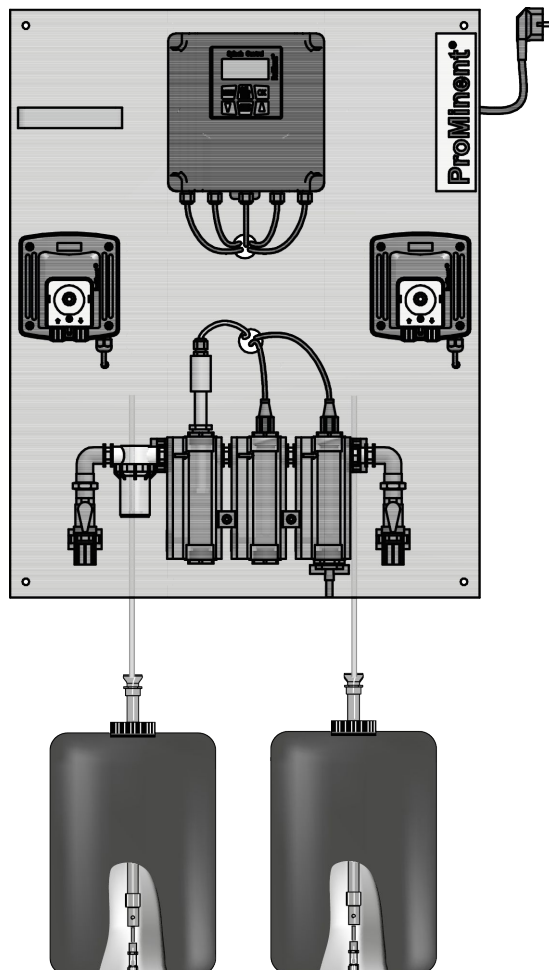


Assembly and operating instructions

DULCODOS® Pool Basic

EN



A0953

Please carefully read these operating instructions before use. · Do not discard.
The operator shall be liable for any damage caused by installation or operating errors.
The latest version of the operating instructions are available on our homepage.

General non-discriminatory approach

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

Supplementary information


Please read the supplementary information in its entirety.

Information



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

Safety Information

The safety information includes detailed descriptions of the hazardous situation, see  *Chapter 3.2 'Explanation of the safety information' on page 9*

The following symbols are used to highlight instructions, links, lists, results and other elements in this document:

More symbols





Symbol	Description
1. 	Action, step by step
	Outcome of an action
	Links to elements or sections of these instructions or other applicable documents
	List without set order
<i>[Button]</i>	Display element (e.g. indicators) Operating element (e.g. button, switch)
<i>'Display /GUI'</i>	Screen elements (e.g. buttons, assignment of function keys)
CODE	Presentation of software elements and/or texts

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1 Identity code

DSPa	DULCODOS® Pool Basic			
	Measured variable:			
PR0	Basic: pH / ORP			
	Hardware auxiliary functions:			
0	Standard			
	Software auxiliary functions:			
0	none			
	Communication interfaces:			
0	none			
	Electrical connection:			
A	230 V, 50/60 Hz, European standard plug			
B	230 V, 50/60 Hz, Swiss plug			
	Sensor equipment:			
0	with sensors			
A	without sensors			
	Design:			
0	with ProMinent logo			
1	without ProMinent logo			
	Language:			
D	German	I	Italian	
E	English	N	Dutch	
F	French	R	Russian	
G	Czech	S	Spanish	
	Metering pumps for acid/alkali:			
0	without metering pumps			
	DULCO®flex (peristaltic pump):			
1	0.8 l/h (DULCO®flex DF2a 0208)			
2	1.6 l/h (DULCO®flex DF2a 0216)			
3	2.4 l/h (DULCO®flex DF2a 0224)			
	alpha (motor-driven metering pump):			
4	1.8 l/h (alpha ALPc PVT)			
5	3.5 l/h (alpha ALPc PVT)			
	Multifunctional valve for acid/alkali pump:			
0	none			
1	with MFV (alpha only)			
	Metering pumps for disinfection:			
0	without metering pumps			

DSPa	DULCODOS® Pool Basic											
											DULCO®flex (peristaltic pump):	
											1	0.8 l/h for up to 45/10 m ³ /h circulation HB/FB*
											2	1.6 l/h for up to 90/20 m ³ /h circulation HB/FB*
											3	2.4 l/h for up to 140/30 m ³ /h circulation HB/FB*
											alpha (motor-driven metering pump):	
											4	1.8 l/h for up to 100/20 m ³ /h circulation HB/FB*
											5	3.5 l/h for up to 200/40 m ³ /h circulation HB/FB*
											Multifunctional valve for disinfection pump	
											0	none
											1	with MFV (alpha only)
											Assembly	
											0	supplied loose without mounting plate
											1	mounted on a base plate
											Certification	
											0	with CE certification

* calculated for 12 percent sodium-calcium hypochlorite

- HB = Indoor swimming pool
- FB = Outdoor swimming pool

2 About this product

DULCODOS® Pool metering systems are specifically designed for the treatment of swimming pool water. Ready mounted, fully-wired and ready for use, they take on the job of pH value adjustment and disinfection with chlorine.

DULCODOS® Pool metering systems are equipped with all the necessary components mounted on a plate:

- Sensors
- Controller
- Metering pumps

2.1 Overview of Equipment

Components

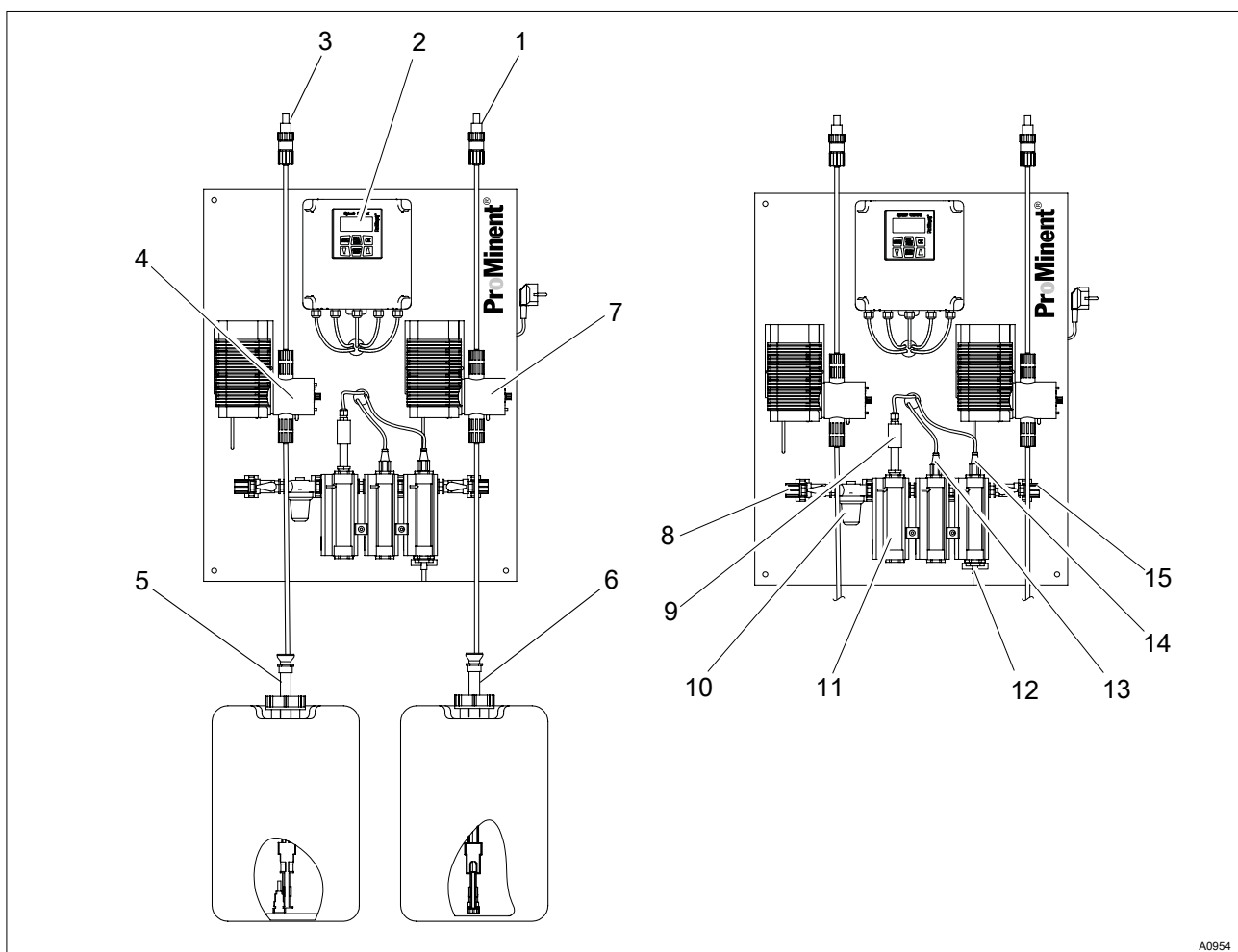


Fig. 1: Overview of equipment of DULCODOS® Pool metering system Basic (with metering pumps alpha)

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Injection valve for disinfection 2. Controller 3. Injection valve for acid 4. Metering pump for acid 5. Suction assembly for acid 6. Suction assembly for disinfection 7. Metering pump for disinfection 8. Ball valve, inlet side 9. Flow sensor | <ol style="list-style-type: none"> 10. Dirt filter 11. Flow module with flow sensor 12. Sampling tap 13. pH sensor* 14. ORP sensor 15. Ball valve, outlet side <p>* To be fitted by the customer. These components are ready for subsequent installation, but are supplied separately to avoid damage in transit.</p> |
|--|---|

Control elements

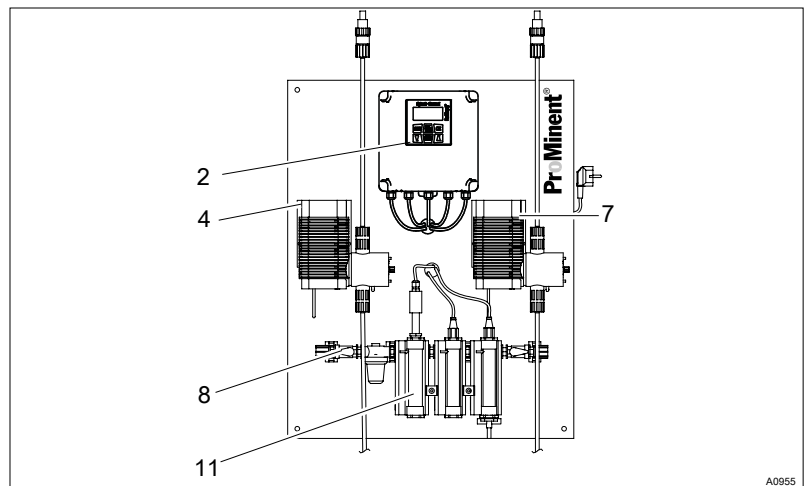


Fig. 2: Control elements of the DULCODOS® Pool metering system Basic (with all options and metering pumps alpha)

The following are used as control elements:

2. Controller keys and display
4. concealed, stroke adjustment dial inside the metering pump
7. concealed, stroke adjustment dial inside the metering pump
8. Ball valve, in-line probe housing, inlet side
11. Flow meter (by scale)

3 Safety and Responsibility

3.1 Users' qualifications



WARNING!

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

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

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

Training	Definition
Instructed personnel	An instructed person is deemed to be a person who has been instructed and, if required, trained in the tasks assigned to him/her and possible dangers that could result from improper behaviour, as well as having been instructed in the required protective equipment and protective measures.
Trained user	A trained user is a person who fulfils the requirements made of an instructed person and who has also received additional training specific to the system from ProMinent or another authorised distribution partner.
Trained qualified personnel	A qualified employee is deemed to be a person who is able to assess the tasks assigned to him and recognize possible hazards based on his/her training, knowledge and experience, as well as knowledge of pertinent regulations. The assessment of a person's technical training can also be based on several years of work in the relevant field.
Electrician	Electricians are deemed to be people, who are able to complete work on electrical systems and recognize and avoid possible hazards independently based on his/her technical training and experience, as well as knowledge of pertinent standards and regulations. Electricians should be specifically trained for the working environment in which they are employed and know the relevant standards and regulations. Electricians must comply with the provisions of the applicable statutory directives on accident prevention.
Customer Service department	Customer Service department refers to service technicians, who have received proven training and have been authorised by ProMinent to work on the system.



Note for the system operator

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

3.2 Explanation of the safety information

Introduction

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

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



DANGER!

Nature and source of the danger

Consequence: Fatal or very serious injuries.

Measure to be taken to avoid this danger

Danger!

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



WARNING!

Nature and source of the danger

Possible consequence: Fatal or very serious injuries.

Measure to be taken to avoid this danger

Warning!

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



CAUTION!

Nature and source of the danger

Possible consequence: Slight or minor injuries, material damage.

Measure to be taken to avoid this danger

Caution!

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



NOTICE!

Nature and source of the danger

Damage to the product or its surroundings

Measure to be taken to avoid this danger

Note!

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



Type of information

Hints on use and additional information

Source of the information, additional measures

Information!

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

3.3 General Safety Information



WARNING!

Danger from hazardous substances!

Possible consequence: Fatal or very serious injuries.

Please ensure when handling hazardous substances that you have read the latest safety data sheets provided by the manufacture of the hazardous substance. The actions required are described in the safety data sheet. Check the safety data sheet regularly and replace, if necessary, as the hazard potential of a substance can be re-evaluated at any time based on new findings.

The system operator is responsible for ensuring that these safety data sheets are available and that they are kept up to date, as well as for producing an associated hazard assessment for the workstations affected.



WARNING!

Live parts!

Possible consequence: Fatal or very serious injuries

- Measure: Disconnect the mains power supply prior to opening the housing
- De-energise damaged, defective units or units that have been tampered with by disconnecting the mains plug



WARNING!

Unauthorised access!

Possible consequence: Fatal or very serious injuries.

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



WARNING!

Operating faults!

Possible consequence: Fatal or very serious injuries.

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



CAUTION!

Electronic malfunctions

Possible consequence: Material damage right through to irreparable damage to the unit

- Do not lay the mains connection cable and data cable together with cables that are prone to interference
- Measure: Take appropriate interference suppression measures



CAUTION!

Warning of feed chemical spraying around

Spraying feed chemical caused by a leak.

Possible consequence: Injuries caused by chemicals.

- Regularly check the system for leaks.
- Ensure that the system with all components can be de-energised from outside the danger zone by appropriate measures (e.g. emergency stop switch etc.).



NOTICE!

Correct sensor operation / Run-in period

Damage to the product or its surroundings

- Correct measuring and metering is only possible if the sensor is working perfectly
- It is imperative that the run-in periods for the sensors are adhered to
- Allow for run-in periods when planning commissioning
- It may take a whole working day to run in the sensor
- Please read the operating instructions for the sensor



NOTICE!

Correct sensor operation

Damage to the product or its surroundings.

- Correct measuring and metering is only possible if the sensor is working perfectly
- Check and calibrate the sensor regularly



NOTICE!

Compensation for control deviations

Damage to the product or its surroundings

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

3.4 Intended Use



Intended Use

The unit is designed to measure and regulate the pH value and chlorine content in swimming pools. Usually the integrated metering pumps are intended for metering the necessary chemicals. Only connect other feeder assemblies, such as electrolysis systems or calcium hypochlorite systems, if these systems are intended for use in swimming pools.

Only use the unit in accordance with the technical details and specifications provided in these operating instructions and in the operating instructions for the individual components (such as sensors, fittings, calibration instruments, metering pumps etc.).

All other uses or modifications are prohibited.

4 Storage and transport

Ambient conditions for storage and transport without sensors



CAUTION!

- Prior to storage or transport, the DULCODOS® Pool metering systems must be free from feed chemicals and water
- Rinse out the media carrying parts, including the tubes using clean, pure water
- Transport and store the DULCODOS® Pool metering systems in their original packaging
- Also protect the packaged DULCODOS® Pool metering systems against damp, exposure to chemicals and mechanical effects
- Please also observe the operating instructions for controllers and fittings and other units, such as sensors, filters, metering pumps ...

Storage temperature: 0 ... 50 °C

Air humidity: < 95% relative air humidity, non-condensing



NOTICE!

If the DULCODOS® Pool metering systems are stored as an assembly with the sensors, then the storage and transport conditions must be appropriate for the component with the least resistance to external influences.

5 Assembly

5.1 Wall mounting



Secure the metering system perpendicular and upright on a wall or a stable mounting system.

The metering system should be freely accessible.

Select the mounting height you require so that:

- The controller's display can be easily read
- There is still space for maintenance work beneath the in-line probe housing (100 mm)
- There is still room for the chemical storage tank (600 mm)
- The fluid level of the full chemical storage tanks is below the metering pumps
- The maximum priming lift of the metering pumps is not exceeded.

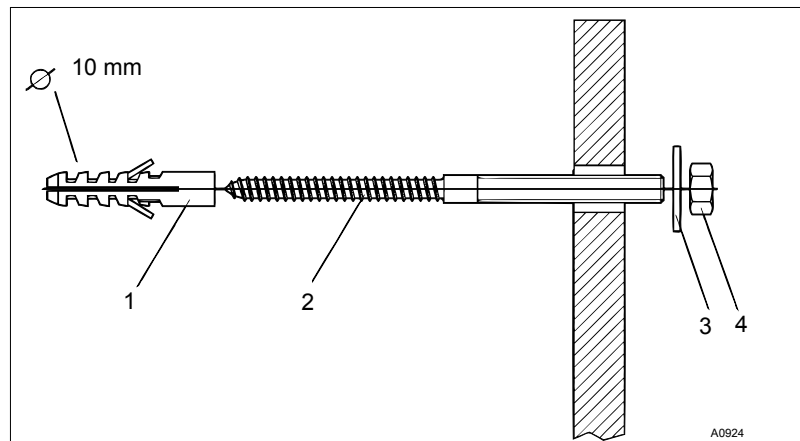


Fig. 3: Hanger bolt

- 1 Rawplug (type dependent on substrate and according to stipulations of the rawplug manufacturer)
- 2 Hanger bolt
- 3 U-washer
- 4 Hexagon nut

5.2 Hydraulic installation

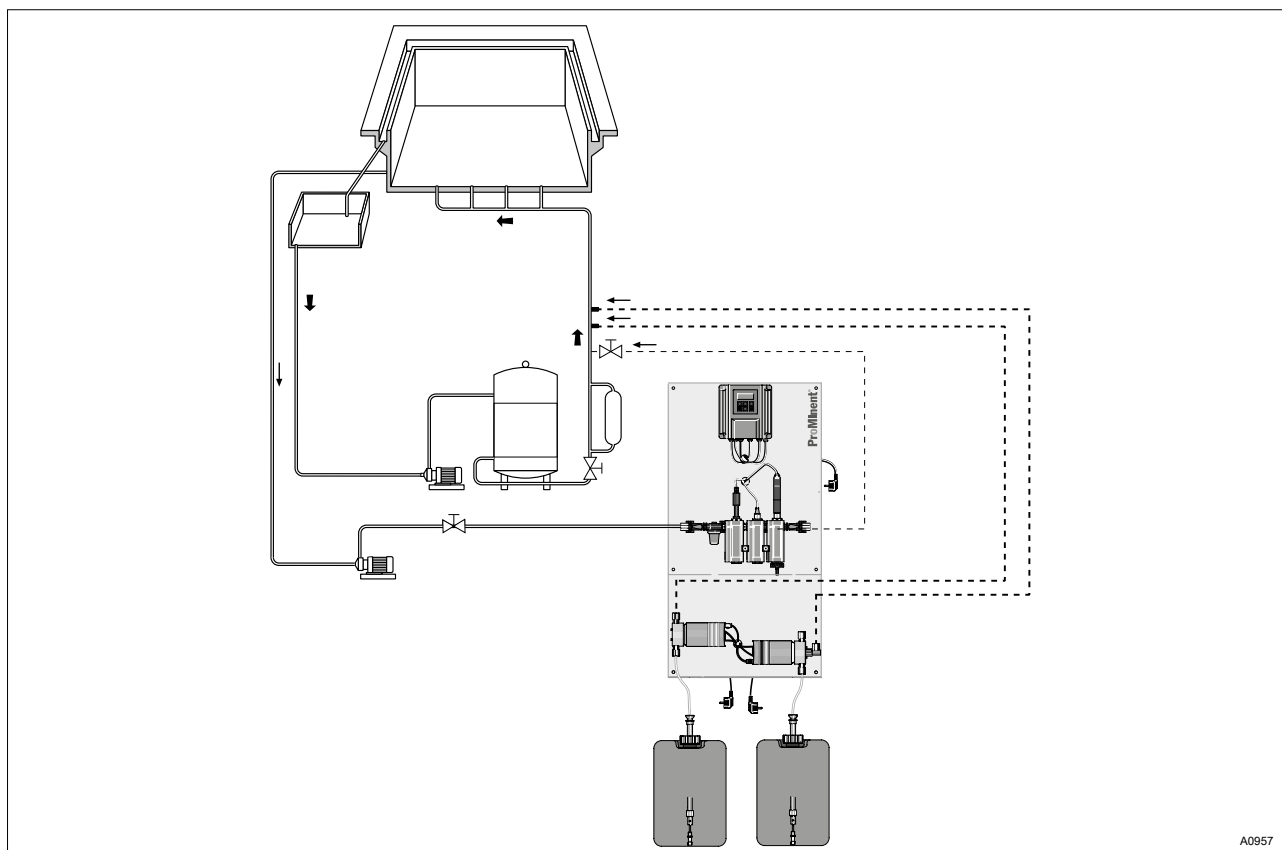
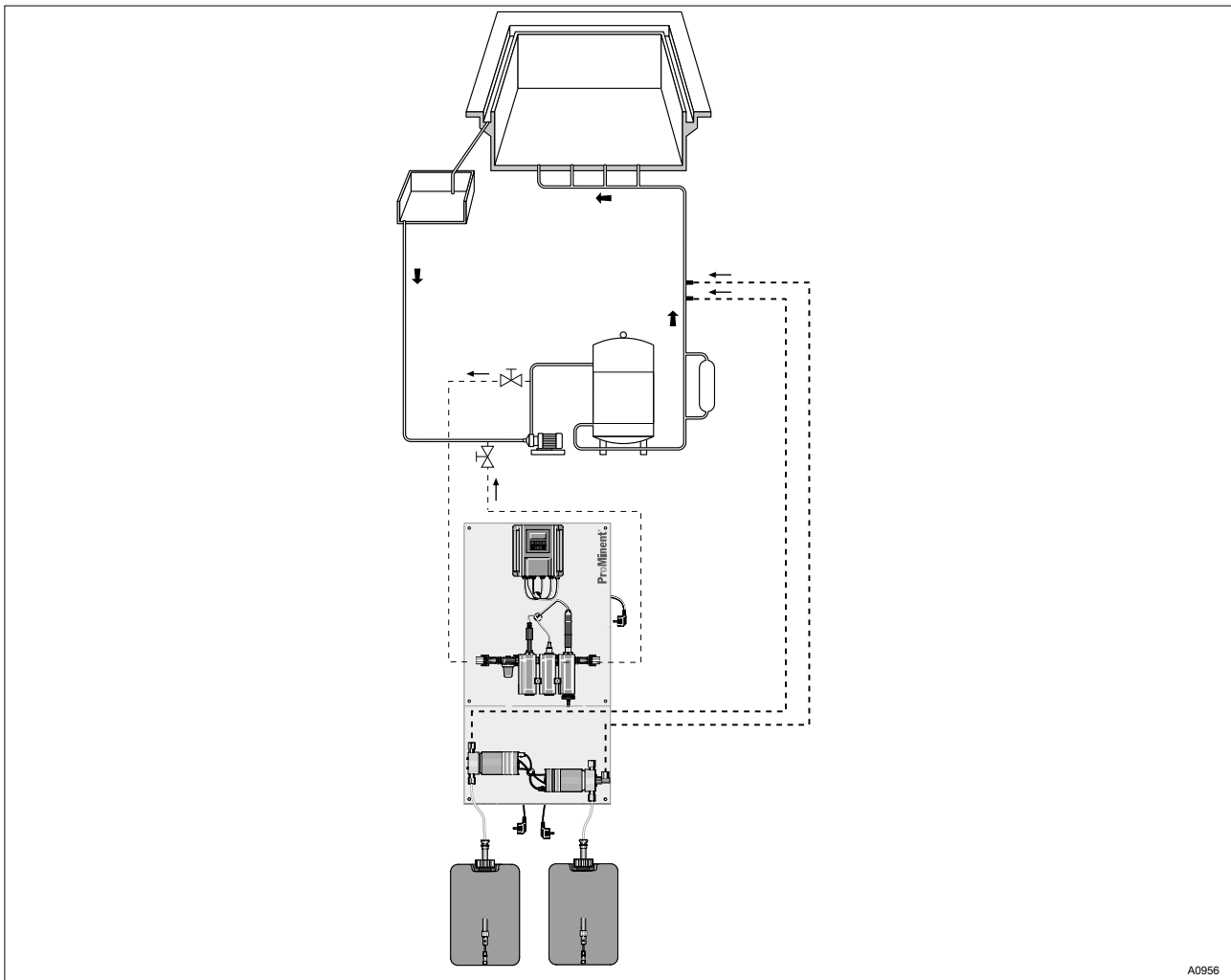


Fig. 4: Hydraulic connection of the swimming pool metering system to the swimming pool installation

Advantage: Water sampling in accordance with DIN 19643 with free drainage of the sample water

Disadvantage: Additional sample water pump and sample water extraction point needed.



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Fig. 5: Simplified hydraulic connection of the swimming pool metering system to the swimming pool installation

- Advantage: Simple installation
 Disadvantage: The measured value is possibly falsified by depletion in the surge water tank is and then not representative of the water in the swimming pool.

Interfaces, Hydraulic

Description	Hose connection	Recommended hose from the ProMinent range
Sample water inlet / outlet	8 x 5 mm	Suction line, soft PVC, 8 x 5
Suction connector for metering pump DF2a	6 x 4 mm	Suction line, soft PVC, 6 x 4
Pressure connector for metering pump DF2a	10 x 4 mm	Suction and metering line, soft PVC, with woven inner layer, 10 x 4
Suction connector for metering pump alpha ALPc	8 x 5 mm	Suction line, soft PVC, 8 x 5
Pressure connector for metering pump alpha ALPc	10 x 4 mm	Suction and metering line, soft PVC, with woven inner layer, 10 x 4

Description	Hose connection	Recommended hose from the ProMinent range
Bleed connection for alpha	6 x 4 mm	Suction line, soft PVC, 6 x 4
Bypass connector multifunctional valve for alpha (optional)	6 x 4 mm	Suction line, soft PVC, 6 x 4

5.2.1 Metering system



NOTICE!

Maximum permissible operating pressure of in-line probe housing

Limit the pressure to a maximum of 2 bar (at 30 °C) directly at the sample water extraction point using a pressure reducer, otherwise the maximum permissible operating pressure of the in-line probe housing will be exceeded.

Do not allow a back pressure of more than 2 bar (at 30 °C) to build up at the outlet, otherwise the maximum permissible operating pressure of the in-line probe housing will be exceeded.

1. ➤ With flow sensor: Push the flow sensor into the in-line probe housing and tighten the reducing nipple and the mounting clip
2. ➤ Route the sample water feed via a ball valve from the filter circuit to the in-line probe housing, see figures above
3. ➤ Route the sample water feed via a ball valve from the filtration circuit to the in-line probe housing, see figures above
4. ➤ Install a 1/2" straight union on the filtration circuit pipe for each injection valve
5. ➤ Screw the injection valves into a straight union of the filtration circuit pipe

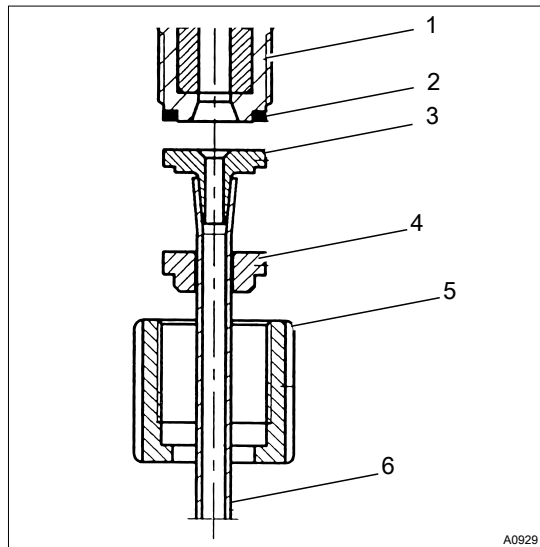


Fig. 6: Connect the tube using the connector kit

1. Valve
2. O-ring
3. Nozzle
4. Clamp ring
5. Union nut
6. Hose

6. ➤ Connect the suction hose of the suction assembly to the connector kit on the liquid end
7. ➤ Connect the pressure hose to the pressure connector using the connector kit
8. ➤ Connect the pressure hose to the injection valve using the connector kit

Testing the hydraulic installation of the metering system:



To ensure reliable measuring and control, the sample water must be free from air bubbles.

1. ➤ Set a flow of 20 ... 60 l/h using the stopcock (read-off at the top edge of the float).
2. ➤ Check the hydraulic leak-tightness of the system (escaping liquid, continuous air bubbles in the in-line probe housing, ...)
 - ⇒ Tighten the threaded connectors if necessary.

Check the system for negative pressure

1. ➤



Have a collecting vessel at the ready

Open the sampling tap

2. ➔ If water flows out of the sampling tap, the system is not under negative pressure and is working correctly



If air is drawn in, this means that there is negative pressure in the system. In this case, throttle the valve at the point at which the sample water pipe enters the filtration circuit - the pressure should not exceed 2 bar.

3. ➔ Use the stopcock on the sample water drain to finely adjust the system

5.2.2 Sensors



Observe the operating instructions for the sensors.

1. ➔ Close the shut-off valves upstream and downstream of the in-line probe housing
2. ➔ Remove the transparent protective cap from the ball-shaped end of the pH sensor
3. ➔ Manually screw both the pH sensor and the redox sensor into separate threaded holes on the in-line probe housing. Then carefully tighten using an SW 17 open-ended spanner until the threaded connector is tight
4. ➔ Testing the sensors' hydraulic installation: Adjust the flow using the shut-off valve to 20... 60 l/h
 - ⇒ Check whether the threaded connectors on the in-line probe housing are tight.

5.3 Electrical installation

1. ➔ Screw the orange-coloured SN6 plugs onto the sensors
2. ➔ Plug the mains plug for the metering system into a socket

5.3.1 Install external signal inputs and signal outputs

Terminal	Description	Technical Data
XK1:1-2	Sample water monitoring*	Open circuit voltage: 15 V
XK1:3-4	Pause input*	Short circuit current: 1.8 mA
XK2:1-2	Level monitoring, chemicals, pH correction*	Minimum switching current for closed contact: 1 mA – corresponds to a residual voltage of approx. 6 V
XK2:3-4	Level monitoring, chemicals, chlorine*	Minimum switching current for open contact: 0.02 mA

* The digital inputs are galvanically isolated from the rest of the connection. As, however, the digital inputs are connected to each other, they are only suitable for potential-free contacts.

Terminal	Description	Technical Data
XE1/XE2	pH sensor	Measuring range from -505 mV ... +505 mV; not galvanically isolated Input resistance > $0.5 \times 10^{12} \Omega$ for potentiometric pH sensors
XE3/XE4	ORP sensor	Measuring range from +90 mV ... +1005 mV; galvanically isolated Input resistance > $0.5 \times 10^{12} \Omega$ for potentiometric ORP sensors
XR1	Alarm relay	max. 250 VAC, max. 3 A, max. 700 VA, changeover type of contact; galvanically isolated from protective low voltage and mains voltage
XP1: N,L, PE	Mains connection	230 VAC $\pm 10\%$, 50/60 Hz
XP2: L,N, PE	Pulse length output, metering pump, chlorine (pump alpha, DULCO®flex DF2a)	The mains voltage is outputted via a load relay:
XP3: L,N, PE	Pulse length output, metering pump, pH lowering (pump alpha, DULCO®flex DF2a)	max. 250 VAC max. 3 A max. 700 VA (protective RC circuit integrated)

* The digital inputs are galvanically isolated from the rest of the connection. As, however, the digital inputs are connected to each other, they are only suitable for potential-free contacts.

5.3.2 Cable Cross-Sections and Cable End Sleeves

	Minimum cross-section	Maximum cross-section	Stripped insulation length
Without cable end sleeve	0.25 mm ²	1.5 mm ²	
Cable end sleeve without insulation	0.20 mm ²	1.0 mm ²	8 - 9 mm
Cable end sleeve with insulation	0.20 mm ²	1.0 mm ²	10 - 11 mm

6 Start up

Preparation:

**WARNING!****Danger from hazardous substances!**

Possible consequence: Fatal or very serious injuries.

Please ensure when handling hazardous substances that you have read the latest safety data sheets provided by the manufacture of the hazardous substance. The actions required are described in the safety data sheet. Check the safety data sheet regularly and replace, if necessary, as the hazard potential of a substance can be re-evaluated at any time based on new findings.

The system operator is responsible for ensuring that these safety data sheets are available and that they are kept up to date, as well as for producing an associated hazard assessment for the workstations affected.

**WARNING!****Acid and chlorine products**

Cause: Never bring together acid and chlorine products, like sodium-calcium hypochlorite as this will produce a toxic chlorine gas.

Possible consequence: Fatal or very serious injuries from chlorine gas.

Action: refer to the current safety data sheets for the feed chemicals.

**CAUTION!**

Wear suitable protective equipment (gloves, protective goggles...) when commissioning.

Refer to the latest safety data sheets on the feed chemicals.

**NOTICE!**

Close the sampling tap otherwise sample water will escape.



The service technician is responsible for instructing the operating and maintenance personnel during commissioning.

**Maximum permissible operating pressure:***In the sample water line: 2 bar at 30 °C (sample water)*

1. ➤ Tighten all threaded connectors prior to initial commissioning
2. ➤ Open the shut-off valves downstream of the metering pumps, in the sample water line and also the shut-off valves in your system
3. ➤ Insert the suction lances into the relevant chemical storage tanks for acid or disinfectant (e.g. sodium-calcium hypochlorite)
4. ➤ Plug the mains plug into the socket and switch on the mains voltage

6.1 Setting the setpoint for pH

You need to adjust the pH in the swimming pool water to a setpoint of pH 7.2 during commissioning, as the pH of the water can be between 6.5 and 7.8 depending on the treatment method and water quality. As the disinfection effect of the chlorine decreases with higher pH values and, on the other hand, pH values below 7 can scarcely be determined using the phenol red method, we recommend pH 7.2 as a setpoint. The handling of the controller is described in chapter ↗ *'Operating and replacing the storage tank'* on page 24.

6.2 Setting the setpoint for ORP

The redox potential is a parameter for presenting the oxidative and therefore disinfecting effect of the chlorine. You need a minimum redox potential of 650 mV for a disinfecting effect. Ensure that the redox potential is at least 700 mV, taking into account measuring inaccuracies and to achieve adequate disinfection speed. The handling of the controller is described in chapter ↗ *'Operating and replacing the storage tank'* on page 24.

The chlorine content should be between 0.3 and 1.0 mg/l, depending on the treatment method and type of swimming pool, in compliance with the German Swimming Pool Standard DIN 19643. The redox potential is also influenced by other constituents in the water and, above all, also by the pH value as well as the chlorine content. The direct correlation between the chlorine content and redox potential differs in each swimming pool and can change over time.

We therefore recommend first setting a chlorine content of approx. 0.5 mg/l and a pH of 7.2 in the swimming pool water and carrying over the redox potential measured by the controller as the setpoint, providing it lies above 700 mV. The chlorine content can be increased, if necessary, if the redox potential lies below this level.

6.3 Adjust the flow sensor switching point

The flow sensor should switch when the flow falls (flow sensor is connected as an NC).



Sample water may escape.

1. ➤ Adjust the flow to 50 l/h using the ball valve
2. ➤ Hold the flow sensor in place and loosen the mounting clip a little
3. ➤ Press the float to 40 l/h using the flow sensor
 - ⇒ The error message should disappear.
4. ➤ Hold the flow sensor in this position and tighten the mounting clip
5. ➤ Then re-adjust the flow required using the ball valve
6. ➤ Acknowledge any error message that occurs
7. ➤ Reset any possible consequences of this in the overall installation
8. ➤ Check the threaded connector for leak-tightness

6.4 Priming

You can prime the pH correction fluid or the oxidant, for example, during commissioning or after replacing a storage tank.

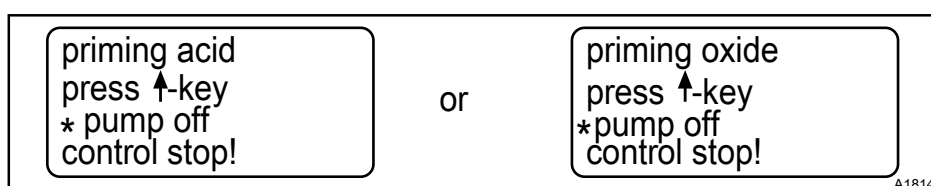


Fig. 7: Priming

1. ➤ To prime the pH correction fluid or the oxidant, press *[Menu]* twice to move to the *[priming acid]* setting menu, or press *[Menu]* three times to move to the *[priming oxide]* setting menu.
2. ➤ Press the UP key.
 - ⇒ The control variable jumps to 100% and the pump pumps for approx. 30 seconds. This also applies in the event that the *[Start/Stop]* key is enabled or that metering is switched off due to a fault message.
3. ➤ Press the UP key again.
 - ⇒ With each re-priming, the pump primes for approx. 30 seconds.
4. ➤ Press *[CAL/ESC]*.
 - ⇒ You are now in continuous display 1.
5. ➤ Press *[Start/Stop]*.
 - ⇒ The control process starts

Stopping priming

Re-starting control:

7 Operating and replacing the storage tank

- **User qualification:** Instructed person, see [Chapter 3.1 'Users' qualifications'](#) on page 8

7.1 Replacing the chemical storage tanks



WARNING!

Danger from hazardous substances!

Possible consequence: Fatal or very serious injuries.

Please ensure when handling hazardous substances that you have read the latest safety data sheets provided by the manufacture of the hazardous substance. The actions required are described in the safety data sheet. Check the safety data sheet regularly and replace, if necessary, as the hazard potential of a substance can be re-evaluated at any time based on new findings.

The system operator is responsible for ensuring that these safety data sheets are available and that they are kept up to date, as well as for producing an associated hazard assessment for the workstations affected.



Labelling the chemical storage tanks

Label the connections on the unit, the metering accessories and the chemical storage tanks in such a way that it is impossible to mix up the storage tanks. It is the responsibility of the system operator to attach and maintain the labels. We can provide labels.

1. ➤ Ensure unrestricted access to the chemical storage tanks to be replaced so that you can work safely and keep escape routes free
2. ➤ Wear protective equipment as outlined in the material safety data sheets for the chemicals used
3. ➤ First replace one chemical storage tank and complete this task first
4. ➤ Handle and remove any spilt feed chemical as per the material safety data sheet
5. ➤ Only then replace the second chemical storage tank, if necessary, and complete this task first
6. ➤ Handle and remove any spilt feed chemical as per the material safety data sheet
7. ➤ Dispose of the empty chemical storage tanks as per the material safety data sheet

7.2 Operating elements

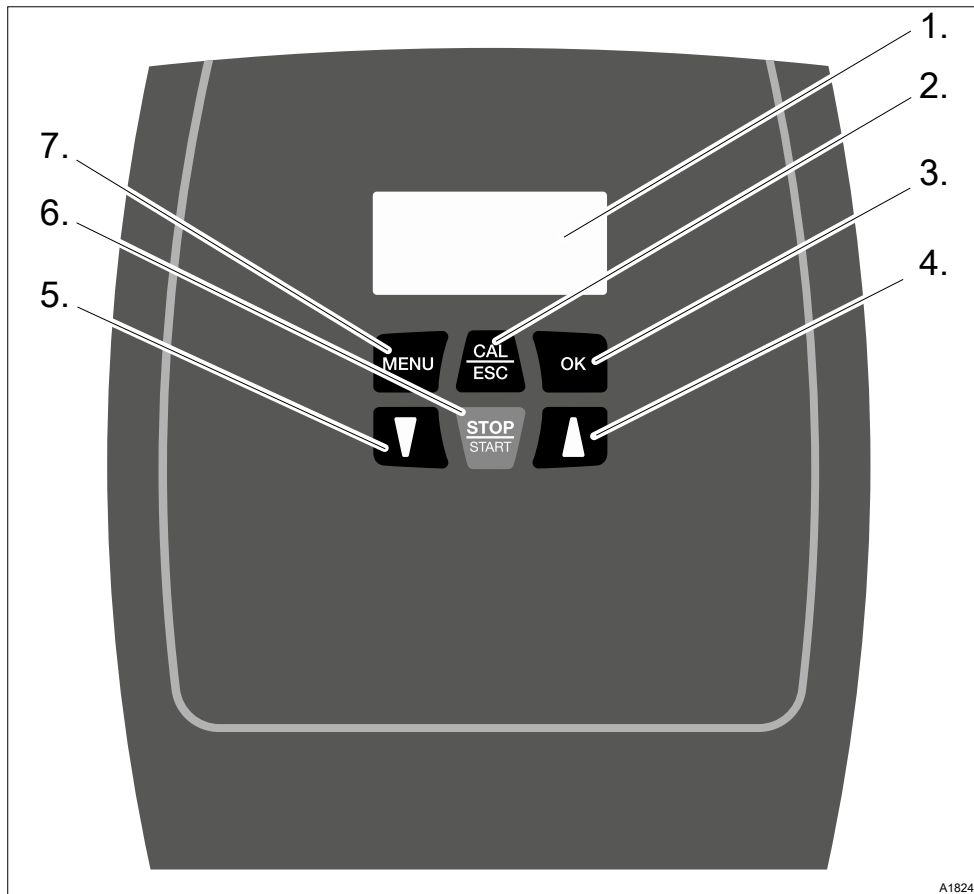


Fig. 8: Operating elements

- | | |
|------------------|---------------------|
| 1. LCD display | 5. "Down" key |
| 2. [CAL/ESC] key | 6. [Start/Stop] key |
| 3. [OK] key | 7. [Menu] key |
| 4. "Up" key | |

The controller's graphic display uses the following symbols:

Symbol	Meaning
○	[Start/Stop] key pressed
ε	Error
1	pH setpoint exceeded 2-point controller 1 Acid metered
↓	pH setpoint undershot 2-point controller 1 Alkali metered
1	ORP setpoint exceeded 2-point controller 2 Oxidant, top
↓	ORP setpoint undershot 2-point controller 2 Oxidant, bottom
▲	Pulse length 1* (acid, alkali) Control off
△	Pulse length 1* (acid, alkali) Control on
▲	Pulse length 2* (oxidant) Control off
△	Pulse length 2* (oxidant) Control on

* controls metering pump or solenoid valve

7.3 Operating structure

- **User qualification:** Instructed person, see [Chapter 3.1](#) 'Users' qualifications' on page 8

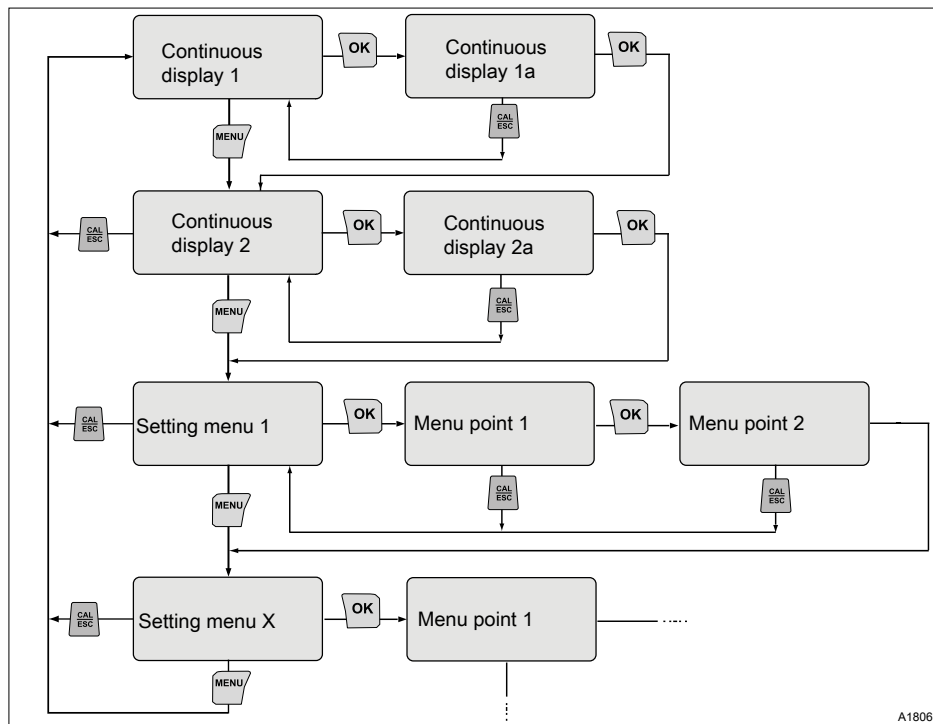


Fig. 9: Operating menu, diagrammatical

The operating menu comprises

- the continuous displays
- the setting menus
- the menu items in the setting menus

Navigation through the operating menu:

- The *[CAL/ESC]* key enables you to move back in every window of the operating menu. You will either return to the continuous display or to the corresponding information display, depending on where you are located in the operating menu.
- If no key is pressed for 10 minutes, the display automatically returns to continuous display 1. This jump back does not apply to the Calibration menu.

Continuous displays and setting menus

Press Menu to return to the individual windows of the continuous displays and the setting menus. After you have gone through all the windows one at a time, you will return to continuous display 1 after the final window.

Operating and adjustment

You can perform all the necessary steps needed to commission the unit in the Operating menu.

These steps include:

- Calibrating the unit
- Changing the access code
- Changing the operating language
- Changing the setpoint (pH, ORP)

Qualified personnel can make settings / changes (accessible via the access code). *[]*

Qualified personnel also have the following additional options of:

- Switching the relay function from pulse length to two-point control
- Switching the metering delay time and the metering control time

Operating Menu

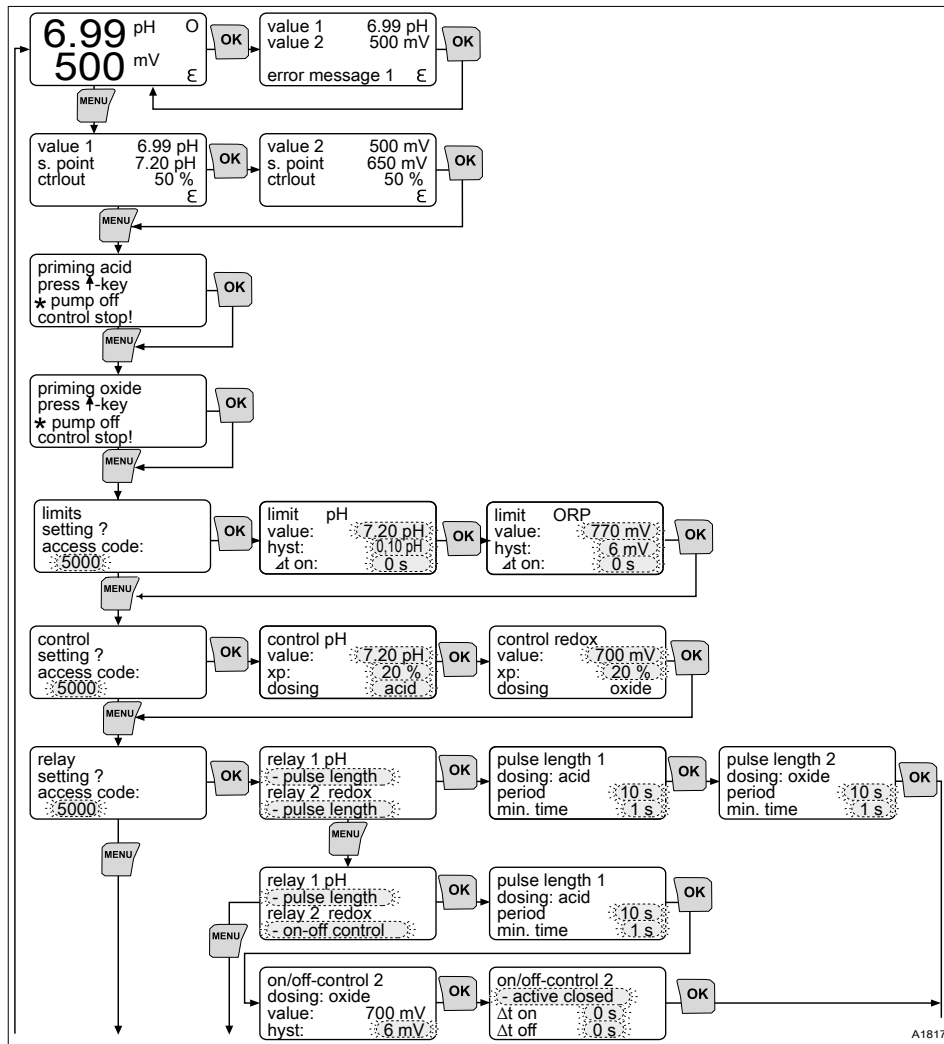


Fig. 10: [] Operating menu / Service technicians can obtain the access code access c from the Service department.

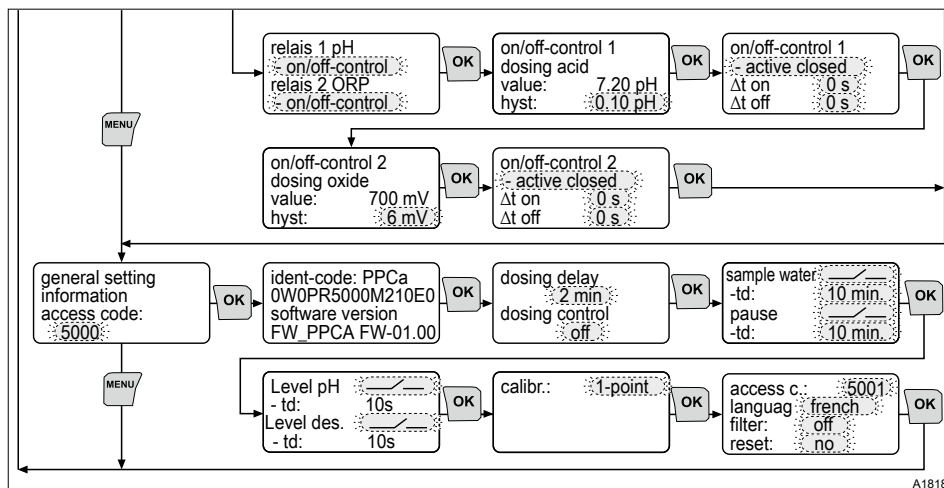


Fig. 11: [] Operating menu / Service technicians can obtain the access code access c from the Service department.

The displays individually are as follows:

Continuous display 1:

- The pH-value is shown as a 4-digit number, with two digits after the decimal point. The unit (pH) appears on the right beside the value.
- The ORP value is shown as a 3-digit number.

Continuous display 1a:

- There error messages are displayed beside the measured values.

Continuous display 2: All the pH-relevant variables are displayed

- Measured value
- Setpoint
- Control variable

Continuous display 2a: All the ORP-relevant variables are displayed

- Measured value
- Setpoint
- Control variable

Setting menus: Prime acid
[priming acid] / Prime oxidant
[priming oxide]

When you press 'On,' metering runs at 100% for approx. 30 seconds. This also applies in the event that *[Start/Stop]* is pressed or that metering is switched off due to an error message. If the relay function is set to 'Pulse length,' then metering starts at 100% frequency after a time delay.

Setting menu: Setting limit values
[limits setting]

Enables access to the limit values for pH and ORP.

The access code can be entered. Only if the entered access code agrees with the 'access code' *[access c]* defined by the 'General Setting' *[general setting]* can the values displayed in the following menu points be altered. Once set up, the access code remains enabled until the next entry in the continuous display 1.

Setting menu: Setting the control
[control setting]

Enables access to the setting menus for pH and ORP.

The access code can be entered. Only if the entered access code agrees with the 'access code' *[access c]* defined by the 'General Setting' *[general setting]* can the values displayed in the following menu points be altered. Once set up, the access code remains enabled until the next entry in the continuous display 1.

Menu items 1 and 2: Control pH
[control pH] and control ORP
[control ORP]

The control is designed as a P-controller with a monodirectional control. Every measured variable is a setpoint and the metering direction (metering: acid or alkali) is assigned. With the relay function 'Pulse length' *[pulse length]* the measured variable is also assigned to the control parameter xp.

Setting menu: Setting the relays
[relais setting]

Enables access to the relay menus for pH and ORP. It can be locked by an access code.

Relay 1 pH menu item *[relais1 pH]*

- Every measured variable is assigned to a relay.
- Every relay can control an actuator.

Pulse length 1 and Pulse length 2 menu items [*pulse length*]

- These two menu items appear if in the menu item 'Relay 1 pH' [*relais 1 pH*] the function 'Pulse length' [*pulse length*] has been selected. You can enter the cycle time and the minimum switching-on time.

Menu items: 2-point controller-1 [*on/off control 1*] and 2-point controller-2 [*on/off control 2*]

These two menu items and their sub-menu items appear if in the menu item 'Relay 1 pH' [*relais 1 pH*] the function '2-point controller' [*on/off control 2*] has been selected. You can enter the switching hysteresis here.

Sub-menu points for 2-point controller1 [*on/off control 1*] and 2-point controller 2 [*on/off control 2*]

You can set the active state and the starting delay (Δt on) and the release delay (Δt off) with each relay.

The status of the relays is displayed in continuous display 1 with the corresponding symbols on the continuous display

Setting menu: General settings [*general setting*]

The setting menu 'General settings' [*general setting*] can be locked by an access code. The setting menu 'General settings' [*general setting*] permits access to the menu items with the following information and setting options:

Identity code menu item [*access c*]

- The identity code [*access code*] and the program version [*software version*] are displayed.

Menu item: Dosing delay [*dosing delay*]

- You can enter the metering delay here (1 min [off] ... 30 min). After connecting to the mains power supply and calibration, metering and troubleshooting is activated with a delay (= metering delay [*dosing delay*]). Press [*Start/Stop*] to end the delay.

Dosing control [*dosing control*]

- Under Dosing control [*dosing control*] you can enter the metering control time (1 min [off] ... 120 min). Metering and control stops if the measured value has not reached the setpoint after this metering control time. Press [*Start/Stop*] to restart metering and control. If the setpoint is reached for longer than 1 minute, then metering and control is started automatically.

Sample water [*sample water*] and Pause [*pause*]



Inputs, function 'active open'

We recommend operating the inputs Sample water and Pause as 'active open' for safety reasons. A malfunction of the external signal encoder, such as cable break etc., then produces an alarm message.

The processes Sample water [*sample water*] and Pause [*pause*] are triggered by external digital potential-free signals.

If one of the inputs is active, the control is stopped and no further errors are emitted.

The processes Sample water [*sample water*] and Pause [*pause*] can be individual set as active closed [*activ closed*] (symbol for "N/O") or as active open [*activ open*] (symbol for "N/C"). The time '*Td*' determines the time after which the control becomes active again after the Pause has been stopped. The delivery status is active open [*activ open*] and '*Td*' = 10 minutes.

If a fault occurs, the alarm relay [*XR1*] is activated.

The inputs can be assigned the following signals, for example:

- Potential-free contacts, general
- Level switch contacts of suction assemblies
- Contact from filter control
- Sample water flow sensor contact (e.g. DGMa)

Filter [*filter*]

The filtering of the input values can be increased to steady the display.

Reset [*reset*]

You can reset the unit [*reset*]. Following a reset, the data in the unit is reset to its delivery status.

Menu item: Calibration [*calibr.*]



NOTICE!

Testing the ORP Sensor

With ORP measured variables, the sensor is not calibrated but tested according to its design

Immerse the ORP sensor in the test tank containing ORP buffer solution (e.g. 465 mV). Permitted deviation ± 40 mV.

- Replace the ORP sensor should the deviation be greater than 40 mV

You can select between one-point and two-point calibration. If you have selected 2-point calibration [*2-point*] then Buffer 1 [*buffer 1*] and Buffer 2 [*buffer 2*] appear in the next two lines although you can only adjust Buffer 2. The buffer value has to differ by ± 1.99 pH from the value of buffer 1.

Menu item: Access code [*access c.*]

Use the access codes [*access c.*] to secure all setting values against unauthorised intervention. As an indication to users that the access code [*5000*] has been switched off, [*5000*] is replaced by the word '*off*' [*off*].

You can also use this setting menu to select languages yourself that can be selected via the identity code. You can also increase filtering of the input values to steady/delay the display. You can also reset all settings, thereby loading the factory settings. To do so, reset '*no*' [*no*] to '*yes*' [*yes*]. Press [*Menu*] to load the factory settings.

Calibration menu [*calibr.*]

Two-point calibration pH [*2-point*]

- When the entry is confirmed in the calibration menu, the device stops the following functions for pH and ORP:
 - Control and metering
 - Troubleshooting

Errors that relate to the measured variable pH will be reset during successful calibration. Following calibration, metering, control and troubleshooting restart after elapse of the metering delay (2 min = standard setting).

Menu item: Sensor in buffer?

The unit awaits confirmation that the pH sensor to be calibrated is immersed in buffer 1 and/or buffer 2.

All buffer values are also displayed in abbreviated form:

- Display of the buffer value set
- Display of the buffer value measured
- Display of the voltage measured

Sub-menu items: pH calibration [*calibr*]

- The unit periodically checks the mV value measured
- The next menu item and the transition are selected automatically

Zero point and slope display during calibration

Depending on the number of values determined, the unit performs a slope and/or a zero point calculation.

Only one zero point correction is performed with a measurement of between pH 6 and pH 8.

With two measurements, both the zero point as well as the slope are re-calculated.

The values determined in the calibration process are displayed or, if not yet determined, the values currently applicable are displayed. The values are automatically carried over, but this can also be performed prematurely by pressing [*Menu*].


Measured value unsteady during calibration

An error message is emitted if the sensor voltage remains unsteady during the actual calibration process. The calibration process for pH is terminated after approximately 4 seconds. The old zero point and the old slope are retained.

Error messages during calibration

The values are outside the permitted tolerance after calculating the zero point and the slope. The entire calibration process is discarded and the unit operates with the values applicable prior to the calibration process. A general error message is then generated in the continuous display 1a. Metering for the measured value pH is stopped.

7.3.1 Menu items



Effectiveness of entries
Your entries become effective as soon as you press [OK].

Without access code

1. ➔ You can move from the associated setting menu to the menu points by pressing [*OK*].
2. ➔ Pressing [*OK*] exits the menu points again and, at the same time, saves the set variables in the menu point, see Fig. 12.

3. ➤ If you do not want to save the set variables, then exit the menu item by pressing *[CAL /ESC]*.
 ⇒ You will return to the setting menu.

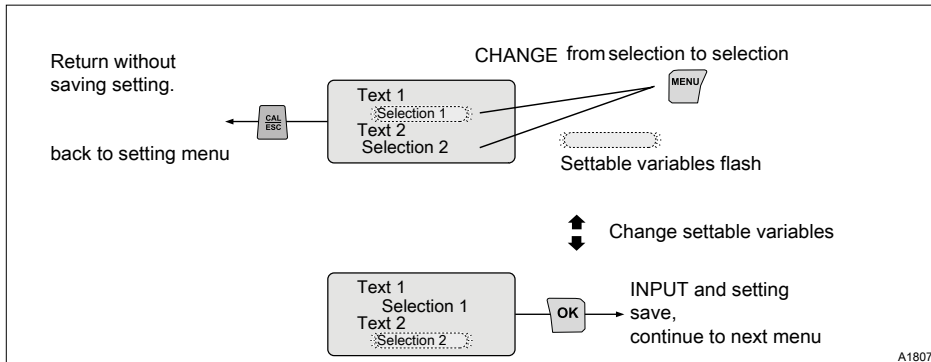


Fig. 12: Functions within the menu items

With access code

1. ➤ If an access code has been set, then you have to enter this access code in the setting menu.
2. ➤ Then you can access the menu points in the setting menu.
3. ➤ You can also access the menu points in the subsequent setting menus without the access code.
4. ➤ The unlocking of the access code is cancelled when you return to continuous display 1.

Navigation within a menu item

1. ➤ You have reached a menu point: You can see words and figures, see Fig. 12
 ⇒ Flashing elements identify variables that can be set.
2. ➤ You can activate other variables that can be set by pressing *[Menu]*
 ⇒ Variables that can be set start flashing.
3. ➤ Press *[Menu]* to return to the previous variable that can be set.

You can modify a variable that can be set. There are two types of variables that can be set, which can be modified in two different ways:

Changing words/expressions

1. ➤ Press *'Down'* or *'Up'*.
 ⇒ You can select between two words/expressions.

Changing numerical values

2. ➤ Press *'Down'* or *'Up'*.
 If you only press 1x briefly, then the last figure increases one higher or decreases one lower.
 The figure continues to rise or decrease if you hold down the key.
 The figure continues to rise or decrease more quickly if you hold down the key for longer.
3. ➤ Press *[OK]* or *[CAL /ESC]*, as in the operating menu, to exit a menu item.

7.3.2 Operating and adjustment

Monitoring

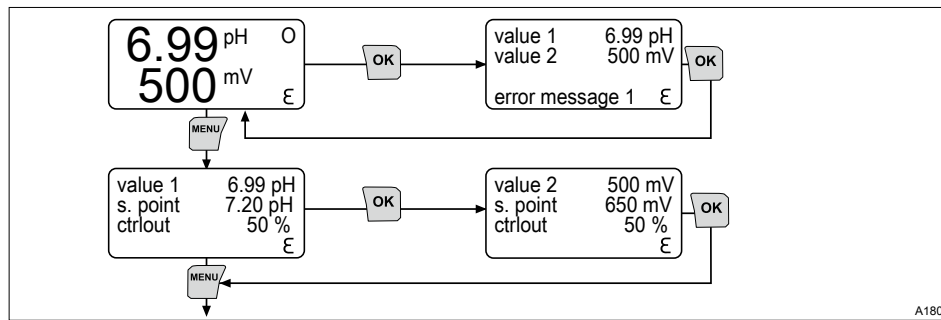


Fig. 13: Monitoring

You can monitor the function of the unit in continuous displays 1, 1a, 2 and 2a, see Fig. 9.

Operating menu

The operating menu consists of continuous displays and setting menus with the following functions:

Continuous display 1	Monitoring
	Calibration (ORP - Chlorine assignment)
Continuous display 2	Monitoring
Priming (acid, alkali)	Priming of acid or alkali
Priming of oxidant	Priming of oxidant
Service menu	only for service technicians
Setting the control	Setting the pH setpoint
	Setting the ORP setpoint
General setting	Setting the access code
	Setting the language

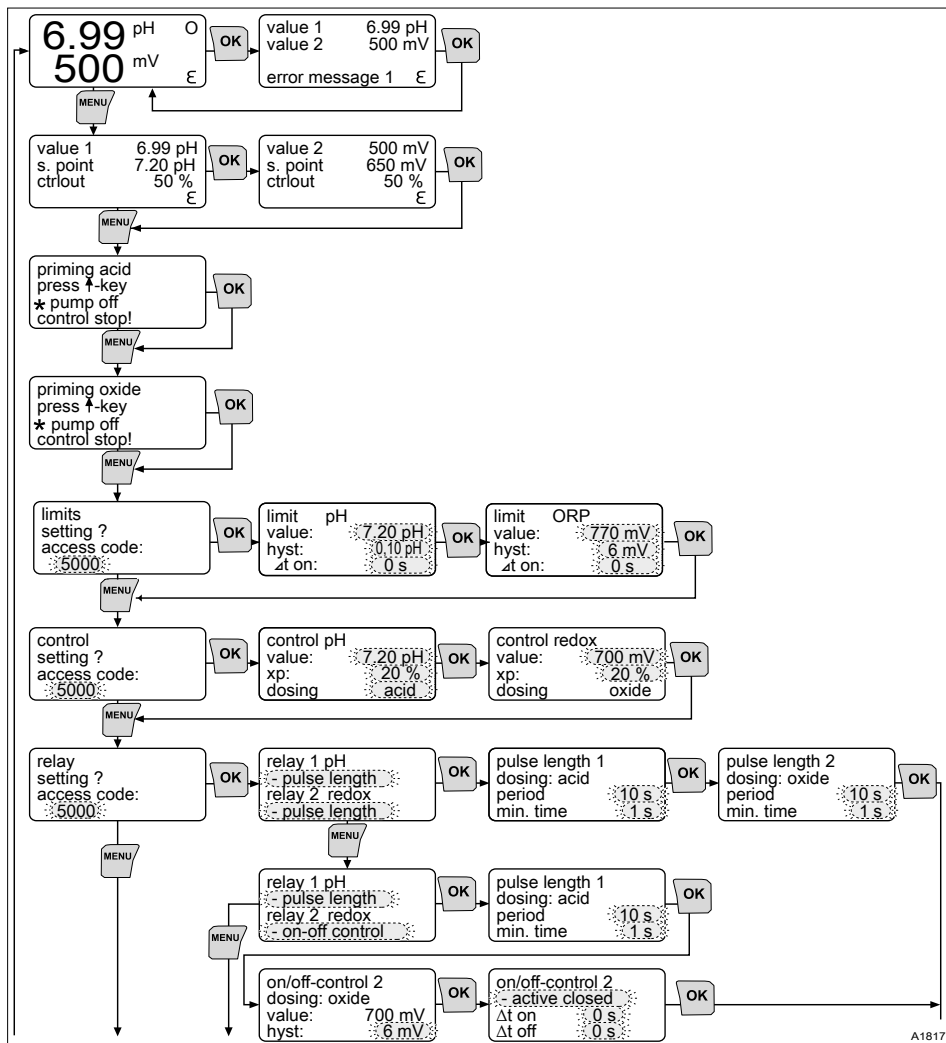


Fig. 14: Operating menu

8 Maintenance and faults



Flush the metering system with a suitable flushing medium prior to maintenance - refer to the latest safety data sheets for the feed chemical.

Observe the operating instructions for the metering pump, the in-line probe housing, the sensors, dirt filter and multifunctional valve (optional).

8.1 Maintenance work

An overview of maintenance work

Maintenance interval	Maintenance task
daily	Check swimming pool water values
	Check storage tank liquid levels
weekly	Visual inspection of metering system (flow meter)
	Check sensor
6 months	Clean dirt filters
12 months	Maintenance by Service

Maintenance interval: daily



Check the current swimming pool water values daily to guarantee the safe operation of your swimming pool system.

1. → Check the chlorine concentration using the DPD test (refer to the operating instructions for the test kit)
2. → Check the pH value using the phenol red test (refer to the operating instructions for the test kit)
 - ⇒ If the swimming pool water values lie outside the tolerance limits, then conduct additional tests, as described in ↗ 'An overview of maintenance work' on page 37.

Maintenance interval: weekly

1. ➤ Regularly conduct a visual inspection of the metering system, specifically the sensors and the flow meter with flow sensor for:
 - Air bubbles in the sample water
 - The state of the sensors
 - Leakages
 - Correct flow values
 - To ascertain whether the flow sensor is fastened correctly onto the flow meter
 - To ascertain whether the float is moving easily within the flow meter: To do so, note down the flow value and then change the flow value - the float should change position

⇒ Call Service if one of these points is not correct.
2. ➤ Check the liquid levels in the storage tanks
 - ⇒ Pour in feed chemical if the liquid level has fallen below 10 cm.
3. ➤ Check the sensors by calibrating them

Maintenance interval: 6 months

Clean dirt filter regularly:

1. ➤ Close the stopcocks upstream and downstream of the in-line probe housing
2. ➤ Unscrew the filter bowl
3. ➤ Remove the filter insert and clean it without detergent
4. ➤ Insert the filter insert into the housing
5. ➤ Check the sealing ring and the sealing surfaces for cleanliness, and clean if necessary
6. ➤ Screw the filter bowl until tight
7. ➤ Open the stopcocks on the in-line probe housing

8.2 Check sensors

Preparation for testing and testing - pH

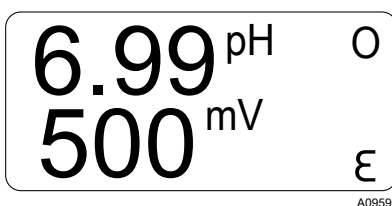


Fig. 15: ORP (mV) and pH

You need the following materials:

- Spray bottle with distilled water
- Clean, soft cloth
- Buffer solution pH 7 (50 ml)
- Buffer solution pH 4 (50 ml)

For this purpose, prepare for removal of the pH sensor, see the operating instructions for the sensors and the in-line probe housing.



Continuous display '1': press the [Start/Stop] key once, [O] appears. Otherwise the pumps can start up before your system is ready for use again. Apart from that, the system can be damaged if the pumps are working against a shut-off valve.

1. ➤ Close both shut-off valves
2. ➤ Unscrew the SN 6 plug from the pH sensor
3. ➤ Unscrew the pH sensor from the in-line probe housing
4. ➤ Screw the SN 6 plug onto the pH sensor
5. ➤ Rinse the pH sensor with distilled water and dab it with a dry, soft cloth.
6. ➤ Dip the pH sensor in pH 7 buffer solution and stir
 - ⇒ Check the value on the controller display: Is the value between 6.8 and 7.2?
7. ➤ Rinse the pH sensor with distilled water and dab it with a dry, soft cloth.
8. ➤ Dip the pH sensor in pH 4 buffer solution and stir
 - ⇒ Check the value on the controller display: Is the value between 3.8 and 4.2?

If one value lies outside the tolerance of \pm pH 0.2, a calibration must be carried out.

Call Customer service if both values are outside tolerance.
9. ➤ Unscrew the SN 6 plug from the pH sensor
10. ➤ Screw the pH sensor into the in-line probe housing
11. ➤ Screw the SN 6 plug onto the pH sensor
12. ➤ Open the shut-off valves
13. ➤



Are the shut-off valves open?

Press the [START/STOP] key once

⇒ [O] disappears.

Preparation for testing and testing - ORP

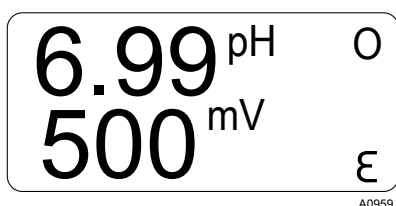


Fig. 16: ORP (mV) and pH

You need the following materials:

- Spray bottle with distilled water
- Clean, soft cloth
- Buffer solution 465 mV (50 ml)

To this end, prepare for removal of the ORP sensor, see the operating instructions for the sensors and the in-line probe housing.



Continuous display '1': press the [Start/Stop] key once, [O] appears. Otherwise the pumps can start up before your system is ready for use again. Apart from that, the system can be damaged if the pumps are working against a shut-off valve.

1. ➤ Close both shut-off valves
2. ➤ Unscrew the SN 6 plug from the ORP sensor
3. ➤ Unscrew the ORP sensor from the in-line probe housing
4. ➤ Screw the SN 6 plug onto the ORP sensor
5. ➤ Rinse the ORP sensor with distilled water and dab it with a dry, soft cloth.
6. ➤ Dip the ORP sensor in a 465 mV buffer solution
 - ⇒ Check the value on the controller display: Is it between 435 ... 490 mV?
Call Customer service if the value is outside tolerance.
7. ➤ Unscrew the SN 6 plug from the ORP sensor
8. ➤ Screw the ORP sensor into the in-line probe housing
9. ➤ Screw the SN 6 plug onto the ORP sensor
10. ➤ Open the shut-off valves
11. ➤



Are the shut-off valves open?

Press the [START/STOP] key once

⇒ [O] disappears.

8.3 Troubleshooting

Use the operating instructions for controllers, sensors, in-line probe housings, metering pumps and multifunctional valves (optional) to eliminate functional faults or call Customer service.

8.4 Disposal of Used Parts

- **User qualification:** instructed user, see ↗ *Chapter 3.1 'Users' qualifications' on page 8*



NOTICE!

Regulations governing the disposal of used parts

- Note the current national regulations and legal standards which apply in your country

The manufacturer will take back decontaminated used units providing they are covered by adequate postage.

Decontaminate the unit before returning it for repair. To do so, remove all traces of hazardous substances. Refer to the Material Safety Data Sheet for your feed chemical.

A current Declaration of Decontamination is available to download on the ProMinent website.

9 Technical Data



Refer to the product-specific operating instructions for technical data on the controller, sensors, in-line probe housing, metering pump and multifunctional valve.

Maximum permissible operating pressure

- In the sample water line: 2 bar at 30 °C (sample water)

Sample water line connector

- 8 x 5 mm PE hose

Sample water filter element

- 300 µm

Weight

- with pumps: approx. 10 kg
- without pumps: approx. 6 kg

Materials

- Plate material: PP
- Materials, wetted: The wetted materials are resistant to the media commonly used in swimming pools. Consult the operating instructions for the individual components for use with other media.
- Sample water filter: polypropylene, nylon, nitrile rubber, stainless steel

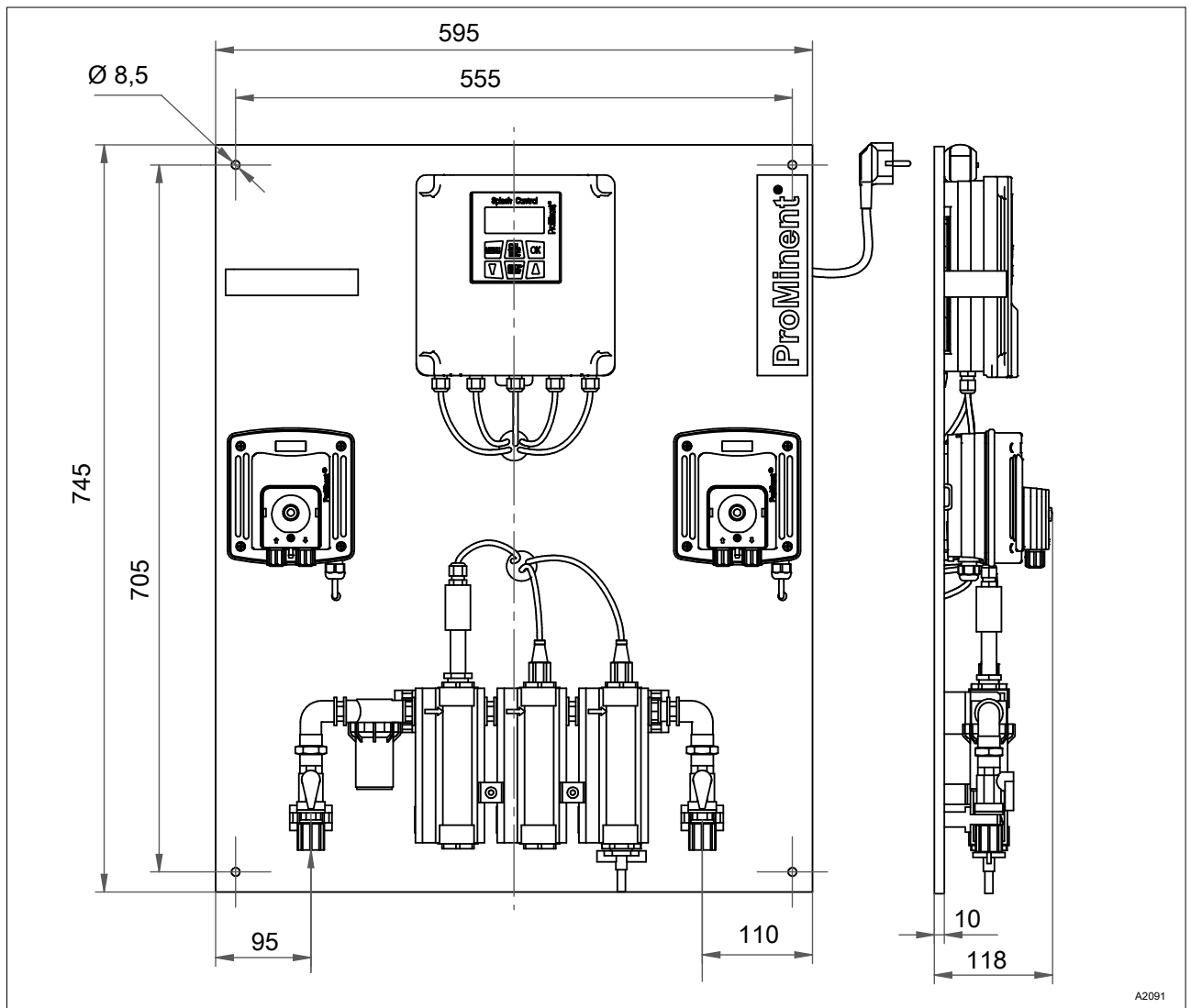


Fig. 17: Dimensions sheet. All dimensions in mm.

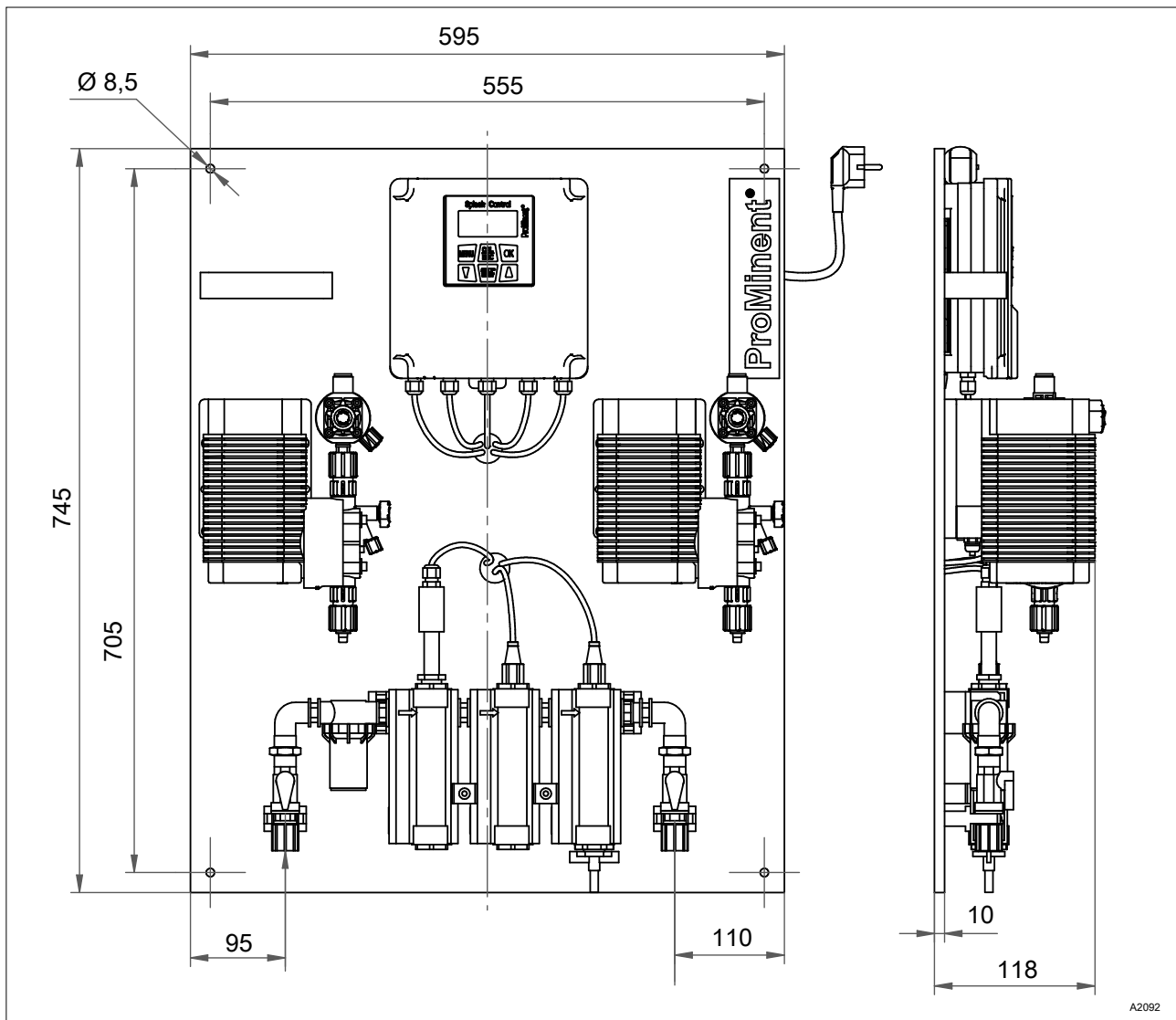


Fig. 18: Dimensions sheet. All dimensions in mm.

9.1 Terminal diagram

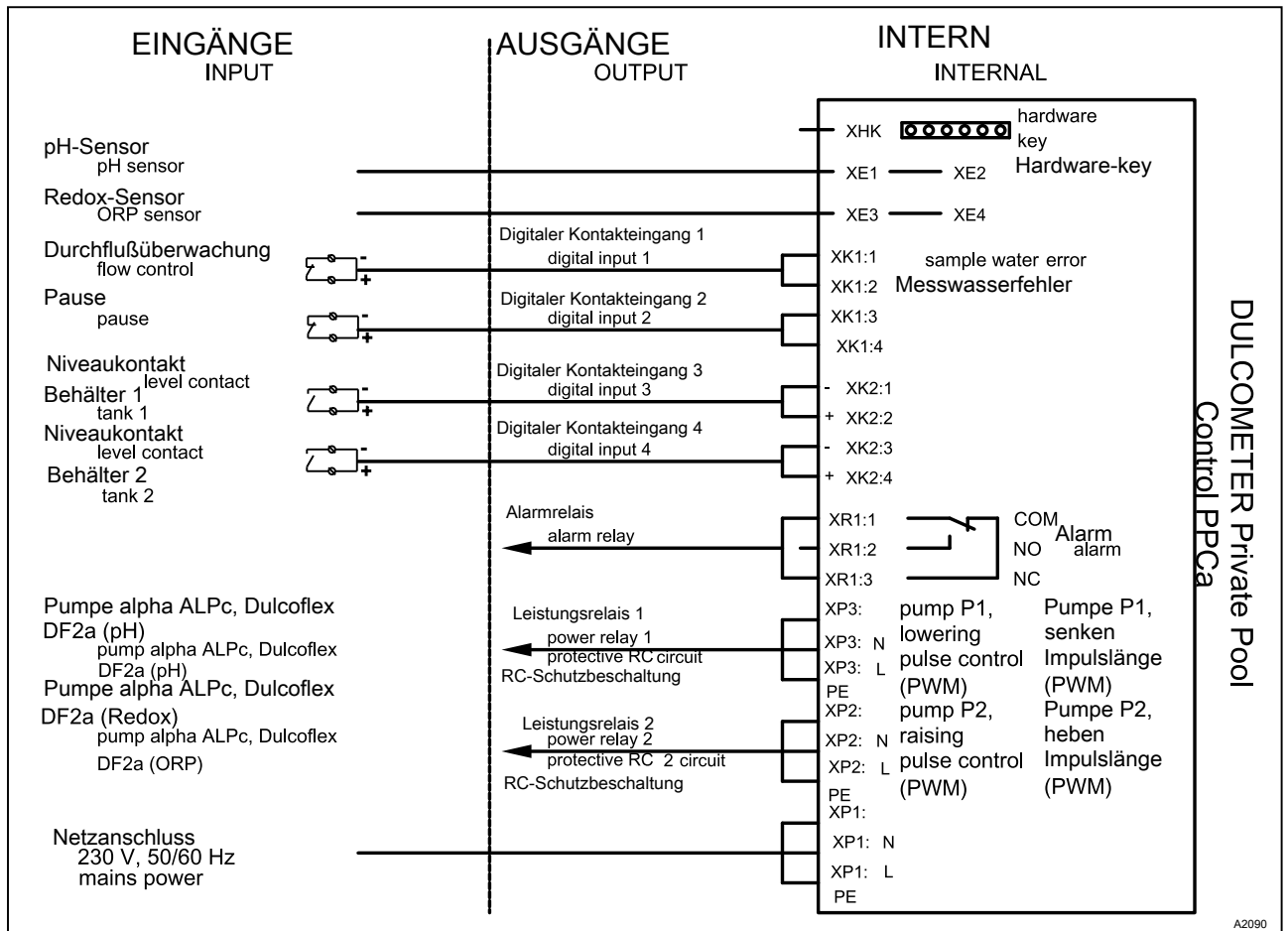


Fig. 19: Terminal diagram

10 Appendices

10.1 Spare parts and accessories

The following are needed for the maintenance of a DULCODOS® Pool:

- 2 no. maintenance kits for the metering pumps
- 1 no. maintenance kit for the measured variable

Maintenance Kits for Metering Pumps

The following table shows the assignment of the maintenance kits to the types of metering pumps used.

	Product range	Pump type	Order number
Hose, complete 4.8 x 8.0 PharMed®	DF2a	0208, 0216, 0224	1009480
Spare parts kit 1005-2/1605-2 PVT	ALPc	1002PVT/1004PVT (ALPc)	1023110

Maintenance Kits for Measured Variables

Maintenance kits are put together for the measured variables of the DULCODOS®-Pool. Depending on the measured variable, the maintenance kits consist of:

- Buffer solutions
- 1 stainless steel screen 300 µm for the water filter
- 1 NBR flat seal for the water filter

The following table shows the assignment of the maintenance kits to the types of DULCODOS® Pool.

	Type	Order number
DSPA maintenance kit PR0	Basic	1050631

Spare Parts

Spare Parts	Order number
pH sensor PHES 112 SE	150702
Buffer solution pH 7, 50 ml	506253
Buffer solution pH 4, 50 ml	506251
Sample water filter with stainless steel screen 300 µm	1038865
Stainless steel screen 300 µm	1038867
NBR flat seal for the water filter	1050274
Laboratory ball valve, ø10, DN6, 1/4"	1010380

Accessories

Accessories	Order number
Photometer: To detect free, bound and total chlorine	1003473

10.2 EC Declaration of Conformity

In accordance with DIRECTIVE 2006/42/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL, Appendix I, BASIC HEALTH AND SAFETY REQUIREMENTS, section 1.7.4.2. C.

Without pumps

We,

- ProMinent Dosiertechnik GmbH
- Im Schuhmachergewann 5 - 11
- DE - 69123 Heidelberg,

hereby declare that the product specified in the following, complies with the relevant basic health and safety requirements of the EC Directive, on the basis of its functional concept and design and in the version distributed by us. This declaration loses its validity in the event of a modification to the product not agreed with us.

Designation of the product:	Swimming pool metering system DULCODOS POOL
Product type:	DSPa _____ 0 _ 0 _ 1_ that is to say for installed systems without metering pumps ex works
Serial number:	refer to nameplate on the device
Relevant EC directives:	Low Voltage Directive 2006/95/EC EC EMC Directive (2004/108/EC)
Harmonised standards applied, in particular:	EN 61010 - 1 EN 60335 -1 EN 61000 -6 -1/2/3/4
Date:	09/03/2012

With pumps

We,

- ProMinent Dosiertechnik GmbH
- Im Schuhmachergewann 5 - 11
- DE - 69123 Heidelberg,

hereby declare that the product specified in the following, complies with the relevant basic health and safety requirements of the EC Directive, on the basis of its functional concept and design and in the version distributed by us. This declaration loses its validity in the event of a modification to the product not agreed with us.

Designation of the product:	Swimming pool metering system DULCODOS POOL
Product type:	DSPa _____ X_ X_ 1_ and X > 0 that is to say for installed systems with metering pumps ex works
Serial number:	refer to nameplate on the device
Relevant EC directives:	EC Machinery Directive (2006/42/EC) EC EMC Directive (2004/108/EC) Compliance with the protection targets of the Low Voltage Directive (2006/95/EC) according to Appendix I, No. 1.5.1 of the Machinery Directive 2006/42/EC
Harmonised standards applied, in particular:	EN ISO 12100 EN 809 EN 61010 - 1 EN 60335 -1 EN 61000 -6 -1/2/3/4
Date:	09/03/2012

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