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INSTRUCTION MANUAL

AquaMaster

with SICON M

Multi-Parameter Measuring System

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Contents

1 General user information

1.1 Terms used in this document (glossary)

Please refer to our website for specialist terms:
http://www.photometer.com/en/abc/index.html

1.2 Purpose of the Instruction Manual

This Instruction Manual provides the user with helpful information about the entire life cycle of the AquaScat and its peripheral devices. Before commissioning the instrument, you should be completely familiar with the Instruction Manual.

1.3 Target group of the documentation

The Instruction Manual is intended for all persons who are responsible for the operation and maintenance of the instrument.

1.4 Additional documentation

DOC. NO.	TITLE	CONTENT
12748E	Brief Instructions	The most important functions and the servicing schedule.
12749E	Reference Handbook	Menu functions in depth and worksteps for advanced users.
12756E	Data Sheet	Descriptions and technical data about the photometer.
12831DEF	Declaration of Conformity	Compliance with the underlying directives and standards.

1.5 Copyright provisions

1.6 Document storage location

This document is part of the product. It should be stored in a safe place and always be close at hand for the user.

1.7 Order document

The most recent version of this document can be downloaded at www.photometer.com (first time registration required).
It can also be ordered from a SIGRIST representative in your country (→ Instruction Manual "Customer service information").

1.8 Proper use

The AquaMaster is designed for measuring the pH, conductivity, redox and dissolved oxygen during water treatment and is optimized for the requirements that occur in water treatment plants with regard to measurement span and ambient conditions.

1.9 User requirements

The instrument may be operated only by trained technical personnel who have read and understood the content of the Instruction Manual.

1.10 Declaration of conformity

Current technological principles were followed in designing and manufacturing the instrument. They comply with the applicable guidelines concerning safety and duty to take due care.

CE

EU: The measuring instrument meets all applicable requirements within the European Union (EU) for carrying the CE mark.

Please refer to the separate declaration of conformity for details. Section 1.4

1.11 Use restrictions

EXPLOSION HAZARD!

Operation in an inappropriate environment.

Use in explosive areas can cause explosions, which can lead to the death of persons in the vicinity.

- It is not permitted to operate the instrument in explosion hazardous areas or rooms.
- It is not permitted to use the instrument with explosive sample substances.

1.12 Dangers when not used properly

DANGER!

Operation when not used properly.

Improper use of the instrument can cause injuries to persons, process-related consequential damage and damage to the instrument and its peripherals.

In the following cases the manufacturer cannot guarantee the protection of persons and the instrument and therefore assumes no legal responsibility:

- The instrument is used in a way not included in the described area of application.
- The instrument is not properly mounted or set up.
- The instrument is not installed and operated in accordance with the Instruction Manual.
- The instrument has been operated with accessory parts which SIGRIST-PHOTOMETER AG has not expressly recommended.
- Improper changes to the instrument have been performed.
- The instrument has not been operated within the specifications, in particular concerning pressure and temperature.

1.13 Meaning of the safety symbols

All **danger symbols** used in this document are explained below:

DANGER!

Danger due to electrical shock that may result in serious bodily injury or death.

Non-observance of this danger warning may lead to electrical shocks and death.

EXPLOSION HAZARD!

Danger due to explosion that may result in serious bodily injury or death.

Non-observance of this notice may cause explosions resulting in serious property damage and death.

WARNING!

Warning about bodily injury or hazards to health with long-term effects.

Non-observance of this warning may lead to injuries with possible long-term effects.

CAUTION!

Notice about possible material damage.

Non-observance of this notice may cause material damage to the instrument and its peripherals.

1.14 Meaning of the pictograms

All **pictograms** used in this document are explained below:

	Additional information about the current topic.
	Practical procedures when working with the AquaScat.
	Manipulations on the touchscreen.
	The screenshot is an example and may differ from current device.

2 Instrument overview

2.1 Overview of AquaMaster with SICON M

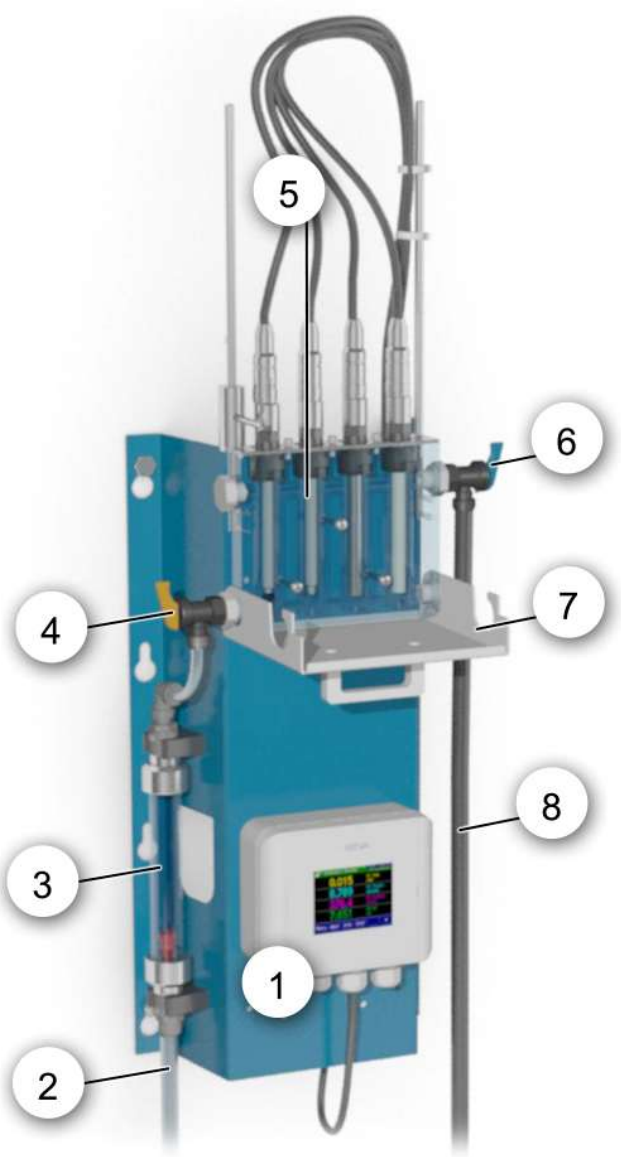


Figure 1: Instrument overview of AquaMaster with SICON M

①	SICON M multi-channel control unit	②	Sample media inlet
③	Flow meter (optional)	④	Inlet regulator valve for measuring cell block
⑤	Measuring cell block with the pH, redox/ORP, conductivity and oxygen sensors	⑥	Outlet regulator valve for measuring cell block
⑦	Cover on measuring cell block	⑧	Sample media outlet

2.2 Designation of the connection box

The connection box is fitted with the following rating plate:

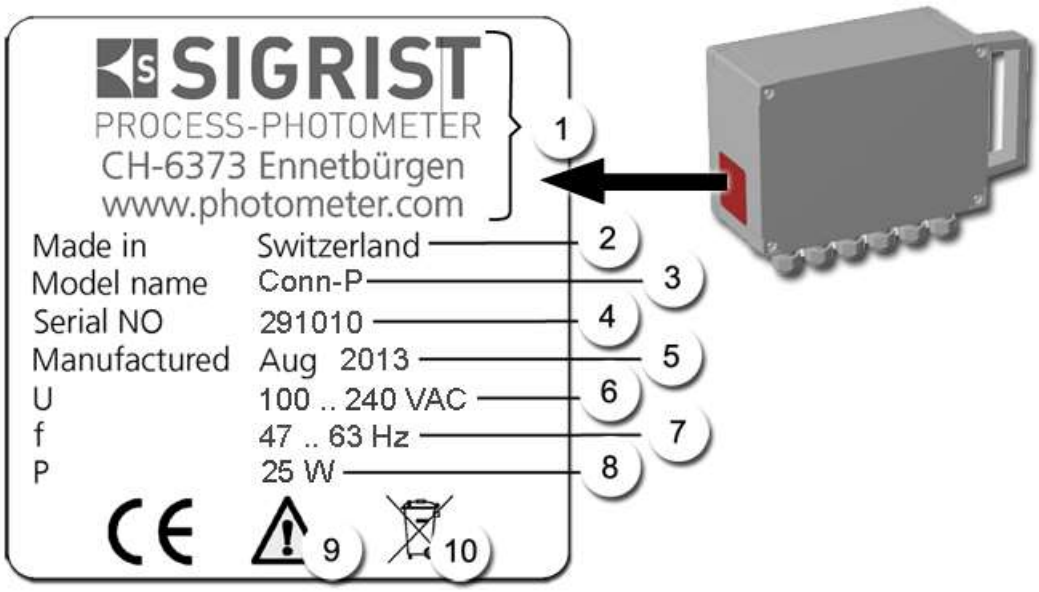


Figure 2: Rating plate on connection box

①	Manufacturer	②	Country of origin
③	Product name	④	Serial number
⑤	Date of manufacture	⑥	Service voltage
⑦	Frequency range	⑧	Power
⑨	Observe the Instruction Manual	⑩	Observe the disposal information

2.3 Designation of the SICON M

The SICON M control unit is fitted with the following rating plate:

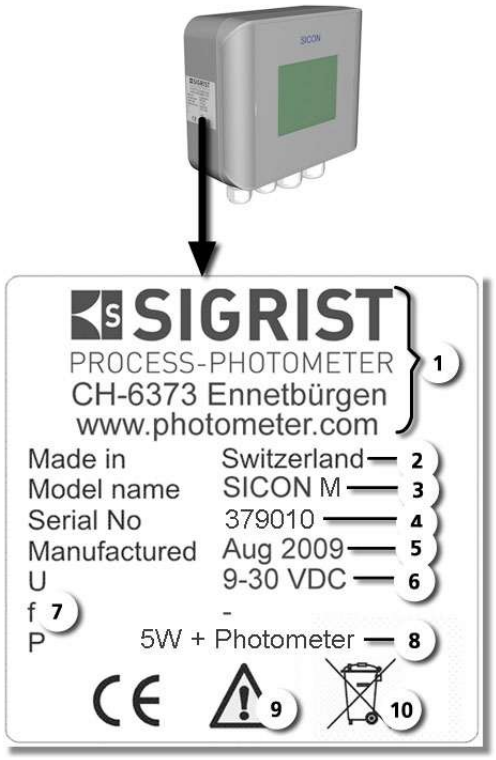


Figure 3: Rating plate on SICON M

①	Manufacturer	②	Country of origin
③	Product name	④	Serial number
⑤	Date of manufacture	⑥	Service voltage
⑦	Frequency range	⑧	Power
⑨	Observe the Instruction Manual	⑩	Observe the disposal information

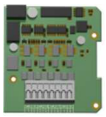
2.4 Scope of supply and accessories

Standard scope of supply for AquaMaster with SICON M 119494:

PCS.	ART. NO.	NAME	VIEW	VARIANT
1	119494	Wall mount, complete with measuring cell block and SICON M control unit. The article number of the separate SICON M control unit can be found in the spare parts list.		
1	Included in scope of supply of the 119494.	Conn-P Connection box with all cables.		
1	Included in scope of supply of the 119494.	Wash bottle		
1	Included in scope of supply of the 119494.	Beaker		

PCS.	ART. NO.	NAME	VIEW	VARIANT
1		Instruction Manual		German French English
1		Reference Manual		German English
1		Brief Instructions		German French English

Optional accessory parts:

PCS.	ART. NO.	NAME	VIEW	VARIANT
1	118442	Interface print		Profibus DP
1	118445			Modbus RTU
1	119796			HART
	119041	Current output 4-way module		
	119795	Current input 4-way module		
1	118826	Ethernet cable IP66 for SICON (M)		
1	119498	Conductivity sensor, initial equipment		Conducell 4USF Arc 120
	119509	Conductivity standard 147µ/cm, 500 ml		
1	119495	pH sensor, initial equipment		Polilyte Plus Arc 120 Two calibration solutions are supplied. If no specific specifications are given, this is pH 4 and pH 7.
	119506	Calibration standards: pH 7		
	119507	pH 10		
	119571	pH 4		

PCS.	ART. NO.	NAME	VIEW	VARIANT
1	119497	Oxygen sensor, initial equipment Sensor for measuring dissolved oxygen		VisiFerm DO Arc 120
1	119496	Redox sensor, initial equipment Sensor for measuring the redox potential		Polilyte Plus ORP Arc 120
	119508	Redox buffer 475 mV, 500 ml		
1	120064	Flow meter for water filtering unit FEW4		Without limit switch
	120065	Flow meter with limit switch for water filtration unit FEW4		With limit switch

2.5 AquaMaster technical data

DATA	VALUES
Sample media	Water
Dimensions	ca. 55 x 115 x 40 cm (B x H x T)
Service voltage	100 .. 240 VAC, 47 .. 63 Hz or 18 .. 30 VDC
Power consumption	10W AquaMaster + 4 Sensors 25W AquaMaster + 4 Sensors + optional Photometer
Weight	ca.16 kg
Protection class	IP 54
Maximum operating altitude	No limitation when powered with 24 VDC, also the relay voltages do not exceed 24 V. 2000 m (6600 ft.) above sea level, if powered with 250 V.
Ambient temperature	0 .. +50 °C
Ambient humidity	0 .. 100 % rel. humidity, noncondensing
Sample pressure	0.6 MPa (6 bar)
Sample temperature	0 .. +60 °C

2.6 Technical data of the SICON M

SICON M DATA	VALUES
Service voltage and power consumption	9 .. 30 VDC; 5 W + photometer(s)
Display	¼ VGA with touchscreen Resolution: 320 x 240 pixels with 3.5" diagonal
Outputs/Inputs	Outputs: ▪ 4 x 0/4 .. 20 mA Outputs, galvanically isolated up to max. 50 V relative to ground and max. 500 Ω burden. ▪ 7 x digital outputs up to max. 30 VDC, freely configurable, 1 output as de-energized closed relay. ▪ Optional: With an integrated 4-way current output, four additional outputs (0/4 to 20 mA, galvanically isolated up to max. 50 V relative to ground and max. 500 Ω burden) are available. Inputs: ▪ 5 x digital inputs up to max. 30 VDC, freely configurable.
Digital and analog interfaces	Ethernet, Modbus TCP, SD card (log, SW update, diagnostics) Optional: Modules for Profibus DP, Modbus RTU, HART and Current output 4 times
Protection class	IP 66
Weight	Approx. 0.6 kg
Dimensions	160 x 157 x 60 mm
Housing material	ABS

2.7 Technical data of the sensors

Conductivity sensor (Conducell 4USF Arc 120):

DATA	VALUES
Sensor type	Conductivity
Measuring principle	4-pin measurement
Measuring values	Conductivity: µS/cm, mS/cm Temperature: °C, °K, °F
Measuring range	1 .. 300,000 µS/cm
Operating temperature	-20 .. 130 °C
Accuracy	± 3% at 1 µS/cm .. 100 mS/cm ± 5% at 100 .. 300 mS/cm
Medium-contacting material	1.4435/316L; Ra < 0.4 µm (N5) PEEK (FDA approved) EPDM (FDA approved)
Various	Autoclavable, can be sterilized with steam, suitable for CIP

pH sensor (Polilyte Plus Arc 120):

DATA	VALUES
Sensor type	pH
Measuring principle	Potential measurement compared to reference
Measuring values	pH Temperature: °C, °K, °F
Measuring range	pH 0 .. 14
Operating temperature	0 .. 130 °C
Accuracy	± 0.05
Medium-contacting material	Glass, FPM (Viton), Electrolyte: Polisolve Plus, Reference: Everref-L
min. conductivity of the sample	2 µS/cm
Various	Autoclavable, can be sterilized with steam

Sensor Redox/ORP (Polilyte Plus ORP Arc 120):

DATA	VALUES
Sensor type	Redox/ORP
Measuring principle	Potential measurement
Measuring values	ORP: mV Temperature: °C, °K, °F
Measuring range	-1500 .. 1500 mV
Operating temperature	0 .. 130 °C
Medium-contacting material	Glass, FPM (Viton), platinum
Various	Autoclavable, can be sterilized with steam

Sensor-02 (VisiFerm DO Arc 120):

DATA	VALUES
Sensor type	Dissolved oxygen (O_2)
Measuring principle	Optical: Oxygen-dependent quenching luminescence
Measuring values	Dissolved oxygen: µg/l; ppb; mg/l; ppm; % sat; % vol Temperature: °C
Measuring range	4 ppb .. 25 ppm
Operating temperature	-10 .. 130 °C, no measuring values above 80 °C
Accuracy	at 25 °C: 1 ± 0.05% vol, 21 ± 0.2% vol, 50 ± 0.5% vol
Medium-contacting material	1.4435 Silicon (FDA approved) EPDM (FDA approved)
Reaction time	98%: < 30s at 25 °C of air to nitrogen
Various	Autoclavable, can be sterilized with steam, suitable for CIP

3 General safety points

3.1 Dangers during normal use

DANGER!

Damage to the instrument or cabling.

Touching damaged cables may lead to electric shocks resulting in death.

- The instrument may be operated only when the cables are undamaged.
- The instrument may be put into operation only if it has been properly installed or repaired.

DANGER!

Dangerous voltage inside the connection box.

Touching live components may lead to electric shocks resulting in death.

- Do not operate the connection box when the housing is opened or damaged.

DANGER!

Damage to the instrument due to incorrect power supply.

The instrument may be damaged if it is connected to an incorrect voltage source.

- The instrument may be connected only to voltage sources as specified on the rating plate.

DANGER!

Instruction Manual missing when the instrument changes hands.

If the instrument is operated without knowledge of the Instruction Manual, then this can lead to personal injuries and damage to the instrument.

- If the instrument changes hands, always include the Instruction Manual.
- If the Instruction Manual is lost, you can request a replacement.
  Registered users can download the latest version under www.photometer.com.

CAUTION!

Escaping water from leaks on the instrument or water connections.

Escaping water can lead to flooding of the room and material damage to the building and fittings.

- Check that the inlet and outlet are not leaking.

CAUTION!

Moisture and condensation on electronic components during servicing duties.

The electronics may be damaged if moisture enters the inside of the instrument.

- Work inside the instrument may only be carried out in dry rooms and at room temperature. In doing so, the instrument should be at operating temperature or room temperature (avoid condensation on optical and electrical surfaces).

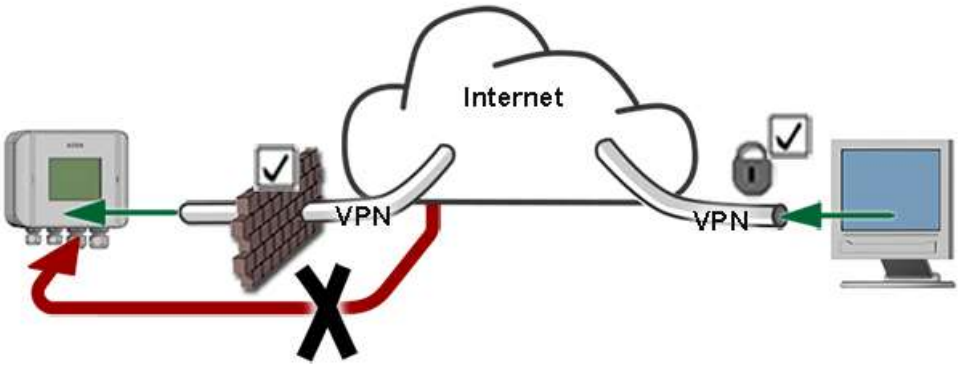
CAUTION!

Use of aggressive chemicals when cleaning the system.

The use of aggressive cleaning agents can lead to damage to the measuring cell and the instrument.

- Do not use aggressive chemicals or solvents when cleaning.
- Inorganic acids such as hydrochloric acid may only be used for cleaning if this is expressly permitted (e.g. for sensor cleaning).
- If the instrument should come into contact with aggressive chemicals, then clean it immediately with neutral cleaning agents.

3.2 Preventing undesirable online access attempts



WARNING!

SIGRIST instruments are equipped with an integrated web user interface and Modbus TCP interface, thus offering state-of-the-art administration and control possibilities. However, if these are connected directly to the Internet, then any Internet user can in principle access your instrument and change the configuration.

Please note the following points to prevent this:

- Never connect the instrument directly to the Internet.
- Operate it behind a firewall and block access to the instrument.
- Only connect to branch offices via VPN.
- Change the standard password on commissioning.
- Always keep up to date with the latest changes regarding Internet security so that you can react promptly in the event of alterations.
- Install the latest updates immediately (also for the router and firewall).

3.3 Residual risk

WARNING!

According to the risk assessment of the applied safety directive DIN EN 61010-1, there remains the risk of the displayed measuring values being incorrect. This risk can be reduced with the following measures:

- Use an access code to prevent unauthorized persons from changing parameters.
- Use flow meter.
- Perform the specified servicing duties.

3.4 Warning and danger symbols on the instrument

WARNING!

There are no warning or danger symbols on the instrument.

Users must ensure that they observe the safety measures as specified in the Instruction Manual at all times when working with the instrument and its peripheral equipment, even if no warning or danger symbols are attached to the instrument.

The following sections must be internalized:

- Section 1.8
- Section 1.12
- Section 1.13
- Section 3.1
- Section 3.3
- Observe safety pointers when performing the described procedures.
- Observe local safety pointers.

4 Mounting

4.1 Location selection

Note the following points for the operating location:

- Electrical supply must be ensured.
- The water supply must be ensured as described in the technical data.
- The water outlet must be unhindered.
- The system should not be exposed to direct sunlight during measurement; the measurement can be skewed by excessive external light.

4.2 Mounting the base plate

When mounting the base plate, refer to the **AQUAMASTER/4-MB** dimension drawing and the **AQUAMASTER/6-MB** drill plan.

Grip the base plate only on the blue sheet.

	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	Drill four holes in the wall for the threaded anchor according to the drill plan. It is advisable to use the M6 threaded anchor for fastening the base plate. The threaded anchor should project 2 or maximum 3 cm from the wall.	
2.	Fasten the threaded anchor in the wall.	
3.	Fasten the base plate to the threaded anchors.	

4.3 Position of the connection box

The connection box is positioned with the cable glands to the right between wall and base plate on the contact surface. The connection cables to the sensors are routed upward. The connection cable to the control unit is routed downward.

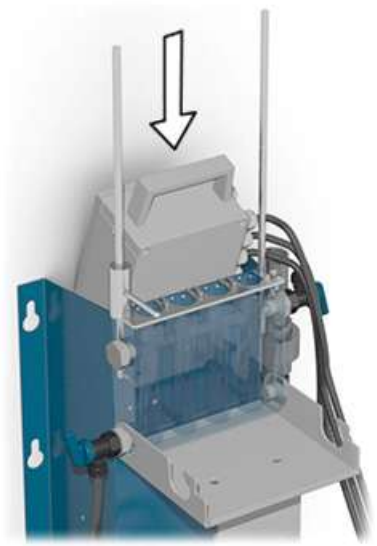


Figure 4: Position of the connection box

5 Electrical installation

5.1 Safety pointers for electrical connection

DANGER!

Connecting the service voltage.

Improper connection of the electrical service voltage can be life-threatening. The system may also be damaged. Local regulations for electrical connections must be observed at all times.

Further, the following basic principles must be observed:

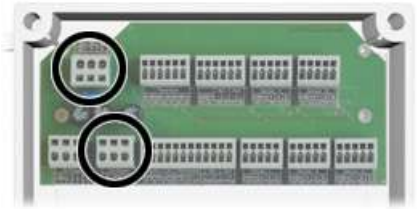
- Because the system has no main switch, a suitable disconnection device (switch, plug) should be installed near the service voltage. It must be designated and easily accessible.
- It is imperative that the protective conductor is connected.
- The system must not be charged with voltage until the installation is completed and all covers are mounted.
- On systems with 100 .. 240 VAC service voltage, a back-up fuse with a max. operating current of 16 A must be present. The cables must be able to withstand this load.
- If malfunctions cannot be remedied, the system must be put out of operation and protected against inadvertent operation.

The connection cables should be long enough so that there is sufficient freedom of movement when carrying out servicing duties on the instruments.

5.2 Installation of the connection box

After installation has been made, stow away the connection box according to Section 4.3.

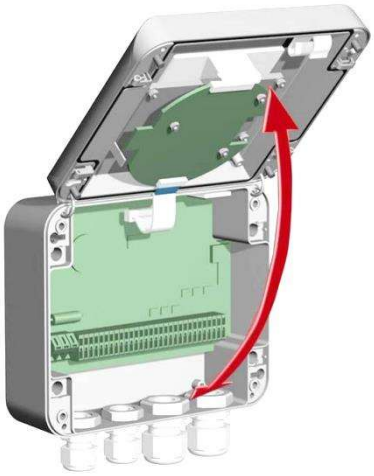
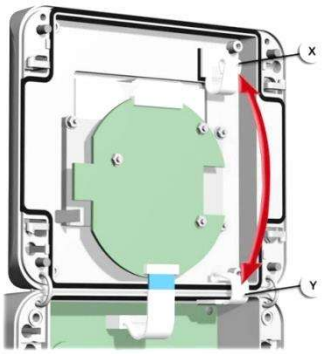
<table>
<tr><th></th><th>WORKSTEP</th><th>ADDITIONAL INFO / IMAGES</th></tr>
<tr><td>1.</td><td>
When a service voltage of between 100 and 240 VAC is present, connect as follows:
Connect the service voltage to the following terminals:
<table>
<tr><td>Terminals</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>Cable</td><td>⏚</td><td>P</td><td>N</td></tr>
</table>
When a service voltage of between 18 and 30 VDC is present, connect as follows:
1. The following cables must first be removed from the terminals:
▪ Cable leading to power unit (circle)
▪ Cable coming from power unit (circle)
2. Now connect the service voltage to the following terminals:
<table>
<tr><td>Terminals</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td>Cable</td><td>⏚</td><td>24V</td><td>GND</td></tr>
</table>
</td><td>


⚠ Unused cable ends must be insulated.
</td></tr>
<tr><td>2.</td><td>
Connect the Powerbox, if present.
<table>
<tr><td>Terminals</td><td>34</td><td>35</td><td>36</td><td>37</td><td>38</td></tr>
<tr><td>Function</td><td>SDA</td><td>GND</td><td>SCL</td><td>GND</td><td>GND</td></tr>
<tr><td>Cable</td><td>White/ green</td><td>Green</td><td>White/ brown</td><td>Brown</td><td>Shield-ing</td></tr>
</table>
</td><td>

</td></tr>
<tr><td>3.</td><td>Sensors purchased afterwards are connected to the free terminals (Sensor 1 to Sensor 5). The order is not important here.</td><td>Section 9.11</td></tr>
</table>

5.3 Installation of the SICON (M)

5.3.1 Removing the cover from the SICON (M)

	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	Open the shutters.	
2.	Loosen the fastening screws on the cover.	
3.	Open the cover.	
4.	Fasten the cover with the cover clamp. To do this, remove the cover clamp from the park position (X) and fasten the cover in position (Y).	

5.3.2 Overview of the opened SICON control unit

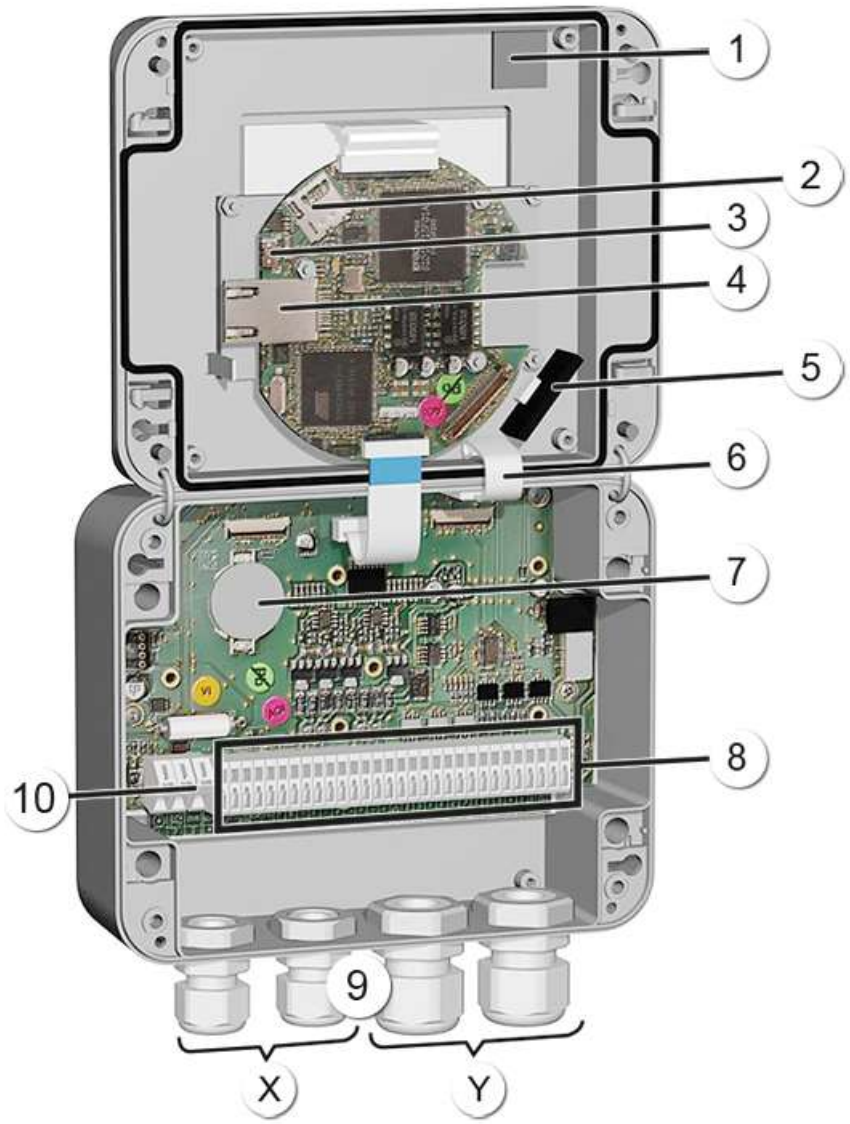


Figure 5: Overview of SICON Standard

①	Park position for cover clamp	②	microSD card (card for log data)
③	USB connection	④	Ethernet connection
⑤	SD card adapter with holder	⑥	Cover clamp in holding position
⑦	Battery	⑧	External connections
⑨	Cable gland X: 4 to 8 mm Y: 8 to 13 mm	⑩	Connections for the service voltage 9 .. 30 VDC

5.3.3 Wiring the SICON (M)

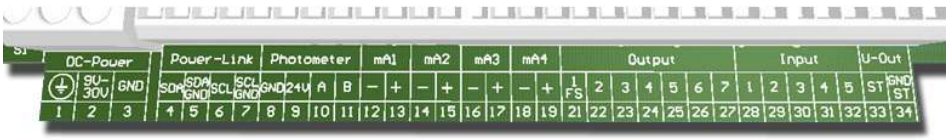
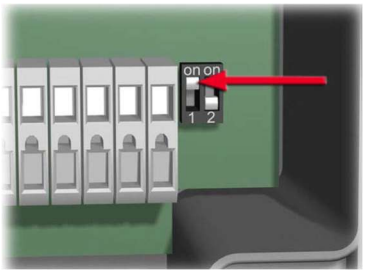


Figure 6: SICON (M) terminal block

Establish the electrical connections in the following sequence:

	TERMINAL	MEANING	REMARKS
1.	1 .. 11	Terminals in SICON M: Terminal / Function / Color 2 / 24V / Brown 3 / GND / Green 4 / SDA / Gray 5 / SDA GND / Pink 6 / SCL / Blue 7 / SCL GND / Red 10 / A / White 11 / B / Yellow	The cables with the colors black, violet, gray/pink and red/blue are not required. The cable ends must be insulated.
2.	12 .. 19	Curr. outputs 1 .. 4	
3.	21	Relay	Terminal 21 is closed de-energized
4.	22 .. 27	Digital optocoupler outputs	Terminals 22 .. 27 are open de-energized
5.	28 .. 32	Digital inputs	
6.	33 .. 34	Internal power supply for operating signals	DIL switch (1) must be on.  → Reference Manual

The use of operating signals is described in the Reference Manual.

5.4 Installation of the interfaces prints (field bus interfaces)

5.4.1 Overview of Modbus RTU and Profibus DP

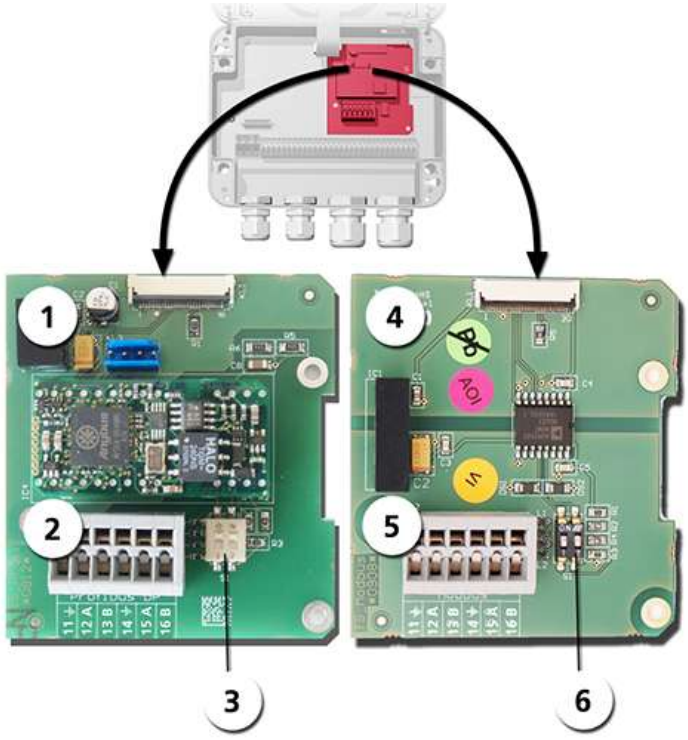


Figure 7: Overview of Modbus RTU and Profibus DP field bus interfaces

①	Field bus interface (connection print) for **Profibus DP**.	④	Field bus interface (connection print) for **Modbus RTU**.
②	Profibus DP terminals.	⑤	Modbus RTU terminals.
③	DIL switch for matching resistors. Switches (1 and 2) must be **ON**.	⑥	DIL switch for matching resistors. Switches (1 and 2) must be **ON**.

5.4.2 Terminal assignment of Modbus RTU/Profibus DP

The Profibus DP / Modbus RTU terminals are assigned as follows:

TERMINALS	MODBUS / PROFIBUS	FUNCTIONAL DESCRIPTION
11 ⏚	Ground IN	Connection for cable shielding
12 A	RS485-A IN	Data connection
13 B	RS485-B IN	Data connection
14 ⏚	Ground OUT	Connection for cable shielding
15 A	RS485-A OUT	Data connection
16 B	RS485-B OUT	Data connection

5.4.3 Implementation of HART

- To connect to HART, the optionally available HART module must be integrated in the SICON (M).
- The HART module must be activated in the **Digi. interf./HART** menu. With the activation of HART, the **Current → General → If fault** parameter is set to 3.6 mA according to the HART standard. The range of **Current output 1** is set permanently to **Measuring range 1**.

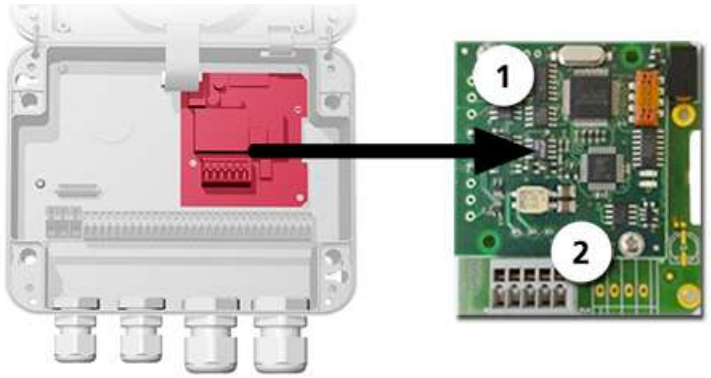


Figure 8: Position of the HART module in the device

①	Field bus interface (connection print) for HART. Serves as interface to HART.	②	HART terminals

5.4.4 Connecting to HART

The terminals of the HART module are configured as follows:

Terminals	HART	Functional description
1	mA+ In	Must be connected with terminal 13 (mA 1+) of SICON (M).
2	mA- In	Must be connected with terminal 12 (mA 1-) of SICON (M).
3	Shield	Cable shielding.
4	mA+ Out	Current output 1 (+) with HART is routed to terminal 26.
5	mA- Out	Current output 1 (-) with HART is routed to terminal 25.

The burden on current output 1 can be between 230 and 500 Ohm for HART communication.

HART process variables	**Function**	**Values**
Primary variable	Measuring value channel 1	Measuring value 1
Secondary variable	Measuring value channel 2	Measuring value 2
Third variable	Measuring value channel 3	Measuring value 3
Fourth variable	Measuring value channel 4	Measuring value 4
Additional status	Status	Prio / Faults / Warnings Section 10
Re-range primary variable	Upper range value	Measuring range 1 from
	Lower range value	Measuring range 1 to

5.5 4-way current output

The configuration of the 4-way current output module is described in the Reference Handbook SICON M.

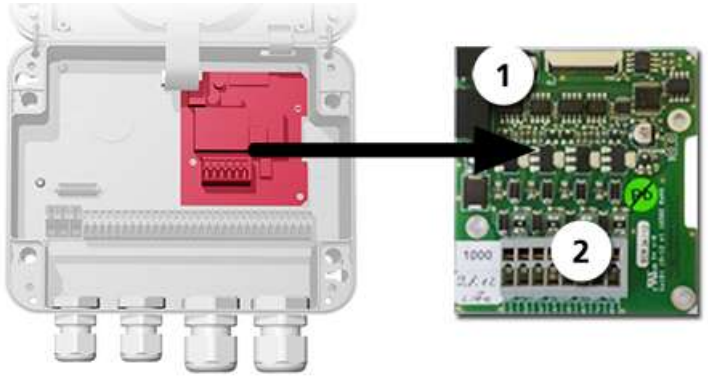


Figure 9: Position of the 4-way current output

①	4-way current output	②	Terminals

The terminals of the 4-way current output are configured as follows:

Terminals	HART	Functional description
1	mA 5 -	Current output 5
2	mA 5 +	
3	mA 6 -	Current output 6
4	mA 6 +	
5	mA 7 -	Current output 7
6	mA 7 +	
7	mA 8 -	Current output 8
8	mA 8 +	

The loop resistance on the current outputs can be a maximum of 500 Ohm.

5.6 4-way current input

The configuration of the 4-way current input module is described in the Reference Handbook SICON M.

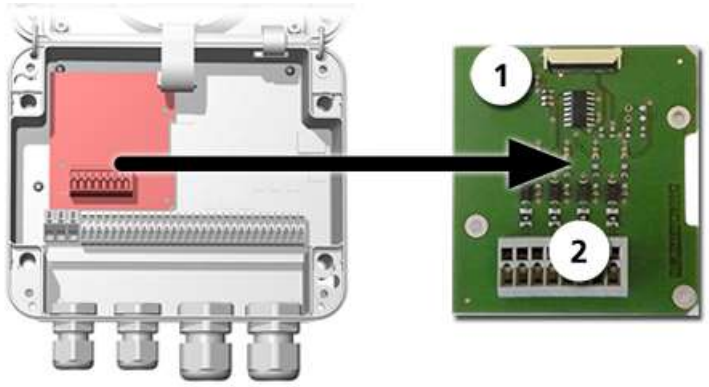


Figure 10: Position of the 4-way current input

①	4-way current input	②	Terminals

The terminals of the 4-way current input are configured as follows:

Terminals	**HART**	**Functional description**
1	In 1 -	Current input 1
2	In 1 +	
3	In 2 -	Current input 2
4	In 2 +	
5	In 3 -	Current input 3
6	In 3 +	
7	In 4 -	Current input 4
8	In 4 +	

Current inputs 1 .. 4 are intended for connecting external 0/4 .. 20 mA signals. The inputs are not galvanically isolated and the negative inputs are connected to the ground of the instrument. The input resistance is 100 Ohm.

5.7 Fitting sensors to the measuring cell block

CAUTION!

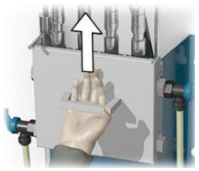
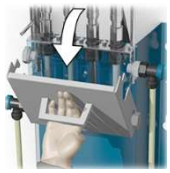
Damage to the sensors due to improper handling.

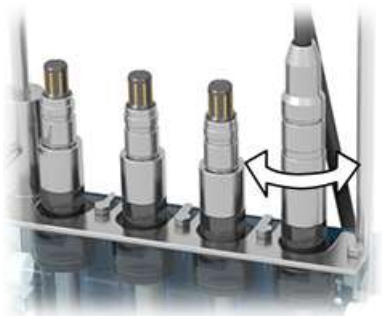
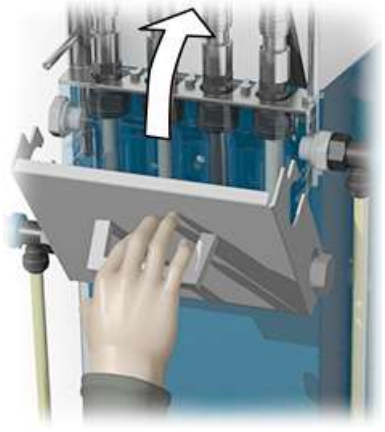
pH sensors and Redox/ORP sensors must be carefully handled. pH sensors have a sensitive glass membrane; redox sensors have a very fine platinum wire at the measuring tip. These sensors can be damaged by carelessly touching the measuring tip, by improper cleaning.

Do not let pH and Redox/ORP sensors dry out. If they are not going to be used for a while, put the tips in a storage solution (e.g. 3 molar solution of potassium chloride).

- Touch the electrodes and measuring tips of the pH and Redox/ORP sensors only when absolutely necessary.
- Use only cleaning agents in accordance with Section 9.2.3.

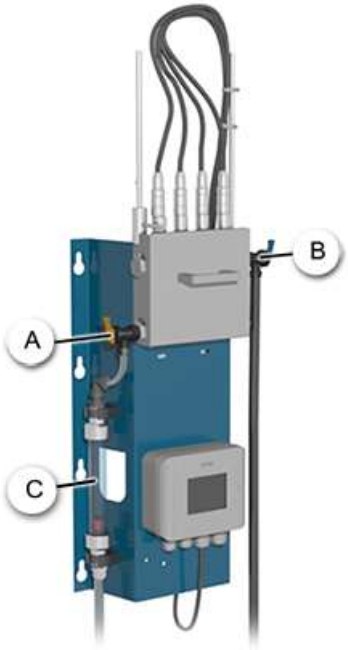
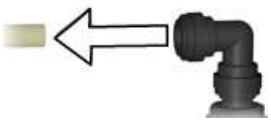
Oxygen sensors and Conductivity sensors are mechanically somewhat more robust. These sensors should nevertheless be handled with sufficient care.

	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	Close the inlet (X) on the measuring cell block and open the outlet (Y) on the measuring cell block.	
2.	Lift up the measuring cell block cover slightly and then unfold it.	 
3.	Swing the lock away from the measuring cell block.	
4.	If a pH or redox/ORP sensor is present, fill the measuring cell block with water until it is half full. This prevents the sensor from drying out.	

	WORKSTEP	ADDITIONAL INFO / IMAGES
5.	Insert the sensor into the measuring cell block with the name (e.g. pH) facing forwards and then plug in without pressing too hard. When using pH or redox/ORP sensors, remove the lock cap first. The order of the sensors in the measuring cell block is not important. However, it is better to install the pH and redox/ORP sensor to the right of the conductivity sensor due to the escaping electrolyte. Seal off the vacant sensor openings with the supplied blind plugs.	
6.	Lock the measuring cell block in place by swinging the lock back into position.	
7.	Screw the connection cable coming from the connection box to the sensors. Align the triangular marking on the cable to the sensor inscription when doing this. The assignment of the connection cables to the sensors is not important. Identification of the sensors is made automatically by the system.	
8.	Fold up the measuring cell block cover. If the lock has not been attached correctly to the measuring cell block (or is not attached at all), then the cover cannot be closed.	

	WORKSTEP	ADDITIONAL INFO / IMAGES
9.	Fasten the connection cable to the right-hand bar with cable ties (arrows).	

5.8 Connecting the water

	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	Feed the outlet hose into the coupling on the water outlet (B) and engage by applying a little pressure.	
2.	**Without** optional flow meter: Feed the inlet hose into the coupling on the water inlet (A) and engage by applying a little pressure. **With** optional flow meter: Feed the inlet hose into the coupling at the bottom of the flow meter (C) and engage by applying a little pressure. The hoses can be removed from the coupling as follows:	
	1. Push in the hose coupling. 	2. Pull the hose out of the coupling. 

5.9 Mounting the optional flow meter

SIGRIST recommends installing a simple flow meter to regularly check the sample. Note the following points when mounting the flow meter:

- The flow meter is mounted in front of the measuring cell block.
- A junction hose must be mounted between the flow meter and measuring cell block.
- If the required water flow rate is exceeded or undershot, measuring errors may occur! Installing a flow meter with limit contact improves measuring accuracy.

5.10 Configuring a flow meter with limit contact

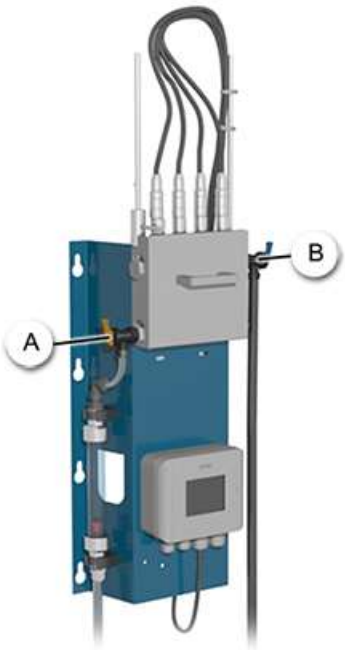
The optional flow meter with limit contact is connected to terminals 28 (In 1) and 33 (O-out ST) in the SICON (M). DIL switch S2/1 must be on. Section 5.3.3
Proceed as follows to activate monitoring:

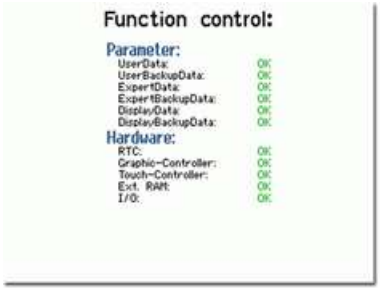
	MANIPULATION	ADDITIONAL INFO / IMAGES
1.	Press the **Menu** button.	
2.	Set the access code and confirm with **OK.**	Factory setting is **0.**
3.	Press the **Local …..** button.	
4.	Press the **Inp./outputs** button.	
5.	Press the **Inputs** button.	
6.	Select **Input 1.**	
7.	Activate input functions **External.**	
8.	Press the **OK** button.	
9.	Press the **General** button.	
10.	Under **Name ext.in** you can enter the text of the fault message with a maximum of seven characters (e.g. FLOWRAT).	**Prio.ext.in** should be on **Fault.**
11.	Press the **Meas** button.	The instrument is back in measuring operation.

6 Commissioning

The initial start-up of the web user interface via the Ethernet interface is described in the Reference Manual. If malfunctions occur, consult the Section 10.

Proceed with the initial start-up in accordance with the following table:

	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	Check that the system is mounted correctly.	Section 4
2.	Check that the sensors are mounted correctly in the measuring cell block.	Section 5.7
3.	**Check the union pieces of the complete system.** Check the water connections and the inlets/outlets.	
4.	**Establish and adjust the sample feed to the measuring cell block.** 4.1: Completely open the inlet regulator valve (A) to the measuring cell block.	
	4.2: Open the outlet regulator valve (B) until the desired flow rate is achieved. To prevent degassing of the sample media and consequent measuring problems, the measuring cell block must be under pressure. This is achieved by regulating the flow rate at the outlet regulator valve (B).	

	WORKSTEP	ADDITIONAL INFO / IMAGES
5.	**Establish service voltage to the system.** 5.1: Establish service voltage to the connection box. The welcome screen appears on the display. The factory setting language is English. Accordingly, the displayed language during the initial start-up is English.	
	5.2: The instrument carries out an internal functional check.	
	5.3: The instrument is ready for measurement.	
6.	Set the operating language.	Section 8.1
7.	Set the current outputs, if present.	Section 8.2
8.	Set the limits.	Section 8.3
9.	Enter the access code.	Section 8.9
10.	Copy the configured data to the microSD card.	Section 8.10

7 Operation

7.1 Operation basics

In this document we describe the practical examples only for the first steps of the menu configuration. All other setting options are described in the Reference Handbook. Operation using the web user interface is described in detail in the Reference Manual.

The instrument has a touchscreen. It is operated by touching with your finger. The navigation elements change color when touched.

CAUTION!

Sensitive touchscreen.

The touch screen can be damaged through improper handling. Damage can be avoided with the following measures:

- Touch the touchscreen only with your fingers and not with sharp objects.
- Use only slight pressure to perform manipulations on the touchscreen.
- Do not use chemicals or solvents to clean the touchscreen.

7.2 Control elements in measuring operation

Figure 11: Control elements in measuring operation

①	**Menu button** Call up the menu structure. Section 7.3	②	**Valu button** Numerical representation of the measuring values. Section 7.4
③	**Info button** Displays the information screen. Section 7.5	④	**Diag button** Graphical representation of the measuring values. Section 7.6
⑤	**Up arrow** Go to previous page.	⑥	**Down arrow** Four channels are displayed per page. Pressing this button displays more channels.

7.3 Menu button

Pressing the **Menu** button and entering the access code takes you to the menu structure. Now the instrument is in service operation. Operator prompting in service operation is described in Section 7.10.

7.4 Valu button

Pressing the **Valu** button displays the measuring values in numerical form. This is described in detail in Section 7.8.

7.5 Info button

When you press the **Info** button, a general overview of the instrument settings appears. These are described below:

7.5.1 Page 1, Info button

Figure 12: Info display

①	Information about the current outputs Standard I1 .. I4 (with additional print I1 .. I8) X: Source of the current output Y: Measuring range of the current output	②	Status of the inputs → Reference Manual
③	Status of the outputs → Reference Manual	④	Main menu buttons

7.5.2 Page 2, Info button

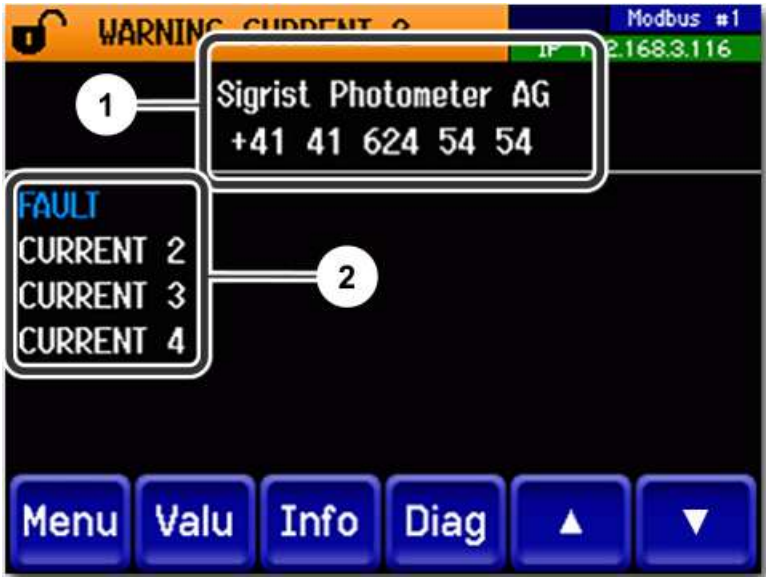


Figure 13: Info screen, page 2

①	Contact information	②	Display of up to 5 pending fault messages

7.5.3 Page 3, Info button

The state of all connected sensors is displayed here.

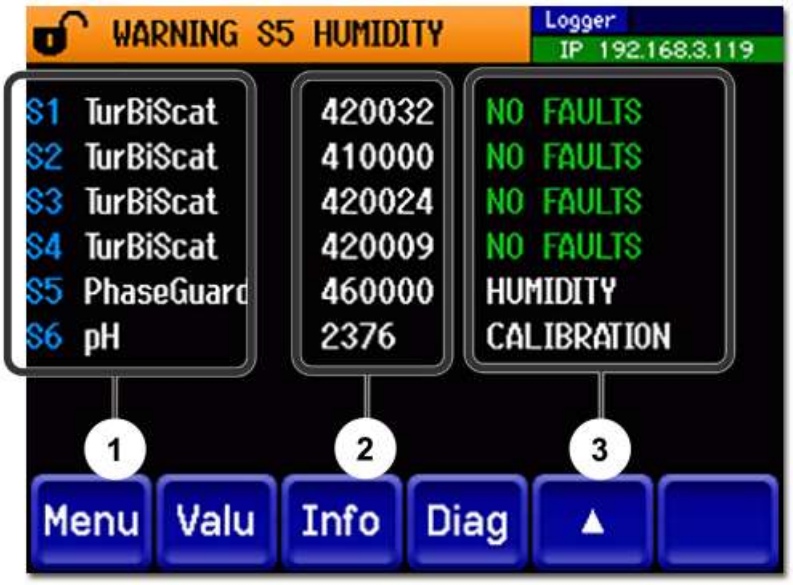


Figure 14: Info screen, page 3

①	Sensor name	②	Serial numbers of the corresponding sensor
③	Fault message Section 10		

7.6 Diag button

When you press the **Diag** button, a diagram appears which graphically shows the measuring values over a certain period of time.

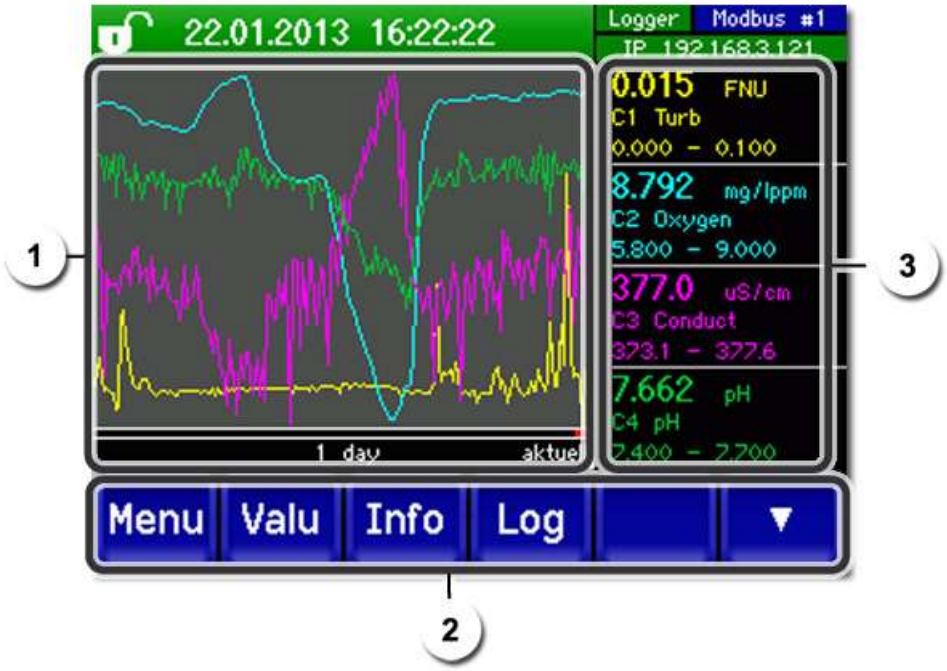


Figure15: Graphic representation of the measuring values

①	**Graphic representation of the measuring values** The measuring values can be recorded from 3 minutes to 32 days and are graphically represented. The color of the measuring value curves corresponds to the measuring channels on the right side of the display (position 3).	②	**Main menu button** The logger functions (Log button) are described in Section 7.7.
③	**Measuring channels:** Numerical representation of the set measuring channels. ▪ Current measured value (e.g. 0.013 FNU). ▪ Measuring channel with name (e.g. C1 Turb). ▪ Scaling of the Y-axis (e.g. 0.000 to 0.100). The channel names shown in the figure are examples and can be adjusted individually.		

7.7 Functions of the log screen (Log button)

The screen logger works independently of the data logger, which is set in the **Logger** menu and writes to the microSD card.

The screen logger records the data of the last 32 days in one minute intervals. The data can be called up from the Log menu.
If the instrument is out of operation for more than 32 days, the logger data is restarted. An hour glass is shown for about 1.5 minutes in the graphic display. During this time no logger data is available.

The **Log** button exists only in the main menu in the diagram screen view; in the **Valu** view the **Diag** button must first be pressed. When the **Log** button is pressed, the following screen appears:

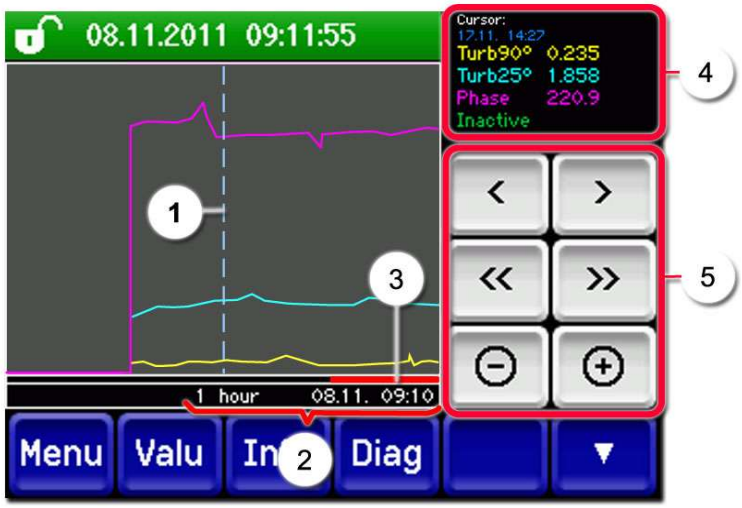


Figure 16: Functions of the Log display

①	The cursor shows the time position which is represented at pos. 4. The cursor position can be changed either by briefly touching with your fingertip or by pressing the </> buttons.	②	Represented time period The following time ranges can be set: 3 min./15 min./1 hr./3 hr./9 hr./1 day/ 3 days/10 days/32 days
③	Red bar indicates how much of the total time period is currently represented.	④	Measuring values which were measured at the cursor position.
⑤	**</>**: Moves the cursor position. The cursor moves faster when these buttons are held down longer. **<</>>**: Jumps forward or backward by the time period set in point 2. **-/+**: Increases (+) or decreases (-) the screen section around the cursor position.		

In the **Display/General** menu you can define whether minimum, maximum or mean values are to be displayed. → Reference Manual
Pressing the **Diag** button takes you to the graphical representation.

7.8 Displays in measuring operation

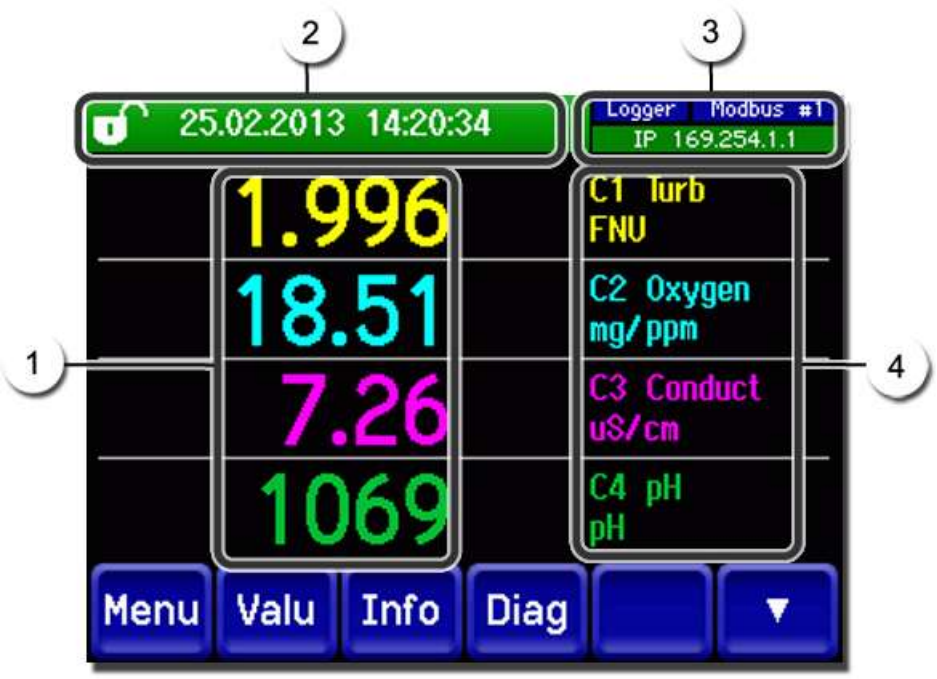


Figure 17: Displays in measuring operation

①	Measuring value(s) For values which are greater than the maximum measuring range, no measuring value is displayed; instead, ******** is displayed.	②	Status line In normal operation, the status line is green and shows the date and time. If faults should occur, warning and fault messages are shown here and the status line changes to orange or red.
③	Interface information ▪ Top left: Logger status ▪ Top right: Modbus, HART or Profibus status ▪ Below: Ethernet IP status The following messages are possible: - IP not connected (cable not connected) - IP DHCP running… - IP 169.254.1.1 (example address) Color coding: Black: Not active / not present Blue: Activated – in idle mode Green: Active Red: Fault	④	Channel name with unit The channel names shown in the figure are examples and can be adjusted individually.

7.9 Activating and deactivating the screen lock

	MANIPULATION	
1.	Press the lock icon top left.	
2.	Within one second press the key bottom at the outside right. Depending on the initial state, the lock icon changes as follows:  Display unlocked  Display locked	

7.10 Switching to service operation

The system is configured in service operation. The measuring procedure is interrupted and the main menus appear on the display. Proceed as follows to access service operation:

	MANIPULATION	ADDITIONAL INFO / IMAGES
1.	Press the **Menu** button.	
2.	Set access code and confirm with **OK.**	Factory setting is **0.**
3.	Select menu **Local …….** or **S 1 .. 8**.	Now the instrument is in service operation.

The following applies in service operation:

- * The measuring values remain on the last values on the digital interfaces.
- * Depending on the configuration, the current outputs go to 0/4 mA or remain on the last measuring value.
- The limits are deactivated.
- If an output for service is programmed, it is activated.
- Error messages are suppressed.

* This applies when the **Local parameters\Current outputs\General\For service** is set to **Measure**.

For measuring operation press the **Meas** button. When switching from service operation to measuring operation, an hourglass appears in the information bar for about 20 seconds. The measuring values are frozen during this time.

7.11 Control components in service mode

7.11.1 Input elements in service operation

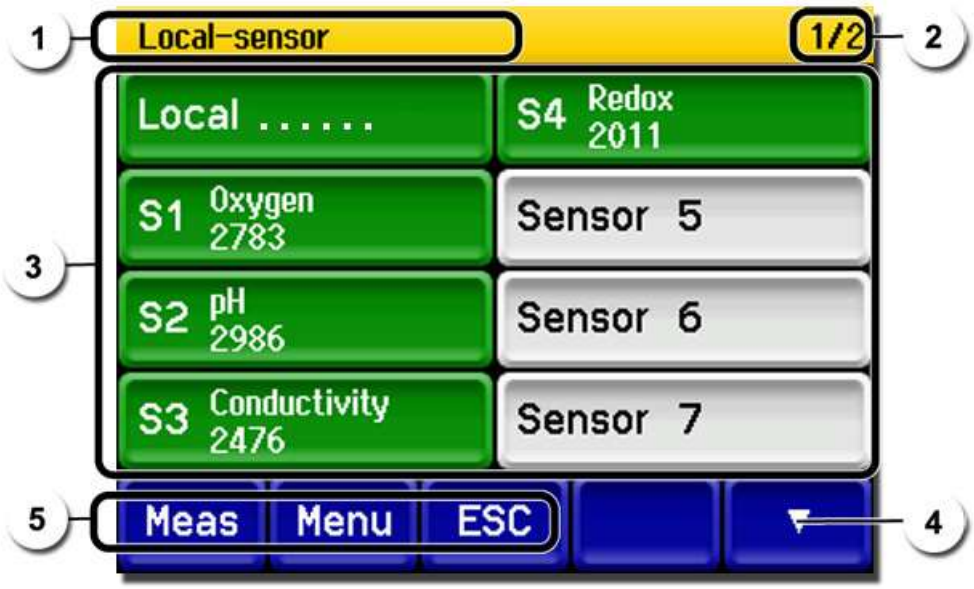


Figure 18: Input elements in service operation

①	**Path specification**	②	**Page number / total number of pages**
③	**Main menus** All of the AquaMaster functions are configured in the **Local .....** menu. Depending on the integrated sensors, the **S 1 .. 8 (sensor 1 .. 8)** menus appear here. The sensors can be configured in these menus.	④	**Next page**
⑤	**Meas button:** The instrument changes to measuring operation. **Menu button:** The display goes back one level but remains in service operation. **ESC button:** The display goes back in the menu hierarchy until the measuring operation finally is reached.		

7.11.2 Numerical entry

The following screen is for entering numbers and data:

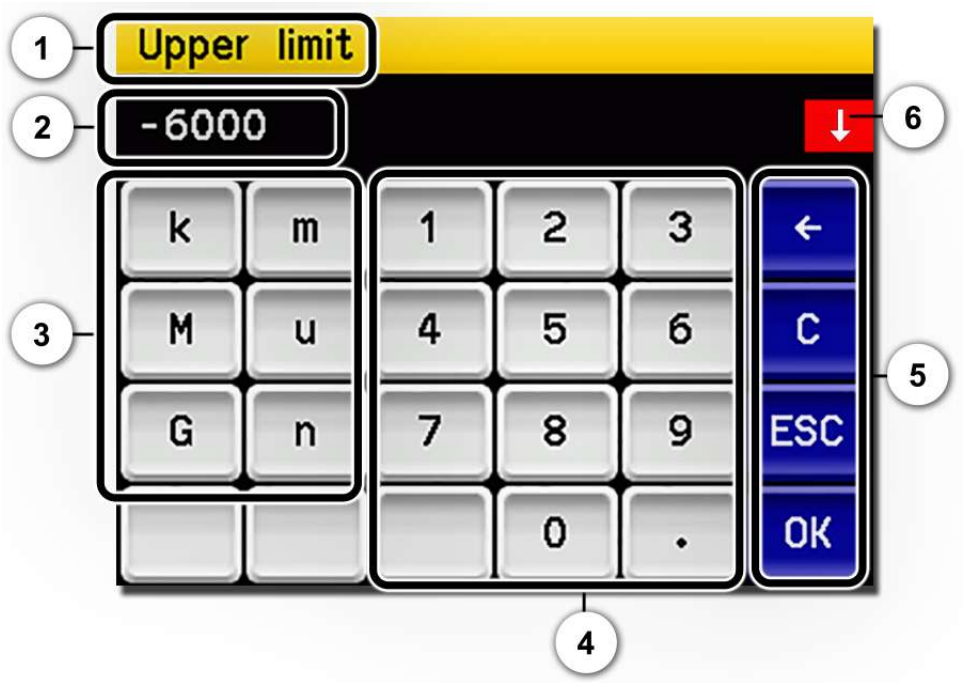


Figure 19: Numerical entry

①	Parameter name	②	Entered values
③	Prefix: For entering very large or very small values. This can be done as follows: 1. Enter value 2. Select SI prefix Function: **n** = 10^{-9}, **u** = 10^{-6}, **m** = 10^{-3}, **k** = 10^{3}, **M** = 10^{6}, **G** = 10^{9}	④	Numerical entry
⑤	**←:** Deletes one digit of the displayed value. **C:** Clears the displayed value. **ESC:** Touching the **ESC** field causes the display to go back one level in the menu hierarchy. The entered value is not saved. **OK:** Confirm entered value.	⑥	If the value entry is too high or too low, a white arrow appears in a red field top right. Arrow points upward: Entry too high Arrow points downward: Entry too low

7.11.3 Single selection of functions

The single selection is **identifiable by the ESC** button below right.

The currently selected function is green. Use the Up/Down arrows to navigate the options in long lists. Use the **ESC** button to cancel the entry.
Pressing a selection item saves the configuration and completes the entry.

Figure 20: Example of single selection

7.11.4 Multiple selection of functions

The multiple selection is identifiable by the **OK** button bottom right:

The currently selected values are green. Use the Up/Down arrows to navigate the options in long lists. Pressing a selection item changes the active status of the corresponding item. Press the **OK** button to save the configuration and complete the entry.

Figure 21: Example of multiple selection

8 Settings

8.1 Setting the operating language

	MANIPULATION	ADDITIONAL INFO / IMAGES
1.	Press the **Menu** button.	
2.	Set access code and confirm with **OK.**	Factory setting is **0.**
3.	Press the **Local .....** button.	
4.	Press the **Configuration** button to access language selection.	If the desired menu does not appear, press the arrow key bottom right.
5.	Press language field (circle). The list of all languages appears (factory setting is English).	
6.	Apply the desired language by pressing the corresponding field. Press the **ESC** button to cancel.	
7.	Press the **Meas** button.	

8.2 Set current outputs

	MANIPULATION	ADDITIONAL INFO / IMAGES
1.	Press the **Menu** button.	
2.	Set access code and confirm with **OK.**	Factory setting is **0.**
3.	Press the **Local .....** button.	
4.	Press the **Curr. outputs** button.	If the desired menu does not appear, press the arrow key bottom right.
5.	Select **C1 .. C4** (**1 .. 8**).	
6.	Select the source of the measuring channel from the **Source** menu item. This name is displayed to simplify identification of the measuring channel.	 The channels defined under **Meas.Channels** as well as three math and two analog channels are available for selection. → Reference Manual
7.	Select **Range**.	MR1 .. MR8 (see table below) In 1, In 2, Auto 1, Auto 2 → Reference Manual
8.	Press the **Meas** button.	Instrument again in measuring operation.

MEASURING RANGE NO.	MEASURING RANGE (DEFAULT)	MEASURING RANGE (CUSTOMER-SPECIFIC)
MR1	-1500 .. 1500	
MR2	0 .. 1000	
MR3	0 .. 100	
MR4	0 .. 50	
MR5	0 .. 25	
MR6	0 .. 14	
MR7	0 .. 10	
MR8	0 .. 1	

If other measuring ranges are needed, you can re-program the table above as required.
→ Reference Manual

8.3 Set limits

	MANIPULATION	ADDITIONAL INFO / IMAGES
1.	Press the **Menu** button.	
2.	Set access code and confirm with **OK.**	Factory setting is **0.**
3.	Press the **Local .....** button.	If the desired menu does not appear, press the arrow key bottom right.
4.	Press the **Limits** button.	
5.	Select **L1 .. L8**	
6.	Select the source of the measuring channel from the **Source** menu item. This name is displayed to simplify identification of the measuring channel.	 The channels defined under **Meas.Channels** as well as three math and two analog channels are available for selection. → Reference Manual
7.	Define **Mode**.	The following selection is available: ▪ **Inactive** (limit monitor of this channel is deactivated) ▪ **Exceeded** (limit active when the set threshold value is exceeded) ▪ **Undershot.** (limit active when the set threshold value is undershot)
8.	Define **upper limit**, **lower limit**, **cut-in delay** and **cut-out delay** with number pad.	Pressing the current number value takes you to the entry mode.
9.	Press the **Meas** button.	Instrument again in measuring operation.

So that the limits are not only displayed but also the outputs are switched, they have to be configured accordingly.

8.4 Upper and lower threshold value of a limit

A maximum of eight limits with upper and lower threshold values can be programmed.

If the operating mode is set to **Exceeded**, then while the upper threshold value is exceeded the limit is active and remains active until the lower threshold value is again undershot.

If the operating mode is set to **Undershot**, then while the lower threshold value is undershot the limit is active and remains active until the upper threshold value is again exceeded.

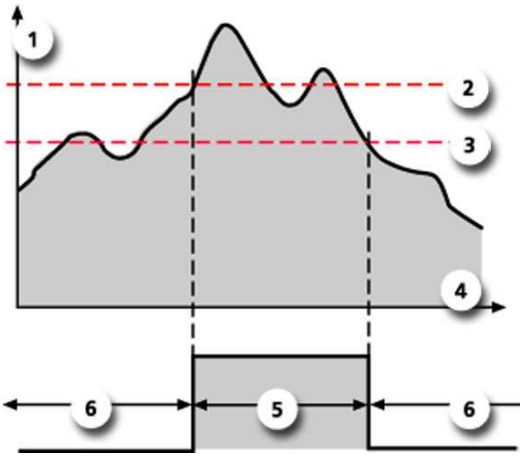


Figure 22: Diagram of limit exceeded

①	Measuring value	②	Upper threshold value
③	Lower threshold value	④	Time
⑤	Limit active	⑥	Limit passive

8.5 Reading if limit exceeded or undershot

If a limit event occurs during operation, it has the following effects on measuring operation:

- Threshold value display indicates an unusual state.
- If an output for the corresponding limit channel is programmed, it is switched.

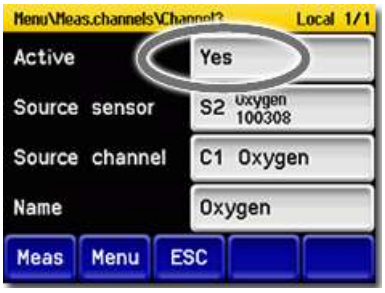
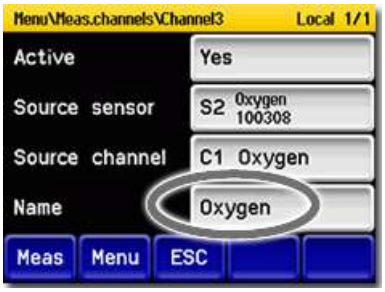
If the message **Limit** appears, the color of the status display changes to **white** and the numbers of the limit channels are listed with their channel numbers in **red** if limits have been exceeded or undershot. Inactive limits are indicated with "_".

8.6 Set outputs

	MANIPULATION	ADDITIONAL INFO / IMAGES
1.	Press the **Menu** button.	
2.	Set access code and confirm with **OK**.	Factory setting is **0.**
3.	Press the **Local .....** button.	
4.	Press the **Inp./outputs** button.	If the desired menu does not appear, press the arrow key bottom right.
5.	Press the **Outputs** button.	
6.	Select **O1 .. O8**.	
7.	Activate outputs (multiple selection possible).	Activated outputs are highlighted green. ▪ Invert: inverts the outputs ▪ Prio fault ▪ Fault ▪ Warning ▪ Service ▪ Adjustment ▪ Limit 1 .. 8 The other buttons named **MR-Out...** and **Valve/Channel** are for automatic measuring range switching and for multiple sample switching with valves. → Reference Manual.
8.	Press the **Meas** button.	Instrument again in measuring operation.

8.7 Setting the measuring channels and the display

Setting of which channel should display the connected sensors

	MANIPULATION	ADDITIONAL INFO / IMAGES
1.	Press the **Menu** button.	
2.	Set the access code and confirm with **OK**.	Factory setting is **0**.
3.	Press the **Local .....** button.	
4.	Press the **Meas. channels** button. Select the desired **Channel 1 .. n**.	If the desired menu does not appear, press the arrow at the bottom right.
5.	At the **Active** menu item, set the button to **Yes**. If set to **No**, this channel is inactive.	
6.	Select the source from the **Source sensor** menu item.	
7.	Select the source from the **Source channel** menu item. Here you can select the desired measuring value of the sensor defined under **Source sensor**.	
8.	Enter the name of the channel in the **Name** menu. The name should be unique, since it is referred to in other settings for the display, e.g. current outputs.	
9.	Press the **ESC** button. The **Meas. channels** menu is displayed. Define the other channels as described under points 4 to 9.	
11.	Press **ESC** and then the up arrow button. All menu items of **Local .....** are displayed.	
12.	Press the **Display** button and then select the desired **Channel 1 .. n**.	

	MANIPULATION	ADDITIONAL INFO / IMAGES
13.	Select the source of the measuring channel from the **Source** menu item. This name is displayed to simplify identification of the measuring channel. The source defined under Channel 1 is displayed in the operation display at the top. Channel 2 is displayed in the second position, and so on. The other menu items refer to settings of the graphic display and are described in the Reference Manual.	
14.	Press the **ESC** button. The **Display** menu is displayed. Define the other channels as described under points 12 to 13.	
15.	Press the **Meas** button.	The instrument is in measuring operation again.

8.8 Setting the date and time

	MANIPULATION	ADDITIONAL INFO / IMAGES
1.	Press the **Menu** button.	
2.	Set access code and confirm with **OK.**	Factory setting is **0.**
3.	Press the **Local .....** button.	
4.	Press the **Configuration** button.	If the desired menu does not appear, press the arrow key bottom right.
5.	To enter the time, press the currently displayed time at the **Time** menu item and enter the new time with the number pad. Confirm entry with **OK.**	The time must be entered in the format **hh:mm:ss** 
6.	To enter the date, press the currently displayed date at the **Date** menu item and enter the new date with the number pad. Confirm entry with **OK.**	The date must be entered in the format selected under the **Date format** menu item. 
7.	Press the **Meas** button.	Instrument again in measuring operation.

8.9 Setting or changing the access code

You can protect the settings of the instrument against unauthorized manipulations by defining your own access code.

	MANIPULATION	ADDITIONAL INFO / IMAGES
1.	Press the **Menu** button.	
2.	Set access code and confirm with **OK**.	Factory setting is **0.**
3.	Press the **Local .....** button.	
4.	Press the **Configuration** button.	If the desired menu does not appear, press the arrow key bottom right.
5.	Press the button to the right of the **Access code** description text.	
6.	Enter the access code and confirm with **OK**.	
7.	Press the **Meas** button.	Instrument again in measuring operation.

A forgotten access code can be cleared only by a SIGRIST service engineer.

Enter your personal access code here:

8.10 Back up configured data

These measures can be of use to the service engineers for service purposes.

	MANIPULATION	ADDITIONAL INFO / IMAGES
1.	Press the **Menu** button.	
2.	Set access code and confirm with **OK.**	Factory setting is **0.**
3.	Press the **Local .....** button.	
4.	Press the **System info.** button.	If the desired menu does not appear, press the arrow key bottom right.
5.	In the **User -> SD** and **Expert -> SD** submenus press the **Copy** function.	The user and expert data are copied to the microSD card. After a successfully completed procedure, acknowledge with the **OK** button.
6.	Press the **Meas** button.	Instrument again in measuring operation.

9 Servicing

9.1 Servicing schedule

WHEN	WHO	WHAT	PURPOSE
Monthly or as needed	Operator	Cleaning, checking and recalibration of the pH sensor. Section 9.5	Obligatory measure for maintaining measuring accuracy.
Every 2 months or as needed	Operator	Cleaning, checking and recalibration of the conductivity sensor. Section 9.6	Obligatory measure for maintaining measuring accuracy.
Every 3 months or as needed	Operator	Cleaning, checking and recalibration of the redox sensor/ORP. Section 9.7	Obligatory measure for maintaining measuring accuracy.
Every 2 months or as needed	Operator	Cleaning, checking and recalibration of the oxygen sensor. Section 9.8	Obligatory measure for maintaining measuring accuracy.
As intervall (recommend. by supplier)	Operator	Replace sensors. **1-2 years:** pH-sensor Redox/ORP sensor Oxygene sensor (cap) **4 years:** Conductivity sensor **7 years:** Oxygen sensor Replacing a sensor configured by SIGRIST or unconfigured.Section 9.9 / 9.10	Obligatory measure for maintaining measuring accuracy.
As needed	Operator	Cleaning the measuring cell block. Section 9.13	Measure for maintaining measuring accuracy. Interval dependent on water quality and handling.
Every 10 years or as needed	Operator	Replacing the battery in the SICON. Section 9.14	Obligatory measure for maintaining functional efficiency.

Table 1: Servicing schedule

9.2 Introduction to handling of the sensors

9.2.1 General information

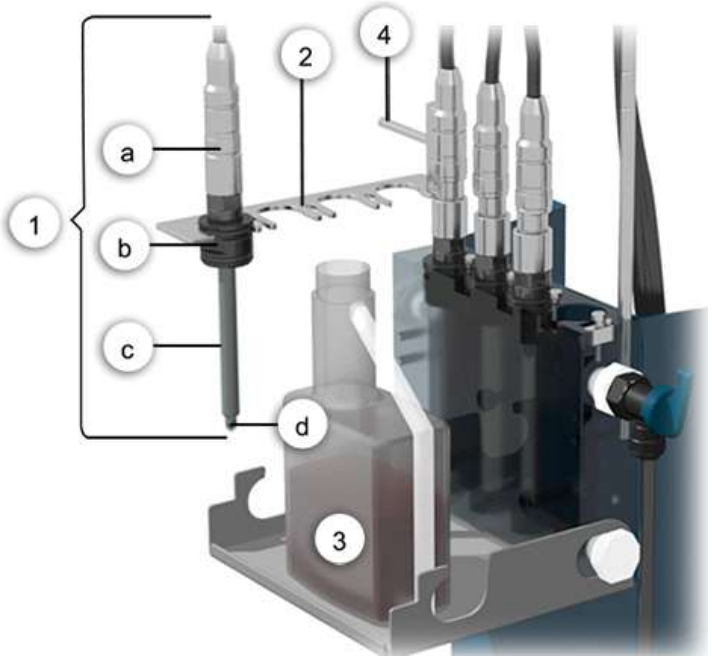


Figure 23: Overview of calibration

①	Complete sensor a: Connection/electronic system b: Holder c: Shaft (electrode) d: Measuring tip	②	Lock
③	Bottle with calibration solution	④	Guide rod for swinging the lock back and forth

The calibration process is designed for use with Hamilton calibration solutions (500 ml container). Although it is possible to use other calibration solutions, SIGRIST-PHOTOMETER expressly recommends using the Hamilton standards.

The pH sensor is subject to two-point calibration. All other sensors are subject to single-point calibration.
The oxygen sensor is calibrated against ambient air. As experience shows, the oxygen sensor needs some time for a stable measurement of the ambient air. Preferably, it should be the first sensor to be removed from the measuring cell block, cleaned and dried, and then only be calibrated at the end.

9.2.2 Measurements with temperature dependency

Many measurements are extremely dependent on the temperature. This dependency is corrected automatically by the sensors. Nonetheless, the calibration solutions and sensors should still have approximately the same temperature as the calibration is only made when the measuring value and temperature are stable.

9.2.3 Cleaning the sensor tips

CAUTION!

Damage to the sensors due to improper cleaning.

Improper handling of the sensors when cleaning and the use of excessively aggressive cleaning agents can lead to damage to the sensors. Note the following when cleaning the sensors:

- Only the following materials may be used for cleaning the sensors:
  - Cleaning set
  - Max. 1M hydrochloric acid (max. 3.6%)
  - Ethanol
- The use of abrasive cleaning agents is not permitted.
- Only the tips and the lower shaft section of the sensors may be cleaned with the cleaning agents as detailed above.
- After cleaning redox/ORP and pH sensors with acid, rinse with water and then immerse in storage solution for 15 minutes in order to prevent slow reaction times during measurement.
- Rinse all sensors with water after cleaning.
- Only touch the electrodes or measuring tip of the pH and redox/ORP sensor when absolutely necessary.

9.2.4 Mechanical handling of the sensors

The blue glass ball on the pH sensor is particularly sensitive and should be protected against drying out (hydrated layer). This also applies to the redox/ORP sensor, whose tip is wrapped with a fine platinum wire. The measuring tips of these sensors should only be dabbed clean, and not mechanically cleaned. A cleaning kit and cleaning instructions are available in the event of heavy soiling.
The oxygen and conductivity sensor are slightly more robust than the two glass sensors (pH and redox/ORP). However, they should still be handled with care.

CAUTION!

Damage to the sensors due to improper handling.

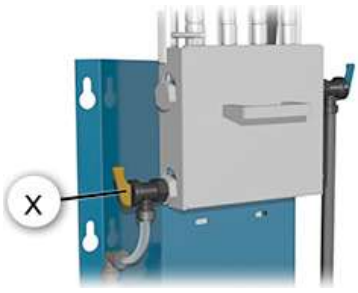
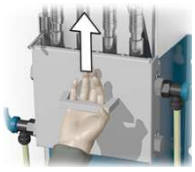
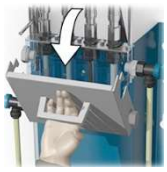
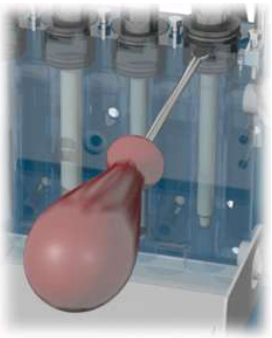
pH sensors and Redox/ORP sensors must be carefully handled. pH sensors have a sensitive glass membrane; redox sensors have a very fine platinum wire at the measuring tip. These sensors can be damaged by carelessly touching the measuring tip, by improper cleaning.

Do not let pH and Redox/ORP sensors dry out. If they are not going to be used for a while, put the tips in a storage solution (e.g. 3 molar solution of potassium chloride).

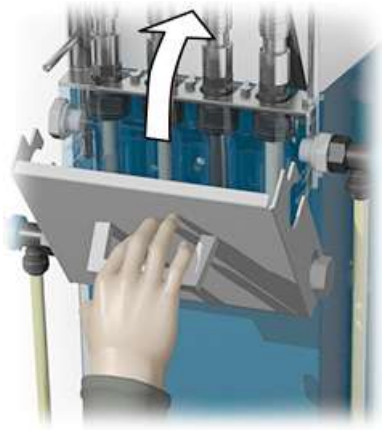
- Touch the electrodes and measuring tips of the pH and Redox/ORP sensors only when absolutely necessary.
- Use only cleaning agents in accordance with Section 9.2.3.

Oxygen sensors and Conductivity sensors are mechanically somewhat more robust. These sensors should nevertheless be handled with sufficient care.

9.3 Removing the sensors

	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	Close the inlet regulator valve (X) to the measuring cell block.	
2.	Lift up the measuring cell block cover slightly and then unfold it.	 
3.	Swing the lock away from the measuring cell block by pressing the guide rod.	
4.	Carefully pull the sensor out of the measuring cell block. If this is not possible, pry out the sensor carefully using a screwdriver. Slight damage to the upper O-ring does not pose a problem as it does not have a sealing function.	
5.	Position the sensor in the lock for servicing duties.	
6.	Carry out the necessary servicing duties on the sensor.	

9.4 Installing the sensors

	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	Insert the sensor into the desired measuring position on the measuring cell block. The position of the sensors is not important. However, it is better to install the pH and redox/ORP sensor to the right of the conductivity sensor due to the escaping electrolyte.	
2.	Push the sensor into the measuring cell block. The holder must be flush with the measuring cell block.	
3.	Lock the measuring cell block in place.	
4.	Fold up the measuring cell block cover. If the lock has not been attached correctly to the measuring cell block (or is not attached at all), then the cover cannot be closed.	
5.	Put the system into operation according to Section 6.	

9.5 Clean and calibrate pH sensor

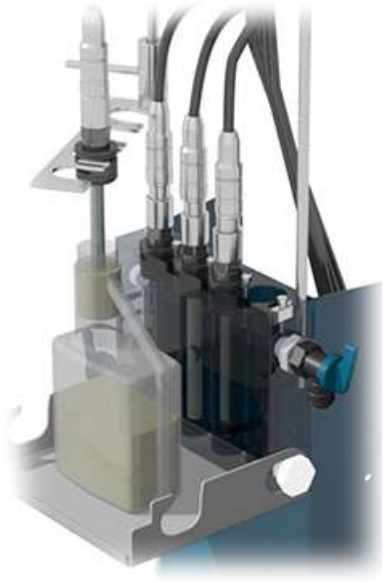
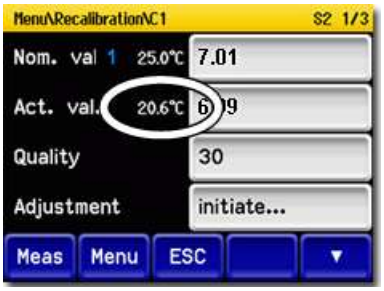
CAUTION!

The pH sensor can be damaged through improper handling.

The pH sensor can be damaged by carelessly touching the measuring tip or by using the wrong cleaning agent.

- For cleaning this sensor please consult Section 9.2.
- Touch the pH sensor only if absolutely necessary.
- Do not clean with abrasive cleaning agents.
- Use only recommended cleaning agents for cleaning.

	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	1.1: Press the **Menu** button.	
	1.2: Set access code and confirm with **OK.**	Factory setting is **0.**
	1.3: Press button with **(S1 .. S4) name of the pH sensor.**	
	1.4: Select the **Recalibration** menu.	
	1.5: Select **C1 pH** menu.	
2.	Remove pH sensor in accordance with Section 9.3 and position in locking device.	
3.	**Clean measuring point of the sensor.** 3.1: Dip the measuring tip of the sensor into cleaning solution or dab with a soaked cloth. Use cleaning agents in accordance with Section 9.2.3.	
	3.2: Rinse the measuring tip with distilled water and dab dry.	
4.	**Prepare recalibration.** 4.1: Open calibration holder and fill with buffer solution by pressing the container. Calibration solutions from various manufacturers are supported. They can be selected in the **Recalibr./Cali. standard** menu. The one from Hamilton is set as standard.	

	WORKSTEP	ADDITIONAL INFO / IMAGES
	4.2: Submerge the pH sensor into the calibration solution to the second notch. The sensor should be centered in the calibration beaker and is not permitted to contact the bottom of the calibration beaker.	
5.	**Perform recalibration for nominal value 1.** 5.1: Compare the **Nom. val.** (circle) with the value on the calibration solution. Pressing the **Nom. val.** button (circle) causes a numerical entry field to appear where the nominal value can be adjusted.	
	5.2: Wait until the temperature value (circle) is stable. The recalibration is performed only if the values were stable over the last 3 minutes.	

	WORKSTEP	ADDITIONAL INFO / IMAGES
	5.3: Press the **Initiate** button. The recalibration begins. If the adjustment was successful, confirm with **Adjustment OK**. This completes the adjustment. If the adjustment was not OK, the following messages may appear: **running...** Cause: Values not yet stable. **Diff. too small** Cause: The nominal values of the calibration solutions are too close to each other. Action: ▪ Correct calibration solution used. ▪ Calibration not OK. **Out of tolerance** Cause: Current actual value is too far from the nominal value. Action: ▪ Ensure that the set nominal value and the nominal value of the calibration solution match. ▪ Clean sensor.	If the quality indication after calibration is between 100 and 35, the age of the sensor is the reason. If the calibration was not correct, 30 is shown at quality. The calibration must be repeated for both nominal values.
6.	Rinse off the pH sensor with distilled water and dab dry.	
7.	**Perform recalibration for nominal value 2.** Change to **Nom. val. 2** by pressing the arrow key bottom right and repeat steps 3 .. 6 with second calibration solution.	
8.	Install pH sensor in measuring cell block in accordance with Section 9.4.	

9.6 Clean and calibrate Conductivity sensor

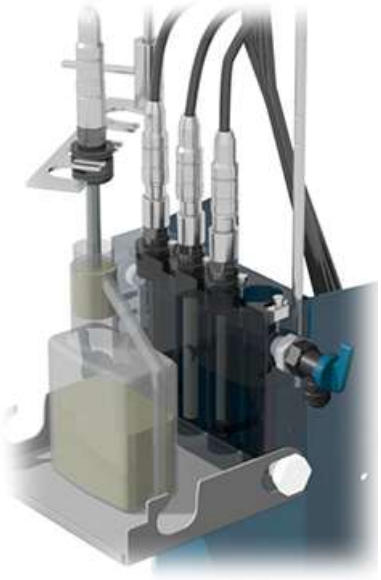
CAUTION!

The Conductivity sensor can be damaged through improper handling.

The Conductivity sensor can be damaged by carelessly touching the measuring tip or by using the wrong cleaning agent.

- For cleaning and calibrating this sensor please consult Section 9.2.
- Touch the Conductivity sensor only if absolutely necessary.
- Do not clean with abrasive cleaning agents.
- Use only recommended cleaning agents for cleaning.

	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	1.1: Press the **Menu** button.	
	1.2: Set access code and confirm with **OK**.	Factory setting is **0**.
	1.3: Press button with **(S1 .. S4) name of the conductivity sensor**.	
	1.4: Select the **Recalibration** menu.	
	1.5: Select **C1 Conduct.** menu.	
2.	Remove Conductivity sensor in accordance with Section 9.3 and position in the locking device.	
3.	**Clean measuring tip of the sensor.** 3.1: Dip the measuring tip into cleaning solution or dab with a soaked cloth. Use cleaning agents in accordance with Section 9.2.3.	
	3.2: Rinse the measuring tip with distilled water and dab dry.	
4.	**Prepare recalibration.** 4.1: Open calibration holder and fill with buffer solution by pressing the container. Calibration solutions from various manufacturers are supported. They can be selected in the **Recalibr./Cali. standard** menu. The one from Hamilton is set as standard.	

	WORKSTEP	ADDITIONAL INFO / IMAGES
	4.2: Submerge the Conductivity sensor into the calibration solution to the second notch. The sensor must be centered in the calibration beaker and is not permitted to contact the bottom of the calibration beaker.	
5.	5.1: Compare the **Nom. val.** (circle) with the value on the calibration solution. Pressing the **Nom. val.** button (circle) causes a numerical entry field to appear where the nominal value can be adjusted.	
	5.2: Wait until the temperature value (circle) is stable. Recalibration is performed only when the temperature value is stable. The nominal value is factory set at 2%/°C temperature compensation (based on 25 °C). (**Meas.Channels Conduct\Temp.Comp** menu.) If the temperature compensation is switched off, the actual value at the actual temperature must be compared to the value on the calibration solution table.	

	WORKSTEP	ADDITIONAL INFO / IMAGES
	5.3: Press the **Initiate** button. The recalibration begins. If the adjustment was successful, confirm with **Adjustment OK**. This completes the adjustment. If the adjustment is not OK, the following messages may appear: **running...** Cause: Values not yet stable. **Out of tolerance** Cause: Current actual value is too far from the nominal value. Action: ▪ Ensure that the set nominal value and the nominal value of the calibration solution match. ▪ Clean sensor.	If the quality indication after calibration is between 100 and 35, the age of the sensor is the reason. If the calibration was not correct, 30 is shown at quality. The calibration must be repeated.
6.	Rinse sensor with distilled water.	
7.	Install sensor in measuring cell block in accordance with Section 9.4.	

9.7 Clean and calibrate Redox/ORP sensor

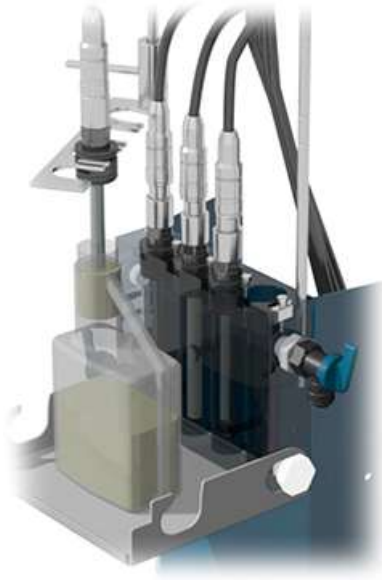
CAUTION!

The Redox/ORP sensor can be damaged through improper handling.

The Redox/ORP sensor can be damaged by carelessly touching the electrode or by using the wrong cleaning agent.

- For cleaning this sensor please consult Section 9.2.
- Touch the measuring tip of the Redox/ORP sensor only if absolutely necessary.
- Do not clean the sensor with abrasive cleaning agents.
- Do not clean the sensor when dry.
- Use only recommended cleaning agents for cleaning.

	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	1.1: Press the **Menu** button.	
	1.2: Set access code and confirm with **OK**.	Factory setting is **0**.
	1.3: Press button with **(S1 .. S4) name of the Redox/ORP sensor**.	
	1.4: Select the **Recalibration** menu.	
	1.5: Select **C1 ORP** menu.	
2.	Remove Redox/ORP sensor in accordance with Section 9.3 and position in the locking device.	
3.	**Clean measuring tip of the sensor.** 3.1: Dip the measuring tip into cleaning solution or dab with a soaked cloth. Use cleaning agents in accordance with Section 9.2.3.	
	3.2: Rinse the measuring tip with distilled water and dab dry.	
4.	**Prepare recalibration.** 4.1: Open calibration holder and fill with buffer solution by pressing the container. Calibration solutions from various manufacturers are supported. They can be selected in the **Recalibr./Cali. standard** menu. The one from Hamilton is set as standard.	

	WORKSTEP	ADDITIONAL INFO / IMAGES
	4.2: Submerge the Redox/ORP sensor into the calibration solution to the second notch.	
5.	5.1: Compare the **Nom. val.** (circle) with the value on the calibration solution. Pressing the **Nom. val.** button (circle) causes a numerical entry field to appear where the nominal value can be adjusted.	
	5.2: Wait until the temperature value (circle) is stable. Recalibration is performed only when the temperature value is stable.	

	WORKSTEP	ADDITIONAL INFO / IMAGES
	5.3: Press the **Initiate** button. The recalibration begins. If the adjustment was successful, confirm with **Adjustment OK**. This completes the adjustment. If the adjustment was not OK, the following messages may appear: **running...** Cause: Values not yet stable. **Out of tolerance** Cause: Current actual value is too far from the nominal value. Action: ▪ Ensure that the set nominal value and the nominal value of the calibration solution match. ▪ Clean sensor.	If the quality indication after calibration is between 100 and 35, the age of the sensor is the reason. If the calibration was not correct, 30 is shown at quality. The calibration must be repeated.
6.	Rinse sensor with distilled water.	
7.	Install sensor in measuring cell block in accordance with Section 9.4.	

9.8 Cleaning and calibrating the oxygen sensor

CAUTION!

The oxygen sensor can be damaged through improper handling.

The oxygen sensor can be damaged by touching the electrode carelessly or by using incorrect cleaning agents.

- See Section 9.2 for details on how to clean the sensor.
- Only touch the measuring tip of the oxygen sensor when absolutely necessary.
- Do not clean the sensor with abrasive cleaning agents.
- Cleaning should not be carried out without cleaning agent.
- Only use the recommended cleaning agents.

Before calibrating in air, the current ambient air pressure must be known (barometer or information from weather service – **NOTE**: use the QFE value).

	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	1.1: Press the **Menu** button.	
	1.2: Set the access code and confirm with **OK**.	Factory setting is **0**.
	1.3: Press the button with **(S1 .. S4) Name of the oxygen sensor**.	
	1.4: Select the **Recalibration** menu.	
	1.5: Select the **C1 Oxygen** menu.	
2.	Remove the oxygen sensor according to Section 9.3 and position it in the lock.	
3.	**Clean the measuring tip of the sensor.** 3.1: Immerse the measuring tip in cleaning solution or dab it with a soaked cloth. Use the cleaning agent according to Section 9.2.3	
	3.2: Rinse off the measuring tip with distilled water and pat dry.	

	WORKSTEP	ADDITIONAL INFO / IMAGES
4.	4.1: Wait until the temperature (1) is stable. Recalibration is only made when the temperature is stable. This can take slightly longer on the oxygen sensor. The oxygen sensor is calibrated to the oxygen content of the ambient air. This is 20.95% by volume. The sensor switches the unit automatically to "by volume". When exiting the menu, the value changes back to the original unit. Pressing the **Nom. val.** button (2) opens a numeric input field where the nominal value can be adjusted. 4.2: Enter the current ambient air pressure (3).	
	4.3: Press the **initiate** button. Recalibration starts. If the adjustment was successful, this is confirmed with **Adjustment OK**. This completes the adjustment. If the adjustment was not successful, the following message may appear: **running...** Cause: Values not yet stable.	If the displayed quality is between 100 and 35 following calibration, then this is due to aging of the sensor. If the calibration was incorrect, then a quality value of 30 is displayed. The calibration must be repeated.
5.	Install the sensor in the measuring cell block according to Section 9.4.	

9.9 Replace sensors configured by SIGRIST

	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	Remove old sensor from the measuring cell block in accordance with Section 9.3.	
2.	Install new sensor in accordance with Section 9.4.	
3.	Put the system into operation again.	

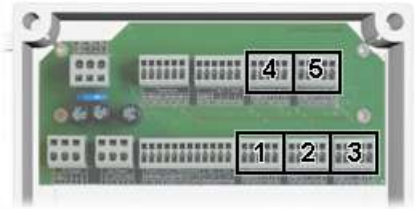
9.10 Installing an unconfigured sensor

This process is only applicable if a new sensor has not been ordered from SIGRIST-PHOTOMETER.

	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	In the **Local .....** menu, access the **Digi. interf.** submenu.	
2.	Remove the old sensor from the measuring cell block according to Section 9.3.	
3.	Remove the holder from the old sensor and screw it onto the new sensor. On pH and redox/ORP sensors, the cap with the storage solution must be removed.	
4.	Install the new sensor in the measuring cell block according to Section 9.4 and attach the connection cable.	
5.	In order for the assignment of the slave number to be carried out reliably, detach the connection cables of all other sensors.	
6.	Select the **Hamilton** menu. Press **start...** under the "Find Sensor" menu item.	

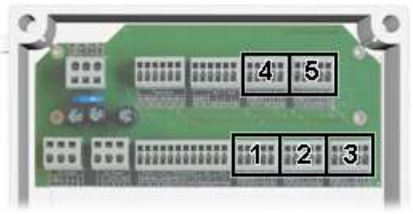
<table>
<tr><th></th><th>WORKSTEP</th><th>ADDITIONAL INFO / IMAGES</th></tr>
<tr><td>7.</td><td>A system search is now carried out for connected Hamilton sensors. As soon as a sensor is found, the type and slave number are displayed (e.g. Oxygen, Slave no. 1).
If the slave number has not yet been adjusted to Siginet, then undefined is shown under the slave number menu item.
In this case, a slave number has to be entered according to the following table.
<table>
<tr><td>Oxygen</td><td>pH</td><td>Conductivity</td><td>Redox/ORP</td></tr>
<tr><td>1</td><td>2</td><td>3</td><td>4</td></tr>
</table>
</td><td> 
</td></tr>
<tr><td>8.</td><td>The other sensors can now be reattached.</td><td></td></tr>
<tr><td>9.</td><td>Select the Siginet menu and press start... under “Network scan”.
A search is made for a few seconds and then a list appears with all found sensors.
If not all sensors are displayed, then proceed as follows:
1. Start the “Network scan” again.
2. Check the connections to the sensors.
3. Check whether each sensor has an individual slave number.</td><td> 
</td></tr>
<tr><td>10.</td><td>If the sequence is not as desired, then the slave numbers can now be reassigned. To do this, all sensors must be selected in the desired sequence one after the other. The new slave number is shown and the associated button changes to green.
If the sequence of the sensors is correct, confirm with the OK button.</td><td></td></tr>
<tr><td>11.</td><td>Set the measuring channels according to Section 8.7.</td><td></td></tr>
<tr><td>12.</td><td>The system can be put into operation.</td><td></td></tr>
</table>

9.11 Integrating sensors purchased afterwards

	WORKSTEP	ADDITIONAL INFOR / IMAGES
1.	Interrupt the service voltage.	
2.	Connect the additional sensor cable in the connection box. One of the five terminal blocks marked with **Sensor** can be used here. Terminals: GND | 24V | A | B | ⏚ Cable color: White | Brown | Blue | Black | shield	
3.	Install the new sensor in the measuring cell block and attach the connection cable to the sensor.	
4.	Re-establish the service voltage.	
5.	In the **Local .....** menu, access the **Digi. interf.** submenu.	
6.	Select the **Hamilton** menu. If the value under **Max. number** is less than the number of required sensors (max. 4), then note down the value entered under **Code.** With this code, you can request an activation code from your SIGRIST representative.	
7.	After receiving the activation code, enter it under **Key word**. If the combination of code and key word is correct, then the maximum number is increased by one (up to a maximum of 4).	
8.	Select the **Siginet** menu and press **start...** under "Network scan". A search is made for a few seconds and then a list appears with all found sensors. If not all sensors are displayed, then proceed as follows: 1. Start the "Network scan" again. 2. Check the connections to the sensors. 3. Check whether each sensor has an individual slave number.	

	WORKSTEP	ADDITIONAL INFOR / IMAGES
9.	When the number of sensors is increased, it makes sense to assign the highest slave number to the new sensor. Only in this way do the measuring channel allocations of the existing sensors remain valid. Moreover, all sensors must be selected in the desired sequence one after the other. The new slave number is shown and the associated button changes to green. If the sequence of the sensors is correct, confirm with the **OK** button.	
10.	Set the measuring channels.	
11.	The system can be put into operation.	

9.12 Integrating ColorPlus 2 in the AquaMaster

	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	Interrupt the service voltage.	
2.	Connect the ColorPlus 2 cable in the connection box. One of the five terminal blocks marked with **Sensor** can be used here. Terminals: GND | 24V | A | B | ⏚ Cable color: Green | Brown | White | Yellow | shield	
3.	Re-establish the service voltage.	
4.	In the **Local ……** menu, access the **Digi. interf.** submenu.	
5.	Select the **Siginet** menu and press **start…** under "Network scan". A search is made for a few seconds and then a list appears with all found sensors. If not all sensors are displayed, then proceed as follows: 1. Start the "Network scan" again. 2. Check the connections to the sensors. 3. Check whether each sensor has an individual slave number.	
6.	If a ColorPlus is added at a later date, it makes sense to assign the highest slave number to this ColorPlus. Only in this way do the measuring channel allocations of the existing sensors remain valid. Moreover, all sensors must be selected in the desired sequence one after the other. The new slave number is shown and the associated button changes to green. If the sequence of the sensors is correct, confirm with the OK button.	
7.	Set the measuring channels.	
8.	The system can be put into operation.	

9.13 Clean the measuring cell block

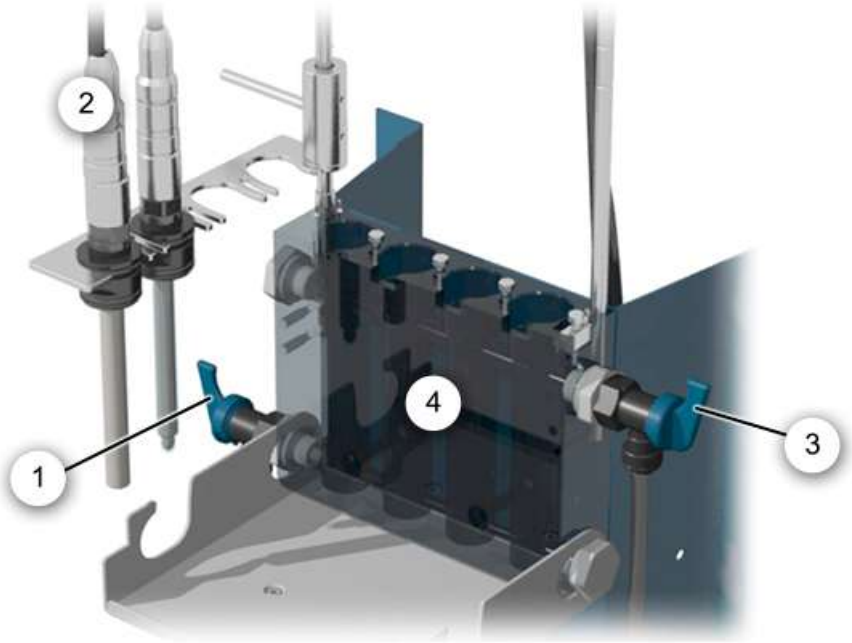


Figure 24: Instrument overview of AquaMaster

①	Inlet flow regulator valve for measuring cell block	②	Sensor positioned on locking device
③	Outlet regulator valve for measuring cell block	④	Measuring cell block

CAUTION!

Damage to the measuring cell (PMMA) if wrong cleaning agent is used.

The use of wrong cleaning agents can damage the measuring cell. Bear in mind the following:

- The following cleaning agents must **not** be used:
  - Alcohol or solvent
  - Inorganic or strong organic acids
- Only the following cleaning agents may be used:
  - Water
  - Commercially available dishwashing liquid
  - Weak organic acid (e.g. Ascorbic acid)

The following procedure describes how to clean the measuring cell block:

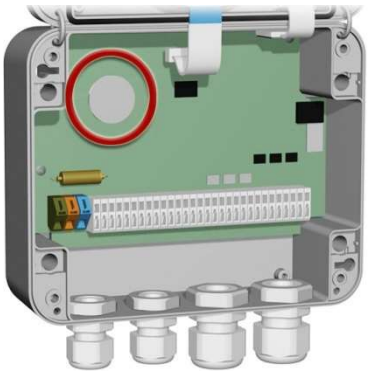
	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	Close main water supply.	
2.	Remove all sensors from the measuring cell block and position in the locking device (Figure 24, pos. 2). Submerge pH sensor and Conductivity sensor in container with water to protect them from drying out. Do not use distilled water but rather clean tap water.	
3.	Remove hose on the measuring cell block inlet flow regulator valve (Figure 24, pos. 1), open inlet regulator valve and let the measuring cell block drain into a container until empty.	
4.	Completely remove the feed hose from the measuring cell block and rinse. Also open the optional flow meter and rinse, if present.	
5.	Remove the outlet hose from the outlet regulator valve (Figure 24, pos. 3) and rinse.	
6.	Reattach the outlet hose on the outlet regulator valve (Figure 24, pos. 3).	
7.	Clean measuring cell block (Figure 24, pos. 4) with bottle cleaner.	
8.	Reattach the hose on the inlet flow regulator valve (Figure 24, pos. 1). Also reattach the flow meter, if present.	
9.	Remount sensors in the measuring cell block.	
10.	Open the main water valve again and put the system into operation.	

9.14 Changing the battery in the SICON

DANGER!

Life-threatening voltage inside the instrument.

Connecting electrical lines can be extremely dangerous. Instrument parts may also be damaged. Local regulations for electrical installations must be observed at all times.

	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	Interrupt the service voltage to the SICON.	
2.	Open the control unit according to Section 5.3.1.	
3.	Remove the battery (circle).	
4.	Insert the new battery.	
5.	Close the control unit.	
6.	Re-establish the service voltage.	
7.	Set date and time.	

10 Troubleshooting

10.1 Pinpointing malfunctions

DETECTABLE MALFUNCTION	MEASURE
No reading	▪ Check whether the supply voltage is connected.
Fault message in the display	▪ Analyze the fault message according to Section 10.2 to Section 10.4.
The reading appears to be wrong	▪ Ensure that the sample to be measured corresponds to the operating conditions. Section 2.5 ▪ Check whether the system is correctly mounted. Section 4 ▪ Ensure that the servicing duties have been performed according to the servicing schedule. Section 9

Table 2: Pinpointing malfunctions

If the listed measures do not lead to the desired results, please consult customer service. Section 11

10.2 Warning messages and effect on operation

Warnings indicate an unusual state.

WARNINGS	
If a warning occurs during operation, it has the following effects: ▪ The system continues to operate. However, the measuring results must be evaluated with caution. The cause of the warning message should be remedied at the next possible opportunity. ▪ When the cause of the warning has been remedied, it is automatically deleted. ▪ When the **Warning** message occurs, the color of the status display changes to **orange** and the warning text describes the warning in question.	 Example: **WARNING S2 CALIBRATION.**

The following warning messages can be displayed:

WARNING	DESCRIPTION	POSSIBLE CAUSES
V IN	The input voltage is outside the permitted range (18-30 VDC).	▪ The service voltage is faulty.
CURRENT 1 .. 8	Current output 1 .. 8 is disturbed.	▪ Terminals open. ▪ Interruption of the current loop of the reading output.
WATCHDOG	The internal fault monitoring has been actuated. The program has been restarted.	▪ Program crash.
MEASURING	Measuring problem with Hamilton sensor.	▪ Temperature or measuring values are unstable or outside the permitted range.
CALIBRATION	Calibration problem with Hamilton sensor.	▪ Calibration recommended. ▪ Last calibration not successful. ▪ Oxygen: Replace cover.
INTERFACE	Connection problem with Hamilton sensor.	▪ Oxygen: mA value outside range. ▪ Oxygen: ECS (electrical connection of this sensor) is outside the range.
HARDWARE	Hardware problem with Hamilton sensor.	▪ Supply voltage outside range.

WARNING	DESCRIPTION	POSSIBLE CAUSES
QUALITY	A Hamilton sensor reports a quality value under 35%.	▪ The calibration was incorrectly performed or was faulty. ▪ If the fault continues after repeated cleaning and calibration, the sensor (or cap on the oxygen probe) must be replaced. ▪ Conductivity: Sensor is outside the medium.
OVER TEMP	A Hamilton sensor reports the temperature is too high.	▪ Medium or ambient temperature too high. ▪ Temperature measurement defective.

Table 3: Possible warning messages

10.3 Fault messages and effect on operation

FAULT	
If a fault occurs during operation, it has the following effects: ▪ The measurement is canceled. ▪ The measuring values go to 0. ▪ When the **Fault** message appears, the color of the status display changes to **red** and the text describes the fault in question. If the cause of the fault has been remedied, it is automatically deleted.	 Example: **FAULT S3 MEASURING**

The following fault messages can be displayed:

FAULT	DESCRIPTION	POSSIBLE CAUSES
POWER LINK	Actuation of the extended inputs/outputs via the Powerlink is disturbed.	▪ Interrupted connection to the extended inputs/outputs.
MEASURING	Serious measuring fault on a Hamilton probe.	▪ Sensor measurement defective. ▪ Temperature measurement defective. ▪ Resistance or potential outside the permitted range.
CALIBRATION	Serious fault when calibrating a Hamilton sensor.	▪ Oxygen sensor: Cap missing. ▪ pH, redox/ORP sensor: Sensor defective (quality <15%). ▪ Conductivity sensor: Sensor defective (quality <15%) or outside the medium.
INTERFACE	Connection problem with Hamilton sensor.	▪ Oxygen sensor: Fault in current output.
HARDWARE	Serious fault in the hardware of a Hamilton sensor.	▪ Input voltage far outside the permitted range. ▪ Temperature measurement far outside the permitted range. ▪ Oxygen sensor: Red channel failure. ▪ Internal communication fault.
ANALOG IN 1/2	The input signal on analog input 1/2 is less than the fault limit.	▪ There is no input signal

Table 4: Possible fault messages

10.4 Prioritized fault messages and their effect on operation

PRIO (PRIORITIZED FAULT)	
When there is a prioritized fault, the cause of the malfunction is serious. If a prioritized fault occurs during operation, it has the following effects: ▪ When there is a prioritized fault, the cause of the malfunction is serious. ▪ A prio fault of the AquaMaster sets all measuring values to 0. ▪ A prio fault of a sensor/photometer sets the concerned measuring values to 0. ▪ The current output goes to the programmed electrical current **If fault.** ▪ The limits are deactivated. ▪ If an output for prioritized faults is programmed, it is activated. ▪ When the **Prio** message occurs, the color of the status display changes to **red** and the text describes the prioritized fault in question. ▪ Prioritized faults can be cleared only by a service engineer.	 Example: **PRIO DEFAULT VALUES**

The following prioritized fault messages can be displayed:

PRIO	DESCRIPTION	POSSIBLE CAUSES
DEFAULT VALUES	The default values were loaded.	▪ If no parameters were initialized or if all parameters were lost, the default values are loaded.
CRC EXPERTS	A fault was determined when the expert data was checked.	▪ Electromagnetic malfunctions. ▪ Defect in the electronic system.
CRC USER	A fault was determined when the user data was checked.	▪ Electromagnetic malfunctions. ▪ Defect in the electronic system.
CRC DISPLAY	A fault was determined when the display data was checked.	▪ Electromagnetic malfunctions. ▪ Defect in the electronic system.
EXT RAM	A fault was determined when the RAM in the graphic controller was checked.	▪ Defect in the electronic system.
SW VERS	Software which is unsuitable for this instrument type was loaded.	▪ Faulty software update. → Service technician

Table 5: Possible prioritized fault messages

11 Customer service information

Should you have any questions, please contact the responsible service center in your country or region. If this is not known, SIGRIST-PHOTOMETER AG customer service in Switzerland would be glad to provide you with a contact address.

A current list of all SIGRIST country representatives is available in the Internet at www.photometer.com.

Please have the following information ready when you contact a SIGRIST service point or customer service:

- The serial number of your AquaScat.
- A description of the instrument behavior and the work steps involved when the problem occurred.
- A description of what you did when trying to solve the problem yourself.
- The documentation of the third-party products you use in conjunction with the photometer or peripheral devices.

12 Decommissioning/storage

The aim of decommissioning is to prepare the individual components of the system properly for storage.

	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	Interrupt the service voltage to the system.	
2.	Stop the main water supply.	
3.	Remove the cover from the SICON M and remove the electrical connections.	Section 4
4.	Remove the SICON M from the base plate and pack it.	
5.	Unscrew the sensor connection cables to the connection box and then remove the connection box from the contact surface of the base plate and pack it.	
6.	Remove the sensors from the measuring cell block, clean them, and then pack according to the manufacturer's instructions. Place the measuring tips of the pH and redox/ORP sensors into their protection covers with the 3-molar potassium chloride solution.	Section 9.3
7.	Remove the base plate from the wall and pack it.	

Storage:
There are no special requirements for storing the instruments. However, please note the following information:

- The system contains electronic components. Storage for such components must fulfill the usual conditions. It is important to note that the storage temperature must be between -20 and +50 °C.
- All components that come into contact with the sample during operation have to be dry and clean for a long time before being put into storage. (For pH and redox/ORP sensors note the special measures at workstep 10.)
- The measuring equipment with all of the accessory parts must be protected against weather factors, condensing humidity and aggressive gases during storage.

13 Packaging/Transport/Returning

DANGER!

Injuries to persons due to hazardous media residues in the returned instrument.

Instruments that have come into contact with hazardous media may not be sent without the appropriate information on the corresponding repairs or professional decontamination (see accompanying repair form).

Precise information on the medium must be received by SIGRIST-PHOTOMETER in advance of the instrument to be repaired so that the necessary precautions can be taken when unpacking it.

The original packaging materials should be used for packaging the instruments if possible. If the original packaging is no longer available, note the following information:

- Before packaging, close the openings of the instrument with adhesive tape or plugs so that no packaging materials can enter the instrument.
- The instrument contains optical and electronic components. Make sure that the packaging protects the instrument from being damaged by impacts during transport.
- All peripheral devices and accessory parts must be packaged separately and marked with the serial number of the AquaMaster (Section 2.2). This prevents confusion and mix-ups later while also making it easier to identify parts.
- Fill in the accompanying repair form and attach it to the inside of the packaging.

When packaged in the way described above, the instruments can be transported by the usual shipping methods and in all positions.

14 Disposal

Disposal of the system and its peripheral devices is to be carried out in compliance with regional statutory regulations.

The system has no environmentally damaging sources of radiation. The materials listed below should be disposed of or recycled as described in the following table:

CATEGORY	MATERIALS	DISPOSAL POSSIBILITIES
Packaging	Cardboard, wood, paper	Reuse as packaging material, local disposal center, incineration plants
	Protective foils, polystyrene shells	Reuse as packaging material, recycling
Electronics	Circuit boards, electromechanical components	To be disposed of as electronic waste
Measuring cell block	Plastic (PMMA)	Local disposal center
Parts which come into contact with water	PVC	Local disposal center
	NBR (seals)	Local disposal center
	PA (hoses)	Local disposal center
	Steel	Waste metal disposal center
Battery	Lithium	Recycling via locally organized collection point

Table 6: Materials and their disposal

15 Spare parts list

The parts mentioned in this documentation and their article numbers are listed in the following table:

ARTICLE NUMBER	ARTICLE NAME	REMARKS
119500	pH Sensor, replacement	
119501	Redox sensor, replacement	
119502	Oxygen sensor, replacement	
119503	Conductivity sensor, replacement	
119504	Pressure sensor, replacement	
119505	Cap for oxygen sensor	
119040	SICON M: Multichannel control unit	

16 Appendix

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