| SIGRIST PROCESS-PHOTOMETER | Document number: 12745E |
|---|---|
| | Version: 4 |
| | Valid from: S/N 281085 / SW V128 |

# INSTRUCTION MANUAL

## AquaMaster

with AquaScat 2 WTM / WTM A / HT

## 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 turbidity, pH values, Conductivity, Redox/ORP, and dissolved Oxygen in water treatment and is optimized for the requirements that occur in water treatment plants with regard to measurement span and environmental 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.

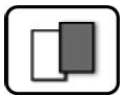
**CAUTION!**

**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 AquaScat 2

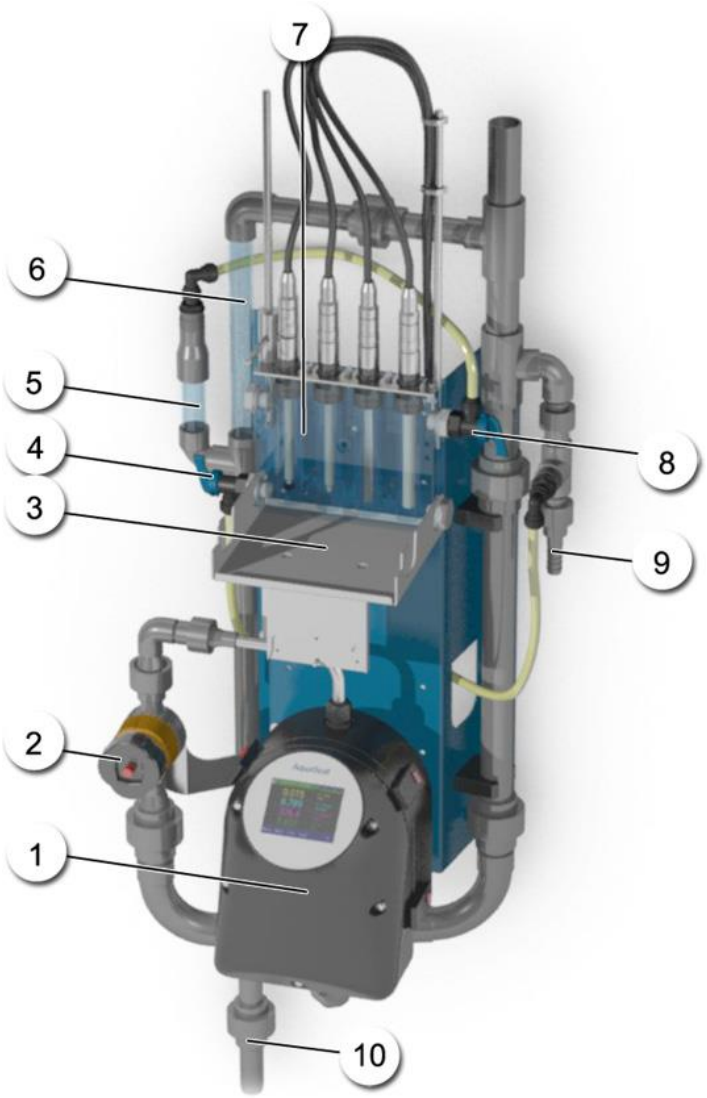



*Figure 1: Instrument overview of AquaMaster with AquaScat 2*

| | | | |
|---|---|---|---|
| ① | Photometer AquaScat 2 WTM / WTM A / HT | ② | Flow Regulator valve for photometer |
| ③ | Measuring cell block cover with docking station for photometer | ④ | Inlet flow regulator valve for measuring cell block |
| ⑤ | Sight glass for flow rate to measuring cell block | ⑥ | Sight glass for photometer overflow |
| ⑦ | Measuring cell block with sensors for Redox/ORP, Oxygen, pH, Conductivity | ⑧ | Outlet regulator valve for measuring cell block |
| ⑨ | Sample medium inlet | ⑩ | Sample medium outlet |

## 2.2 Designation of the photometer

The photometer is fitted with the following rating plate:

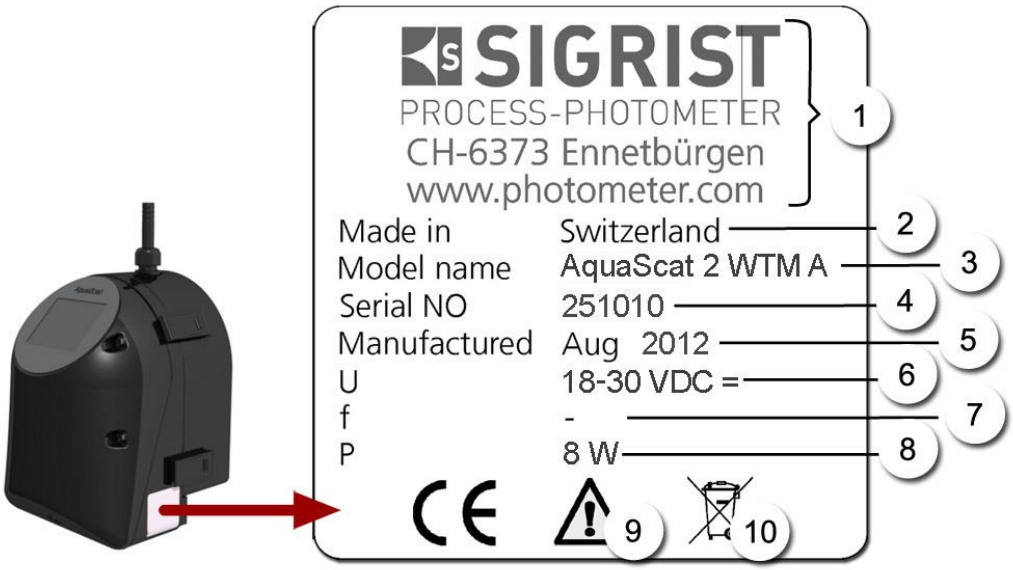



*Figure 2: Rating plate on AquaScat 2 WTM A*

| | | | |
|---|---|---|---|
| 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 Identification of the connection box

The rating plate below is located on the connection box:

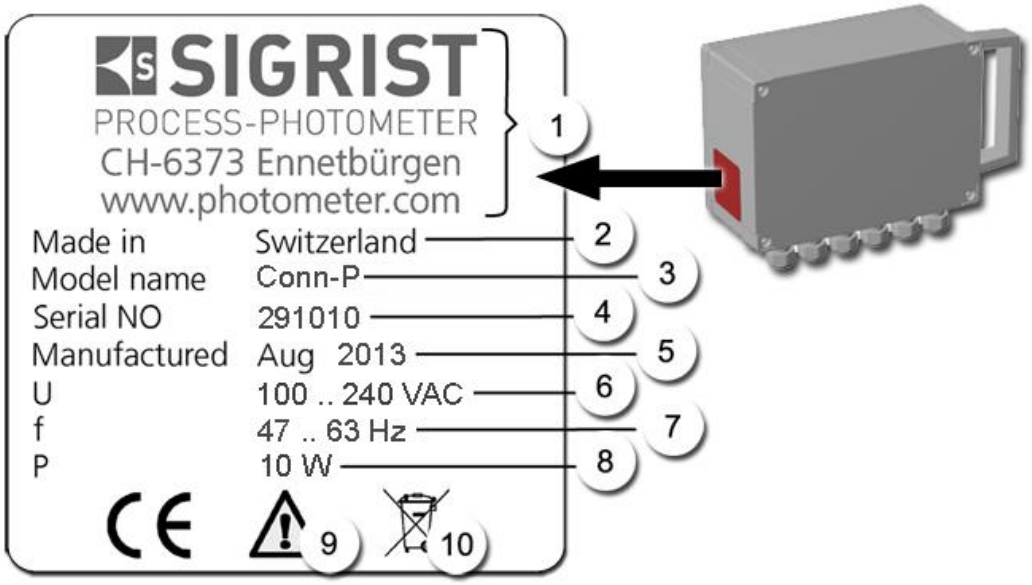



*Figure 3: AquaMaster rating plate, connection box*

| | | | |
|---|---|---|---|
| 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 | Disposal information |

## 2.4 Scope of supply and accessory parts

Standard scope of supply for AquaMaster 119490/1/2:

| PCS. | ART. NO. | NAME | VIEW | VARIANT |
|---|---|---|---|---|
| 1 | 119490/1/2 | AquaMaster complete with tubing, holder and measuring cell block. |  | |
| 1 | For 119490 with AquaScat 2 WTM<br>For 119491 with AquaScat 2 WTM A<br>For 119492 with AquaScat 2 HT | Photometer |  | AquaScat 2 WTM/ WTM A / HT with integrated I/O module |
| 1 | Included in the scope of supply of 119490/1/2. | Connection box with all cables. |  | |
| 1 | Included in the scope of supply of 119490/1/2. | Wash bottle | | |
| 1 | Included in the scope of supply of 119490/1/2. | Beaker | | |

| PCS. | ART. NO. | NAME | VIEW | VARIANT |
|---|---|---|---|---|
| 1 | | Instruction Manual |  | German<br>English<br>French |
| 1 | | Reference Hand-book | | German<br>English |
| 1 | | Brief Instruction | | German<br>English<br>French |

Optional accessory parts:

| PCS. | ART. NO. | NAME | VIEW | VARIANT |
|---|---|---|---|---|
| 1 | 119423 | One deaeration tube optional | | |
| 1 | 119424 | Two auxiliary de-aeration tube optional | | |
| 1 | 116708 | Checking unit for AquaScat 2 WTM/ HT |  | Manual solid refer-ence |
| 1 | 119542 | Flow meter |  | |
| 1 | 119543 | Flow meter **with** limit switch | | |
| 1 | 119566 | Regulating valve | | |
| 1 | 119102 | Profibus DP inter-face print → Reference handbook |  | |
| 1 | 119103 | Modbus RTU inter-face print → Ref-erence handbook |  | |
| 1 | 119798 | HART interface print → Reference handbook |  | |
| 1 | 119041 | Current output 4-way module |  | |

| PCS. | ART. NO. | NAME | VIEW | VARIANT |
|---|---|---|---|---|
| 1 | 119081 | Ethernet cable IP66 (for fixed installation) |  | |
| 1 | 119498 | Conductivity sensor<br>Sensor for measuring conductivity. |  | Conducell 4USF Arc 120 |
| | 119509 | Conductivity calibration standard 147 µ/cm, 500 ml | | |
| 1 | 119495 | pH sensor<br>Sensor for measuring the pH value |  | Polilyte Plus Arc 120<br>Two calibration solutions are supplied. If no specific specifications are given, this is pH 4 and pH 7. |
| | | Calibration standards | | |
| | 119506 | pH 7 | | |
| | 119507 | pH 10 | | |
| | 119571 | pH 4 | | |
| 1 | 119497 | Oxygen sensor<br>Sensor for measuring dissolved oxygen |  | VisiFerm DO Arc 120 |
| 1 | 119496 | Redox/ORP sensor<br>Sensor for measuring the redox-potential. |  | Polilyte Plus ORP Arc 120 |
| | 119508 | Calibration standard<br>Redox 475 mV, 500 ml | | |

## 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<br>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.<br>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) |

Technical data for the AquaScat 2 WTM:

| DATA | VALUES |
|---|---|
| Measuring principle | Scattered light measurement |
| Measurement span | 0 .. 4000 FNU |
| Wavelength | 880 nm, compliant with DIN EN ISO 7027 |
| Radiation class | LED device of Class 1 according to EN 60825-1 |
| Measuring angle | 90° |
| Resolution | 0.001 FNU |
| Reproducibility | 0 .. 10 FNU: ±0.002 FNU, or ±1% full scale at flow rate 2.5 .. 7 l/min (±3% at flow rate 1.3 .. 2.5 l/min)<br>10 .. 4000 FNU: ±1.5% at flow rate 3.5 .. 7 l/min |
| Repeatability | 0.001 FNU or ±0.1% full scale |
| Outputs/Inputs | Outputs:<br>▪ 4 x 0/4 .. 20 mA, galvanically isolated to max. 50 V relative to ground, load resistor max. 500 Ω.<br>▪ With optional current output module 4 additional outputs (0/4 to 20mA) are available.<br>▪ 5 x digital outputs up to 30 VDC max., freely configurable.<br>▪ 2 relay contacts 250 V, 4 A<br>Inputs:<br>▪ 4 x digital inputs up to 30 VDC max., freely configurable.<br>▪ Contactor for flow monitoring<br>▪ 2 x current inputs, 25 mA max. |
| Measuring ranges | 8 ranges between 0 .. 0.1 and 0 .. 4000 FNU freely configurable |
| Interfaces | Ethernet, SD card (for logging, SW update, diagnostics)<br>Modbus TCP, optional Modbus RTU or Profibus DP |
| Display | ¼ VGA with touchscreen<br>Resolution: 320 x 240 pixels with 3.5“ diagonal |

Technical data for the AquaScat 2 WTM A (remaining data identical to AquaScat 2 WTM):

| DATA | VALUES |
|---|---|
| Automatic adjustment | Photometer with automatic adjustment |

Technical data for the AquaScat 2 HT (remaining data identical to AquaScat 2 WTM):

| **DATA** | **VALUES** |
|---|---|
| Resolution | 0.1 FNU |
| Reproducibility | 0 .. 10 FNU: ±0.1 FNU, or ±1% full scale at flow rate 2.5 .. 7 l/min (at flow rate 1.3 .. 2.5 l/min ±3%)<br>10 .. 4000 FNU: ±1.5% at flow rate 3.5 .. 7 l/min |
| Repeatability | 0.1 FNU or ±0.1% full scale |
| Measuring ranges | 8 ranges between 0 .. 10 and 0 .. 4000 FNU, freely configurable |

Technical data of the free-fall measuring cell:

| **DATA** | **VALUES** | |
|---|---|---|
| Material | Inlet pipe: stainless steel 1.4435<br>Outlet: PVC | |
| Sample pressure | Pressureless | |
| Sample temperature | 0 .. 40 °C (not more than 30 °C over the ambient temperature) | |
| Sample flow | Turbidity: | Flow rate: |
| | < 0.5 FNU | 1.3 .. 3.5 l/min<br>Sample flows in the range of 1.3 .. 2.5 l/min are possible; please refer to the Section 8.2.3. |
| | 0.5 .. 10 FNU | 2.5 .. 3.5 l/min |
| | > 10 FNU | min. 3.5 .. 7.0 l/min |
| Connections | Inlet pipe: ∅12 mm<br>Outlet pipe: ∅25 mm | |

**Conductivity sensor (Conducell 4USF Arc 120):**

| DATA | VALUES |
|---|---|
| Sensor type | Conductivity |
| Measuring principle | 4-pin measurement |
| Measuring values | Conductivity: µS/cm, mS/cm<br>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<br>± 5% at 100 .. 300 mS/cm |
| Medium-contacting material | 1.4435/316L; Ra < 0.4 µm (N5)<br>PEEK (FDA approved)<br>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<br>Temperature: °C, °K, °F |
| Measuring range | pH 0 .. 14 |
| Operating temperature | 0 .. 130 °C |
| Accuracy | ± 0.05 |
| Medium-contacting material | Glass, FPM (Viton),<br>Electrolyte: Polisolve Plus,<br>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<br>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<br>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<br>Silicon (FDA approved)<br>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 when using properly

**DANGER!**

**Damage to instrument or cabling.**

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

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

**DANGER!**

**Dangerous voltage inside the connection box and photometer**

Touching components carrying mains voltage may lead to electrical shocks resulting in death.

- Do not operate the instrument if the housing is open or damaged.

**DANGER!**

**Damage to the instrument due to incorrect service voltage.**

If the instrument is connected to an incorrect service voltage, the instrument can be damaged.

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

**DANGER!**

**Missing Instruction Manual after the instrument changes hands.**

Operating the instrument without knowledge of the Instruction Manual may lead to injuries to persons 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 current version at www.photometer.com.

**CAUTION!**

**Water escaping from leaking instrument or water connections.**

Escaping water can lead to flooding of the space and may cause material damage to the building and furnishings.

- Check the sealing of the inlet and outlet.

**CAUTION!**

**Penetration of moisture as well as condensation on the electrical components during servicing duty.**

If moisture enters the instrument, the photometer can be damaged.

- Work on the inside of the instrument may be performed only in a dry room and at room temperature. The instrument should be at operating or room temperature (avoid condensation on optical and electrical surfaces).

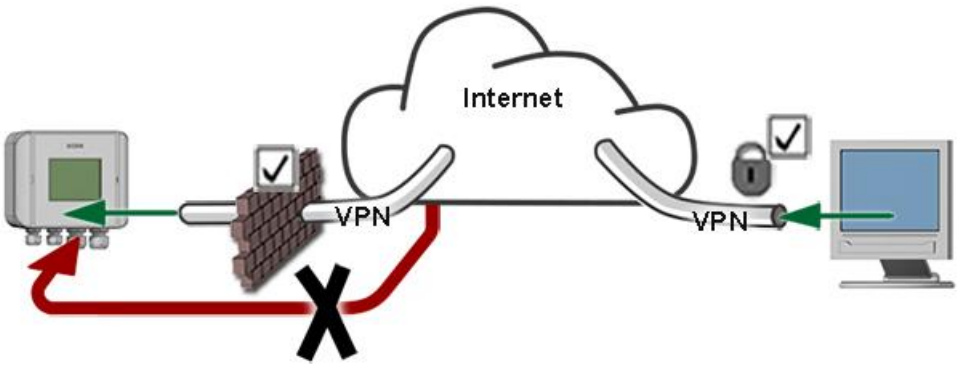
**CAUTION!**

**The use of aggressive chemicals when cleaning.**

Use of aggressive chemicals can damage the measuring cell and the instrument.

- Do not use aggressive chemicals or cleaning agents when cleaning.
- Inorganic acids such as hydrochloric acid may be used for cleaning only when expressly permitted (e.g. sensor cleaning).
- Should the instrument come in contact with aggressive chemicals, clean it thoroughly with a neutral cleaning agent.

## 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 and installation

## 4.1 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.

## 4.2 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.

Cable lengths should be long enough such that during servicing duty there is sufficient room for movement of the photometer and its peripherals (e.g. fastening the photometer to the docking station).

## 4.3 Mount base plate

When mounting the base plate, refer to the **AQUAMASTER/1-MB** dimension drawing and the **AQUAMASTER/6-MB** drill plan.

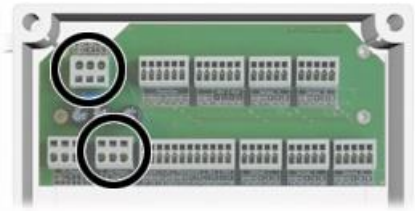
Grip the base plate only on the blue sheet.

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 1. | Drill four holes in the wall for the threaded anchor according to the drill plan.<br>Because the bottom right hole is difficult to access, we recommend using the next to the lowest hole.<br>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 threaded anchor in the wall. | |
| 3. | Fasten the base plate to the threaded anchors. | |

# 4.4 Connecting the connection box

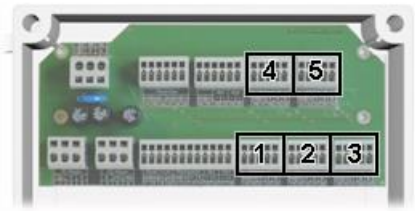
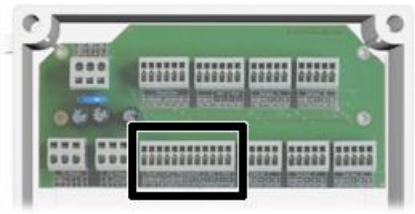
The connection cables between the connection box, photometer and external connections should be long enough so that there is sufficient freedom of movement when carrying out servicing duties (e.g. in order to fasten the photometer onto the docking station).

<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:<br>
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:<br>
1.1: The following cables must first be removed from the terminals:<br>
▪ Cable leading to power unit (circle)<br>
▪ Cable coming from power unit (circle)<br>
1.2: 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 external signals 0/4 .. 20 mA, if present.
<table>
<tr><td>Terminals</td><td>40</td><td>41</td><td>42</td><td>43</td><td>44</td><td>45</td></tr>
<tr><td rowspan="2">Cable</td><td rowspan="2">24V</td><td rowspan="2">24V</td><td colspan="2">An 1</td><td colspan="2">An 2</td></tr>
<tr><td>-</td><td>+</td><td>-</td><td>+</td></tr>
</table>
</td><td>

</td></tr>
<tr><td>3.</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><td>39</td></tr>
<tr><td>Cable</td><td>SDA</td><td>GND</td><td>SCL</td><td>GND</td><td>GND</td><td>24V</td></tr>
</table>
</td><td>

</td></tr>
</table>

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 4. | Sensors purchased afterwards are connected to the free terminals marked with **Sensor** (Sensor 1 to Sensor 5). The order is not important here.<br>The connection of the sensors is described in the following sections:<br>▪ **Hamilton Sensors:** Reference handbook<br>▪ **ColorPlus 2:** Reference handbook |  |
| 5. | Connect the AquaScat 2 to the connection box according to the following table:<br>  The terminals in the AquaScat 2 are described in Section 4.7. |  |

| Connection box | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Name | SDA | GND | SCL | GND | GND | 24V | A | B | An 1- | An 1+ | An 2- | An 2+ |
| Color | Grey | Pink | Blue | Red | Green | Brown | White | Yellow | Black | Violett | Grey/ Pink | Red/ Blue |

# 4.5 Position of the connection box

The connection box is positioned with the screwed 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 photometer is routed downward.

For space reasons, the transverse tube (loosen at arrows) and the junction hose between measuring cell block and sight glass must be removed.

The junction hose can be removed and fastened as follows:

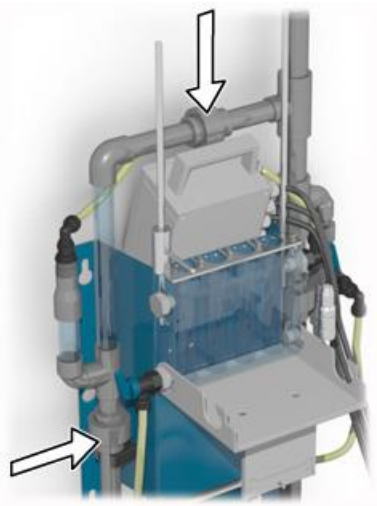
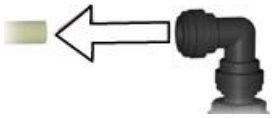


*Figure 4: Position of the connection box*

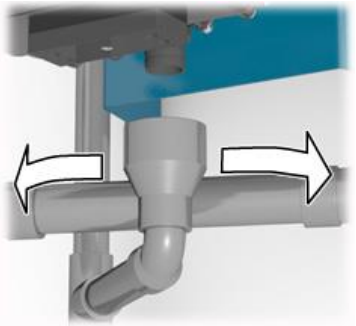
Push in hose coupling.

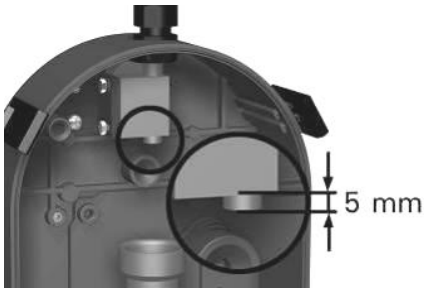
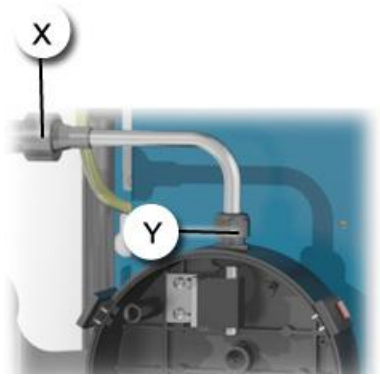
Pull hose out of the coupling.



Fasten hose: Put hose into coupling and engage with a bit of pressure.

## 4.6 Fasten photometer to base plate

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 1. | Fasten the photometer mounting bracket to the base plate. Make sure that the two positioning pins (circles) are inserted into the holes on the mounting bracket of the photometer.<br><br>Ensure that the outlet tube of the instrument is aligned to the drain funnel (the union piece of the drain funnel may have to be loosened and the funnel aligned).<br>  |  |
| 2. | Remove the optics unit of the photometer according to the Instruction Manual. | |
| 3. | Align the photometer according to the Instruction Manual. | |
| 4. | 4.1: Insert the angled inlet tube from above into the union piece. |  |

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| | 4.2: Ensure that the inlet tube projects 5 mm out of the holder. |   |
| | 4.3: Fasten the inlet tube first to the PVC union piece (X) and then to the conduit gland on the measuring cell unit of the photometer (Y). |   |
| | 4.4: Ensure the outlet cone (X) contacts the conduit gland (Y). |   |
| 5. | Re-fasten optics unit onto the photometer according to the Instruction Manual. | |

## 4.7 Connecting the electrical connections

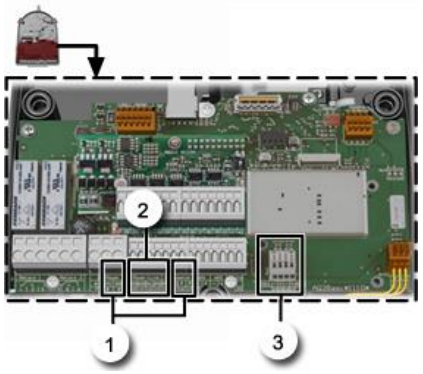
**DANGER!**

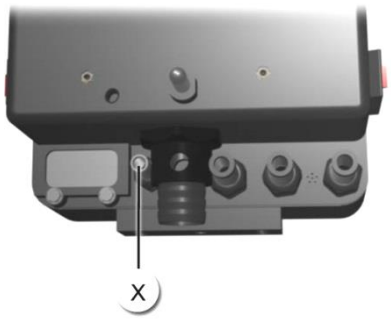
**Life-threatening voltage inside the instrument:**
The system has no mains switch, hence the system is charged with voltage immediately after being electrically connected.

Cable lengths should be long enough such that during servicing duty there is sufficient room for movement of the photometer and its peripherals (e.g. fastening the photometer to the docking station).

Establish the electrical connections in the following sequence:

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 1. | Remove the front cover of the AquaScat 2 by loosening the five screws (circles). |   |
| 2. | **Connect the 12-pin connection cable to the AquaScat 2.**<br>Usually, the photometer is delivered with an installed cable.<br>2.1: Insert the 12-pin cable coming from the connection box into the cable bushing (Y) and tighten. |   |

<table>
<tr><th></th><th>WORKSTEP</th><th>ADDITIONAL INFO / IMAGES</th></tr>
<tr><td></td><td>2.2: Connect the cable as follows to the terminals of the AQ2Basi print.<br>Pos. 1) Connection to the connection box
<table>
<tr><td>Terminals</td><td>8</td><td>9</td><td>16</td><td>17</td></tr>
<tr><td>Name</td><td>24V</td><td>GND</td><td>A</td><td>B</td></tr>
<tr><td>Cable color</td><td>Brown</td><td>Green</td><td>White</td><td>Yellow</td></tr>
</table>
Pos. 2) Connection to the Powerbox
<table>
<tr><td>Terminals</td><td>10</td><td>11</td><td>12</td><td>13</td></tr>
<tr><td>Name</td><td>SDA</td><td>GND</td><td>SCL</td><td>GND</td></tr>
<tr><td>Cable color</td><td>Gray</td><td>Pink</td><td>Blue</td><td>Red</td></tr>
</table>
Pos. 3) 0/4 .. 20 mA input
<table>
<tr><td>Terminals</td><td>24 (-)</td><td>25 (+)</td><td>26 (-)</td><td>27 (+)</td></tr>
<tr><td>Cable color</td><td>Black</td><td>Violet</td><td>Gray/ pink</td><td>Red/ blue</td></tr>
</table></td><td> 
</td></tr>
<tr><td>3.</td><td>Connect the standard current outputs according to the following table:<br>AQ2Basi print:
<table>
<tr><td>Terminals</td><td>18</td><td>19</td><td>20</td><td>21</td></tr>
<tr><td>Name</td><td>mA 1 -</td><td>mA 1 +</td><td>mA 2 -</td><td>mA 2 +</td></tr>
</table>
I/O module:
<table>
<tr><td>Terminals</td><td>28</td><td>29</td><td>30</td><td>31</td></tr>
<tr><td>Name</td><td>mA 3 -</td><td>mA 3 +</td><td>mA 4 -</td><td>mA 4 +</td></tr>
</table></td><td></td></tr>
<tr><td>4.</td><td>Connect the optional current outputs (4-way module) according to the following table:<br>4-way module:
<table>
<tr><td>Terminals</td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td>Name</td><td>mA 5 -</td><td>mA 5 +</td><td>mA 6 -</td><td>mA 6 +</td></tr>
</table>
<table>
<tr><td>Terminals</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>Name</td><td>mA 7 -</td><td>mA 7 +</td><td>mA 8 -</td><td>mA 8 +</td></tr>
</table></td><td></td></tr>
<tr><td>5.</td><td>Connect the two relay outputs according to the following table:<br>AQ2Basi print:
<table>
<tr><td>Terminals</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr>
<tr><td>Function</td><td>I/O</td><td>I/O</td><td>C</td><td>I/O</td><td>I/O</td><td>C</td></tr>
<tr><td>Name</td><td colspan="3">Rel. 1</td><td colspan="3">Rel. 2</td></tr>
</table></td><td></td></tr>
</table>

<table>
<tr><th></th><th>WORKSTEP</th><th>ADDITIONAL INFO / IMAGES</th></tr>
<tr><td>6.</td><td>Connect the digital inputs and outputs according to the following table:<br>Outputs 3 .. 7 on the I/O module
<table>
<tr><td>Terminals</td><td>32</td><td>33</td><td>34</td><td>35</td><td>36</td><td>41</td><td>42</td></tr>
<tr><td>Name</td><td>Out 3</td><td>Out 4</td><td>Out 5</td><td>Out 6</td><td>Out 7</td><td>ST</td><td>ST GND</td></tr>
</table>
Inputs 2 .. 5 on the I/O module
<table>
<tr><td>Terminals</td><td>37</td><td>38</td><td>39</td><td>40</td><td>41</td><td>42</td></tr>
<tr><td>Name</td><td>In 2</td><td>In 3</td><td>In 4</td><td>In 5</td><td>ST</td><td>ST GND</td></tr>
</table></td><td>Reference Manual</td></tr>
<tr><td>7.</td><td>If a flow meter with relay contact is present, install it on the AQ2Basi print of the photometer according to the following table:<br>AQ2Basi print:
<table>
<tr><td>Terminals</td><td>22</td><td>23</td></tr>
<tr><td>Name</td><td>In 1</td><td>GND</td></tr>
</table></td><td>Use the small cable gland (X).<br> 
</td></tr>
<tr><td>8.</td><td>If field bus interfaces such as Modbus RTU, Profibus-DP or HART are present, mount and connect them on the AQ2Basi print according to the Reference Manual.</td><td></td></tr>
<tr><td>9.</td><td>Reattach the front cover.</td><td></td></tr>
</table>

# 4.8 Mount sensors before commissioning

**CAUTION!**

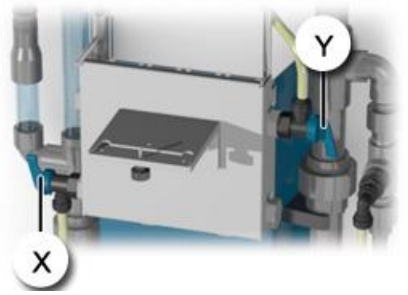
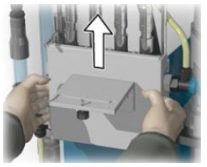
**Damage to the sensors due to improper handling.**

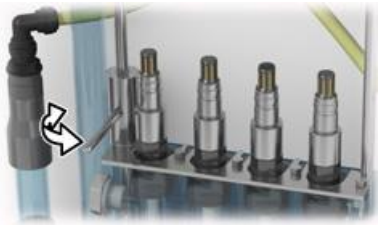
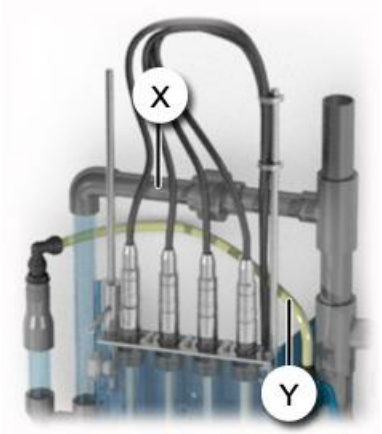
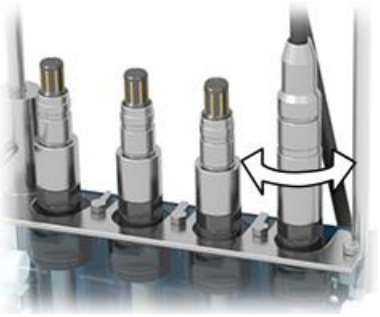
pH sensors and Redox/ORP sensors must be carefully handled. pH sensors have a sensitive glass membrane; redox sensors have a very fine platinum wire at the measuring tip. These sensors can be damaged by carelessly touching the measuring tip, by improper cleaning.

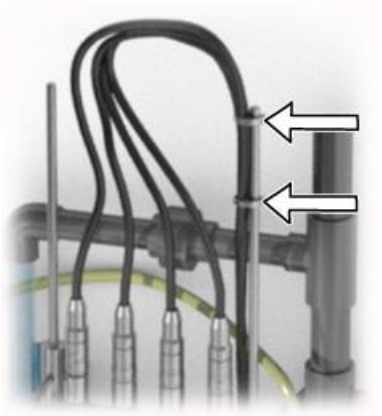
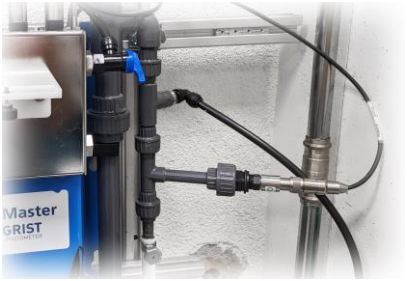
Do not let pH and Redox/ORP sensors dry out. If they are not going to be used for a while, put the tips in a storage solution (e.g. 3 molar solution of potassium chloride).

- 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 8.1.1.3.

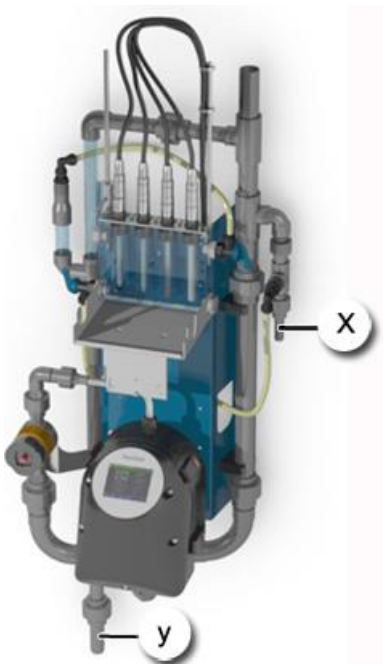
Oxygen sensors and Conductivity sensors are mechanically somewhat more robust. These sensors should nevertheless be handled with sufficient care.

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 1. | Close measuring cell block inlet (X) and open measuring cell block outlet (Y). |  |
| 2. | Slightly lift measuring cell block cover and fold down. |   |
| 3. | Swing the locking device away from measuring cell block. |  |
| 4. | If a pH or Redox/ORP sensor is present, fill the measuring cell block halfway with water. This protects the sensor against drying out. | |

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 5. | With the name to the front, insert the sensor vertically into the measuring cell block and push in with moderate pressure.<br>If pH or Redox/ORP sensors are used, remove the lock cap beforehand.<br>The position of the sensors is generally irrelevant. However, because of escaping electrolyte it is better to position the pH and Redox/ORP sensors to the right of the Conductivity sensor.<br>Close unoccupied sensor openings with the supplied blanking plugs. |  |
| 6. | Close measuring cell block by swinging back the locking device. |  |
| 7. | Screw connection cables from connection box onto sensors. The connection cables must be conveyed in front of the lateral tube (X) and the junction hose (Y).<br>  <br>Which connection cables are attached to which sensors is not important. The system automatically identifies the sensors. |  |

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 8. | Fold up measuring cell block cover.<br><br>If the locking device has not been pushed onto the measuring cell block or not been properly pushed, the cover cannot be closed. |  |
| 9. | Use cable ties to fix the connection cable in place on the right rod (arrows). |  |
| 10. | Alternatively, the conductivity probe can be mounted horizontally in the inlet. This helps to avoid incorrect measured values due to bubbles forming in the measuring cell block.<br><br>Parts required for this purpose:<br>Art. 123446 T-piece<br>Art. 119604 Plug for measuring cell block |  |

## 4.9 Connect water

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 1. | There are two connection types:<br>▪ ¾" (X) and 1 ¼" (Y) thread<br>▪ 16 mm (X) and 25 mm (Y) hose nipple<br><br>To fasten the hoses, first remove the hose nipples (X and Y) from the line; otherwise, they may easily break off. |  |
| 2. | Insert degasser hoses of all optional deaeration tubes into drain funnel. | |

## 4.10 Mounting the optional flow meter

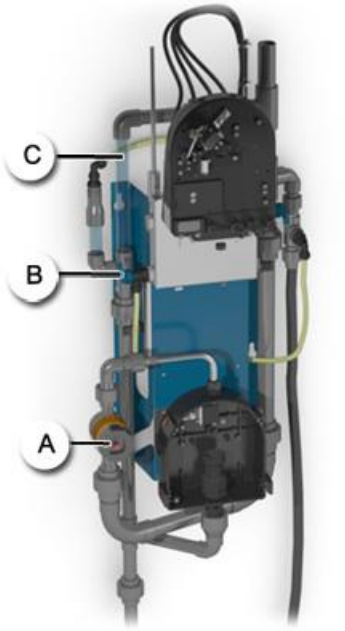
SIGRIST recommends installing a simple flow meter to regularly check the sample. Note the following points when mounting the flow meter:

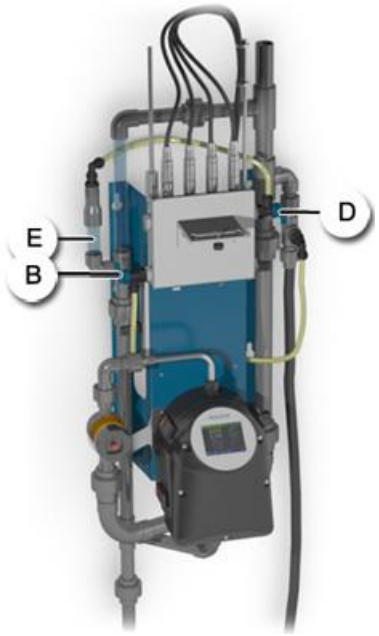
- Mount the flow meter between the main inlet of the sample and the photometer inlet.
- If the required water flow rate is exceeded or undershot, measuring errors may occur! Installing a flow meter with limit contact improves measuring accuracy.

# 5 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 9.

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

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 1. | **Check photometer mounting and the associated peripherals.**<br>1.1: Ensure the inlet and outlet are correctly mounted on the photometer. | Section 4 |
| | 1.2: Ensure the sensors are correctly mounted in the measuring cell block. | Section 4.8 |
| 2. | **Check the piping of the complete system.**<br>Check the water connections, inlet and outlet connections, and tubing. | |
| 3. | **Establish sample feeding to the photometer as follows:**<br>3.1: Fasten optics unit to docking station. |  |
| | 3.2: Ensure the flow regulator valve (A) to the instrument is closed. | |
| | 3.3: Ensure the inlet regulator valve (B) to the measuring cell block is closed. | |
| | 3.4: Establish main water supply to the system. | |
| | 3.5: Open flow regulator valve (A) to the instrument. | |
| | 3.6: Adjust water jet according to Section 8.2.2 and close the measuring cell of the photometer. | |
| | 3.7: Check the sight glass (C) to ensure that there is continuous water flow through the photometer. | |
| | 3.8: Mount and fasten the optics unit again on measuring cell of the photometer. | |

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 4. | **Establish and adjust sample feeding to measuring cell block**<br>4.1: Open inlet regulator valve (B) to the measuring cell block all the way. |  |
| | 4.2: Open outlet regulator valve of the measuring cell block (D) until water continually flows through the sight glass (E). | |
| 5. | **Establish service voltage to the system.**<br>5.1: Establish service voltage to the connection box. Welcome screen appears. Section 4<br>The factory setting language is English. Accordingly, the displayed language during the initial start-up is English. |  |
| | 5.2: Instrument carries out an internal functional check. |  |
| | 5.3: The instrument is ready for measurement. |  |

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 6. | Set operating language. | Section 7.1 |
| 7. | Set current outputs if required. | Section 7.2 |
| 8. | Set limits. | Section 7.3 |
| 9. | Enter access code. | Section 7.9 |
| 10. | Copy the configured data to the microSD card. | Section 7.10 |

# 6 Operation

## 6.1 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.

## 6.2 Control elements in measuring operation


*Figure 5: Control elements in measuring operation*

| | | | |
|---|---|---|---|
| ① | **Menu button**<br>Call up the menu structure.<br>Section 6.3 | ② | **Valu button**<br>Numerical representation of the measuring values. Section 6.4 |
| ③ | **Info button**<br>Displays the information screen.<br>Section 6.5 | ④ | **Diag button**<br>Graphical representation of the measuring values. Section **Fehler! Verweisquelle konnte nicht gefunden werden.** |
| ⑤ | **Up arrow**<br>Go to previous page. | ⑥ | **Down arrow**<br>Four channels are displayed per page. Pressing this button displays more channels. |

## 6.3 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 6.10.

## 6.4 Valu button

Pressing the **Valu** button displays the measuring values in numerical form. This is described in detail in Section 6.8.

# 6.5 Info button

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

## 6.5.1 Page 1, Info button

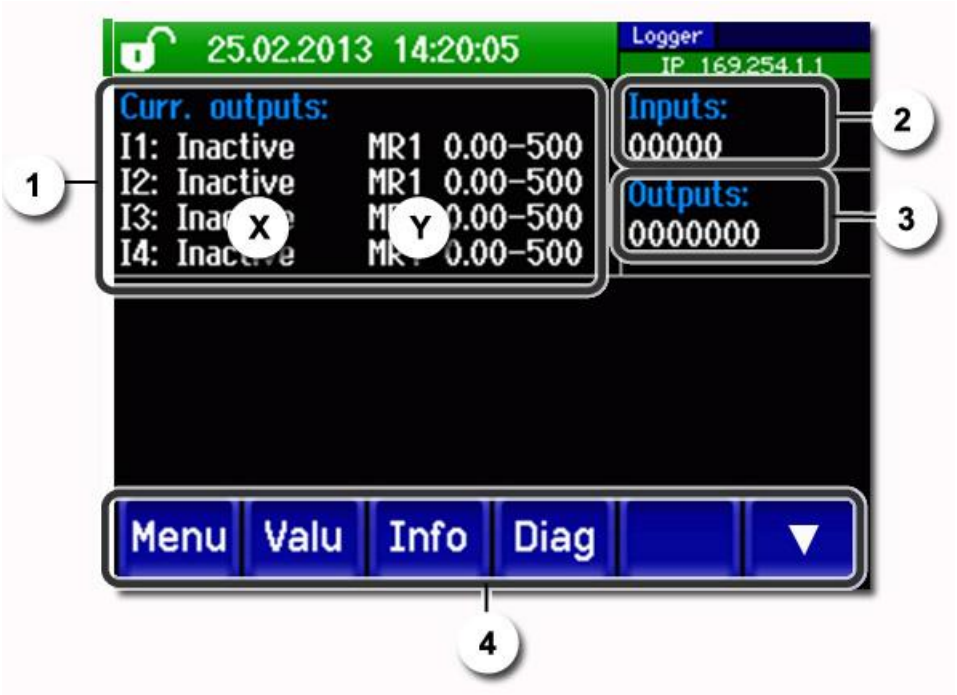



*Figure 6: Info display*

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

### 6.5.2 Page 2, Info button

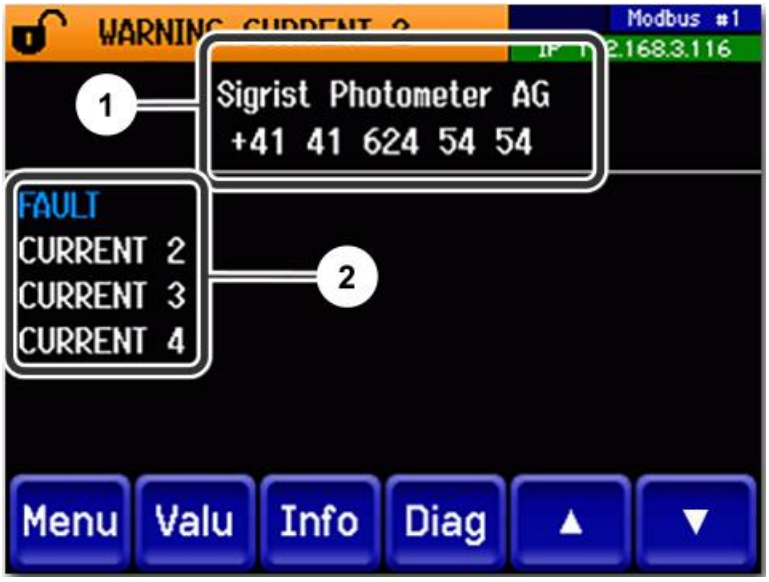



*Figure 7: Info screen, page 2*

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

### 6.5.3 Page 3, Info button

The state of all connected sensors is displayed here.

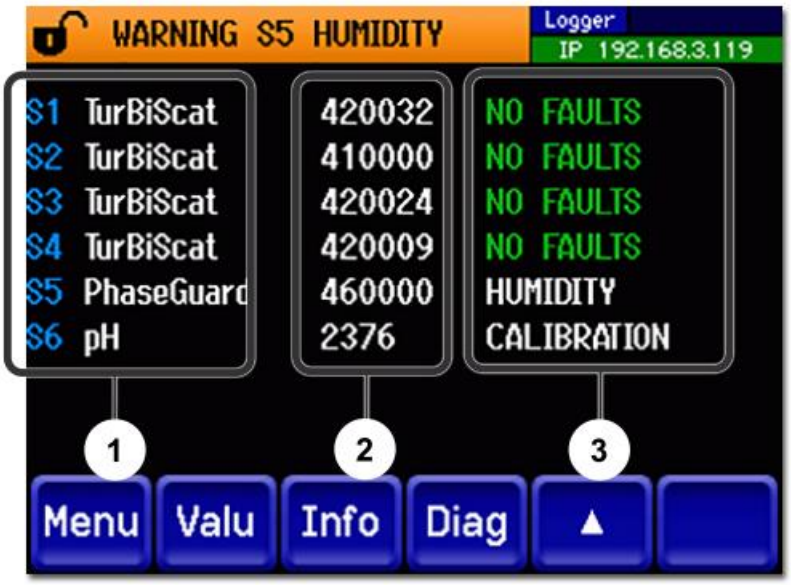



*Figure 8: Info screen, page 3*

| | | | |
|---|---|---|---|
| ① | Sensor name | ② | Serial numbers of the corresponding sensor |
| ③ | Fault message | | |

## 6.6 Diag button

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

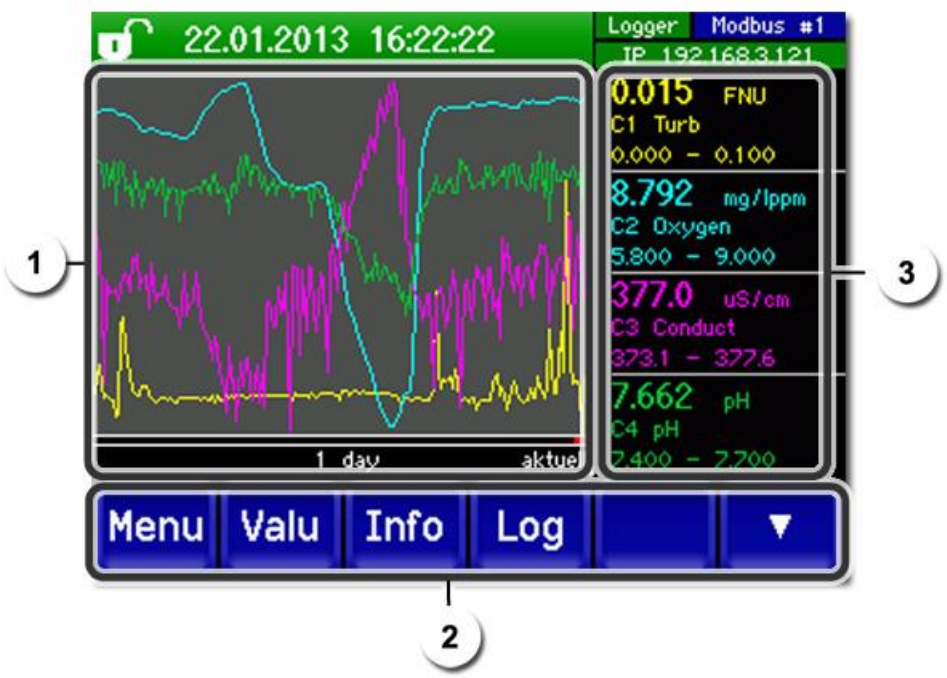



*Figure9: Graphic representation of the measuring values*

| | | | |
|---|---|---|---|
| ① | **Graphic representation of the measuring values**<br>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**<br>The logger functions (Log button) are described in <dg_ref_source_inline></dg_ref_source_inline>. |
| ③ | **Measuring channels:**<br>Numerical representation of the set measuring channels.<br>▪ Current measured value (e.g. 0.013 FNU).<br>▪ Measuring channel with name (e.g. C1 Turb).<br>▪ Scaling of the Y-axis (e.g. 0.000 to 0.100).<br>The channel names shown in the figure are examples and can be adjusted individually. | | |

## 6.7 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:

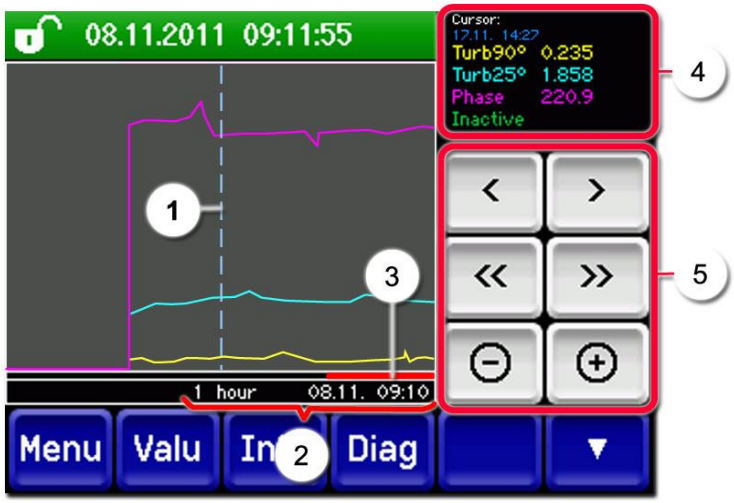



*Figure 10: Functions of the Log display*

| | | | |
|---|---|---|---|
| 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<br>The following time ranges can be set:<br>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.<br>**<</>>**: Jumps forward or backward by the time period set in point 2.<br>**-/+**: 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.

## 6.8 Displays in measuring operation

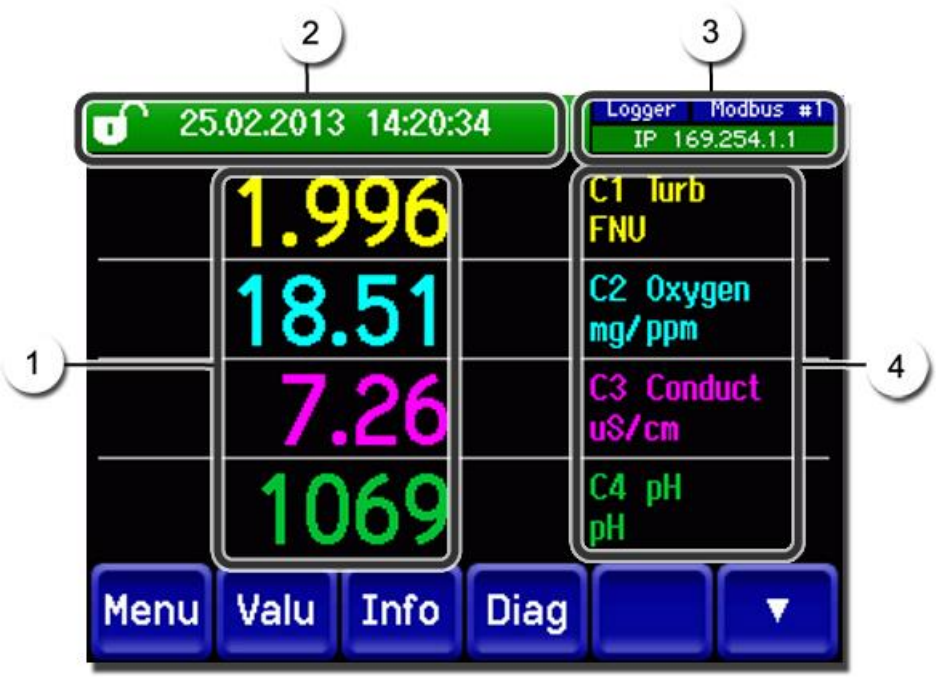



*Figure 11: Displays in measuring operation*

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

## 6.9 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.<br>Depending on the initial state, the lock icon changes as follows:<br>  Display unlocked<br>  Display locked |   |

## 6.10 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.

# 6.11 Control components in service mode

## 6.11.1 Input elements in service operation

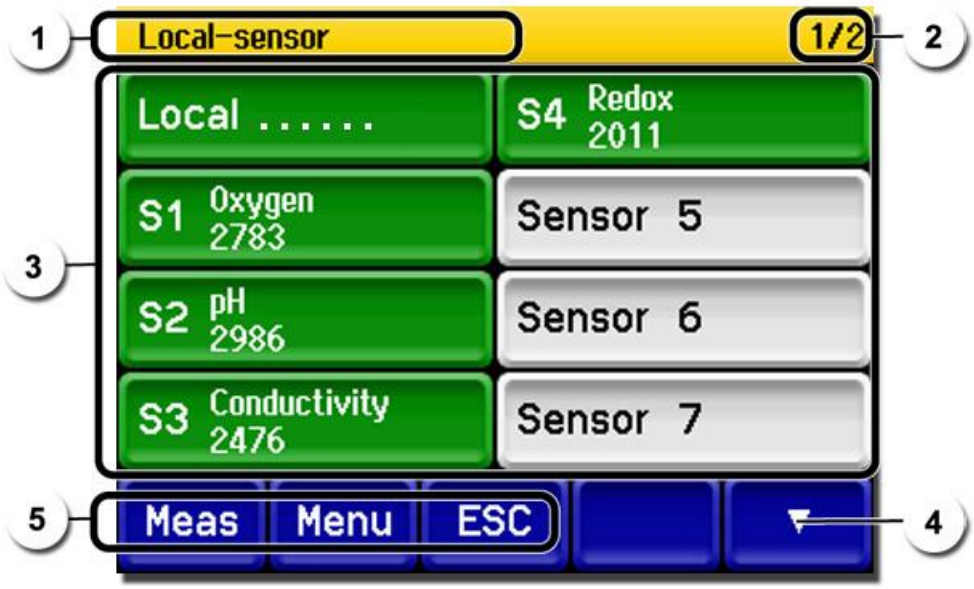



*Figure 12: Input elements in service operation*

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

## 6.11.2 Numerical entry

The following screen is for entering numbers and data:

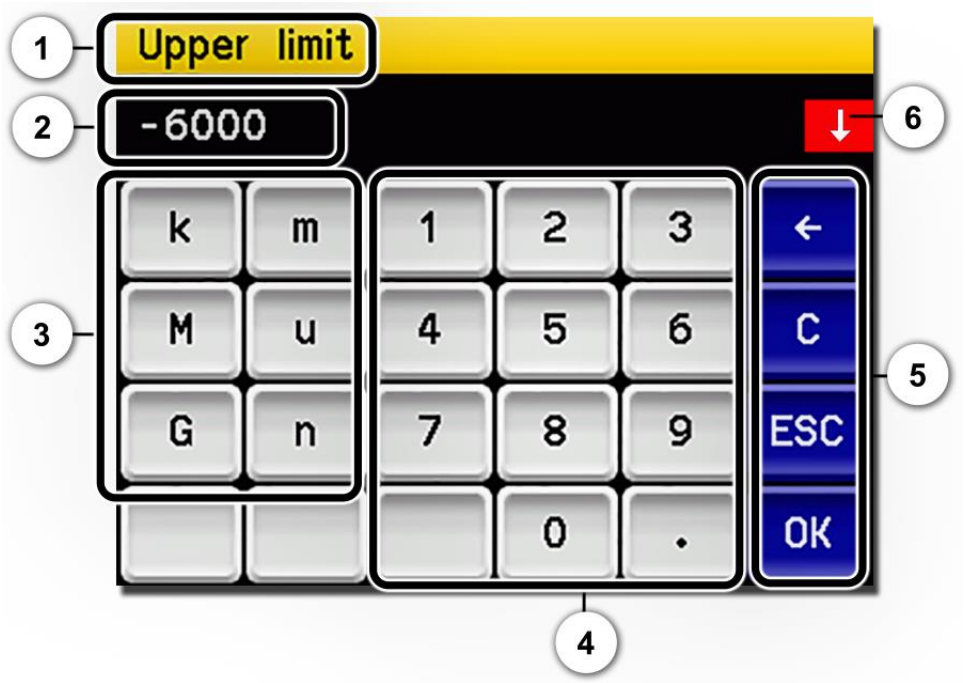



*Figure 13: Numerical entry*

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

## 6.11.3 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 14: Example of single selection*

## 6.11.4 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.

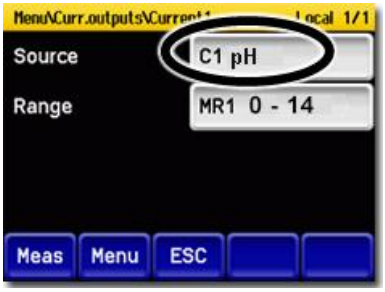

*Figure 15: Example of multiple selection*

# 7 Settings

## 7.1 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.<br>Press the **ESC** button to cancel. |  |
| 7. | Press the **Meas** button. | |

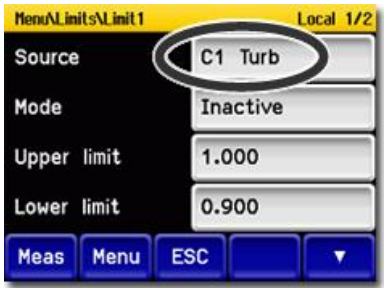
## 7.2 Set current outputs

| | 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)<br>In 1, In 2, Auto 1, Auto 2<br>→ 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

## 7.3 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:<br>▪ **Inactive** (limit monitor of this channel is deactivated)<br>▪ **Exceeded** (limit active when the set threshold value is exceeded)<br>▪ **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.

## 7.4 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.

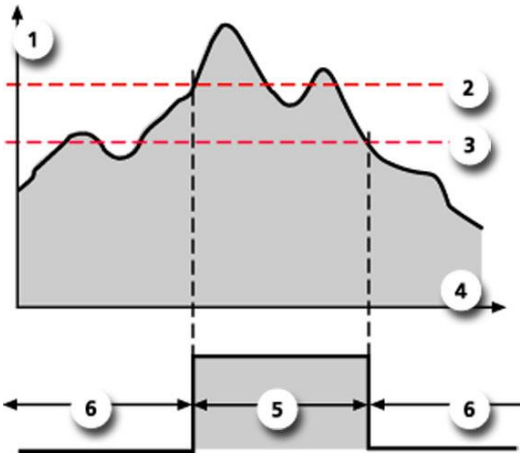



*Abbildung 16: threshold value of a limit*

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

## 7.5 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.

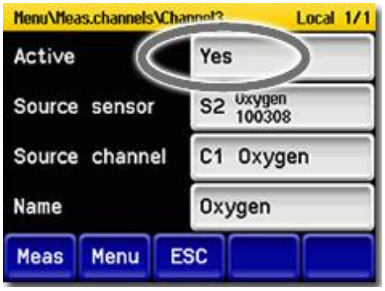
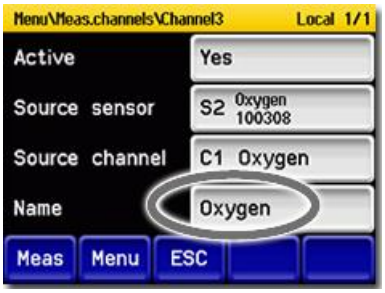
If the message **Limit** appears, the color of the status display changes to **white** and the numbers of the limit channels are listed with their channel numbers in **red** if limits have been exceeded or undershot. Inactive limits are indicated with "_".

# 7.6 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.<br>▪ Invert: inverts the outputs<br>▪ Prio fault<br>▪ Fault<br>▪ Warning<br>▪ Service<br>▪ Adjustment<br>▪ Limit 1 .. 8<br>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. |

# 7.7 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.<br>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.<br>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.<br>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.<br>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.<br>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.<br>Define the other channels as described under points 12 to 13. | |
| 15. | Press the **Meas** button. | The instrument is in measuring operation again. |

## 7.8 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.<br>Confirm entry with **OK**. | The time must be entered in the format **hh:mm:ss**<br>  |
| 6. | To enter the date, press the currently displayed date at the **Date** menu item and enter the new date with the number pad.<br>Confirm entry with **OK**. | The date must be entered in the format selected under the **Date format** menu item.<br>  |
| 7. | Press the **Meas** button. | Instrument again in measuring operation. |

## 7.9 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:

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |

# 7.10 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. |

# 8 Servicing

## 8.1 Servicing schedule for AquaMaster

| WHEN | WHO | WHAT | PURPOSE |
|---|---|---|---|
| Every three months or as needed | Operator | Cleaning, checking and, if required, recalibration of the pH sensor.<br>Section 8.1.4 | Obligatory measure for maintaining measuring accuracy. |
| Every three months or as needed | Operator | Cleaning, checking and, if required, recalibration of the conductivity sensor.<br>Section 8.1.5 | Obligatory measure for maintaining measuring accuracy. |
| Every three months or as needed | Operator | Cleaning, checking and, if required, recalibration of the redox/ORP sensor.<br>Section 8.1.6 | Obligatory measure for maintaining measuring accuracy. |
| Every three months or as needed | Operator | Cleaning, checking and, if required, recalibration of the oxygen sensor.<br>Section 8.1.7 | Obligatory measure for maintaining measuring accuracy. |
| As needed | Operator | Replacing sensors.<br>Replacing a sensor configured by SIGRIST.<br>Section 8.1.8<br>Replacing an unconfigured sensor.<br>Section 8.1.9 | Obligatory measure for maintaining measuring accuracy. |
| As needed | Operator | Cleaning the pipes and parts which come into contact with water. Section 8.1.11 | Measure for maintaining measuring accuracy. Interval dependent on water quality and handling. |
| As needed | Operator | Cleaning the measuring cell block.<br>Section 8.1.10 | Measure for maintaining measuring accuracy. Interval dependent on water quality and handling. |

*Table 1: Servicing schedule*

## 8.1.1 Introduction to handling of the sensors

### 8.1.1.1 General information

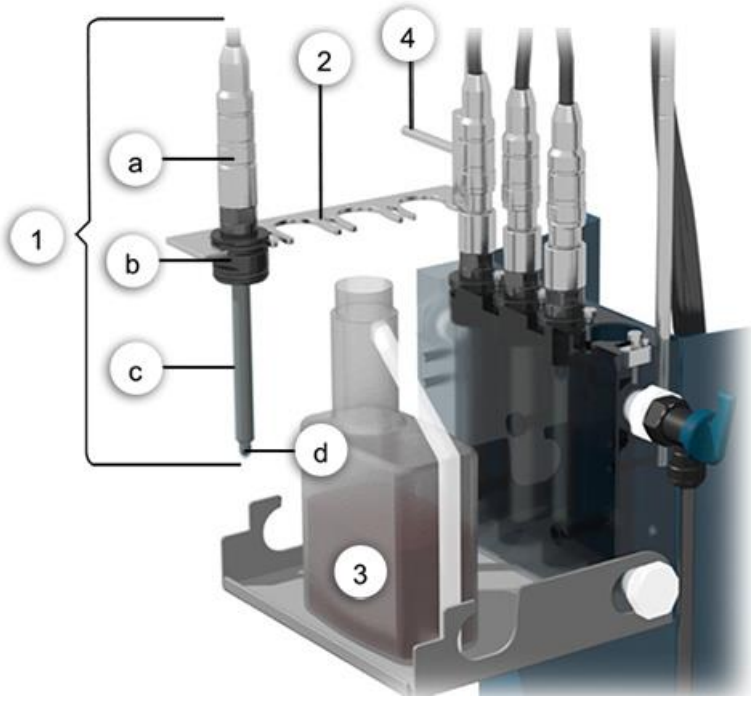



*Figure 17: Overview of calibration*

| | | | |
|---|---|---|---|
| ① | Complete sensor<br>a: Connection/electronic system<br>b: Holder<br>c: Shaft (electrode)<br>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.

### 8.1.1.2 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.

### 8.1.1.3 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.

### 8.1.1.4 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.**

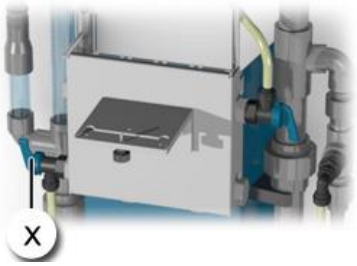
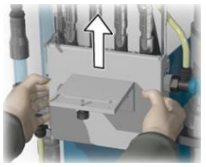
pH sensors and Redox/ORP sensors must be carefully handled. pH sensors have a sensitive glass membrane; redox sensors have a very fine platinum wire at the measuring tip. These sensors can be damaged by carelessly touching the measuring tip, by improper cleaning.

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).

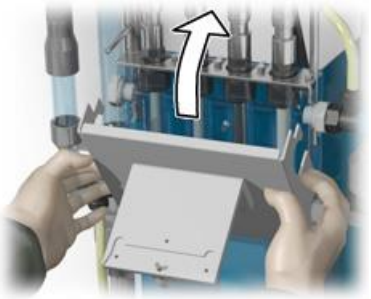
- Touch the electrodes and measuring tips of the pH and Redox/ORP sensors only when absolutely necessary.
- Use only cleaning agents in accordance with Section 8.1.1.3.

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

## 8.1.2 Removing sensors

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 1. | Close the inlet flow regulator valve to the measuring cell block (X). |   |
| 2. | Slightly lift measuring cell block cover and fold down. |   |
| 3. | Move locking device away from the measuring cell block by pressing the guide rod. |  |
| 4. | Pull sensor carefully out of the measuring cell block.<br>If this is not possible, pry out the sensor with a screwdriver.<br>A slightly damaged O-ring is not a problem; it has no sealing function. |  |
| 5. | Position sensor in the locking device for servicing duties. |  |
| 6. | Carry out the servicing duty on the sensor. | |

## 8.1.3 Installing sensors

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 1. | Insert sensor in the desired measuring position on the measuring cell block.<br>The position of the sensors is generally irrelevant. However, because of escaping electrolyte it is better to position the pH and Redox/ORP sensors to the right of the Conductivity sensor. | |
| 2. | Press sensor into the measuring cell block. The holder must be flush with the measuring cell block. | |
| 3. | Close the measuring cell block with the locking device. |  |
| 4. | Fold up measuring cell block cover.<br>If the locking device has not been pushed onto the measuring cell block or not been properly pushed, the measuring cell block cover cannot be closed. |  |
| 5. | Put system into operation in accordance with Section 5. | |

## 8.1.4 Clean and calibrate pH sensor

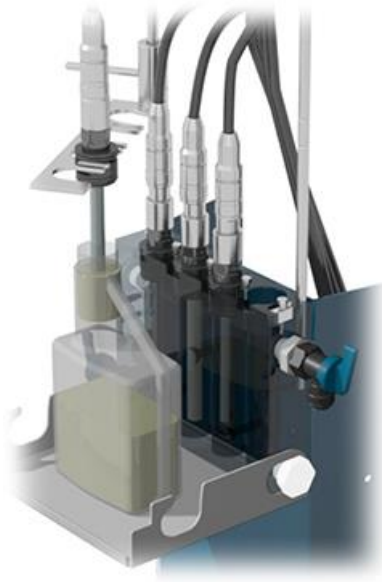
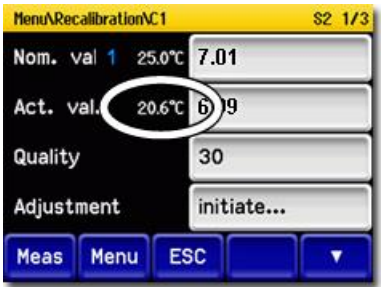
**CAUTION!**

**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 8.1.1.
- 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 8.1.2 and position in locking device. | |
| 3. | **Clean measuring point of the sensor.**<br>3.1: Dip the measuring tip of the sensor into cleaning solution or dab with a soaked cloth.<br>Use cleaning agents in accordance with Section 8.1.1.3. | |
| | 3.2: Rinse the measuring tip with distilled water and dab dry. | |
| 4. | **Prepare recalibration.**<br>4.1: Open calibration holder and fill with buffer solution by pressing the container.<br>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.<br><br>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.**<br>5.1: Compare the **Nom. val.** (circle) with the value on the calibration solution.<br><br>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.<br><br>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.<br>If the adjustment was successful, confirm with **Adjustment OK**. This completes the adjustment.<br><br>If the adjustment was not OK, the following messages may appear: **running...**<br>Cause: Values not yet stable.<br><br>**Diff. too small**<br>Cause: The nominal values of the calibration solutions are too close to each other.<br>Action:<br>▪ Correct calibration solution used.<br>▪ Calibration not OK.<br><br>**Out of tolerance**<br>Cause: Current actual value is too far from the nominal value.<br>Action:<br>▪ Ensure that the set nominal value and the nominal value of the calibration solution match.<br>▪ Clean sensor. | If the quality indication after calibration is between 100 and 35, the age of the sensor is the reason.<br>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.**<br>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 8.1.3. | |

## 8.1.5 Clean and calibrate Conductivity sensor

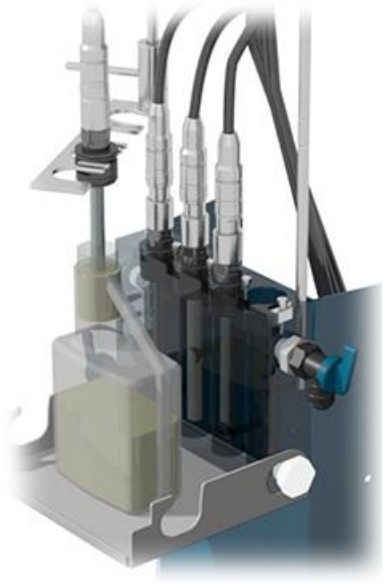
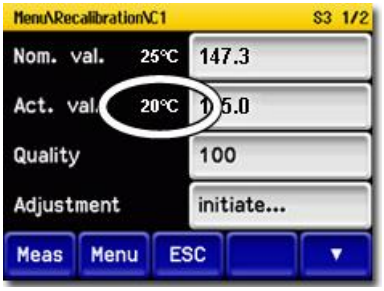
**CAUTION!**

**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 8.1.1.
- 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 8.1.2 and position in the locking device. | |
| 3. | **Clean measuring tip of the sensor.**<br>3.1: Dip the measuring tip into cleaning solution or dab with a soaked cloth.<br>Use cleaning agents in accordance with Section 8.1.1.3. | |
| | 3.2: Rinse the measuring tip with distilled water and dab dry. | |
| 4. | **Prepare recalibration.**<br>4.1: Open calibration holder and fill with buffer solution by pressing the container.<br>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.<br><br>ℹ 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.<br><br>ℹ 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.<br><br>ℹ Recalibration is performed only when the temperature value is stable.<br>The nominal value is factory set at 2%/°C temperature compensation (based on 25 °C). (**Meas.Channels Conduct\Temp.Comp** menu.)<br>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.<br>If the adjustment was successful, confirm with **Adjustment OK**. This completes the adjustment.<br><br>If the adjustment is not OK, the following messages may appear:<br>**running...**<br>Cause: Values not yet stable.<br><br>**Out of tolerance**<br>Cause: Current actual value is too far from the nominal value.<br>Action:<br>▪ Ensure that the set nominal value and the nominal value of the calibration solution match.<br>▪ Clean sensor. | If the quality indication after calibration is between 100 and 35, the age of the sensor is the reason.<br>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 8.1.3. | |

## 8.1.6 Clean and calibrate Redox/ORP sensor

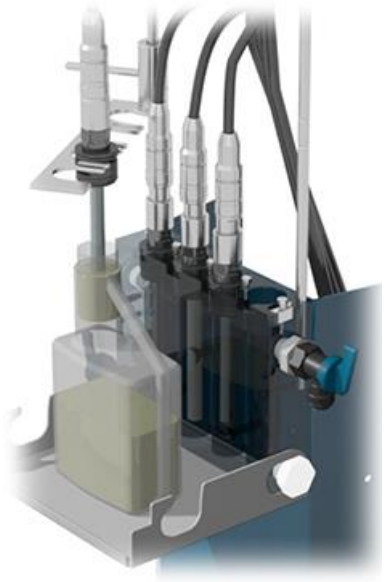
**CAUTION!**

**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 8.1.1.
- 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 8.1.2 and position in the locking device. | |
| 3. | **Clean measuring tip of the sensor.**<br>3.1: Dip the measuring tip into cleaning solution or dab with a soaked cloth.<br>Use cleaning agents in accordance with Section 8.1.1.3. | |
| | 3.2: Rinse the measuring tip with distilled water and dab dry. | |
| 4. | **Prepare recalibration.**<br>4.1: Open calibration holder and fill with buffer solution by pressing the container.<br>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.<br>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.<br>Recalibration is performed only when the temperature value is stable. |  |

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| | 5.3: Press the **Initiate** button. The recalibration begins.<br>If the adjustment was successful, confirm with **Adjustment OK**. This completes the adjustment.<br>If the adjustment was not OK, the following messages may appear:<br>**running...**<br>Cause: Values not yet stable.<br><br>**Out of tolerance**<br>Cause: Current actual value is too far from the nominal value.<br>Action:<br>▪ Ensure that the set nominal value and the nominal value of the calibration solution match.<br>▪ Clean sensor. | If the quality indication after calibration is between 100 and 35, the age of the sensor is the reason.<br>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 8.1.3. | |

## 8.1.7 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 8.1.1 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 8.1.2 and position it in the lock. | |
| 3. | **Clean the measuring tip of the sensor.**<br>3.1: Immerse the measuring tip in cleaning solution or dab it with a soaked cloth.<br>Use the cleaning agent according to Section 8.1.1.3. | |
| | 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.<br><br>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".<br>When exiting the menu, the value changes back to the original unit.<br>Pressing the **Nom. val.** button (2) opens a numeric input field where the nominal value can be adjusted.<br><br>4.2: Enter the current ambient air pressure (3). |  |
| | 4.3: Press the **initiate** button. Recalibration starts.<br>If the adjustment was successful, this is confirmed with **Adjustment OK**. This completes the adjustment.<br>If the adjustment was not successful, the following message may appear:<br>**running...**<br>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.<br>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 8.1.3. | |

## 8.1.8 Replace sensors configured by SIGRIST

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 1. | Remove old sensor from the measuring cell block in accordance with Section 8.1.2. | |
| 2. | Install new sensor in accordance with Section 8.1.3. | |
| 3. | Put the system into operation again. | |

## 8.1.9 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 8.1.2. | |
| 3. | Remove the holder from the old sensor and screw it onto the new sensor.<br>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 8.1.3 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.<br>Press **start...** under the "Find Sensor" menu item. |  |
| 7. | 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).<br>If the slave number has not yet been adjusted to Siginet, then **undefined** is shown under the slave number menu item.<br>In this case, a slave number has to be entered according to the following table. |  |
| 8. | The other sensors can now be reattached. | |

| Oxygen | pH | Conductivity | Redox/ORP |
|---|---|---|---|
| 1 | 2 | 3 | 4 |

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 9. | Select the **Siginet** menu and press **start...** under "Network scan".<br>A search is made for a few seconds and then a list appears with all found sensors.<br>If not all sensors are displayed, then proceed as follows:<br>1. Start the "Network scan" again.<br>2. Check the connections to the sensors.<br>3. Check whether each sensor has an individual slave number. |  |
| 10. | 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.<br>If the sequence of the sensors is correct, confirm with the **OK** button. | |
| 11. | Set the measuring channels according to Section 7.7. | |
| 12. | The system can be put into operation. | |

## 8.1.10 Clean the measuring cell block

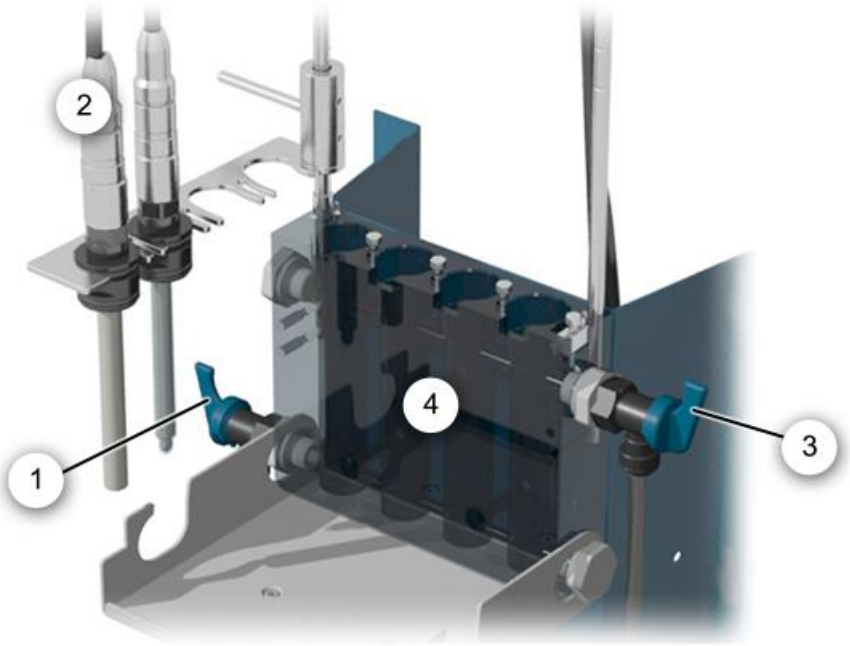



*Figure 18: Instrument overview of AquaMaster*

| | | | |
|---|---|---|---|
| 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 |

The following procedure describes how to clean the 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)

| | 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 18, pos. 2).<br>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 18, pos. 1), open inlet regulator valve and let the measuring cell block drain into a container until empty. | |
| 4. | Clean measuring cell block (Figure 18, pos. 4) with bottle cleaner. | |
| 5. | Refasten inlet hose (Figure 18, pos. 1). | |
| 6. | Remount sensors in the measuring cell block. | |
| 7. | Open the main water valve again and put the system into operation. | |

## 8.1.11 Cleaning the tubing

**CAUTION!**

**Damage to the tubing if wrong cleaning agent is used.**

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

- No acids may be used for cleaning the tubing.
- Only the following cleaning agents may be used:
  - Water
  - Ethanol
  - Commercially available dishwashing liquid

The following procedure describes how to clean the tubing:

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 1. | Close main water supply. | |
| 2. | Close the inlet regulator valve to the measuring cell block. | |
| 3. | Disassemble tubing up to the measuring cell block with all accessory parts and clean. | |
| 4. | Re-mount tubing with accessory parts. | |
| 5. | Put the system into operation again in accordance with: Section 5. | |

## 8.2 Servicing schedule for AquaScat 2 WTM/WTM A/HT

| WHEN | WHO | WHAT | PURPOSE |
|---|---|---|---|
| Monthly or as needed | Operator | Checking the flow rate and cleanliness.<br>Section 8.2.2 | Obligatory measure for maintaining measuring accuracy. |
| Every three months or as needed | Operator | Only for WTM / HT: Performing manual adjustment.<br>Section 8.2.4 | Obligatory measure for maintaining measuring accuracy. |
| | | Only for WTM A:<br>Initiating automatic adjustment.<br>Section 8.2.5 | |
| | | Cleaning parts which come into contact with water.<br>Section 8.2.6 | |
| Annually or as needed | Operator | Checking soiling of the optics and the current correction factor.<br>Section 8.2.7 | Obligatory measure for maintaining functional efficiency. |
| | | Replacing the air filter.<br>Section 8.2.8 | |
| Every 10 years or as needed | Operator | Replacing the battery.<br>Section 8.2.9 | Obligatory measure for maintaining functional efficiency. |

*Table 2: Servicing schedule AquaScat 2 WTM / WTM A / HT*

### 8.2.1 Fastening the optics unit to the docking station

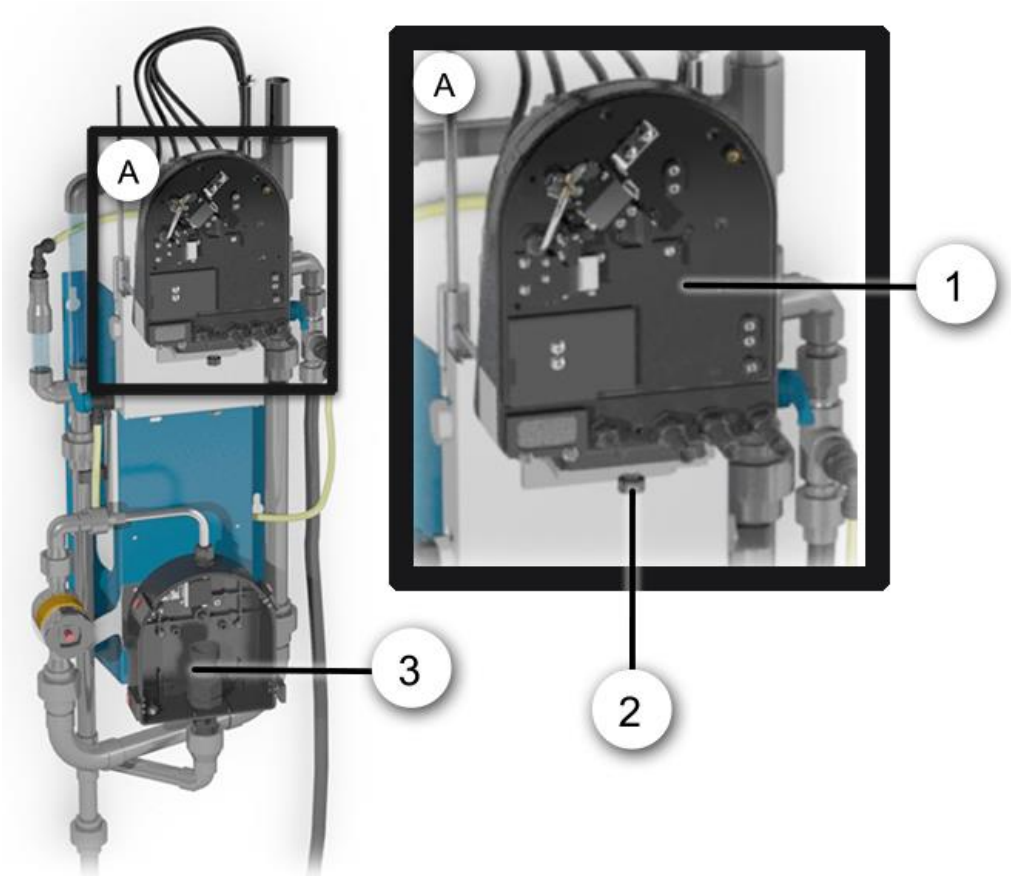
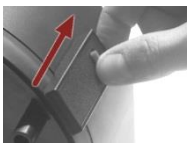
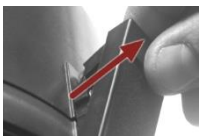



*Figure 19: Optics unit fastened to docking station*

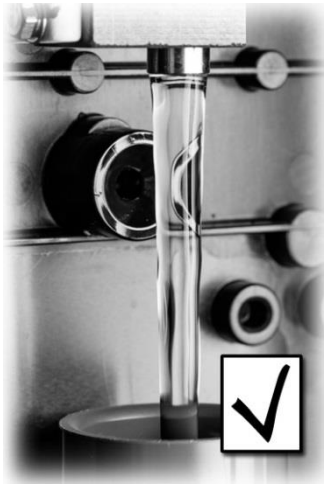
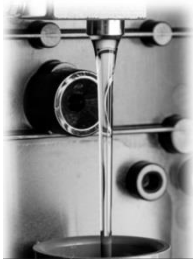
| | | | |
|---|---|---|---|
| ① | Optics unit | ② | Docking station with knurled screw for fastening the optics unit |
| ③ | Measuring cell component | | |

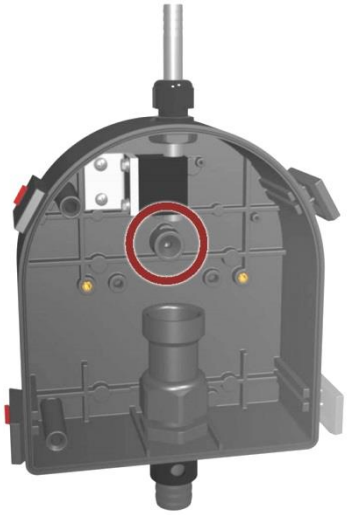
The optics unit is mounted on the docking station as follows:

<table>
<tr><th></th><th>WORKSTEP</th><th>ADDITIONAL INFO / IMAGES</th></tr>
<tr><td>1.</td><td>Open the mounting clips (circle in figure below) as follows:<br>Use a little force to push the red fuse in the direction of the arrow (picture 1) and at the same time lift the mounting clip (picture 2). Press the mounting clip in the direction of the arrow over the lock plate of the optics unit (picture 3) and then open (picture 4).<br>  <br>Position of the mounting clips</td><td>  <br>Picture 1<br>  <br>Picture 2<br>  <br>Picture 3<br>  <br>Picture 4</td></tr>
<tr><td>2.</td><td>Remove the optics unit (Figure 19, pos. 1) from the photometer, position it on the docking station (Figure 19, pos. 2) and then fasten in place with the knurled screw.</td><td></td></tr>
</table>

## 8.2.2 Checking the flow rate and cleanliness

The following procedure describes how the flow rate is checked:

<table>
<tr><th></th><th>WORKSTEP</th><th colspan="2">ADDITIONAL INFO / IMAGES</th></tr>
<tr><td>1.</td><td>Remove the optics unit of the photometer and fasten onto the docking station.</td><td colspan="2">Section 8.2.1</td></tr>
<tr><td>2.</td><td>Check the flow rate of the sample according to the technical data. Section 2.5</td><td colspan="2">If the flow rate is insufficient, please refer to Section 8.2.3.</td></tr>
<tr><td rowspan="2">3.</td><td rowspan="2">Check the water jet.<br>  <br>Normal jet without bubbles, reflections (e.g. of the shutter) are visible in the water jet.<br><br>Small air bubbles are difficult or impossible to see and may occur in the normal jet!</td><td>  <br>incorrect<br>Uneven water jet after water stop<br>This can occur if air is drawn into the hose at the AquaScat 2 input after a water stop and the instrument is then operated again.</td><td>  <br>incorrect<br>Too little water</td></tr>
<tr><td>  <br>incorrect<br>Too much water</td><td>  <br>incorrect<br>With large air bubbles</td></tr>
</table>

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 4. | Check the light trap in the measuring cell for residual water (circle).<br>Remove any residues with a cloth. |  |
| 5. | Check the shutter assembly for residual water (circle).<br>Remove any residues with a cloth. |  |
| 6. | Place the optics unit back on the measuring cell unit and lock with the four mounting clips. Pay attention to the guide pins (see picture). |  |

### 8.2.3 Flow rate reduction

A reduction of the minimum flow rate from 2.5 l/min to 1.3 l/min is possible; however, note the following points:

- Reproducibility worsens (from ±1% at 2.5 l/min to ±3% at 1.3 l/min).
- The instrument must be very precisely leveled. If there is a 1° angle, the measuring value can change by up to ±3%.
- If the flow rate is low, it is even more important to maintain a constant supply flow because the fluctuations have a greater impact on the measuring value.

## 8.2.4 Manual adjustment

The following procedure describes how manual adjustment is made with an AquaScat 2 WTM / HT:

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 1. | Interrupt the sample supply to the photometer. | |
| 2. | Loosen the conduit gland (X) and remove the inlet pipe (Y). |  |
| 3. | Remove the optics unit of the photometer and fasten onto the docking station. | Section 8.2.1 |
| 4. | Inspect the checking unit to ensure it is clean. | |
| 5. | Mount the checking unit and fasten with the knurled screws.<br>Make sure that the pins enter the positioning holes (circles). |  |

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 6. | Place the optics unit back on the measuring cell unit and lock with the four mounting clips. Pay attention to the guide pins (see picture). |  |
| 7. | Switch the photometer to service operation. | Section 6.10 |
| 8. | Press the **Local ...../Recalibration** button and then the **C1 Turb** menu. | |
| 9. | Check whether the saved nominal value matches the information on the checking unit. | |
| 10. | Carry out the adjustment as follows:<br>Press the **initiate...** button and wait.<br>If the adjustment was successful, this is confirmed with **Adjustment OK**. This completes the adjustment.<br>If the adjustment was **not** successful, it is indicated with **Adjust. fault**. In this case, check the points in the following list one after the other:<br>▪ Cleanliness of the checking unit.<br>▪ Correct checking unit used.<br>▪ Nominal value does not correspond to the value of the checking unit.<br>▪ Soiled optics in the instrument. In this case, check the cleanliness of the optics as described in Section 8.2.7 and then repeat the procedure. | If the check could not be successfully completed, contact your country representative. Section 10 |
| 11. | Remove the checking unit from the photometer again. | |
| 12. | Mount the inlet pipe as described in Section 4.6 and assemble the instrument in reverse order. | |
| 13. | The instrument can now be operated again. | |

A new recalibration factor is determined during the adjustment. The deviation from the original state is displayed under **Curr. corr.**.

## 8.2.5 Automatic adjustment with AquaScat 2 WTM A

The automatic adjustment is possible only with instrument type AquaScat 2 WTM A. The automatic adjustment can also be set for time actuation in the **Adjust interval** menu. This is described in the Reference Manual.

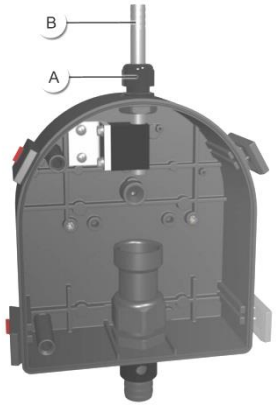
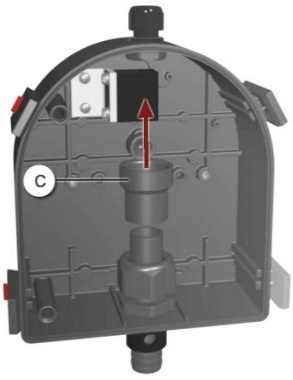
The following procedure describes how manual triggering of an adjustment is made with an AquaScat 2 WTM / HT:

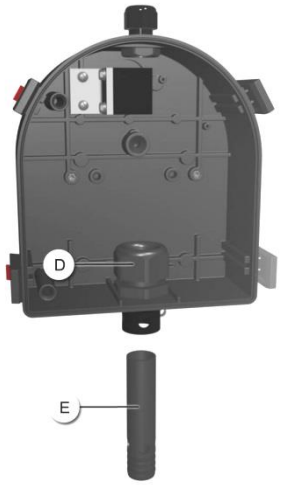
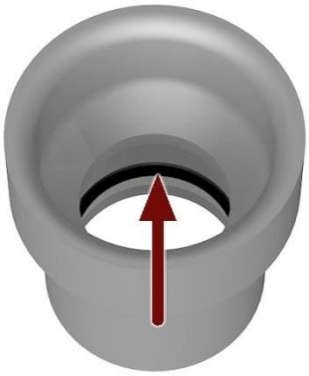
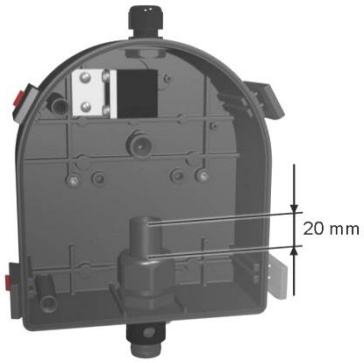
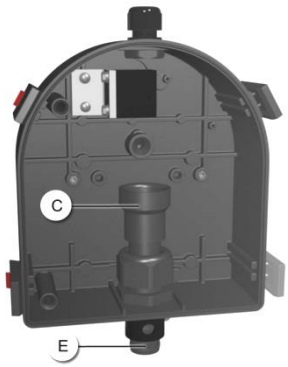
| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 1. | Switch the photometer to service operation. | Section 6.10 |
| 2. | Press the **Local .....** button. | |
| 3. | Press the **Recalibration** button and then **C1 Turb**. | |
| 4. | Carry out the adjustment as follows:<br>Press the **initiate...** button. This starts the adjustment.<br>If the adjustment was successful, this is confirmed with **Adjustment OK**. This completes the adjustment.<br>If the calibration check was **not** successful, it is indicated with **Adjust. fault**. The following points can now be checked:<br>▪ Check the cleanliness of the optics according to Section 8.2.7.<br>▪ Check whether the outlet cone is correctly mounted according to Section 8.2.6.<br>After performing the checks above, repeat the adjustment.<br>If the adjustment could not be successfully completed, contact your country representative. | |

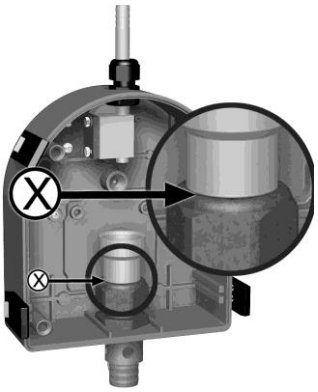
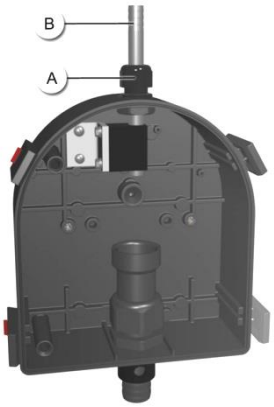
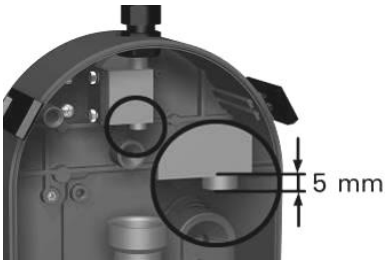
A new recalibration factor is determined during the adjustment. The deviation from the original state is displayed under **Curr. corr.**.

## 8.2.6 Cleaning the parts which come into contact with water

The following describes cleaning the parts of the photometer that come into contact with water:

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 1. | Interrupt the sample supply to the photometer. | Section 4.9 |
| 2. | Remove the inlet and outlet from the photometer. | |
| 3. | Remove the optics unit of the photometer and fasten onto the docking station. | Section 8.2.1 |
| 4. | Loosen the conduit gland (A) and remove the inlet pipe (B). |   |
| 5. | Pull off the outlet cone (C) upward. |   |

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 6. | Loosen the conduit gland (D) and pull off the outlet pipe (E) downward. |  |
| 7. | Clean the removed parts or replace if necessary.<br>When doing so, also inspect the gasket in the outlet cone (arrow). |  |
| 8. | Insert the outlet pipe into the conduit gland and fasten loosely in place.<br>The outlet pipe should protrude approx. 20 mm into the measuring cell unit. |  |
| 9. | Put the outlet cone (C) onto the outlet pipe (E) to the stop. When doing so, hold the outlet pipe from below. Now press the outlet cone together with the outlet pipe downward to the stop. |  |

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 10. | Fasten this unit by tightening the conduit gland.<br>At position X, there should now be no space between the outlet cone and the conduit gland! |  |
| 11. | Insert the inlet pipe (B) from above into the conduit gland (A) to the stop. |  |
| 12. | Tighten the inlet pipe (B) with the conduit gland (A). The inlet pipe should protrude 5 mm out of the holder. |  |
| 13. | Place the optics unit back on the measuring cell unit and lock with the four mounting clips.<br>Pay attention to the guide pins (see picture). |  |

## 8.2.7 Checking soiling of the lenses and cleaning the optics

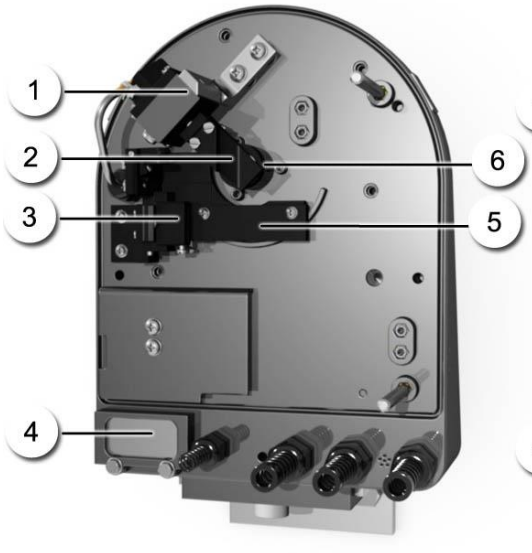



*Figure 20: AquaScat 2 WTM A optics unit in adjustment position*

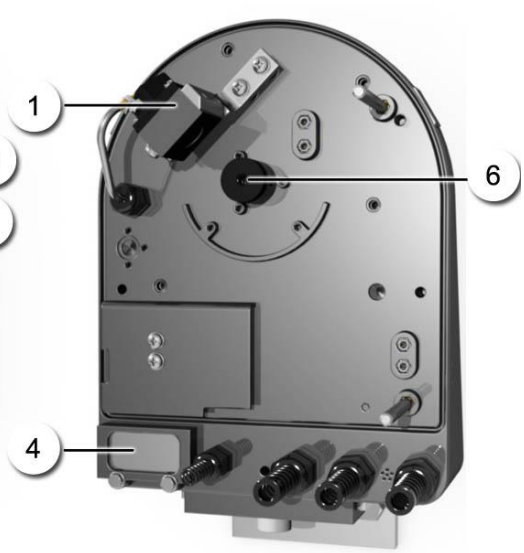
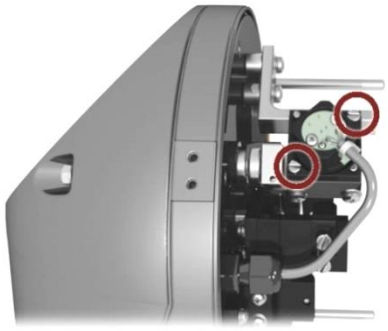
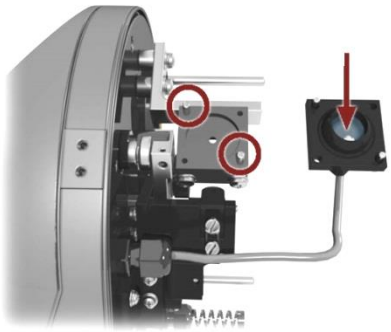
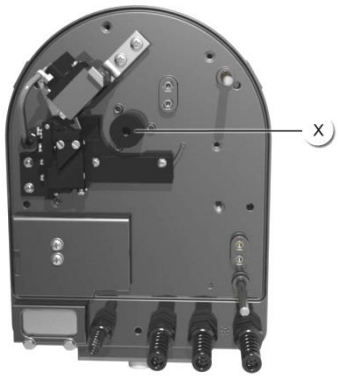


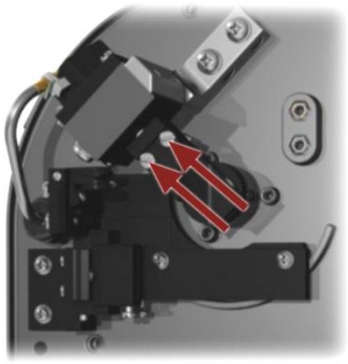
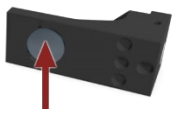

*Figure 21: AquaScat 2 WTM/IHT*

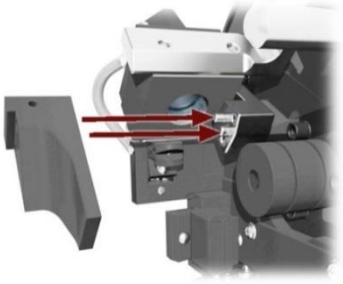
| | | | |
|---|---|---|---|
| ① | Transmitter | ② | Head of the automatic checking unit |
| ③ | Stop for idle position of the checking unit | ④ | Air filter |
| ⑤ | Fastening plate for the stop of the checking unit | ⑥ | Shutter assembly |

The following describes checking the lenses for soiling and cleaning the optics:

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 1. | 1.1: If an AquaScat 2 WTM / HT is present, carry out an adjustment as described in Section 8.2.5.<br>If an AquaScat 2 WTM A is present, carry out an automatic adjustment as described in Section 8.2.4. | |
| | 1.2: In the **Local AquaScat 2/Recalibration/C1 Turb** menu, check the current calibration factor in the **Curr. corr.** menu. The factory setting is 1.00.<br>If the difference is greater than 10% (i.e. < 0.90 or > 1.10), then this may be due to soiling of the lens on the transmitter and/or receiver.<br>In this case, please note the instructions in step 5 and 6. | |
| 2. | Interrupt the sample supply to the photometer. | |
| 3. | Interrupt the service voltage to the photometer. | |
| 4. | Remove the optics unit of the photometer and fasten onto the docking station. | Section 8.2.1 |
| 5. | Clean the transmitter:<br>5.1: Loosen the two screws (circles) and remove the transmitter. |  |
| | 5.2: Check for soiling of the lens (arrow).<br>▪ If **no** soiling can be determined and the difference in calibration factor is **not** greater than 10%, proceed with step 5.4.<br>▪ If soiling can be determined **and/or** the difference in calibration factor is greater than 10%, proceed with step 5.3. |  |
| | 5.3: Clean the lens (arrow) on the transmitter with a cotton-tipped applicator moistened with ethanol. | |
| | 5.4: After cleaning, place the transmitter on the positioning pins (circles) and fasten with the two screws. | |

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 6. | Clean the lens of the receiver:<br>If the difference in the current calibration factor is not greater than 10% and there is no visible soiling apparent on the shutter assembly, then it can be assumed that the lens on the receiver is **not** soiled. Step 6 can then be omitted in its entirety. Otherwise, proceed with step 6.1.<br>6.1: Unscrew the shutter assembly (X) counter-clockwise. |  |
| | 6.2: Check the lens (circle) for soiling using a flashlight.<br>▪ If **no** soiling can be determined and the difference in calibration factor is **not** greater than 10%, proceed with step 6.4.<br>▪ If soiling can be determined **and/or** the difference in calibration factor is greater than 10%, proceed with step 6.3. |  |
| | 6.3: Clean the lens of the scattered light receiver with a cotton-tipped applicator moistened with ethanol. | |
| | 6.4: Screw the shutter assembly into the optics holder clockwise.<br>Pay attention to the position of the gasket on the shutter assembly (arrow). |  |
| 7. | Place the optics unit back on the measuring cell unit and lock with the four mounting clips.<br>Pay attention to the guide pins (see picture). |  |

<table>
<tr><th></th><th>WORKSTEP</th><th colspan="2">ADDITIONAL INFO / IMAGES</th></tr>
<tr><td>8.</td><td>Restore the service voltage to the photometer.<br>On instruments without automatic adjustment, carry out a manual adjustment as described in Section 8.2.4. This servicing duty is then completed.<br>On instruments with automatic adjustment (AquaScat 2 WTM A) continue with step 9.</td><td colspan="2"></td></tr>
<tr><td>9.</td><td>Change over the instrument to service operation as described in Section 6.10.</td><td colspan="2"></td></tr>
<tr><td>10.</td><td>In the Local ...../Simulation menu, select the Motor position submenu. Now select the Adjustment menu item.<br>The checking unit now moves to the adjustment position.</td><td colspan="2"></td></tr>
<tr><td>11.</td><td>Remove the optics unit of the photometer and fasten onto the docking station.</td><td colspan="2">Section 8.2.1</td></tr>
<tr><td rowspan="3">12.</td><td>Clean the head of the checking unit.<br>12.1: Remove the two screws (arrows) and then remove the head of the checking unit.</td><td colspan="2">  </td></tr>
<tr><td rowspan="2">12.2: Clean the two glass panels (arrows) with a cotton-tipped applicator moistened with ethanol.</td><td>Position glass panel 1</td><td>Position glass panel 2</td></tr>
<tr><td>  </td><td>  </td></tr>
</table>

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| | 12.3: Put the head of the checking unit on the positioning pins (arrows) and then fasten with the two screws. |  |
| 13. | Place the optics unit back on the measuring cell unit and lock with the four mounting clips.<br>Pay attention to the guide pins (see picture). |  |
| 14. | Carry out an adjustment. | Section 8.2.4<br>Section 8.2.5 |

## 8.2.8 Replacing the air filter

The following describes the replacement of the air filter:

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 1. | Interrupt the sample supply to the photometer. | Section 5 |
| 2. | Interrupt the service voltage to the photometer. | Section 4.4 |
| 3. | Remove the optics unit of the photometer and fasten onto the docking station. | Section 8.2.1 |
| 4. | Remove the screws (circles) used for securing the air filter and remove the filter cover and filter (X). |  |
| 5. | Replace the old filter with a new one and fasten it onto the photometer again along with the filter cover. | |
| 6. | Place the optics unit back on the measuring cell unit and lock with the four mounting clips.<br>Pay attention to the guide pins (see picture). |  |

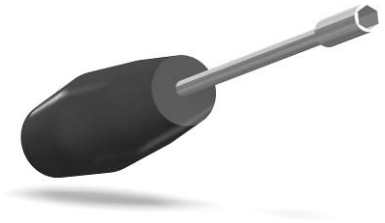
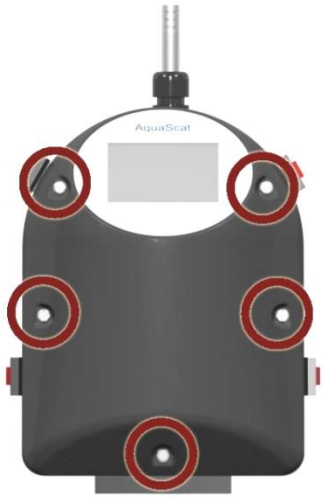
## 8.2.9 Replacing the battery

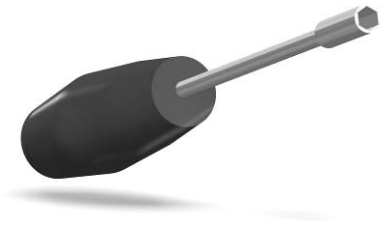
**DANGER!**

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

External signal lines may carry life threatening voltage even if the voltage supply to the instrument is disconnected. Before opening the instrument, make sure that no connected lines are charged with voltage.

The following describes the replacement of the battery:

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 1. | Interrupt the service voltage to the photometer. | Section 4.4 |
| 2. | Loosen the five screws on the front cover with a 7 mm key and remove the front cover.<br>  <br>*7 mm hex key* |  |
| 3. | Remove the old battery and replace with a new one (circle).<br>The battery is built into the front cover on the connection print (AQ2Conn). |  |

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 4. | Carefully mount the front cover and fasten with the five screws.<br>**⚠ Damage to the threaded inserts in the housing due to excessive tightening of the screws of the front cover:**<br>Use a hex key without a T-handle to tighten the screws of the front cover finger-tight (approx. tightening torque 1 Nm). |  <br>*7 mm hex key* |
| 5. | Put the instrument into operation again. | |
| 6. | Set the date and time as described in Section 7.8. | |

# 9 Troubleshooting

## 9.1 Pinpointing malfunctions

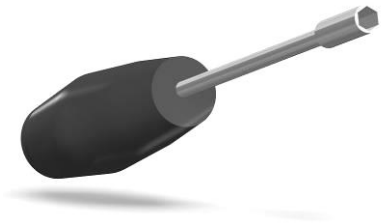
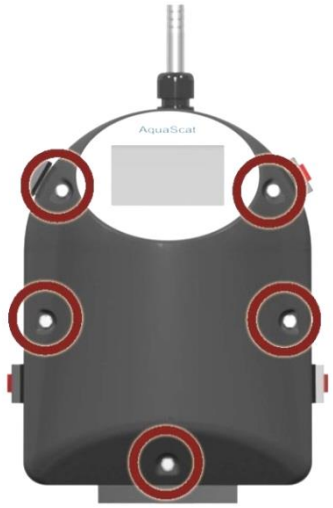
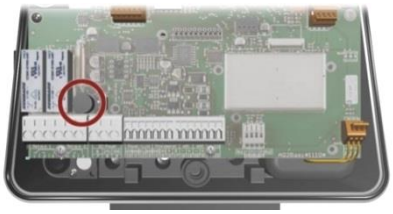
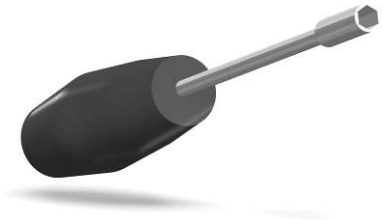
| DETECTABLE MALFUNCTION | ACTION |
|---|---|
| No reading | ▪ Check whether the supply voltage is present. |
| Error message in the display | ▪ Analyze the error message. Section 9.3 to Section 9.5 |
| The reading is wrong | ▪ Ensure that the sample to be measured corresponds to the operating conditions. Section 2.5<br>▪ Perform adjustment. Section 8<br>▪ Check whether the photometer and the associated peripherals are correctly mounted. Section 4<br>▪ Ensure that the servicing duties have been performed according to the servicing schedule. Section 8 |

*Table 3: Pinpointing malfunctions*

If the listed measures do not result in the desired results, please consult with customer service. Section 10

## 9.2 Replacing the fine-wire fuses

The following describes the replacement of the fine-wire fuse on the AQ2Basi print:

| | WORKSTEP | ADDITIONAL INFO / IMAGES |
|---|---|---|
| 1. | Interrupt the service voltage to the photo-meter. | Section 4.7 or |
| 2. | Loosen the five screws on the front cover with a 7 mm key and remove the front cover.<br>  <br>*7 mm hex key* |  |
| 3. | Remove the old fine-wire fuse (circle) from the AQ2Basi print and replace with a new one (type T2A). |  |
| 4. | Carefully mount the front cover and fasten with the five screws.<br>⚠ **Damage to the threaded inserts in the housing due to excessive tightening of the screws of the front cover:**<br>Use a hex key without a T-handle to tighten the screws of the front cover finger-tight (approx. tightening torque 1 Nm). |  <br>*7 mm hex key* |
| 5. | Put the instrument into operation again. | |

## 9.3 Warning messages and effect on operation

Warnings indicate an unusual state.

| **WARNINGS** | |
|---|---|
| If a warning occurs during operation, it has the following effects:<br>▪ The system continues to operate; however, the measuring results must be carefully evaluated. The cause of the warning message should be remedied at the next possible opportunity.<br>▪ When the cause of the warning has been remedied, it is automatically deleted.<br>▪ When the **Warning** message occurs, the color of the status display changes to **orange** and the warning text describes what the warning is about. |  <br>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. |
| ADJUSTMENT | The adjustment of the AquaScat 2 could not be performed. | ▪ The instrument is soiled.<br>▪ The set point for the adjustment does not match the value of the medium. |
| CURRENT 1.. 4 (8) | Current output 1.. 4 (8) is disturbed. | ▪ Terminals open.<br>▪ Interruption of the current loop of the reading output. |
| FLOW<br>(Name ext.in.)<br>Only for AquaScat 2 WTM | A flow rate fault is signaled via a digital input. | ▪ Flow rate incorrect. |
| VENTILATOR | The fan does not reach its nominal speed. | ▪ Fan is defective. |
| WATCHDOG | The internal error monitoring has been actuated.<br>The program has been restarted. | ▪ Program crash. |
| MEASURE | Measuring problem with Hamilton sensor. | ▪ Temperature or measuring values are unstable or outside the permitted range. |
| CALIBRATION | Calibration problem with Hamilton sensor. | ▪ Calibration recommended.<br>▪ Last calibration not successful.<br>▪ Oxygen: replace cap. |

| WARNING | DESCRIPTION | POSSIBLE CAUSES |
|---|---|---|
| INTERFACE | A connection problem with Hamilton sensor. | ▪ Oxygen: mA value outside range.<br>▪ Oxygen: ECS (Electrical connection for this sensor) is outside range. |
| HARDWARE | Hardware problem with Hamilton sensor. | ▪ Supply voltage outside range. |
| QUALITY | A Hamilton sensor reports a quality value under 35%. | ▪ The calibration was incorrectly performed or was faulty.<br>▪ If the fault continues after repeated cleaning and calibration, the sensor (or cap on the oxygen sensor) must be replaced.<br>▪ Conductivity: the sensor is outside the medium. |
| OVER TEMP | A Hamilton sensor reports the temperature is too high. | ▪ Medium or ambient temperature too high.<br>▪ Temperature measurement defective. |

*Table 4: Possible warning messages*

## 9.4 Fault messages and effect on operation

**FAULT**

If an error occurs during operation, it has the following effects:

- A fault is a malfunction which prevents correct measurement value acquisition.
- The measuring values of the concerned sensor/photometer go to 0.
- Assigned current outputs go to the programmed electrical current "If fault".
- Assigned limits are deactivated.
- If an output for faults is programmed, it is activated.
- 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 error messages can be displayed:

| ERROR MESSAGE | DESCRIPTION | POSSIBLE CAUSES |
|---|---|---|
| V ANALOG | One of the internal analogue voltages is outside the permitted range. | ▪ Defect in the electronic system. → Service technician |
| MEASUR.FAULT | Measurement value acquisition is faulty. | ▪ Air bubbles in the water.<br>▪ External light in the vicinity of the measuring station (e.g. transparent hoses).<br>▪ Defect in the electronic system. → Service technician |
| AN.MEAS.FAULT | The measurement value acquisition of the analogue channels is disturbed. | ▪ Defect in the electronic system. → Service technician |
| LIGHT SOURCE 1 | The detector for monitoring the LED receives no light. | ▪ Defective light source. → Service technician |
| ANALOG IN 1/2 | The input signal on analog input 1/2 is less than the error limit. | ▪ There is no input signal. |
| POWER LINK | Actuation of the extended inputs/outputs via the Powerlink is disturbed. | ▪ Interrupted connection to the extended inputs/outputs. |
| MEASUR.FAULT | Serious measuring fault on a Hamilton sensor. | ▪ Sensor measurement defective.<br>▪ Temperature measurement defective.<br>▪ Resistances or electric potentials outside the permitted range. |
| CALIBRATION | Serious fault calibrating a Hamilton sensor. | ▪ Oxygen sensor: cap missing.<br>▪ pH, Redox/ORP sensor: sensor defective (quality <15%).<br>▪ Conductivity sensor: sensor defective (quality <15%) or outside medium. |
| INTERFACE | Connection problem with Hamilton sensor. | ▪ Oxygen sensor: current output fault. |
| HARDWARE | Serious fault in the hardware of a Hamilton sensor. | ▪ Input voltage far outside the permitted range.<br>▪ Temperature measurement far outside the permitted range.<br>▪ Oxygen sensor: red channel failure.<br>▪ Internal communication fault. |

*Table 5: Possible fault messages*

# 9.5 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:

**Effects:**

- 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.

**Prio fault originating from the AquaMaster:**

- A prio fault of the AquaMaster sets all measuring values to 0.
- All current outputs go to the programmed electrical current If fault.
- All limits are deactivated.

**Prio fault originating from the sensor:**

- A prio fault of a sensor/photometer sets the concerned measuring values to 0.
- The assigned current output goes to the programmed electrical current If fault.
- The assigned limit is deactivated.


Example: **PRIO DEFAULT VALUES**

The following prio error messages can be displayed:

| PRIO MESSAGE | 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.<br>▪ Defect in the electronic system. |
| CRC USER | A fault was determined when the user data was checked. | ▪ Electromagnetic malfunctions.<br>▪ Defect in the electronic system. |
| CRC DISPLAY | A fault was determined when the display data was checked. | ▪ Electromagnetic malfunctions.<br>▪ 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. |

*Table 6: Possible prio error messages*

# 10 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.

# 11 Decommissioning/storage

## 11.1 Decommissioning

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. | Interrupt main water supply. | |
| 3. | Remove front cover of the AquaScat 2and remove electrical connections. | Section 4.7 |
| 4. | Re-fasten front cover onto the AquaScat 2. | |
| 5. | Remove the optics unit of the AquaScat 2 and fasten onto the docking station. | Section 8.2.1 |
| 6. | Remove junction hoses and then clean and dry the measuring cell housing of the AquaScat 2. | |
| 7. | Re-mount optics unit on the AquaScat 2. | |
| 8. | Remove the AquaScat 2 from the base plate and close all openings. | |
| 9. | Unscrew sensor connection cables to the connection box and then remove connection box from the contact surface of the base plate and pack it. | |
| 10. | Remove sensors from the measuring cell block, clean them, and then pack according to the manufacturer's instructions.<br>Store the measuring tips of the pH and Redox/ORP sensors in containers with clean tap water so that they are protected against drying out.<br>The protection covers intended for that purpose with the 3 molar solution of potassium chloride can also be used. | Section 8.1.1.3 |
| 11 | Disassemble and clean tubing with optional components (e.g. deaeration tube, flow meter). | Section 8.1.11 |
| 12. | Remove the base plate from the wall and pack for storage. | |

## 11.2 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 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.

# 12 Packaging/Transport/Returning

**DANGER!**

**Injuries to persons caused by dangerous samples in the returned instrument.**

Instruments that have come into contact with dangerous samples may not be sent to be repaired without information regarding the concerned sample or without a proper decontamination (Refer to repair form).

Detailed information about the samples must be received by SIGRIST-PHOTOMETER so that relevant precautionary measures can be taken when unpacking.

The original packaging of the photometer and its peripheral devices should be used for packaging when possible. If the original packaging is no longer available, note the following information:

- Before packaging, close the openings of the photometer with adhesive tape or plugs so that no packaging materials can enter the instrument.
- The photometer contains optical and electronic components. Make sure that the packaging protects the instrument from being damaged by impact during transport.
- All peripheral devices and accessory parts must be packaged separately and marked with serial numbers (Section 2.3). This prevents confusion and mix-ups later while also making it easier to identify parts.
- When sending for repairs, ensure that the complete instrument including the **checking unit** is sent.
- Fill in the repair note and attach 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.

# 13 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 points, incineration plants |
| | Protective foils, polystyrene shells | Reuse as packaging material, recycling |
| Electronics | Printed circuit boards, electromechanical components | To be disposed of as electronic waste |
| Measuring cell block | PMMA plastic | Local disposal center |
| Parts which come into contact with water | PVC | Local disposal center |
| | NBR (gaskets) | Local disposal center |
| | PA (hoses) | Local disposal center |
| | Steel | Waste metal disposal center |
| Optics | Glass, aluminum | Recycling via centers for recycling glass and waste metal |
| Battery | Lithium | Recycling via locally organized collection point |
| Photometer housing | ABS plastic | Local disposal center |

*Table 7: Materials and their disposal*

# 14 Spare parts list

## 14.1 Spare parts for the AquaMaster

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 | |
| 119566 | Regulating valve for AquaMaster/AquaScat 2 WTM(A)/HT | |

## 14.2 Spare parts for the AquaScat 2 WTM (A) / HT

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

| Article number | Name | Remarks |
|---|---|---|
| 116627 | Air filter | Section 8.2.8 |
| 116468 | Inlet tube, stainless steel 1.4435 | Section 8.2.6 |
| 116833 | Inlet tube, PVC | Section 8.2.6 |
| 117988 | Outlet tube with flood protection, complete | Section 8.2.6 |
| 117442 | Fuse, microfuse 250 V 2 AT RM5 | Section 9.2 |
| 111834 | Battery 3V CR 2032 (button battery) | Section 8.2.9 |

# 15 Appendix

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## S



## T



## U



## W

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