50016

9 Spare Parts / Accessories

- Installation kit for control panel installation
- Sensors, measuring transducer
- Sensor cable

10 Parts Disposal

Note:
Plastics and electronic scrap are special waste and must be recycled!
Used parts are taken back by municipal collection points or at all ProMinent branches!
With the exception of the electrical assemblies, the device design has few individual mechanical parts. These parts are relatively simple to separate and sort. With the exception of the membrane keypad, these parts can be recycled (refer to Section 6 Material Specifications)!
The membrane keypad must be classified and disposed of in accordance with municipal guidelines!

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Subject to modification · Printed in Germany

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