Instruction Manual DULCOMARIN®

Swimmingpool controller for 2, 3 or 4 measured variables (pH value, chlorine content, ORP/redox potential or temperature)



Overview of the Devices / Operating Elements



Imprint:

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General User Information

These operating instructions describe the technical data and functions of the Series B DULCOMARIN® swimming-pool controller, provide detailed safety information and are divided into clear steps. The activities to be carried out are identified by bold-type bullets (•).



<u>IMPORTANT:</u>

Please observe the parts of these operating instructions applicable to your particular version of the device. This is indicated in the Section "Device identification/identity code".



IMPORTANT:

Correct measurement and metering are only possible if the probes are functioning satisfactory! The probes must be checked/calibrated regularly.

Device Identification /Identity Code

DCM	DU	LCC	_COMARIN® swimming-pool controller									
	В		Series									
	Version											
			0	Bas	c versior	ersion for two measured variables						
1 Expans						ersion f	or three o	or four r	neasure	d variab	les	
					Туре	of mo	unting					
				W	Wall	mountir	ng	<u></u>				
					Conti	rol pane	ei installa	tion				
						Ope	rating vo	ontage				
						230	V 50/60 I	1Z				
						115	V 50/60 I	1Z				
					2	200		٦ <u>८</u> اح				
						100	V 50/60 I		ariables			
						0			(hasic vo	arsion)		
							nH r4		asic vere	ion)		
						2	DH. re	dox. ch	lorine	,		
						3	pH, te	emperat	ure, chlo	orine		
						4	pH, re	edox, ch	nlorine, te	emperat	ture (4th	measured variable on LCD)
						5	pH, te	mperat	ur, chlor	ine, red	ox (4th r	measured variable on LCD)
								Actu	ators			·
							0	pH m	etering p	oump, c	hlorine n	netering pump
							1	pH m	etering p	oump, c	hlorine a	actuator
							2	pH so	olenoid v	alve, ch	lorine m	etering pump
							3	pH so	olenoid v	alve, ch	lorine a	ctuator
							4	pH so	plenoid v	alve, ch	lorine so	plenoid valve
							5	pH m	etering p	oump, c	hlorine s	solenoid valve
									Analo	g outp	uts	
								0	None			
									⊢or al	i measu	ired varia	
										None	ace	
									1	RC 22	22 printo	r protocol
									Ľ-†	1020		lage presetting
										D	Germa	an
										E	Englis	h
										F	French	h
										1	Italian	
										N	Dutch	
										S	Spanis	sh
										Р	Polish	
												Setpoint and limit value presetting
											0	Private pool
												Public pool
											2	vvarm jet pool (Jacuzzi)
												Analog outputs presetting
												1 4-20 mA
•	•		▼	V	▼	•	▼		•	<u> </u>	*	_ ★
DCM	в											
2.011												- -
			Plea	ise en	ter the ic	dentity	code of	your d	evice he	ere!		
											$\overline{}$	
				Affix	type id	entific	ation pl	ate he	ere!			
						-		-				
	l										J	

Tests

EC Declaration of Conformity				
We,	ProMinent Dosiertechnik GmbH Im Schuhmachergewann 5 - 11 D - 69123 Heidelberg			
hereby declare that, on the basi circulation by us, the product sp health stipulations laid down by Any modification to the product	s of its functional concept and design and in the version brought into ecified in the following complies with the relevant, fundamental safety and EG regulations. not approved by us will invalidate this declaration.			
Product description:	Measurement- and control instrument, DULCOMARIN			
Product type:	DCMb			
Serial number:	see type identification plate overleaf and on device			
relevant EC regulations:	EC - low voltage regulation (73/23/EEC) EC - EMC - regulation 89/336/EEC subsequently 92/31/EEC			
Harmonised standards used, in particular:	EN 60335-1, EN 61010-1, EN 60730-1 EN 50081-1/2, EN 61000-3-2, EN 61000-3-3, EN 55011 EN 50082-1/2, EN 61000-4-2, EN 61000-4-4			
Nationale standards and technical specifications used, in particular:	DIN 19226 DIN VDE 700 T1, IEC 335-1 VDE 0411 T1, IEC 1010-1 VDE 0838 T2, IEC 1000-3-2 VDE 0838 T3, IEC 1000-3-3 VDE 0847 T2, IEC 1000-4-2 VDE 0847 T4, IEC 1000-4-4			
Date/manufacturer's signature: The undersigned:	19.12.1996 Mister Manfred Hüholt, factury manager			

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1 Foreword

Swimming and bathing are today amongst the most popular leisure activities and are also regarded by the public as very healthpromoting.

Because pools are commonly used by many people at the same time, swimming and bathing pool water can give rise to health hazards, particularly due to pathogens.

Only chemical substances in concentrations which are technically unavoidable and are not harmful to human health may be used for treatment and disinfection.

DIN 19643 For this reason therefore (in accordance with DIN 19643) each publiclyoperated swimming or bathing pool must have an automaticallycontrolled dosing plant and equipment for measurement of free chlorine, redox voltage and pH.

The DULCOMARIN[®] series of equipment is available for this purpose.

DULCOMARIN[®] Swimming Pool Controller The DULCOMARIN[®] swimming-pool controller is a measuring and control device which is designed exclusively to meet the specific requirements of swimming-pools.

Different versions are available for the demanding private pool, for whirlpools and public baths - corresponding to the new DIN 19643.

In swimming-pools where the hydraulic, measuring and metering technology are mutually matched, the self-setting control characteristic of DULCOMARIN[®] ensures optimum water quality irrespective of the pool size.

Appropriately preselected set and limit values enable the unit to run with practically no operator costs.

2 Technical Data

Dimensions	342 x 227 x 78 mm (W x H x D)
Installation in instrument panel	Installation height 40 mm, installation depth 36 mm
Connections	 5 off PG 11 for cable diameters of 8 to 10 mm or 6 to 8 mm (Bushings to be chosen to suit the particular cable diameter) 5 off PG 9 for cable diameters of 6 to 8 mm (For the PG 9 bushings the internal diameter can be broken out to 7 and 10) 9 off 12.5 mm dia. holes for PG 7 (cable diameters of 3 to 6.5 mm)
Mains supply	115 V/230 VAC, 50/60 Hz, Power consumption approximately 20 VA

Technical data

<i>Type of protection: Wall mounting Instrument panel installation</i>	IP 65 to EN 60529
Air conditioning	PW 24 in accordance with DIN 50016
Dimensions	Width x Height x Depth: 342 x 227 x 78 mm Cutout for instrument panel installation: 335 x 218 mm
Measured value inputs	2, 3 or 4 isolated current inputs 420 mA (insulation voltage 500 V) Input resistance 50 Ohm; accuracy 1% of current input range. Reso- lution of A/D conversion 11 bit. Suitable for connection of DULCOTEST [®] sensors with a current output, power supply for these is 20.5 ± 0.5 VDC. Load capacity 30 mA (current limiting); other signal current sources can be connected (note special terminal allocation).
Inputs for control and message signalling functions	 5 floating inputs for contacts or switching transistors - the polarity of these contact inputs is selectible; open circuit voltage 24 V ± 1.V; input resistance 3.5 kOhm; floating (insulation voltage 500 V); switching point 12 V ± 4 V; For measurement water interruption, feed forward and control interruption (pause) - e.g. reversible-flow flushing - as well as pump faults. One floating position signal input (special equipment). Connection of 1 kOhm potentiometer to provide position feedback for operation of a servomotor valve or adjustment of a stroke length. Open circuit voltage 10 V ± 1 V Potentiometer load 2 mA
Pump control	Two reed relays with normally open contacts. Load capacity 24 V.d.c, 50 mA (ohmic), mechanical life > 100* 10 ⁶ switching cycles, on-time 100 ms, frequency 0 to 120/min
Solenoid valve activation (optional equipment)	Power relay for solenoid valve activation; type of contact, normally open contact; load rating 250 V AC/3 A/700 VA; mechanical service life >20* 10 ⁶ switching operations; RC protective circuits should be provided for inductive loads.
Actuator activation (special optional equipment)	2 power relays for actuator activation; type of contact, normally open contact; load rating 250 V AC/3 A/700 VA; mechanical service life >20* 10 ⁶ switching operations; RC protective circuits should be provided for inductive loads.
Fault messages	One power relay with changer type contacts for alarm output. Load rating 250 VAC, $3 A/700 VA$, mechanical life > $20^{\circ} 10^{\circ}$ switching cycles. RC protective circuits are to be used for inductive loads.

Technical data/functions

Measured value outputs (option)	Current outputs for each measured value 0/4 to 20 mA floating (insulation voltage 500 V), maximum burden 600 Ohm.
Protocol output (option)	Serial interface RS 232; for documentation of the measured values, warning notices and fault messages; serial data transmission to a log printer.
Chemical resistance	Resistant to swimming pool atmosphere and hydrochloric acid vapour.
Weight	Maximum weight of complete unit approx. 2.5 kg depending on equipment fitted. Maximum shipping weight including packaging is approximately 3.0 kg.
Climatic resistance	FW 24 to DIN 50016/50015
Ambient temperature	Working temperature range 0 to +50 °C Storage temperature range -20 to +70 °C
Materials: Cover Sealing rings Sealing cord Sealing washer Housing Retaining clips Cable bushings	Polyester Natural rubber (NR) Chloroprene Cellular rubber (CR) (for instrument panel installation only) Polyurethane (PUR) PPE-GF 10 Galvanised steel Polyamide (PA) + 30% glass fibre A2 (high grade steel)
Countersunk screws	Az (nign grade steel)

3 Functions

The DULCOMARIN[®] swimming-pool controller is a combined controller with 2, 3 or 4 measured value inputs.Various input signals can be combined to form output signals which take account of operator inputs and/ or computer instructions. These are applied directly to the ProMinent pumps (e.g. Gamma or Vario types) or to their control elements and also to solenoid valves, servomotors etc.

Operator inputs are made via pushbutton switches and an alphanumeric LCD display enables the values and text for operating processes to be displayed.

The basic version of the DULCOMARIN[®] swimming-pool controller features two measurement inputs: either for pH-value and chlorine concentration or for pH-value and redox potential. As an add-on controller, it features three or four measurement inputs: pH-value, chlorine concentration, redox potential and/or temperature. A remote control input can stop the control, e.g. for reverse-flow filter flushing. An alarm can be triggered via a further contact input in the event of the measurement water failing. The control can be adapted to special operating conditions (e.g. air injection) with the forward feed input. When the feedforward input is active, metering immediately takes place at the preset basic load (however, this is only affective when the actual manipulared variable is smaller than the

Functions/Functional diagramm

basic load). Two further contact inputs are provided for the purpose of signalling pump faults.

The measured values are displayed by means of a large brightly-lit, 7segment digital display. The LCD display field (2 lines each with 16 characters each) is an aid for calibrating and setting the unit using clear text displays, this also shows the cause of an alarm if the general fault relay is triggered.

4 Functional diagram



5 Inputs and outputs

The DULCOMARIN[®] Swimming Pool Control Unit is provided with the following inputs and outputs whose electrical terminals can be fitted on the lower section of the housing (breakouts, PG bushings).

Mains supply	115V/230 VAC, 50/60 Hz
Measured value inputs	Up to current inputs (420 mA) available for either: pH, chlorine concentration, redox voltage or pH, chlorine concentration, temperature or pH, chlorine concentration, redox voltage, temperature pH range: -1 to 15 pH. Chlorine content indicating range: 0 to 10 ppm Redox voltage indicating range: 0 to 1000 mV. Temperature indicating range: 0 to 100 °C.
Control and signalling functions	For signalling external faults, interference variables, control interruptions (pauses) and pump faults.
	Signalling the position of a control valve or a stroke length setting etc.
Pump control	Two reed relays/frequency outputs provided for control of pumps with a contact input for pH correction and chlorine dosing.
	Up to three power relays for control of other equipment (special equipment).
Fault signal	One power relay to provide an alarm.
<i>Measured value outputs</i> (option)	Current outputs are provided for each measured value for a recorder with a standard signal (420 mA).
Log output (option)	Serial interface to RS 232 for documentation of measured values, warning notices and fault reports and for serial data transfer to a log printer or PC.

Safety precautions

6 Safety precautions

6.1 General notes



WARNING

The operation of the DULCOMARIN[®] is permissible only if it is mounted correctly on a wall or in an instrument panel.

The type of enclosure protection is only guaranteed if the unit is closed and the upper section is securely bolted in place.

The parked position (refer also to pages 25 and 29) is therefore permissible only for mounting, installation and maintenance work (e.g. when changing a fuse).

Sealing faces and circumferential housing seals must not be damaged.

<u>NOTE</u>

The permissible ambient temperature for DULCOMARIN[®] equipment is 0 to 50 °C.

ATTENTION

A brief summary of the operating instructions appears on the left-hand side of the back of the device!



7 Presettings

The DULCOMARIN[®] is factory-set to the set and limit values (individually adjustable) which are based on the following parameters:

	lower limit	set value	upper limit	analogue output		
0 = Private bath) <u>:</u>					
рН	pH 6.5	pH 7.2	pH 7.5	pH 2–12		
Chlorine	0.2 ppm	0.3 ppm	0.5 ppm	0–1 ppm		
ORP	600 mV	650 mV	700 mV	0–1000 mV		
1 = Public bath(according to DIN 19643):						
pН	pH 6.5	pH 7.2	pH 7.5	pH 2–12		
Chlorine	0.3 ppm	0.45 ppm	0.6 ppm	0–1 ppm		
ORP	750 mV	(775 mV)	800 mV	0–1000 mV		
<u>2 = Whirlpool:</u>						
pH	pH 6.5	pH 7.2	pH 7.5	pH 2–12		
Chlorine	0.7 ppm	0.85 ppm	1.0 ppm	0–1 ppm		
ORP	750 mV	775 mV	800 mV	0–1000 mV		
3 = Bath with high chlorine concentration:						
рН	pH 6.8	pH 7.2	pH 7.8	pH 2–12		
Chlorine	1.0 ppm	1.5 ppm	2.5 ppm	0–5 ppm		
ORP	600 mV	700 mV	800 mV	0–1000 mV		

Adjustment ranges:

All setpoints and limit values are adjustable within the relevant measuring range of the measured variable.

Pumps are adjustable from 0 to 400 strokes/min.

Manual operation is adjustable from 0 to 100%.

Basic metering is adjustable from 0 to 50%.

Control - here the proportional range from 1 to 500% and all times from 0 to 10000 sec are adjustable.

Feed forward control - here metering from 0 to 50% and the chlorine correction factor (if chlorine is a measured variable) from 1.00 to 2.00 are adjustable.

Solenoid valve - the minimum on time is adjustable from 0.2 s to 150 s in steps of 0.2 s; the cycle time is adjustable from approximately twice the minimum switching time up to 999 s.

Actuator - the potentiometer range is adjustable from 500 Ω to 1200 Ω in steps of 10 Ω ; the minimum position is adjustable within the potentiometer range; the maximum position is adjustable between the minimum position and the upper limit of the potentiometer range.

Unpacking

8 Unpacking



Styrene parts

Repackaging material

<u>ATTENTION</u>

Styrene parts are special waste which must not be placed with domestic waste and must be disposed of separately or reutilised (Special waste acceptance points).

It is best to keep all the repackaging material including the styrene parts for return of the DULCOMARIN[®] Swimming Pool Control Unit for repair or guarantee claims.

After unpacking the following parts should be available:

Units for wall mounting "W"

DULCOMARIN® Swimming Pool Control Unit.

Set of fixing parts (three 5 x 45 round head slotted screws, two 5.3 facing washers and three 8 mm dia. dowels).

Set of Pg 11 and Pg 9 bushings.

Units for panel mounting "S"

DULCOMARIN® Swimming Pool Control Unit.

Set of fixing parts (six plated philips-type screws 3,5 x 6,5; six steel brackets and one rubber foam seal \emptyset 3 mm).

ATTENTION

Check that the details on the identification plate agree with the order details!

If they do not, immediately notify ProMinent Dosiertechnik GmbH, Im Schuhmachergewann 5-11, D-69123 Heidelberg, tel. +49-(0) 62 21/842-0, fax. 842-617.





9 Accessories

Foreign parts

WARNING:

Use original ProMinent parts for mounting. When used in combination with other units, always take account of their technical specifications, otherwise no liability will be accepted.

- Comprehensive accessories lists are given in ProMinent Main Catalogue.
- 9.1 Possible combinations with Original ProMinent Accessories



9.2 CGE chlorine sensor

CGE 2 mA chlorine sensor cell (with two-wire terminal connections). Measurement of free chlorine and chlorines combined with isocyanic acid (total available chlorine).

Sensor assembly (for direct connection to the DULCOMARIN[®]) for measurement of total available chlorine (organic chlorine), fitted in flow transmitter (DLG).

Order No. 79.28.43.5	Measuring range up to 2 ppm
Order No. 79.28.42.7	Measuring range up to 10 ppm
	Further literature: CGE Operation Instructions
	Accessories:
Order No. 72.51.22.6	Two-core 4 mm dia., 2 x 0.25 mm test lead (piece goods, state length when ordering).

Accessories

Order No. 79.18.18.8	Chlorine sensor installation kit for DGM		
Order No. 81.50.79.9	Chlorine sensor installation kit for DLG		
	9.3 CLE chlorine sensor cell		
	CLE 3 mA, chlorine sensor (with two wire terminal connection). Measurement of free chlorine in the absence of isocyanate acid. Sensor assembly (for direct connection to DULCOMARIN [®]) for measurement of anorganic chlorine, fitted in DLG flow transmitter.		
Order No. 79.29.20.1	Measuring range up to 2 ppm		
Order No. 79.29.19.3	Measuring range up to 10 ppm Further literature: CLE Operating Instructions Accessories		
Order No. 72.51.22.6	Two-core, 4 mm dia., 2 x 0.25 mm test lead (piece goods, state length when ordering).		
Order No. 79.18.18.8	Chlorine sensor installation kit for DGM		
Order No. 81.50.79.9	Chlorine sensor installation kit for DLG III A/B		
	9.4 pH measurement		
Order No. 30.50.54.9	PHE 112 SE pH probe measuring range pH 112, for connection to transducer 80.91.26.6.		
Order No. 80.91.26.6	Transducer 4 to 20 mA pH V1		
	The transducer is plugged on the pH-probe and converts their signal to 4 to 20 mA.		
	It is fitted together with the pH-probe into the DGM in line probe housing.		
	Further literature: Operating Instructions/Technical Data Sheet Transducer, 4 to 20 mA.		
	Observe the notes for the installation conditions of the pH-probe. Accessory:		
Order No. 72.51.22.6	Two-core test lead, 4 mm dia., 2×0.25 mm ² (piece goods, state length when ordering).		
	9.5 Measuring redox value		
Order No. 30.50.01.01	Redox probe, RHE-Pt-SE for connection to transducer 80.91.27.4		
Order No. 80.91.27.4	Transducer 4 to 20 mA rH V1		
	The transducer is plugged on the redox probe and transforms its signal to 4 to 20 mA. It is fitted, together with the redox probe, to the DGM in line probe housing.		
	Further literature: Operating Instructions/Technical Data Sheet Transducer 4 to 20 mA.		

Accessories

Observe the notes for installation conditions for the rod measuring chain.

Accessory:

Order No. 72.51.22.6 Two-core test lead, 4 mm dia. 2 x 0.25 mm² (piece goods, state length when ordering).

9.6 Measurement of temperature

Order No. 30.50.63.0 Temperature sensor Pt 100 SE for connection to transducer 80.91.28.2

Order No. 80.91.28.2 Transducer 4 to 20 mA Pt 100 V1

The transducer is plugged in and transforms the signal to 4 to 20 mA. It is fitted to the DGM together with the temperature sensor.

Further literature: Operating Instructions/Technical Data Sheet Transducer 4 to 20 mA.

Observe the notes for the installation conditions of the temperature sensor.

Accessory:

Order No. 72.51.22.6 Two-core test lead, 4 mm dia., 2 x 0.25 mm² (piece goods, state length when ordering).

9.7 In-Line Probe Housing DGM

Modular in-line probe housing for accepting measuring probes. The modules can be mounted one behind the other. Flow sensor with potential-free reed switch Type of contact: Changeover contact

Reference literature:

In-line probe housing DGM operating instructions



10 Installation

The DULCOMARIN[®] can be mounted on a wall or in an instrument panel, depending on the purpose and the type and construction of the swimming bath installation.

<u>NOTE</u>

DIN 19643

<u>) 75</u> N 10642 A

DIN 19643 All machines, fittings and system components must be installed such that they are easily accessible for operating and maintenance purposes!

Wherever possible, install device at eye level!

Leave sufficient space for wiring!

Allow for dimensional deviations which may occur when copying the hole template for wall mounting!

Allow for deviations which may occur when copying the punch template for control panel installation!

10.1 Wall mounting

The DULCOMARIN[®] can be secured directly to a wall by means of a three-point fixing arrangement.



For this purpose, a set of attaching parts consisting of screws, facing washers, dowels and a drilling template are provided with the unit.





- Secure the drilling template to the wall
- A clearance of approximately 100 mm must be left at the top (x) so that the housing upper section can be placed in the "parked position".
- Mark the drill holes after fixing the template in position.

<u>NOTE</u>

You now require an 8 mm dia. drill and a size 5 screwdriver.

- Using an 8 mm diameter drill, drill the top hole approximately 50 mm deep.
- Press in the dowel and screw in the screw leaving the screw head projecting 3.5 to 4 mm.



- A strap is provided on the rear of the housing at the top for hanging the DULCOMARIN[®] on the already-fitted screw.
- Hang the unit in position and pull down until it noticeably engages.
- Now open the housing upper section (8).

10.1.1 Opening the housing

<u>NOTE</u>

You now need a size 2 Philips screwdriver

- Slacken the four Philips screws (9) in the housing upper section (8)
- The screws are held in place by locking rings and remain in the housing upper section
- Grip the unit with both hands and push with the fingers on the housing upper section (a)
- At the same time, pull forwards (b) to unlock the latches and remove the housing upper section from the lower section.



ATTENTION

Carefully separate the upper and lower sections - they are connected to each other by a ribbon cable.

If force is used to separate them, the cable can be damaged.

10.1.2 "Parked position"

• The housing upper section (8) can now be slid, using both its latches, into the upper guide rails of the housing lower section (16) ("parked position").



The terminals, fuse holder and lower wall mounting holes are now readily accessible.

<u>NOTE</u>

•

Transport protection

Now remove the transport protection (styrene strips) from inside the unit. Keep these in case the unit is returned.

10.1.3 Fitting the DULCOMARIN®

- Check the markings for the two lower dowel holes and correct if necessary.
- Push the unit upwards on the wall and disengage from the alreadyfitted screw so that both lower drilling positions are readily accessible.

<u>NOTE</u>

You now need an 8 mm drill and a size 5 screwdriver.

- Using an 8 mm dia. drill, drill both lower dowel holes approximately 50 mm deep and press in the dowels.
- Refit the unit and secure it to the wall using both remaining screws and facing washers.

10.2 Instrument panel mounting (control panel thickness 2 to 3 mm)

The DULCOMARIN[®] can be fitted from outside provided a suitable cutout is present in the instrument panel. The front will then project approximately 40 mm out of the instrument panel.



For this purpose, a set of attaching parts consisting of screws attaching brackets, sealing cord and punching template are supplied with the unit.





10.2.1 Preparation

- Fix the punching template to the case ensuring that there is sufficient room for the electric wiring.
- There must also be an upwards (x) clearance of approximately 100 mm so that the housing upper section can be placed in the "parked position".
- After fixing the template in place, mark the hole positions, (e.g. using a centre punch)

<u>NOTE</u>

You now need a centre punch, a drill approximately 12 to 13 mm dia. suitable for drilling metal, an electric keyhole saw, flat and round files for deburring and a size 2 Philips screwdriver. Note the dimensions given for the punching template.

- Mark out and drill the corners of the breakout.
- Make the cutout using the electric keyhole saw or punch out and completely deburr.
- Position the sealing cord in the circumferential groove on the back of the housing lower section (16).
- Position the housing complete with sealing cord in the cutout.
- Secure in place from behind using six angle brackets and screws (six guide slots for fixing the angle brackets are provided on the back of the unit).



- Now open the housing upper section (8).
- Open the housing and engage in the park position in exactly the same way as for wall mounting **(10.1.2)**.

10.3 Electrical/electronic connections



10.3.1 Terminal/Relay Assignments

NOTE

The terminal blocks are supplied already plugged in!



Terminal block 1 to 3

Measured value input for pH transducer Operation with ProMinent Transducer complete with cable: Terminal 1 (+), brown Terminal 2 (-), white Terminal 3 (not used)

Operation with other 4 to 20 mA signal current source: Terminal 1 (not used) Terminal 2 for (+) signal current source Terminal 3 for (-) signal current source



Terminal block 4/5

pH analogue output for recorder, unit-specific (0/4 to 20 mA range)

Terminal 4 (+) Terminal 5 (-)



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Measured value input for chlorine or redox transducer (dependent on type of device)

Operation with ProMinent transducer complete with cable Terminal 6 (+), brown Terminal 7 (-), white

Terminal 8 (not in used)

Operation with other 4 to 20 mA signal current source: Terminal 6 (not used) Terminal 7 for (+) signal current source Terminal 8 for (-) signal current source



Terminal block 9/10

Analog output, chlorine or redox for recorder (depending on type of device) (0/4...20 mA range)

Terminal 9 (+) Terminal 10 (–)

Terminal block 11/12

Contact input "Feed forward control"



13 14

Terminal 11 (+)

Terminal 12 (–)

Terminal block 13/14

Contact input "error sample flow"

> Terminal 13 (+) Terminal 14 (-)

15 16	Terminal block 15/16 "Pause" contact input: dosing function of DULCOMARIN [®] can be switched on and off from a separate position Terminal 15 (+) Terminal 16 (-)
17 18	Terminal block 17/18 Contact output "control pH metering pump" (floating potential) Terminal 17 Terminal 18
19 20	Terminal block 19/20 Contact output "control CI metering pump" (floating potential) Terminal 19 Terminal 20
21 22 23	Terminal block 21 to 23 Serial interface RS 232 (unit-specific) Terminal 21 (output/transmitted data, TX) Terminal 22 (input/received data, RX) Terminal 23 (reference line, GND)
24 25 26	Terminal block 24 to 26 Reserved for future applications (e.g. RS 485) Terminal 24 Terminal 25 Terminal 26
27 28 29	Terminal block 27 to 29 Measured value input for redox transducer Terminal 27 (+ brown) Terminal 28 (– white) Terminal 29 (not used)
	Operation with other 4 to 20 mA signal current source: Terminal 27 (not used) Terminal 28 for (+) signal current source Terminal 29 for (–) signal current source
30 31	<u>Terminal block 30/31</u> Redox analogue output for recorder Terminal 30 (+) Terminal 31 (-)
32 33 34	Terminal block 32 to 34 Measured value input for temperature transducer Terminal 32 (+ brown) Terminal 33 (– white) Terminal 34 (not used)
	Operation with other 4 to 20 mA signal current source:

Terminal 32 (not used)

Terminal 33 for	(+) signal cur	rent source
Terminal 34 for	(-) signal cur	rent source



Terminal block 35 /36

Temperature analogue output for recorder

⁶ Terminal 35 (+) Terminal 36 (–)



Terminal block 37/38

Reserved for future applications

Terminal 37 Terminal 38



Terminal block 39/40

Reserved for future applications Terminal 39 Terminal 40



Terminal block 41/42

Contact input "pH metering pump fault"

Terminal 41 (+) Terminal 42 (–)



Terminal block 43/44

Contact input "CI metering pump fault"

Terminal 43 (+) Terminal 44 (-)



Terminal block 45/46

Reserved for future applications

Terminal 45 Terminal 46



Terminal block 47 to 49

Input for signalling the position of a servomotor via a 1 kOhm potentiometer

Terminal 47: Potentiometer - slider position for "open" end Terminal 48: Potentiometer - slider

Terminal 49: Potentiometer - slider position for "closed" end



Terminal block 50 to 52

Reserved for future applications Terminal 50 Terminal 51



<u>000</u> L1 N PE <u>Terminal block L1/N/PE</u>

Mains connection Terminal L1 (phase) Terminal N (neutral conductor) Terminal \downarrow (PE/protective earth conductor)



Terminals 57 to 60

Contact output for activating a solenoid valve. Meters product for influencing pH-value.

Terminal 57 (C-root) Terminal 58 (NO contact) Terminal 59 (not used) Terminal 60 (not used)



Terminals 61 to 64

Contact output for actuator activation in "close" direction. Meters product for influencing Cl-concentration. Terminal 61 (C-root) Terminal 62 (NO contact) Terminal 63 (not used) Terminal 64 (not used)



Terminals 65 to 68

Contact output for activating a solenoid valve or for activating an actuator in "open" direction. Meters product for influencing CI-value. Terminal 65 (C-root) Terminal 66 (NO contact) Terminal 67 (not used) Terminal 68 (not used)



Terminals 69 to 72

"Alarm" relay output: Always active even in the case of power failure; with additional DULCOMARIN[®] alarm function for connection of visual or acoustic alarm units.

Terminal 69 (C-root) Terminal 70 (NO contact) Terminal 71 (NC contact)

Terminal 72 (not used)

10.4 Electrical connection of DULCOMARIN®



DANGER:

The safety regulations of the professional associations must be observed when working at or in electrical installations.

- Isolate (shutdown) swimming pool control units before opening.
- To do this, disconnect the units from the mains supply.
- . Make absolutely safe against unauthorised reconnection whilst working on the terminals.
- . Check for absence of voltage.



<u>WARNING</u>

Swimming pool control units and their peripheral devices may only be connected by qualified electricians.

ATTENTION

When connecting the power supply cable, the correct allocation of phase, neutral and protective conductors, marked underneath the main terminal **(PE/N/L1)** on the board, must be observed.

The unit is immediately ready for operation after it has been connected to the mains supply.

Sealed holes which can be broken through to allow the passage of connecting cables for the electrical terminals of the terminal blocks (1 to 3 to PE/N/L1) are located on the underside of the DULCOMARIN[®].





five threaded holes for Pg 9 bushings nine holes for Pg 7 bushing

Pg 9 and P 11 bushings are included in the supply package for units for wall mounting.

10.4.1 Electrical connections for wall mounting -

Electrical connections for panel mounting

<u>NOTE</u>

You now need a screwdriver or a dome-shaped tool of 3.5 mm max dia. (to break out the threaded holes), a suitable screwdriver and 16 mm and 19 mm open ended spanners.

• Using the screwdriver or dome-shaped tool, break out the required number of threaded holes for Pg 9 or Pg 11 bushings, depending on the number of cables.



- Remove a sufficient length of the cabling sheathing (depending on position of the terminals).
- Shorten stranded wires to the necessary total length, strip back insulation by approx. 7 mm, use core sleeves if necessary.
- Fit Pg cable glands (screw fitting, thrust ring and seal) from installation kit on to cables.
- Pass cables through cut-outs corresponding to position of terminals (1...3 to PE/N/L1).
- Screw Pg cable glands into threaded holes.

• Route the wiring as shown in the illustration



- Use multicore cable ends as necessary for entering the wires into the terminals.
- Secure the wires to the terminals using the terminal screws.

<u>NOTE</u>

Unused terminal blocks must also be plugged into the corresponding terminal strips.

• Withdraw the housing upper section (8) from the "Parked position", place on the housing lower section (16) and secure in place using screws.

ATTENTION

Any core wires 30 mm away from the terminals should be bound together with a cable binder!

It must not be possible for live wires to come into contact with low voltage terminals should they should come loose.

10.4.2 Use of Pg 7 bushings

For panel mounting, the cables without Pg bushings should be passed through the threaded holes in the housing lower section.

The row for the Pg 7 bushings is located outside the instrument panel. If required this can also be additionally used.

Bushes are obtainable from your relevant ProMinent branch or representative:

Order No. 70.38.96.1 1 off, Pg 7 cable bushing, black

Order No. 70.38.19.3 1 off, Pg 7 locknut, nickel plated brass

All normal commercial Pg 7 bushings with locknuts can also be used for this purpose.

<u>NOTE</u>

You now require a water pump pliers and backing plate (to break out the threaded holes), a tool to deburr the holes, a lustre terminal screwdriver and a 15 mm hexagonal spanner.

 Using the water pump pliers and backing plate, break out holes for Pg 7 bushings sufficient for the number of cables.



- Deburr the holes completely using a triangular scraper or similar tool.
- Remove sufficient length of the cable sheathing (depending on the position of the terminals).
- Shorten stranded wires to the necessary total length, strip back insulation by approx. 7 mm, use core sleeves if necessary.
- Fit Pg cable glands in cut-out corresponding to position of terminals (1...3 to PE/N/L1) and secure with lock nut.
Installation

- Unscrew union nut and fit on cable.
- Fit cables in cable glands corresponding to position of terminals (1...3 to PE/N/L1) and secure with union nuts.
- Screw Pg cable glands into threaded holes.
- Secure the wires to the terminals using the terminals screws.

<u>NOTE</u>

Unused terminal blocks must also be plugged into the terminal strips before the DULCOMARIN[®] is closed and operated.

• Withdraw the housing upper section (8) from the "parked position", place on the housing lower section (16) and secure in place using screws.

10.5 Electrical connection diagram



ATTENTION:

Although the power supply is switched off, then could be a voltage at the clamps 57 to 72 (as per identity code)!



11 Operation

For swimming pools whose hydraulic, measuring and dosing techniques are harmonised, the self-setting action of the DULCOMARIN[®] ensures optimum water quality regardless of the size of the pool.

The preset set and limit values (identcode-dependent) enable the unit to be operated without practically any operator input. Furthermore, all operating values of the DULCOMARIN[®] can be set as required using pushbutton switches and are therefore adaptable to specific conditions.

<u>NOTE</u>

Settings, text and signal processing are specially set in the DULCOMARIN[®] to the particular application of the swimming pool.

11.1 Controls and indicators



Pushbutton 2

CHANGE - for setting a function/mode or to change within a menu.



Pushbutton 3

DOWN - to decrement a displayed numerical value.



Pushbutton 4

BACK - to leave the operator menu in stages (going back 1 setting level at a time).



Pushbutton 5

UP - to increment a displayed numerical value.



Pushbutton 6

ENTER - to enter (confirm) a displayed value or state (numerical and functional value).



<u>Pushbutton 23</u> Calibration of test probes = entry into the calibration programme.



LCD display 22

Shows functions/mode, numerical values and fault messages.







11.2 Further controls and indicators

Display 1 with LED display 24

pH value and units display Flashing of "pH" = pH outside limits Flashing of green LED display = dosing medium supply for pH.

Display 7 with LED display 10

Display of chlorine value and units or redox voltage Flashing "ppm" = chlorine outside limits Flashing "mV" redox outside limits Flashing green LED display = dosing medium supply for chlorine or redox voltage.

Display 25 with LED display

Display of chlorine value and units or redox voltage Flashing "ppm" = chlorine outside limits Flashing "mV" redox outside limits Flashing green LED display = dosing medium supply for chlorine or redox voltage.



Pushbutton 12 with LED display 11

Cancel alarm = hooter off. Flashing LED display = fault; steady light = alarm cancelled but fault still present.



Pushbutton 14 with LED display 13

Start/stop of control and dosing functions Steady light = control and dosing functions "ON", No steady light = control and dosing functions stopped.

11.3 What information can be called up - what operating values can be set or adjusted.

Setting	
data?	

display informations ?

Set installation ? Set and limit values can be changed from this display.

> Detailed description from page 52

The set operating values can be displayed starting from this display.Detailed description from page 55

The set operating values, and limit values can be changed starting from this display.

> Detailed description from page 64



By pressing this button, the sensors for the measured variables in your unit can be calibrated. pH and chlorine are calibrated but the redox probe is only checked (not calibrated).

> Detailed description from page 46

11.4 General operating instructions from A to Z

Adaption The adaption is used for the automatic adaptation of the control parameters to the changing operating conditions.

To achieve a uniformly good control quality, it is recommended that the control parameters (at least approximately) be adapted to the actual conditions, as the set values serve as basic settings for the adaption.

CAUTION

To ensure effective adaptation, the measurement and control unit must be informed of all interruptions in operation such as reversible-flow filter flushing, circulation stop, measurement water failure via corresponding contact inputs!

- Alarm relay The alarm relay operates as a normally closed contact, i.e. it de-energizes in the event of a fault or power failure. It can be generally de-energized and also de-energized for each limit value.
- Displays (1) and (7) These are updated twice every second.

Outputs These are updated twice every second.

Data backup <u>ATTENTION</u>

The storage of data in the EEPROM requires a certain amount of time. For safety reasons the power should not be switched off until at least 5 seconds has elapsed after a store command.

Dosing Normally, the dosing pumps are automatically controlled relative to the control deviation between the set value and measured value.

It is possible to change over from this automatic dosing to manual dosing. This enables a constant dosing output to be set.

> Setting in "Commissioning" menu as of Page 63

Fault handling The controller features extensive display and processing facilities for faults and disturbances. Any faults which may occur are shown in the display with an explanatory text, the red indicator lamp flashes and the alarm relay is activated. All faults must be confirmed by pressing button 12; the acknowledgement then switches off the alarm relay.

Such extensive fault handling is normally not necessary in the majority of operating situations.

Restricted fault handling In this case, faults are displayed only for as long as they are acute - with the acknowledgement provision in order to switch off the alarm relay. Faults which are rectified without external influence (e.g. adjustment of a limit value transgression by the control) are no longer displayed, switch off the indicator lamp, switch off the alarm and need not be acknowledged. It is possible to switch over the system to complete fault handling.

Setting in "Commissioning, alarm-relay functions" menu, Page 73

Monitoring chlorine metering Chlorine metering can be restricted to the basic load when the upper

	redox limit is exceeded (beyond the set delay time). Error message "redox too high". This is only possible in devices which feature redox measurement.
	 Setting in "Commissioning, chlorine metering functions" menu, Page 66
Information displays	All the setting of the unit can be checked in this menu. This also includes a display of the results of the calibration of the probe (zero point and slope for pH and slope for chlorine).
Control time measured value	A measured signal is regarded as unreliable if it has remained constant beyond the control time. An alarm is then triggered.
	You can switch on this monitoring function by setting the monitoring time to "1" or higher.
	> Refer also to "Faults which you can rectify yourself" from page 76
	> Adjustments in the "Installation menu" from page 63
Solenoid valve	If the unit is equipped to control a solenoid valve, changeover to pump control is possible in the "Installation" menu. Fault messages and warnings are displayed only with reference to the set correcting element. For the solenoid valve as a correcting element the LED flashes approximately thirty times per minute to indicate dosing. Take particular care when changing over to ensure that the old actuator has been switched off properly.
	> Setting in "Installation" menu from page 63
Measurement	All measured values are updated twice a second.
Measurement water	Constant flow of measurement water can be monitored.
	stopped, the red LED (11) flashes and an alarm is triggered.
Pump control	The maximum number of contacts per minute with which the pump can be controlled must be matched to the particular type of pump and the required dosing output.
Pump fault	The functions of the metering pumps for pH correction and chlorine metering can be monitored. If the contact input is activated, the corresponding metering line is stopped, red LED (11) flashes and an alarm is triggered.
Control parameters	Three control parameters can be set. Setting in "Installation" menu from page 63
"xp" control parameter	"xp" is the proportional range. The setting is given as a percentage of the measuring range (pH: 0 to 14 pH, chlorine: 0 to 2 ppm or 0 to 10 ppm, redox: 0 to 1000 mV).
	If there is a control deviation of the magnitude of the proportional range, the dosing pump is driven at the max. set storke frequency. If the xp value is too small this causes considerable changes in the control of the dosing pump - overdosing is possible.
	If the xp value is too large, the response to the control deviations can be too little.

"Tn" control parameter	"Tn" is the residual time (integral action part of the control) Its value should be approximately double the reaction time (this is the time between a dosing operation and the succeeding measured value change). If the "Ti" value is too small there is a danger that the control system will hunt. If the "Ti" value is too large, control deviations can only be very slowly compensated.
"Tv" control parameter	"Tv" is the derivative action time constant (differential part of the control) its value should be approximately half the value of the reaction time. If the "Td" value is too large, the control action is unsteady.
Closed loop control	The DULCOMARIN [®] is a modern PID controlling system with saturation avoidance. The better the PID controlling parameters are set, the faster the adaption
	can operate. The control parameters are preset depending on the type of swimming pool (as set on delivery).
Type of swimming pool	If the basic setting of the swimming pool type is changed over, the set and limit values must also be changed over accordingly. The alarms of the limit values are "not active"
	For heavy chlorination, the slope of the probe signal is changed over to the enlarged measuring range (and vice versa). The recorder output range is also appropriately set at the same time.
	The alarm relay is generally activated.
	When changeover to whirlpool is made the dynamics of the adaption process are also adjusted.
	When changing over the type of swimming pool the PID control parameters are not changed over.
	> Setting in the "Installation" menu from page 63
Locking setting menu	The setting menu is locked to protect the controller from unauthorized use. Calibration and information menu remain accessible. Access to the setting menu can be permitted.
	> Setting in the "Installation/Functions" menu from page 73
Correcting variable	The correcting variable is recalculated every 2 seconds. Control processes with a faster reaction are not possible.
Servomotor	If the unit is equipped for the control of a servomotor, it is possible to change over in the "Installation" menu to pump control. Fault messages and warnings are displayed only with reference to the set correcting element.
	For the servomotor correcting element the LED flashes at a rate of approximately thirty times per minute to indicate dosing.
	It is important that all the set values be stored before leaving the corresponding menu. If the menu is left without storing, the old settings remain unchanged.

	If the servomotor does not reach its set position in five minutes a warning is output. If the motor reaches a range of $\pm 1\%$ of the potentiometer range around the set position, it is stopped. When the deviations exceed $\pm 2\%$ the servomotor again becomes active.
	In the "Installation" menu the servomotor can be activated by pressing the arrow button (3) or adjusted by (5).
	> Setting in the "Installation" menu from page 63.
Disturbance variable	The pH and chlorine concentration can be influenced by aeration, e.g. in a whirlpool. The "disturbance variable" contact input is used to provide an immediate
	reaction which improves the control action.
	The necessary basic forward feed variables for pH correction or chlorine metering must be determined by trials.
	pH correction can be set to a basic load.
	Chlorine metering can be set to a basic load.
	The pH dependency of chlorine measurement can be compensated by a correction factor for the duration of forward feed control.
	The factor effects the chlorine measured value used by the control, but not the displayed value.
	> Setting in the "Commissioning" menu from page 63
Chlorine/redox changeover	If the chlorine measurement shows a fault, it may be necessary to use the redox measurement instead for control of the chlorine content. Changeover is possible.
Chlorine/redox changeover	If the chlorine measurement shows a fault, it may be necessary to use the redox measurement instead for control of the chlorine content. Changeover is possible. > Setting in the "Installation" menu from page 63
Chlorine/redox changeover	 If the chlorine measurement shows a fault, it may be necessary to use the redox measurement instead for control of the chlorine content. Changeover is possible. Setting in the "Installation" menu from page 63 When this happens the following settings remain unchanged.
Chlorine/redox changeover	 If the chlorine measurement shows a fault, it may be necessary to use the redox measurement instead for control of the chlorine content. Changeover is possible. Setting in the "Installation" menu from page 63 When this happens the following settings remain unchanged. Maximum number of strokes per minute of the dosing pump Basic load dosing Automatic/manual dosing Control parameter "Ti" Control parameter "Td" The setting which decides whether the control parameters are to be adaptively changed
Chlorine/redox changeover	 If the chlorine measurement shows a fault, it may be necessary to use the redox measurement instead for control of the chlorine content. Changeover is possible. Setting in the "Installation" menu from page 63 When this happens the following settings remain unchanged. Maximum number of strokes per minute of the dosing pump Basic load dosing Automatic/manual dosing Control parameter "Ti" Control parameter "Td" The setting which decides whether the control parameters are to be adaptively changed
Chlorine/redox changeover	 If the chlorine measurement shows a fault, it may be necessary to use the redox measurement instead for control of the chlorine content. Changeover is possible. Setting in the "Installation" menu from page 63 When this happens the following settings remain unchanged. Maximum number of strokes per minute of the dosing pump Basic load dosing Automatic/manual dosing Control parameter "Ti" Control parameter "Td" The setting which decides whether the control parameters are to be adaptively changed The following should be set. Redox set value "xp" control parameter
Chlorine/redox changeover	 If the chlorine measurement shows a fault, it may be necessary to use the redox measurement instead for control of the chlorine content. Changeover is possible. Setting in the "Installation" menu from page 63 When this happens the following settings remain unchanged. Maximum number of strokes per minute of the dosing pump Basic load dosing Automatic/manual dosing Control parameter "Ti" Control parameter "Td" The setting which decides whether the control parameters are to be adaptively changed The following should be set. Redox set value "xp" control parameter Note that the LED always flashes on "Chlor" to indicate dosing.
Chlorine/redox changeover	 If the chlorine measurement shows a fault, it may be necessary to use the redox measurement instead for control of the chlorine content. Changeover is possible. Setting in the "Installation" menu from page 63 When this happens the following settings remain unchanged. Maximum number of strokes per minute of the dosing pump Basic load dosing Automatic/manual dosing Control parameter "Ti" Control parameter "Td" The setting which decides whether the control parameters are to be adaptively changed The following should be set. Redox set value "xp" control parameter Note that the LED always flashes on "Chlor" to indicate dosing. When the chlorine measurement again functions correctly, change the chlorine dosing back to chlorine measurement.

water, forward feed control, pause and pump fault) can be set as normally open and as normally closed contacts. The delivery status is "normally open contact". If they are switched over to "normally closed contact" the line interrupts are also processed as a signal (e.g. for safety shut-down). The inputs which are not used must then be bridged.

> Setting in "Commissioning" menu, as of Page 63

- Alarm delay time If the set limits for a measured value are not maintained, the particular alarm is activated and if the out-of-limits operation persists longer than the set delay time, the alarm is then activated.
 - > Refer also to "Faults which you can rectify yourself" from page 76
 - > Setting in the "Installation" menu from page 63
 - Access code The purpose of the access code is to prevent unauthorised access to the relevant part of your settings.

> Setting in "Installation" menu from page 63

<u>NOTE</u>

It is absolutely necessary to make note of your access code. If your "Installation" menu is no longer accessible, please call your Customer Service.

11.5 Special operating conditions

Start/stop button (14) Operation of the start/stop button can stop all dosing operations (the message "Stop button" appears in the alternate part of the display) and restart them again.

The same applies for the calculation or adaption of the control variables.

"Pause" contact input If the "Pause" contact is applied, the red LED (11) is continuously on and the green LED (13) is turned off.

All dosing operations are stopped and the calculation of the control variables is interrupted.

The message "Pause" appears in the alternate part of the display.

This contact input is useful, for example, during backwashing of filters.

Faults which may occur during a "pause" are not processed or displayed. The control is stopped. Both functions begin once again 2 minutes after the end of the "pause". This facilitates, for instance, over night cut-out with calm restart.

11.6 **Calibration and testing**

11.6.1 Why calibrate and test?

Regular calibration serves to check the functional serviceability and the calibration of the zero point and slope (sensitivity) of probes.

pH probes require calibration of both the zero point and slope. Buffer solutions whose pH is clearly different, e.g. pH 4.0 and pH 7.0, are used for this purpose.

Because of its considerable zero point stability, a DULCOMARIN® chlorine measuring cell requires only slope calibration. This is achieved by comparison with a measurement in accordance with the DPD value (reference measurement of chlorine content).

Redox probes are not calibrated but are instead given a functional test consisting of comparing the measured value with a buffer solution.

The temperature probe is not checked or calibrated.

11.6.2 How is calibration and testing performed?

In order to calibrate/check the pH or redox probe, interrupt the supply of measurement water and unscrew the bottom dummy plug on the corresponding module of the in-line probe housing DGM. Fill the calibration cup with standardized buffer solution.

ATTENTION

Follow the procedural steps as specified by the DULCOMARIN[®].

Observe the instructions enclosed with each probe.

11.6.3 Buffer solutions for calibrating and testing

Order No. 50.62.51.8	Quality buffer solution pH 4.0 (coloured red, 50 ml)
Order No. 50.62.53.4	Quality buffer solution pH 7.0 (coloured green, 50 ml)
Order No. 50.62.55.9	Quality buffer solution pH 10.0 (coloured blue, 50 ml)
Order No. 50.62.44.3	Quality buffer solution, redox 220/185 mV, 50 ml
Order No. 50.62.40.1	Quality buffer solution, redox 465/430 mV, 50 ml



WARNING

The 465/430 mV buffer solution is very corrosive.

(





11.6.5 Calibration of pH probe

pH buffer self recognition pH 4, pH 7 and pH 10

pH calibration

Zero point is accepted between -30 mV and +30 mV
 Zero point with warning is accepted up to -60 mV and +60 mV
 The slope is always stated in mV/pH.
 Slope is accepted between 62 mV/pH and 53 mV/pH
 Slope is accepted with warning up to 65 mV/pH and 45 mV/pH



change buffer ! Buffer < pH XXX.XX ! Buffer > pH XXX.XX !

11.6.6 pH probe warnings and fault messages

When calibrating the pH probe in the second buffer and this solution has too little difference from the first buffer solution (difference less than dpH=2), the following alternate displays then appear.

Using the solution enables a new prompt to be reached for continuing the calibration in a second buffer solution.

If this is then performed successfully, or if the S-button is used to change over without calibration to a second buffer (limited calibration), the result of the calibration of the pH probe is then displayed.

Zero p. X	(XXX.X mV
Slope XXX	X.XX mV/pH

If the solution is again used to continue, the result of the calibration is analyzed.

If the following messages are displayed



the pH probe is in a state which differs slightly from the normal (but is still acceptable).

If the following messages are displayed



the pH probe is then in a state which deviates considerably from the normal, which would lead to a limitation with regard to further functioning. It is recommended that the probe be changed as it is presumably defective.

The following message is displayed



and the following message appears in the alternate messages of the unit state



and continues to be displayed until the next successful calibration of the pH probe (until then the dosing is stopped).

11.6.7 Calibration of chlorine probe

Calibration of chlorine The signal slope is accepted in the 0.25 to 2.0 times range of the signal slope in the delivery state of the probe.

Warnings in the range up to 0.125 or 4.0 times.

A serviceable probe has a signal slope of 6,5 mA/ppm at a measuring range of 2 ppm and of 1.3 mA/ppm at a measuring range up to 10 ppm.



11.6.8 Chlorine probe warnings and fault messages

If when the DPD value from the reference measurement is input it is too small, no calibration is carried out and the following message is displayed.



Operation of the button enable a further input of a DPD reference value.

If the calibration can be performed, it is then analyzed.

If the following messages appear



the chlorine probe is then in a state which deviates slightly from the normal (but is still acceptable).

If the following messages appear



the chlorine probe is in a state which deviates considerably from the standard, which would lead to limitation for further functioning. It is recommended that the probe be changed as it is presumably defective.

The following message is displayed.



and the following message appears in the alternate messages of the unit state



and remains displayed until the next successful calibration of the chlorine probe (until then the dosing remains stopped or is reduced to the set constant load).

11.6.9 Redox probe test procedure

Buffer self recognition

Redox 465 mV

Redox test

Warning up to \pm 30 mV No warning in the range within \pm 15 mV of the buffer.



11.6.10 Redox probe warnings and fault messages

After the probe is immersed in a buffer, the measured and input redox potential values are displayed



Pressing the button checks whether the difference between the measured and buffer value is too great.

If the following messages appear



the redox probe is in a state which deviates slightly from the standard (but is still acceptable)

If the following messages appear



the redox probe is in a state which deviates considerably from the standard, which would lead to limitations in further functioning. It is recommended that the probe be changed as it is presumably defective.

The following message is displayed



and in the alternate messages of the unit state the following is displayed

check ORP	
defective	

and continues to be displayed until the next successful calibration of the redox probe (until then dosing is stopped or reduced to the set constant load).

11.7 Change setting data

11.7.1 Main menu setting data



11.7.2 pH setting



11.7.3 Chlorine setting (with chlorine measurement)

11.7.4 Setting redox (where redox measurement facility is available))



- 11.7.5 Setting temperature (where temperature measurement facility is available)
- 11.7.6 Setting functions



- 11.8 Display information
- 11.8.1 Main menu information



11.8.2 pH information



11.8.3 Chlorine information





11.8.4 Redox information





11.8.5 Temperature information



11.8.6 Function information





11.9 Commissioning procedure





11.9.2 Commissioning pH





11.9.3 Commissioning chlorine







11.9.4 Commissioning redox






11.9.5 Commissioning temperature



11.9.6 Commissioning functions







12 Fault messages/trouble shooting

Fault display • Faults are displayed only outside of the setting menu (i.e. in the basic menu) as LCD text.

The error messages appear as an alternating display, e.g. in alternation with the text "device in operation".

- If a fault occurs during a setting, only the red LED display (11) is activated. The hooter and LCD text (22) can only be activated in the basic menu.
- Fault processing is limited during calibration

Fault handling • Pressing the confirm key (12) is important for fault handling.

- Cancelling a fault resets the alarm relay, to which for example a signalling device such as a hooter can be connected, regardless of the presence of other faults. The LED (11) goes to a continuously on state. LCD text (22) is displayed until rectification of the cause is shown on the alternate display.
- The setting and calibration menus can be used even with a fault pending (also not acknowledged).

Restricted fault handling:

• If the cause of the fault is no longer applicable, the error message is cleared from the alternating display; the LED (11) goes out, the alarm switches off without the need for acknowledgement.

Complete fault handling:

Faults which disappear before they have been acknowledged remain in the alternating display and are identified in the LCD text (22) with an "*". The indicator lamp and alarm are active up to acknowledgement.

12.1 Faults which you can rectify yourself

Limit infringements

- Alarm active and red LED (11) flashes
- Press the cancel button (12) to switch off the alarm.
- LED units flash (regardless of the delay time) the following messages may appear depending on the type of equipment.



i.e. the particular measured value is outside the set limit. This limit infringement persists longer than the set delay time.

- Check the set limits and/or the delay time.
- An improved matching of the set control parameters to the actual conditions may be necessary.

Probe failure	 Alarm active and LED (11) flashes. Press the cancel button (12) to switch off the alarm The following messages may appear, depending on the type equipment pH probe Chlorine probe defective Chlorine probe defective Chlorine probe defective
Measured value monitoring	 i.e. the relevant measurement signal is interrupted or distinct exceeds the permissible measuring range. pH probe failed: pH dosing is stopped Chlorine or redox probe failed: Chlorine dosing is reduced to the set basic load Check that the probe, transducer and cable are correctly connecter If the measurement signal distinctly exceeds the permissib measurement range (chlorine in particular), then reduce the chlorin concentration in the permissible range. Notify the Customer Service if necessary. After the cause of the fault has been removed the unit will continue to operate correctly. Alarm active and red LED (11) flashes. Press the cancel button (12) to switch off the alarm. The following messages may appear, depending on the type of units of the set of th
Defective data	pH probe error Chlorine probe error ORP probe error temperature probe error i.e. the particular measured signal is unreliable. A measured sign is regarded as unreliable if it remains constant beyond the monitorin time. pH probe malfunction pH dosing is stopped Chlorine or redox probe malfunction: Chlorine dosing is reduced to the set basic load Check that the probe, transducer and cable are correctly connected Adjust control time if necessary Notify Customer Service if necessary After the cause of the fault has been removed, the unit will continu to operate correctly. Alarm active and red LED (11) flashes Press the cancel button (12) to switch off the alarm. The following messages may be displayed depending on the typ of unit,

i.e. the stored data is defective.

Check

data input

Check

mA output

- The particular dosing is stopped
- Check the set data and set new data if necessary
- Press stop/start button (14)
- Notify Customer Service if necessary

Red LED (11) lights permanently.

- After removal of the cause of the fault the unit will continue to operate correctly.
- Wrong time •
- set time & date

i.e. internal time and date processing is faulty, e.g. due to battery failure.

- All time-dependent outputs in the protocol are stopped. The time is not specified for all further outputs in the protocol.
- Reset time and date.
 The battery is recharged after the device has been switched on for approx. 2 days.

Have a defective battery replaced only by Service!

Actuator fault • Red LED (11) lights permanently

motor valve CI control defect

i.e. the actuator does not reach the specified position.

- Check actuator and position feedback.
- Call in Service if necessary.
- The device continues trouble-free operation once the cause of fault has been eliminated.
- Pump fault Alarm active and red LED (11) flashes

pump pH error		pump chlorine error
01101	וו	01101

i.e. a fault signal is sent from the metering pump with fault signalling relay to the corresponding contact input of the controller.

- Metering (pH or chlorine) is stopped.
- Check that the pumps are operating correctly.

Measurement water flow fault

- Alarm active and red LED (11) flashes
- i.e. the contact for measurement water monitoring is active.
- All metering functions are stopped.
- Check flow of measurement water.

12.2 Faults which must be notified to the Customer Service for rectification.

Measured value input disturbed Measured value input absent

- Alarm active and red LED (11) flashes.
- Press the cancel button (12) to switch off the alarm
- The following messages may be displayed, depending on the type of unit,

pH input	chlorine input	ORP input	temp. input
error	error	error	error
a malfunction is present in the alextrical preserving			

i.e. a malfunction is present in the electrical processing.

check circuit	check circuit	check circuit	check circuit
pH input	chlorine input	ORP input	temp. input
o an installation fault is present			

i.e. an installation fault is present

- pH probe:
- pH dosing is stopped
- pH value display (1) reads "-1".

Chlorine or redox probe

- Chlorine dosing is reduced to the set basic load
- The chlorine or redox value indication (7) reads "-1"
- Notify Customer Service
- Red LED (11) continuously on.
- The following messages may be displayed, depending on the type of unit.

pH output	chlorine output	ORP output	temp. output
error	error	error	error

- i.e. a fault is present in the electrical processing
- Notify Customer Service
- After removal of the cause of the fault the unit will continue to operate correctly
- Alarm active and red LED (11) flashes.
- Press the cancel button (12) to switch off the alarm
- The following messages may be displayed, depending on the type of unit,

check circuit	check circuit	check circuit	check circuit
pH output	chlorine output	ORP output	temp. output

i.e. an installation fault is present

Notify customer service

Measured value output disturbed

Measured value output absent

RS interface faulty

No RS interface

- Red LED (11) lights permanently.
- Following messages can appear depending on the type of device:

_	4 h a n a 🕹 a	
	error	
	RS interface	

i.e. there is a fault in the electrical wiring

check circnit RS	
interface	

i.e. there is an assembly fault.

- Call in Service.
- Memory defect
- Alarm active and red LED (11) flashes
- Press the cancel button (12) to switch off the alarm
- The following message is displayed



i.e. the stored data are defective.

- All dosing is stopped.
- Notify Customer Service

12.3 Operation Messages

Stop key
 Pause

Stops all metering functions because the stop button (14) has been pressed.

Interruption in metering by pause contact. Interruption in all error messages with alarm.

Maintenance

13 Maintenance

The measuring, control and recording equipment requires regular maintenance and functional checks by the operator.

Functional checks and adjustment of the equipment as necessary are to be performed at regular intervals.

Maintenance contract It is recommended that a maintenance contract be concluded with a specialist company.

13.1 General maintenance



DANGER:

When working at or in electrical systems the safety regulations of the professional associations must be followed.

- . Isolate swimming pool control units before opening (switch off).
- To do this, disconnect from the electrical mains supply.
- . Make absolutely certain that unauthorised switch on cannot occur during maintenance work.
- . Check for absence of voltage.



WARNING!

Swimming bath control units and their peripheral equipment may only be connected by specialized personnel and qualified electricians.

Notify your relevant Customer Service.

Enter the address and telephone number of your supplier and Customer Service here :



Order No. 71.20.57.9 Order No. 71.20.26.4

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ATTENTION:

Do not clean the front panel using sharp or corrosive cleaning agents

Do not allow cleaning fluids to flow under the front panel.

13.2 Replacement of miniature fuse (17)

- A defective fuse can be replaced by a commercial miniature fuse.
- Unscrew the housing upper section (8), place in parked position < Fig. left>, open the fuse holder and change the fuse.
 - For unit type 230 V: miniature fuse 0.20 A delay action.
- For unit type 115 V: miniature fuse 0.315 A, delay action.
- Close the fuse holder and refit the upper section using screws.

Customer service

Rules and Regulations

14 Rules and Regulations

14.1 Statutory regulations and technical rules for the system operator

The latest version of the following regulations and rules of the Federal Republic of Germany or the corresponding ones of your country are to be observed at all costs when operating a public pool!.

BSeuchG	${\sf Paragraph}11oftheFederalLawConcerningthePreventionofEpidemics.$
GUV 18.14	Safety regulations for pools.
VBG 65	"Chlorination of water" Accident Prevention Regulation and Implementa- tion Order to VBG 65
DIN 19643	Treatment and disinfection of swimming pool and bathing pool water.
DIN 38404 Part 5	Standard methods of water analysis; determination of pH level.
DIN 38404 Part 6	Standard methods of water analysis; determination of redox voltage
DIN 38408 Part 4	Standard methods of water analysis; determination of free chlorine and total chlorine
DIN 57100/VDE 0100	Erection of power installations with rated voltages up to 1000 V
DIN 57100/VDE 0100 Part 702	Covered swimming pools (indoor swimming pools and outdoor swimming pools)
KOK Guidelines	KOK (Coordination Committee for Baths) Guidelines for technical and hygienic requirements for operating baths.
	14.2 Applicable Directives/Standards, Approvals
	14.2.1. EC Directives
EC Low voltage directive	(73/23/EEC)

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

Rules and Regulations

14.2.2 Harmonised EN Standards

EN 60335-1	Safety of electrical devices for domestic use
EN 61010-1	Safety of measuring, control and laboratory devices
EN 60720-1	Automatic electrical control devices for domestic use and similar applications
EN 50081-1/2	EMC, Basic standard governing emitted interference in domestic/industrial applications
EN 61000-3-2	EMC, Limits for harmonic currents
EN 61000-3-3	EMC, Limits for voltage fluctuations and flicker
EN 50082-1/2	EMC, Basic standard governing interference immunity in domestic/industrial applications
EN 61000-4-2	Testing interference immunity to electrostatic charge
EN 61000-4-4	Testing interference immunity to rapid transient interference/burst
EN 55011	Radio interference suppression of electrical equipment and systems

14.2.3 Other National and International Stadards

DIN VDE 0875 P11	Corresponds to EN 55011
DIN VDE 0700 P1	Corresponds to EN 60335-1 and IEC 335-1
DIN VDE 0700 P500	Routine testing of equipment
DIN 50016	Load in moist/changeable climate
DIN VDE 0411 P1, IEC 1010-1	Corresponds to EN 61010-1
VDE 0838 P2, IEC 1000-3-2	Corresponds to EN 61000-3-2
VDE 0838 P3, IEC 1000-3-3	Corresponds to EN 61000-3-3
VDE 0847 P4-2, IEC 1000-4-2	Corresponds to EN 61000-4-2
VDE 0847 P4-4, IEC 1000-4-4	Corresponds to EN 61000-4-4

14.2.4 Device Approvals

Europe CE mark

14.3 Confirmation

14.3.1 Note on Conformity Declaration/Manufacturer's Declaration

Conformity with EC directives is certified with a conformity declaration (refer to page 5).

Repairs/disposal of old parts

15 Repair



DANGER:

When working at or in electrical systems the safety regulations of the professional associations must be followed.

- Isolate swimming pool control units before opening (switch off)
- To do this, disconnect from the electrical mains supply
- Make absolutely certain that unauthorized switch on cannot occur during maintenance.
- Check for absence of voltage



<u>WARNING!</u>

Swimming bath control units and their peripheral equipment may only be connected by specialist personnel and qualified electricians.

Notify your relevant Customer Service

Customer service

Enter the address and telephone number of your supplier and Customer Service here :

16 Disposal of old parts



NOTE:

Plastics and electronic scrap are special waste and must be recycled.

AbfG, AbfRestÜberwV Waste, (old parts) are to be disposed of in accordance with "regulated disposal to preserve the public welfare and in particular to protect the environment". Therefore, old parts must be disposed of in accordance with the Law for the Avoidance of Waste (Abfg) or sent for recycling in accordance with the Waste and Residual Substances Monitoring Order (AbfRestÜberwV).

Taking back old partsThe community small quantity collection service of the towns or districts
will take back plastics and electronic scrap.

If you are unable to find a suitable disposal point, <u>your local</u> <u>ProMinent Branch or Representative</u> (address given on the back page/page of this Instruction manual)

will take back your old parts against a small share of the cost.

Notes