

INSTRUCTION MANUAL

AquaScat 2

Versions: WTM / WTM A / HT



**Turbidimeter with non-contact
measuring cell**

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Terms used in this document (glossary)

Please refer to our website for specialist terms: www.photometer.com

1. General notes to the user

1.1. Purpose of the Instruction Manual

This Instruction Manual provides the user with helpful information about the entire life cycle of the photometer. Please read through it completely before putting the instrument into operation.

1.2. Target group

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

1.3. Additional documentation

DOC. NO.	TITLE	CONTENT
11779E	Brief Instructions	The most important functions and complete menu structure
11780E	Reference Manual	More extended menu functions and work steps for advanced users.
11880E	Data sheet	Descriptions and technical data about the photometer.
11781E	Service Manual	Repair and conversion instructions for service engineers.
11888DEF	Declaration of conformity for AquaScat WTM / WTM A / HT	Compliance with the underlying directives and standards.
11887DEF	Declaration of conformity SP-C039 (mains device)	Compliance with the underlying directives and standards.

1.4. Copyright stipulations

The Instruction Manual has been written by SIGRIST-PHOTOMETER AG. Copying or modifying the content or providing this document to third parties is permitted only with the express written consent of SIGRIST-PHOTOMETER AG.

1.5. Storage location of the Instruction Manual

The Instruction Manual is a component of the product and should always be close at hand. The most recent version (in color) of the Reference Manual can be downloaded at www.photometer.com (one-time registration). It can also be ordered from our representative in your country. → Section 10

1.6. Meaning of the safety symbols

All **danger symbols** used in the Instruction Manual are explained below:



DANGER!



**EXPLOSION
HAZARD!**



WARNING!



CAUTION!

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 or death.

Danger due to explosion that may result in serious bodily injury or death.
Non-observance of this notice may cause explosions resulting in serious material damage and death.

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.

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

1.7. Meaning of the safety pictograms

All **pictograms** used in the Instruction Manual are explained below:



Additional information about the current topic.



Practical procedures when working on the photometer.



Manipulations on the touchscreen.



Work on the PC.

1.8. Proper use

The AquaScat 2 is designed for measuring turbidity during water treatment and is optimized for the values 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.
- The instrument may be operated only by persons who have read and understood the content of the Instruction Manual.

1.10. Conformity

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



The system meets the requirements applicable within the European Union (EU) for electromagnetic compatibility (EMC) and low voltage directives (LVD) and has the CE mark.



Please refer to the separate declaration of conformity for details (document 11888DEF).

1.11. Use restrictions



Explosion hazard during operation in an inappropriate environment.

- 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



Operation when not used properly.

Improper use can cause injuries to persons, process-related consequential damage and damage to the photometer 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.
- The instrument is not installed 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.

2. Instrument overview

2.1. Measuring station with optional accessory parts

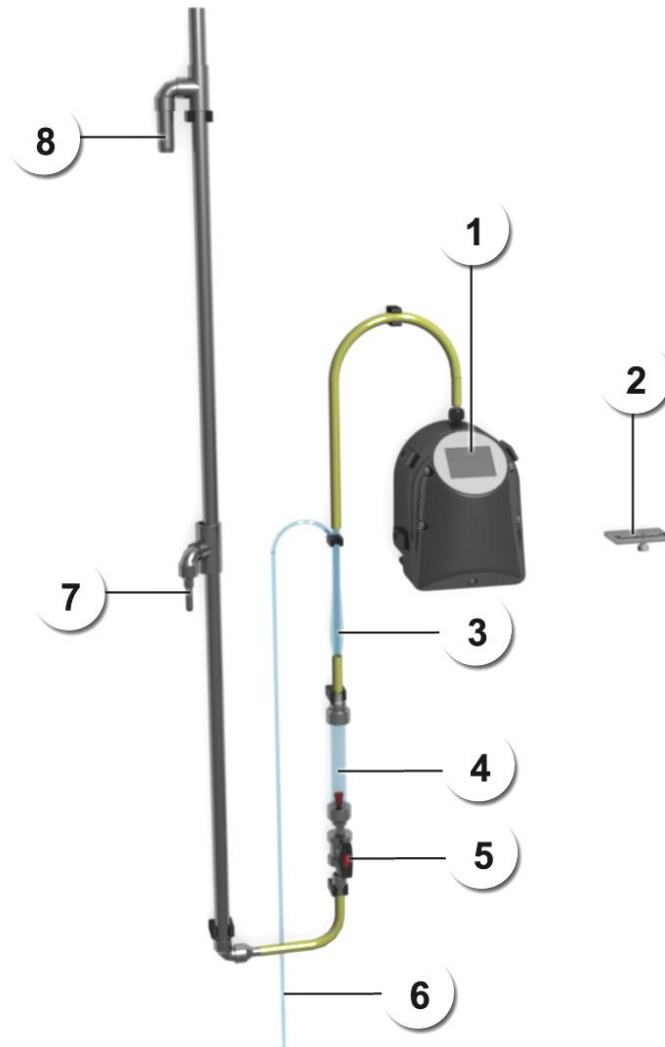


Figure 1: Measuring station with optional accessory parts

①	Photometer with non-contact measuring cell → Section 2.3/2.4	②	Docking station → Section 4.3
③	Deaeration tube	④	Flow meter with optional limit switch
⑤	Regulator valve	⑥	Venting hose
⑦	Sample inlet of the level control	⑧	Sample overflow of the level control

2.2. Identification AquaScat 2

The photometer is fitted with a rating plate:

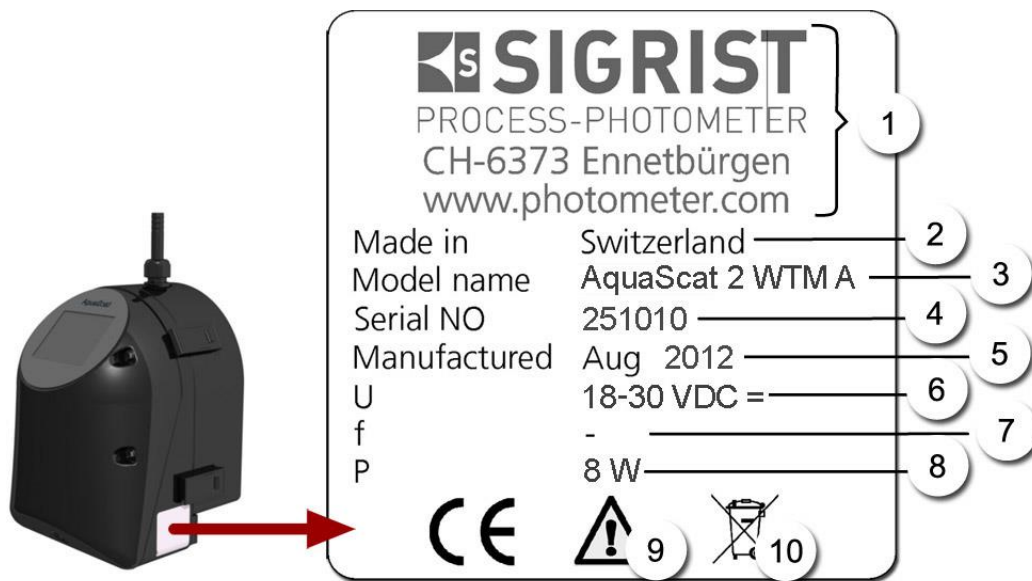


Figure 2: Rating plate on the AquaScat 2


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 → Section 13

2.3. Scope of supply and accessory parts

Scope of supply



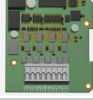

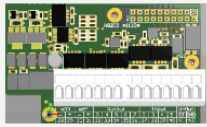

PCS.	ART. NO.	NAME	VIEW	VARIANT
1	118992	AquaScat 2 WTM 24 VDC		For high resolution / Low turbidity
1	118993	AquaScat 2 WTM A 24 VDC		With automatic adjustment for high resolutions / Low turbidity
1	118994	AquaScat 2 HT 24 VDC		For high turbidities

Documentation

1		Instruction Manual		German 11778D
				English 11778E
				French 11778F
1		Reference Manual		German 11780D
				English 11780E
1		Brief Instructions		German 11779D
				English 11779E
				French 11779F

Optional accessory parts

PCS.	ART. NO.	NAME	VIEW	VARIANT
1	118788	Long level control	→ Section 2.1	
1	118778	Deaeration tube	→ Section 2.1	
1	118811	Hose kit for long level control	→ Section 2.1	
1	118812	Hose kit for long level control with deaeration tube		
1	116786	Flow meter zu AquaScat (2) WTM/HT	→ Section 2.1	
1	116789	Flow meter with limit switch for AquaScat (2) WTM/HT	→ Section 2.1	
1	118411	Flow meter with regulating valve for AquaScat (2)	→ Section 2.1	
1	118415	Flow meter with limit switch and regulating valve for AquaScat (2)	→ Section 2.1	
1	116708	Checking unit for AquaScat (2) WTM/HT	→ Section 8.3	Manual solid matter reference

PCS.	ART. NO.	NAME	VIEW	VARIANT
1	119102	Profibus DP interface print for AquaScat 2 → Reference Manual		
1	119103	Modbus RTU interfaces print for AquaScat 2 → Reference Manual		
1	119041	Current output 4 times for AquaScat 2		
1	119045	24 VDC power supply 20 W IP66, input 100-240 VAC		
1	119082	I/O module for AquaScat 2		
1	119081	Ethernet IP66 for AquaScat 2		

2.4. Technical data

TURBIDITY MEASUREMENT	VALUES
Measuring principle	Scattered light measurement
Measurement span	0 .. 4000 FNU
Sample media	Water
Wavelength	880 nm, compliant with DIN EN ISO 7027
Radiation class	LED device of Class 1 according to EN 60825-1
Measuring angle	90°


AQUASCAT 2 WTM	VALUES
Resolution	0.001 FNU
Reproducibility	0 .. 10 FNU: ± 0.002 FNU, or $\pm 1\%$ full scale at flow rate 2.5 .. 7 l/min ($\pm 3\%$ at flow rate 1.3 .. 2.5 l/min) 10 .. 4000 FNU: $\pm 1.5\%$ at flow rate 3.5 .. 7 l/min
Repeatability	0.001 FNU or $\pm 0.1\%$ full scale
Service voltage	18-30 VDC
Power consumption	8 W
Curr. outputs	2 x 0/4 .. 20 mA, galvanically isolated to max. 50 V relative to ground
Burden	max. 600 Ω
Relay contacts	2 relay contacts 250 V, 4 A
Control unit	Integrated control unit
Measuring ranges	8 ranges between 0 .. 0.1 and 0 .. 4000 FNU freely configurable
Housing	Plastic (ABS)
Dimensions	For detailed dimension sheet see Section 15
Weight	approx. 3.2 kg
Protection degree	IP54 (only electronics)
Maximum operating altitude	3000 m above sea level for instruments which are not operated with extra low voltage (mains, relays).
Ambient temperature	0 .. 50°C
Ambient humidity	0 .. 95% rel. humidity, non-condensing
Interface	Ethernet, SD card (for logging, SW update, diagnostics) Modbus TCP, optional Modbus RTU or Profibus DP
Terminal size for signal cable	Cable holder for \varnothing of 0.08 mm ² to 1.5 mm ²
Terminal size for supply and relays	Cable holder for \varnothing of 0.08 mm ² to 2.5mm ²

AQUASCAT 2 WTM	VALUES
Display	¼ VGA with touchscreen Resolution: 320 x 240 pixels with 3.5" diagonal

AQUASCAT 2 WTM A	VALUES
Automatic adjustment	Photometer with automatic adjustment
Other data identical to AquaScat 2 WTM	

AQUASCAT 2 HT	VALUES
Resolution	0.1 FNU
Reproducibility	0 .. 10 FNU: ±0.1 FNU, or ±1% full scale at flow rate 2.5 .. 7 l/min (±3% at flow rate 1.3 .. 2.5 l/min) 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

Other data identical to AquaScat 2 WTM

NON-CONTACT MEASURING CELL	VALUES	
Material	Inlet tube: stainless steel 1.4435 or PVC Drain: 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  Sample flows in the range of 1.3 .. 2.5 l/min are possible; please refer to Section 8.2.1.
	0.5 .. 10 FNU	2.5 .. 3.5 l/min
	> 10 FNU	min. 3.5 .. 7.0 l/min
Connections	Inlet tube: Ø 12 mm Drain tube: Ø 25 mm	

DEAERATION TUBE (OPTIONAL)	VALUES
Material	Polycarbonate
Intake connection	Ø 12 mm
Outlet connection	Ø 12 mm

3. General safety pointers

3.1. What to do in an emergency



What to do in an emergency:
 SIGRIST-PHOTOMETER AG instruments have no On/Off switch. This is the responsibility of the customer. Before commissioning, clarify the following points:

- Clarify the position of the On/Off switch and the way it works.
- Where and how the sample supply can be stopped.
- Who the responsible authorities are.

PROCEDURE IN AN EMERGENCY!

	MEASURE	NOTES
1.	Interrupt the service voltage to the measuring station.	
2.	Interrupt sample supply.	
3.	Secure emergency site.	
4.	Notify responsible institution.	

3.2. Dangers when using properly



Electrical shock due to damaged instrument or cabling.

- 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.



Life threatening voltage inside the instrument.

- The instrument must never be operated when the front cover is removed.
- The instrument may be opened only by trained personnel.



Damage due to incorrect service voltage.
 The instrument may be connected only to voltage sources as specified on the rating plate.

**CAUTION!****Property damage due to escaping sample.**

The instrument must never be connected to leaking sample tubes and operated.

**CAUTION!****Damage to the touchscreen due to strong mechanical pressure.**

- Do not apply excessive pressure to the touchscreen (touch lightly with your fingertip).
- Do not use pointed objects for manipulations on the touchscreen.

**CAUTION!****Use of aggressive chemicals.**

- Do not use aggressive chemicals or cleaning agents when cleaning.
- Thoroughly clean the instrument with a neutral cleaning agent if it has come into contact with aggressive chemicals.

**CAUTION!****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.



According to the risk assessment of the applied safety directive DIN EN 61010-1, there remains the risk of a faulty measuring value display. This risk can be reduced with the following measures:

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

3.3. 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.

The following sections must be internalized:

- Section 1.6
- Section 1.8
- Section 3
- Observe local safety pointers when performing the described procedures.

4. Mounting the measuring device

4.1. Location evaluation

A note about selecting the right installation location:

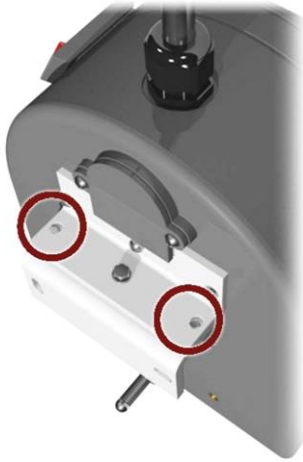

- The sample feed should be as short as possible so that changes in the reading are displayed without delay.
- There should be no vibrations on the mounting surface. Vibrations cause measuring errors and can permanently damage the unit.
- The photometer and its peripherals should be easily accessible to facilitate inspection and servicing duty.
- Make sure that the photometer is not exposed to direct sunlight. This may cause significant deviations in the reading.


4.2. Mechanical mounting of the photometer

The dimensional specifications according to the mounting drawings in the Appendix must be observed when mounting the photometer. → Section 15



	WORKSTEP	PROCEDURE
1.	Fit the mounting bracket.	Screw on the mounting bracket at the intended position. The mounting bracket must be horizontally aligned with a spirit level.

	WORKSTEP	PROCEDURE
2.	Fasten the photometer onto the pre-mounted mounting bracket.	2.1: Position the photometer on the pre-mounted mounting bracket and pay attention to the two positioning pins (circles).  2.2: Screw the photometer onto the mounting bracket.
3.	Remove the optics unit of the photometer.	→ Section 4.4
4.	Align the photometer.	4.1: Loosen the fixing nut (X) of the support (Y). 

	WORKSTEP	PROCEDURE
		<p>4.2: By turning the support (Y, picture above) adjust the instrument using a spirit level until it is vertical. Use the measuring cell housing as a support surface for the spirit level.</p> 
		<p>4.3: Tighten the fixing nut (X) of the support (Y).</p>

4.3. Mounting the docking station

Mount the docking station close to the photometer using two fastening screws.

4.4. Remove optics unit, place on docking station

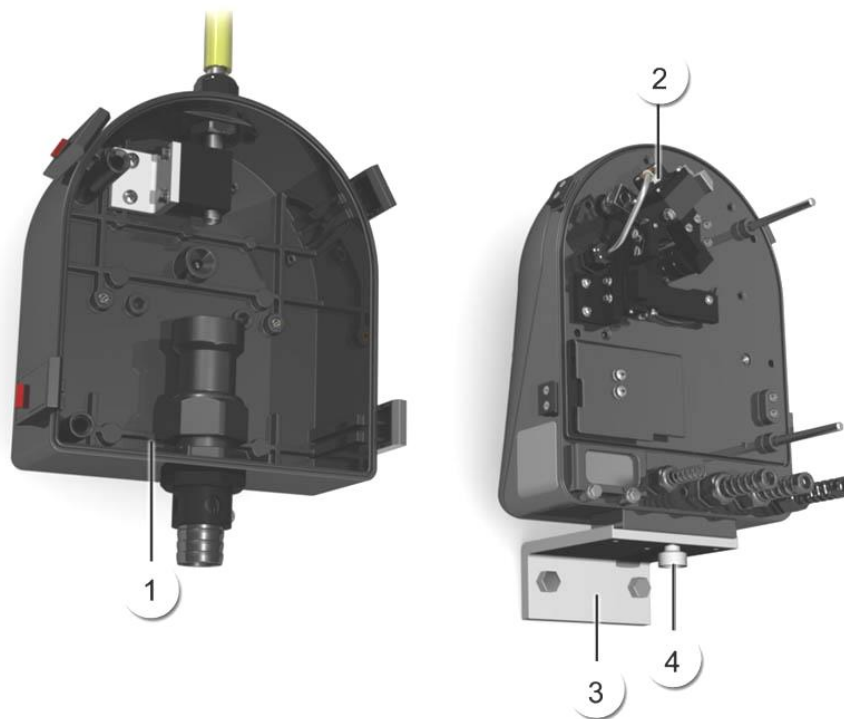


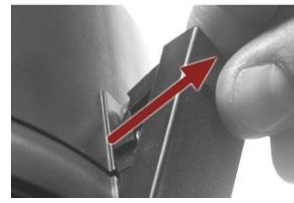


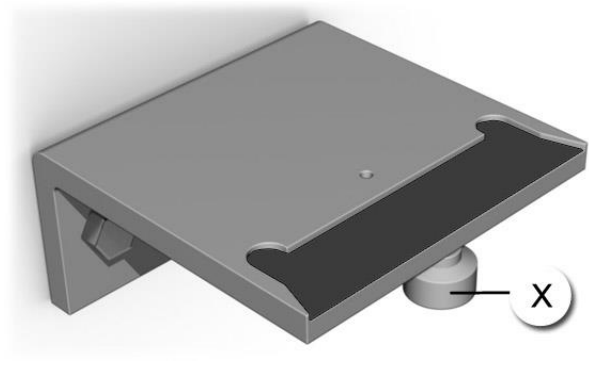


Figure 3: Fasten optics unit to docking station:

①	Measuring cell component	②	Optics unit
③	Docking station → Section 4.3	④	Knurled screw for fastening the optics unit



	WORKSTEP	PROCEDURE
1.	<p>Loosen mounting clip and remove optics unit</p> 	<p>1.1: Use a little force to push the release lock (red arrow) in the direction of the arrow (picture 1) and at the same time lift the mounting clip (picture 2).</p> <div style="display: flex; justify-content: space-around;"> <div> <p>Picture 1</p>  </div> <div> <p>Picture 2</p>  </div> </div> <p>1.2: Press mounting clip in the direction of the arrow over the lock plate of the optics unit (picture 3) and then open (picture 4).</p> <div style="display: flex; justify-content: space-around;"> <div> <p>Picture 3</p>  </div> <div> <p>Picture 4</p>  </div> </div> <p>1.3: Remove optics unit from the measuring cell unit.</p>
2.	<p>Mount optics unit to docking station.</p>	<p>2.1: Position optics unit on the docking station. Pay attention to the milled area (dark colored area).</p>  <p>2.2: Fasten optics unit with knurled screw (X, picture above) to the docking station.</p>

4.5. Mounting the sample connections

4.5.1. Important information when mounting the sample connections

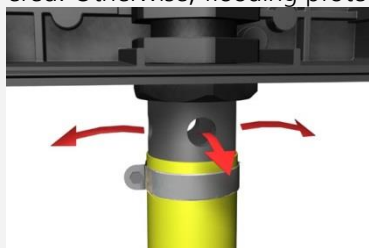


CAUTION!

Flooding of the instrument due to incorrect connection of sample connections.

Note the following when connecting the hoses:

- The drain hose must be fastened so that the flooding protection holes are not covered. Otherwise, flooding protection is not guaranteed (see the following picture).



- All hose connections have to be secured with hose clamps. The connections should be checked about 2 weeks after installation to ensure that no air can be pulled in.

In order to ensure an accurate measurement of the turbidity, observe the following points when mounting the sample connections:

- A continuous water flow rate as specified in the technical data is required.
→ Section 2.4
- Large drops in the pressure must not occur; if that happens, air bubbles may occur.
- A regulator valve must be used to adjust the water flow rate.
- The use of transparent hoses is not permitted.
- When mounting the inlet hose, ensure it does not exert any force on the inlet tube. Use the supplied hose holder as strain relief. → Mounting drawings in Section 15

4.5.2. Installation of the optional flow meter

SIGRIST recommends installing a simple flow meter to regularly check the sample flow.

→ Sections 2.1 and 2.3

Note the following points when mounting the flow meter:

- The flow meter is to be fastened before the sample inlet of the photometer.
- If the required water flow rate is exceeded or undershot, measuring errors may occur. Installing a flow meter with limit switch helps to avoid this kind of problems.

4.5.3. Attaching the sample connections to the photometer

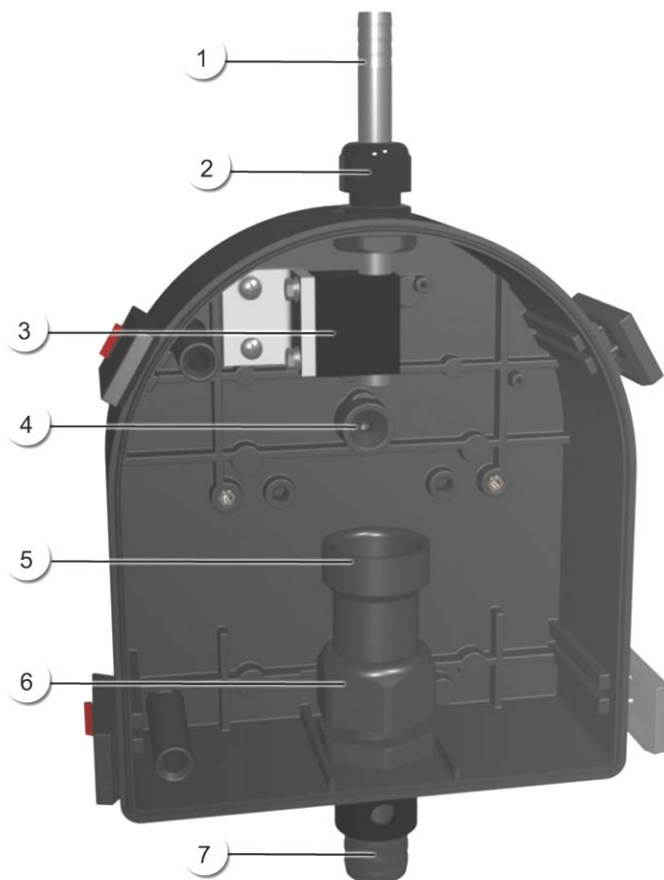

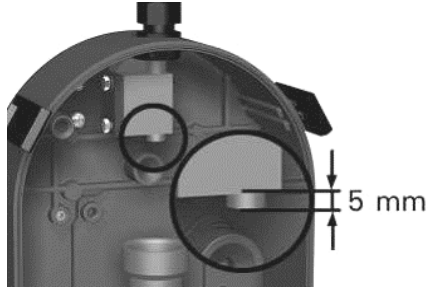


Figure 4: Overview of AquaScat 2 measuring cell unit

①	Inlet tube	②	Inlet tube conduit gland
③	Holder for inlet tube	④	Light trap
⑤	Outlet tundish	⑥	Drain tube conduit gland
⑦	Drain tube with flood protection		



	WORKSTEP	PROCEDURE
1.	Remove the optics unit of the photometer and fasten onto the docking station.	→ Section 4.4
2.	Fasten inlet hose on the inlet tube (Figure 4, 1) of the instrument.	

	WORKSTEP	PROCEDURE
3.	<p>Fasten drain hose onto the photometer.</p> <div style="border: 1px solid black; padding: 5px; background-color: #f0f0f0;"> <p> Flooding of the instrument due to improper mounting of the drain hose: The drain hose must be fastened so that the flooding protection holes on the side are not covered (flood protection). → Section 4.5.1</p> </div>	<p>Fasten the drain hose on the drain tube (Figure 4, 7) of the instrument.</p> <p>When doing so, press the outlet tundish (Figure 4, 5) downward with your hand so that the drain tube (Figure 4, 7) is not pressed into the measuring cell space. This can interfere with the operation of the automatic calibration system so care is required.</p>
4.	<p>Check the position of the inlet tube and outlet tundish.</p>	<p>4.1: Check to ensure the inlet tube (Figure 4, 1) projects 5 mm out of the holder.</p> <div style="text-align: center;">  </div> <p>4.2: Check whether the outlet tundish (Figure 4, 5) contacts the conduit gland (Figure 4, 6).</p>
5.	<p>Place the optics unit again on the measuring cell unit and lock with the four mounting clips.</p>	

4.6. Installation of the optional accessory parts

4.6.1. Information about installing the optional accessory parts



Note the following when connecting the optional accessory parts:

- All hose connections have to be secured with hose clamps. The integrity of the connections should be checked about 2 weeks after installation to ensure that no air can be pulled in.
- The venting hose of the deaeration tube must be neither shortened nor bent.
- Make sure that the water can drain from the deaeration tube; the venting hose should point downward as shown in Figure 1.
- A minimum flow of 1 l/min. must be guaranteed on the overflow of the level control.
- The dimensions of the drawings below must be adhered to (course and radii of the hoses, spacing position of the deaeration tube to the photometer etc.).

4.6.2. Mounting the deaeration tube

Mounting the complete deaeration tube is carried out in accordance with drawings **AQUASCAT/ER/1-MB** and **AQUASCAT/ER-MB**.

4.6.3. Mounting the level control

Mounting the level control is carried out in accordance with drawings **AQUASCAT/NR-MB** and **NR2_AS-MB**.

4.6.4. Mounting with deaeration tube and level control

Mounting the deaeration tube and level control is carried out in accordance with drawings **AQUASCAT/ER/2-MB**, **AQUASCAT/ER-MB** and **NR2_AS-MB**.

5. Electrical installation

5.1. Safety pointers for the installation

**Life threatening voltage inside the instrument:**

Connecting electrical lines is extremely dangerous. Parts of the system can also be damaged. Local regulations must be observed at all times for electrical installations.

Further, the following basic principles must be observed:

- It is imperative that the protective conductor is connected.
- Because the instrument has no main switch, a suitable disconnection device (switch, plug) should be installed near the service voltage. It must be designated and easily accessible.
- The instrument box must not be charged with voltage until the installation is completed and the front cover is mounted.
- On instruments with an optional mains device, a back-up fuse with a max. tripping current of 16 A must be present. The cables must be able to withstand this load.
- If faults cannot be remedied, the unit must be put out of operation and protected against inadvertent operation.



The installation and commissioning of the Modbus RTU and Profibus DP field bus interfaces are described in the Reference Manual.

5.2. Installation procedure

You can access the terminals by removing the front cover. Proceed as follows:



	WORKSTEP	PROCEDURE
1.	Loosen the five screws on the front cover with a 7 mm key and remove the front cover.	
2.	Establish the electrical connections as described in Section 5.3.	
3.	<p>When the installation is completed, assemble the photometer in the reverse order. In doing so, carefully mount the front cover and fasten with the five screws.</p> <p>⚠ Damage to the threaded inserts in the housing due to excessive tightening of the front cover screws:</p> <p>Use a hex key without a T-handle to tighten the screws of the front cover finger-tight (approx. tightening torque 1 Nm).</p>	<p>7 mm hex key</p>



The use of operating signals is described in the Reference Manual. → Section 2

5.3. Connecting the customer connections



Life threatening voltage inside the instrument:
The photometer has no mains switch; hence the instrument is charged with voltage immediately after being connected.



The cable lengths must be selected keeping in mind that the instrument is able to be mounted on the docking station.

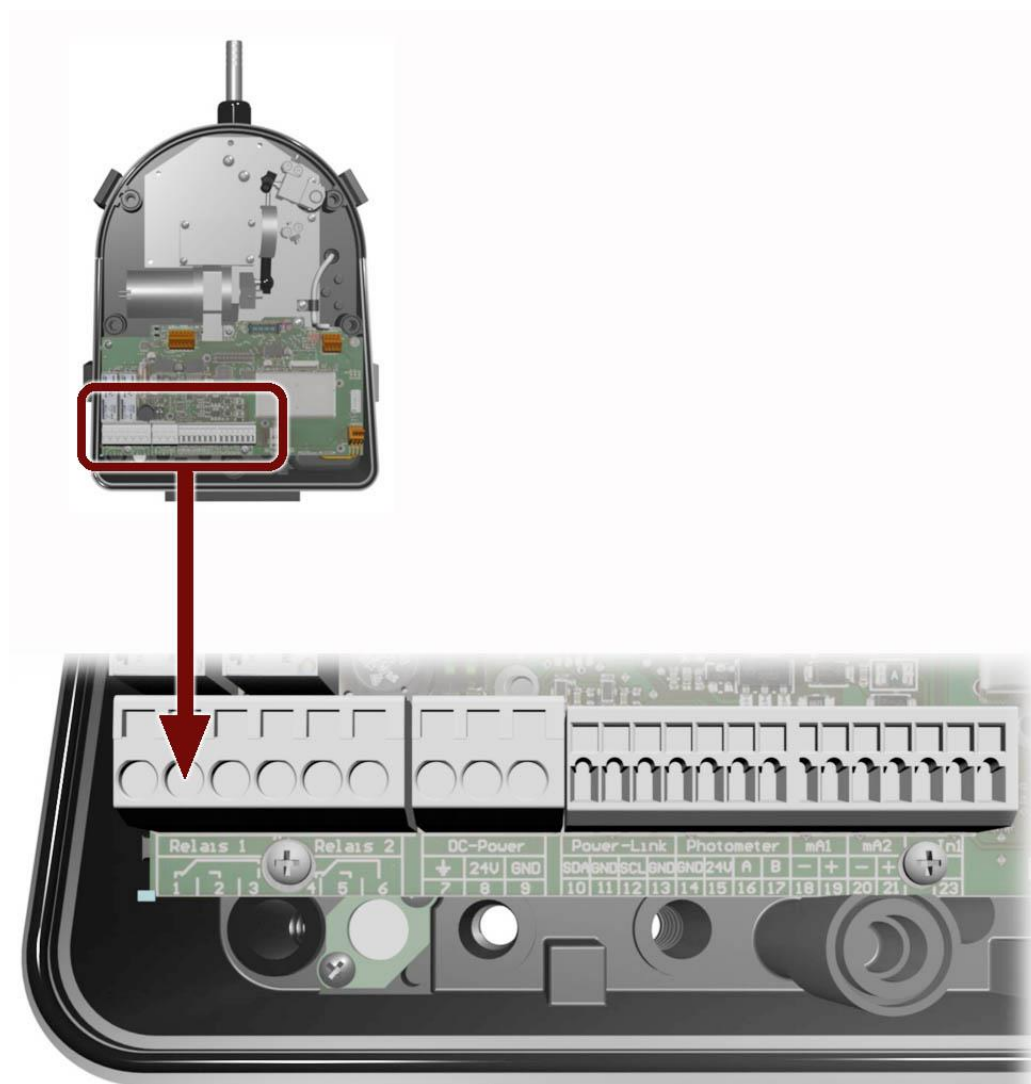


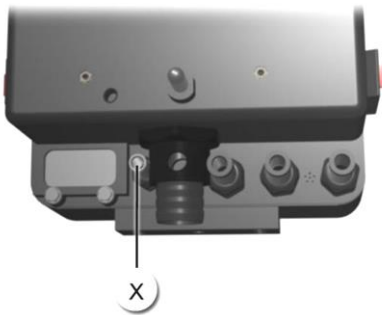
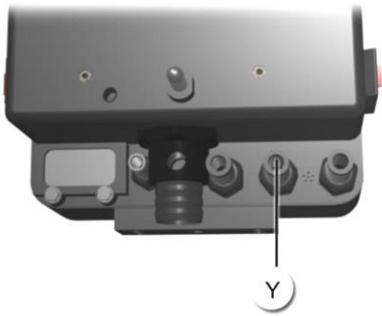
Figure 5: Position of the customer terminals



The three large screwed cable glands are designed for cable with an outer diameter of 4-8 mm. The small screwed cable gland is for an outer diameter of 3-6.5 mm.

Establish the electrical connections in the following sequence:



	TERMINALS	MEANING	REMARKS
1.	1 – 2 – 3	Output 1 (relay contact 1)	The relay outputs can be freely configured. → Section 7.11
2.	4 – 5 – 6	Output 2 (relay contact 2)	
3.	18, 19	Reading output 1	
4.	20, 21	Reading output 2	
5.	22, 23	Connection for optional flow rate monitoring	Use small screwed cable gland (X).  → Section 7.10 → Reference Manual
6.	7 – 8 – 9	Power supply 18-30 VDC	Use screwed cable gland (Y) in the middle. 

5.4. Connection of the optional power supply



Life threatening voltage inside the instrument:
 Connecting electrical lines can be extremely dangerous. Local regulations must be observed at all times for electrical installations.

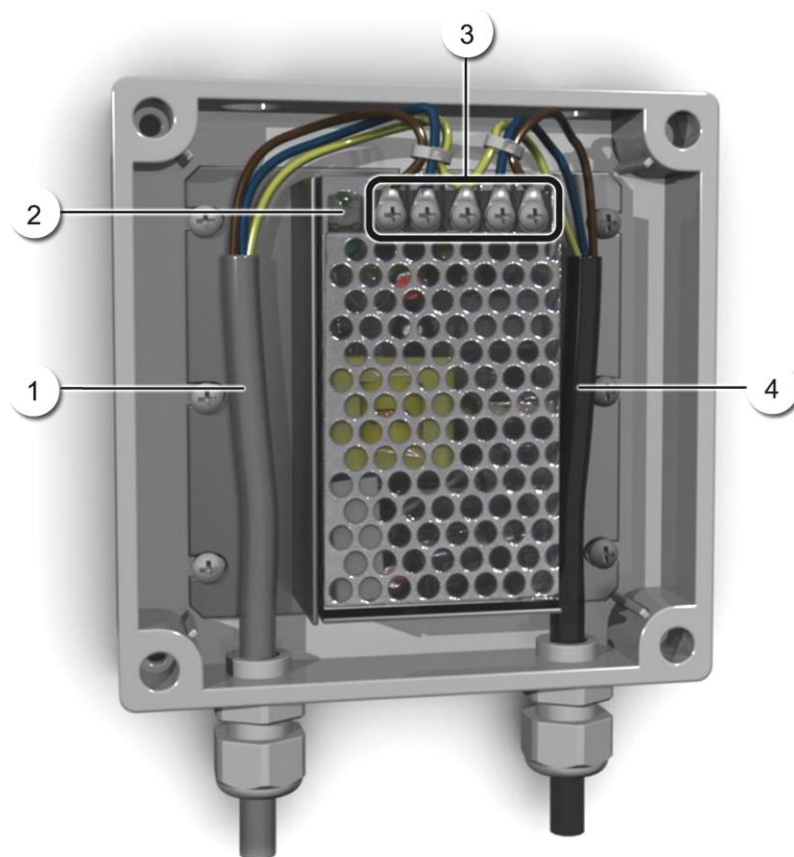


Figure 6: Optional power supply open

①	Cable to photometer (24 VDC)	②	Indicator lamp
③	Terminal screws	④	Mains cable (100 .. 240 VAC)



Life threatening voltage due to released voltage-carrying wires:
 The wires of the supply connection must be bound with cable ties so that if one wire becomes loose no other parts can be charged with voltage (Figure 6).



Cable with an outer diameter of 4-8 mm must be used.

Connecting the
mains device:

TERMINAL DESIGNATION IN THE POWER SUPPLY	CABLE COLOR	TERMINAL DESIGNATION IN THE PHOTOMETER	FUNCTION
+24V	brown	8: 24 V	24 VDC
RTN	blue	9: GND	Ground
Protective ground	yellow-green	7: Ground connection	Ground connection
Protective ground			Mains protective ground
N			Mains neutral conductor
L			Mains phase


6. Initial start-up



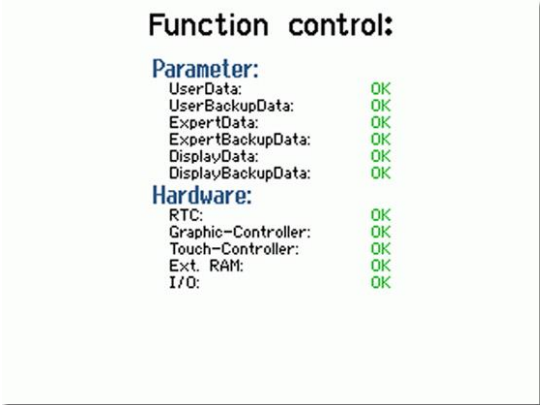



The initial start-up with the web user interface via the Ethernet interface is described in the Reference Manual.

Proceed with the initial start-up in accordance with the following table. If malfunctions occur, please refer to Section 9.



	WORKSTEP	PROCEDURE
1.	Remove the optics unit of the photometer and fasten onto the docking station.	→ Section 4.4
2.	Check the sampling system for the correct sample feed and then open the sample feeding.	→ Section 4.5 <div style="border: 1px solid black; padding: 5px;">  Flooding of the instrument due to improper mounting of the drain hose: The drain hose must be fastened so that the flooding protection holes on the side are not covered (flood protection). </div>
3.	Check the flow rate and ensure that the light trap and aperture are clean. <div style="border: 1px solid black; padding: 2px; display: inline-block;"> i </div> There must be no pressure surge when turning the water off and on!	→ Section 8.2
4.	Make sure that the photometer is correctly mounted and that the electrical connections are correctly connected.	→ Section 4.2

	WORKSTEP	PROCEDURE
5.	Replace optics unit on photometer.	<p>Replace the optics back on the measuring cell unit and lock with the four mounting clips. Pay attention to the guide pins (see picture).</p> 
6.	Establish service voltage to the photometer.	<p>6.1: Welcome screen appears.</p>  <p>6.2: The instrument carries out an internal functional check.</p> 

	WORKSTEP	PROCEDURE
		6.3: Normal operation begins. 
7.	Set language.	→ Section 7.7
8.	Set current outputs.	→ Section 7.8
9.	Set limits.	→ Section 7.9
10.	Configure flow meter if present.	→ Section 7.10
11.	Set outputs 1 & 2 (relay outputs).	→ Section 7.11
12.	Setting the date and time.	→ Section 7.12
13.	Enter access code.	If no access code is required, you can skip this step. → Section 7.13
14.	Copy the configured data to the microSD card.	→ Section 7.14



If malfunctions occur, please refer to Section 9.

7. Operation

7.1. Operation basics



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



Damage to the touchscreen caused by incorrect handling:

- Only touch the touch screen only with your fingers and not with sharp objects.
- Manipulations on the touchscreen should be performed moderately but with a certain pressure.
- Do not use chemicals or solvents to clean the touch screen.



The AquaScat 2 has a touch screen. It is operated by touching with your fingers. The navigation elements change color when touched.

7.2. Control components in normal operation



Figure 7: Control components in normal operation

①	Menu button Available menu structure → Section 7.2.1	②	Valu button Numerical representation of the measuring value → Section 7.2.4
③	Info button General overview of the settings and configurations of the instrument → Section 7.2.5	④	Diag button Graphic representation of the measuring value → Section 7.2.2

7.2.1. Menu button

You reach the menu structure by pressing the **Menu** button and entering the access code. Now the instrument is in service operation. Operator prompting in service operation is described in Section 7.6.

7.2.2. Diag button

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

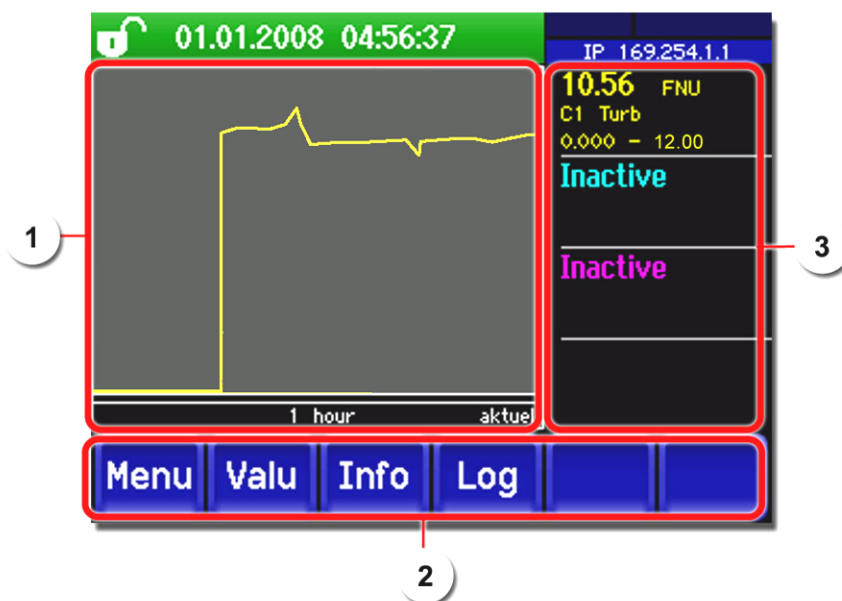


Figure 8: Graphic representation of the measuring values

<p>① Graphic representation of the measuring values</p> <p>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 reading (position 3).</p>	<p>② Main menu buttons → Section 7.2</p> <p>1 The logger functions (Log button) are described in Section 7.2.3.</p>
<p>③ Measuring channel:</p> <p>Numerical representation of the measuring channel.</p> <ul style="list-style-type: none"> ■ Current measured measuring value (e.g. 10.56 FNU) ■ Measuring channel with name (e.g. C1 Turb) ■ Scaling of the Y-axis (e.g. 0.000 – 12.00) 	

7.2.3. 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 is in the graphic screen only after the **Diag** button has been pressed. When the **Log** button is pressed, the following screen appears:

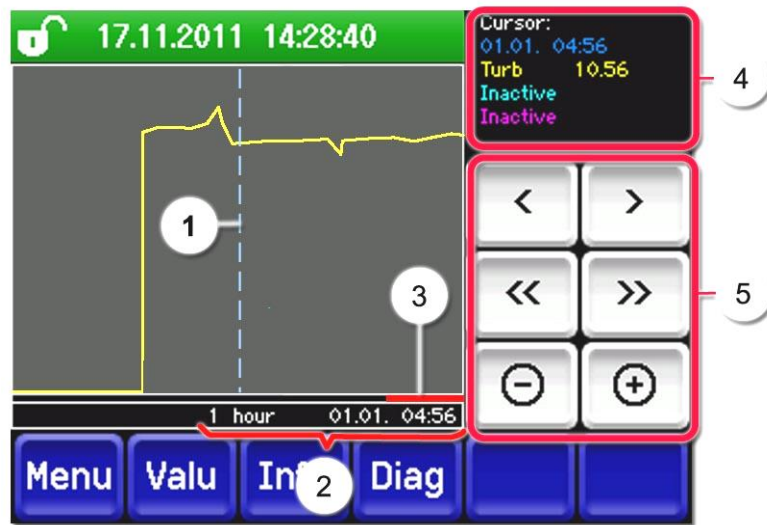


Figure 9: Functions of the Log display

<p>① 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.</p>	<p>② Represented time period The following time ranges can be set: 3 min. / 15 min. / 1 hr. / 3 hr. / 9 hr. / 1 day / 3 days / 10 days / 32 days</p>
<p>③ Indicates how much of the total time period is currently represented.</p>	<p>④ Measuring value which was measured at the cursor position.</p>
<p>⑤ </>: Moves the cursor position. The cursor moves faster when these buttons are held down longer. <</>>: Jumps forward or backward by the time period set in point 2. -/+ : Increases (+) or decreases (-) the screen section around the cursor position.</p>	



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

7.2.4. Valu button

By touching the **Valu** field, a numerical measuring value appears on the display.
 → Section 7.4

7.2.5. Info button

When you press the **Info** button, a general overview of the settings and configurations of the photometer appears.





Figure 10: Info menu

<p>① Information about the current outputs, standard I1 .. I2 X: Source of the current output Y: Measuring range of the current output</p>	<p>② Status of the inputs → Reference Manual</p>
<p>③ Status of the outputs → Reference Manual</p>	<p>④ Main menu buttons</p>

7.3. Activating and deactivating the screen lock



<p>1. Press the lock icon top left.</p>	<p>2. Within one second press the button bottom right.</p>				
	 <p>Depending on the initial state, the lock icon changes as follows:</p> <table border="1"> <tr> <td> </td> <td> <p>Display unlocked</p> </td> </tr> <tr> <td> </td> <td> <p>Display locked</p> </td> </tr> </table>		<p>Display unlocked</p>		<p>Display locked</p>
	<p>Display unlocked</p>				
	<p>Display locked</p>				

7.4. Display in normal operation

After switching on the instrument, it shows normal operation. The real-time measuring values are continuously displayed.



Figure 11: Displays in normal operation

<p>① Measuring value</p> <p>i For values which are greater than the maximum measuring range, no measuring value is displayed; instead, **** is displayed.</p>	<p>② Status line</p> <p>i In normal operation the status line is green and shows the date and time.</p>
<p>③ Interface information</p> <p>Top left: Logger status Top right: Modbus or Profibus status Below: Ethernet IP status The following messages are possible:</p> <ul style="list-style-type: none"> ■ IP not connected (cable not connected) ■ IP DHCP running... ■ IP 169.254.1.1 (example address) <p>Color coding: Black: Not active / not present Blue: Activated, in quiescent mode Green: Active Red: Fault</p>	<p>④ Channel name with unit</p>

7.5. Switching to service operation

Definition
Service mode

The photometer is configured in the service mode. The measuring procedure is suspended and the main menus appear on the display.

Proceed as follows for service operation:



	MANIPULATION	SUPPLEMENTARY INFORMATION
1.	Press the Menu button.	
2.	Set the access code and confirm with OK .	Factory setting is 0 .
3.	The main menus appear.	Now you are 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 will be deactivated.
- If an output for service is programmed, it is activated.
- Error messages are suppressed.

* This doesn't apply when the **Current outputs\General\For service** parameter is set to **Measure**.



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

7.6. Control components in service operation

7.6.1. Entry element in service operation

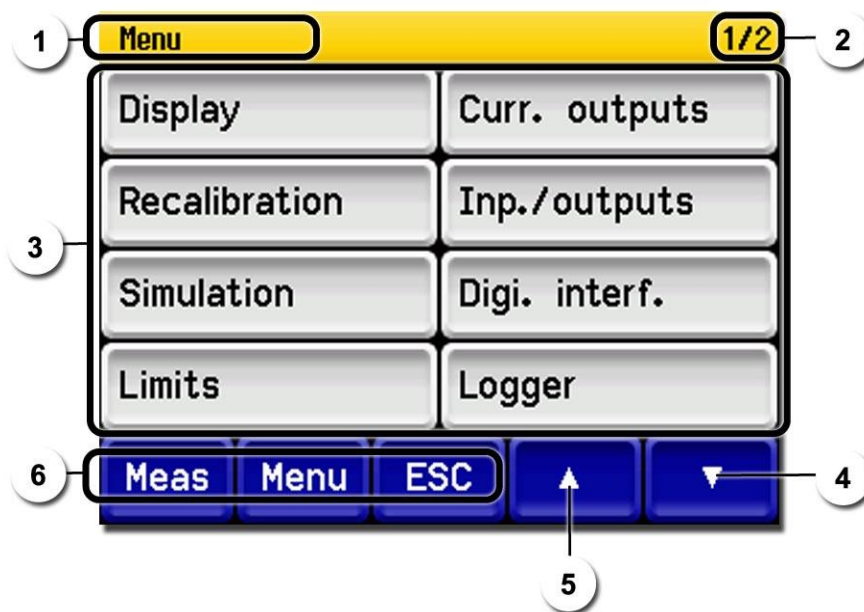


Figure 12: Menu structure

①	Path specification	②	Page number / total number of pages
③	Main menus Instrument-specific menus of the photometer.	④	Next page
⑤	Go to previous page	⑥	Meas button: Touching this button switches the instrument to normal operation. Menu button: Touching this button displays the top-most level in the menu hierarchy. ESC button: Touching this button goes back one level in the menu hierarchy.

7.6.2. Numerical entry

The following screen is for entering numbers and data:

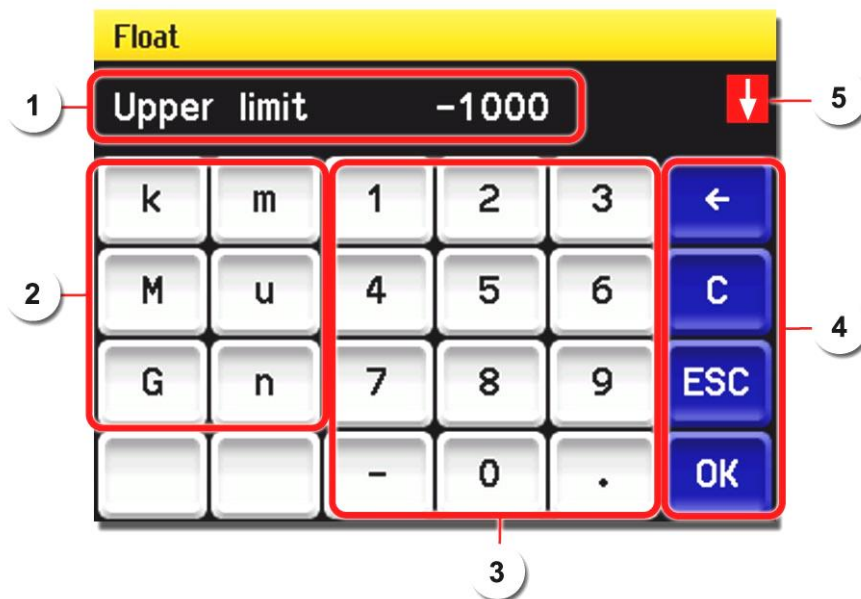


Figure 13: Numerical entry

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

7.6.3. Single or multiple selection with scroll bar

Single selection

The single selection is identifiable on the **ESC** button below right:

The currently selected value 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

Multiple selection

The multiple selection is identifiable on 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 **OK** to save the configuration and complete the entry.

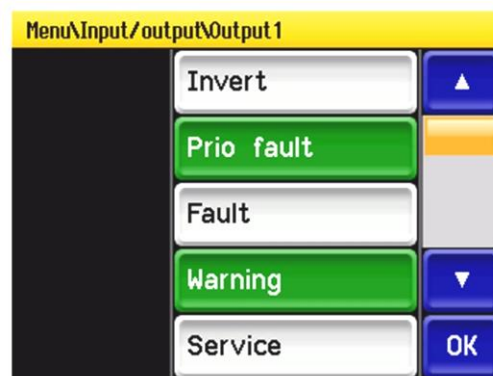


Figure 15: Example of multiple selection

7.7. Setting the operating language

The following describes how to set the language of the menus and messages:



	MANIPULATION	SUPPLEMENTARY INFORMATION
1.	Press the Menu button.	
2.	Set the access code and confirm with OK .	Factory setting is 0 .
3.	Use the down arrow key to select the second page.	
4.	Press the Configuration button to access language selection.	
5.	Press language field (circle). The list of all languages appears (factory setting is English).	
6.	Apply the desired language by pressing the corresponding field. Press the ESC to cancel.	
7.	Press the Meas button.	Instrument again in normal operation.

7.8. Setting the current outputs



	MANIPULATION	SUPPLEMENTARY INFORMATION
1.	Press the Menu button.	
2.	Set the access code and confirm with OK .	Factory setting is 0 .
3.	Press the Curr. outputs button.	
4.	Select current output 1 or 2.	
5.	Select C1 Turb source.	For Inactive the current output is switched off.
6.	Select range.	MR1 .. MR8 (see table below for range definition) In 1, In 2, Auto 1, Auto 2 → Reference Manual
7.	Press the Meas button.	Instrument again in normal operation.


MEASURING RANGE NO.	MEASURING RANGE STANDARD WTM/WTM A	MEASURING RANGE STANDARD HT	MEASURING RANGE (CUSTOMER SPECIFIC)
1	0 .. 500	0 .. 4000	
2	0 .. 100	0 .. 2000	
3	0 .. 30.0	0 .. 1000	
4	0 .. 10.0	0 .. 500	
5	0 .. 3.00	0 .. 200	
6	0 .. 1.00	0 .. 100	
7	0 .. 0.30	0 .. 30	
8	0 .. 0.10	0 .. 10	

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

7.9. Setting the limits

So that the limits are not only displayed but also the outputs are switched, they have to be configured accordingly. → Section 7.10



	MANIPULATION	SUPPLEMENTARY INFORMATION
1.	Press the Menu button.	
2.	Set the access code and confirm with OK .	Factory setting is 0 .
3.	Press the Limits button.	
4.	Select limit 1 or 2.	
5.	Select source.	<ul style="list-style-type: none"> ■ Turb ■ Analog 1 ■ Analog 2
6.	Define mode.	The following selection is available: <ul style="list-style-type: none"> ■ Off (limit monitor of this channel is deactivated) ■ Exceeded (limit active when the set threshold value is exceeded) ■ Undershot. (limit active when the set threshold value is undershot)
7.	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.	
8.	Press the Meas button.	Instrument again in normal operation.

Upper and lower threshold value of a limit.

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

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

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

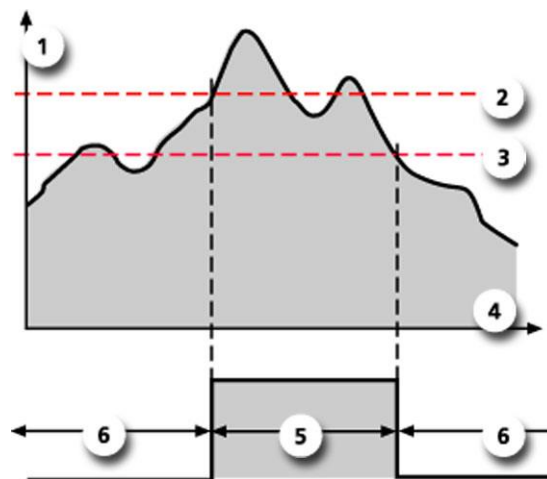


Figure 16: Diagram of limit exceeding

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

Reading if limit exceeded or undershot

LIMIT

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

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



If the message **Limit** appears, the status display changes to **white** and the numbers of the limit channels where a limit has been exceeded or undershot are shown with the corresponding channel numbers in **red**. Inactive limits are indicated by the **_** icon.

7.10. Configuring the flow meter with limit switch

The optional flow meter with limit switch is connected to terminals 22, 23 (In1). Proceed as follows to activate monitoring:



	MANIPULATION	SUPPLEMENTARY INFORMATION
1.	Press the Menu button.	
2.	Set the access code and confirm with OK .	Factory setting is 0 .
3.	Press the Inp./outputs button.	
4.	Press the Inputs button.	
5.	Select Input 1 .	
6.	Activate input functions External and Invert .	
7.	Press the OK button.	
8.	Press the General button.	
9.	Under Name ext.in you can enter the text of the error message with a maximum of seven characters (e.g. FLOWRAT).	Prio.ext.in should be on Fault .
10.	Press the Meas button.	Instrument again in normal operation.

7.11. Setting the outputs (relay outputs 1 or 2)

Outputs 1/2 are located on the base print of the customer connection terminals and are designated as relays 1/2. → Section 5.3



	MANIPULATION	SUPPLEMENTARY INFORMATION
1.	Press the Menu button.	
2.	Set the access code and confirm with OK .	Factory setting is 0 .
3.	Press the Inp./outputs button.	
4.	Press the Outputs button.	
5.	Select output 1 or 2 button.	

	MANIPULATION	SUPPLEMENTARY INFORMATION
6.	Activate output functions (multiple selection possible)	<p>Activated output functions are highlighted green.</p> <ul style="list-style-type: none"> ■ Invert: inverts the outputs ■ Prio fault ■ Fault ■ Warning ■ Service ■ Adjustment ■ Limit 1.2 <p>The functions marked with MR refer to automatic measuring range switching and are described in the Reference Manual.</p>
7.	Press the Meas button.	Instrument again in normal operation.

7.12. Setting the date and time



	MANIPULATION	SUPPLEMENTARY INFORMATION
1.	Press the Menu button.	
2.	Set the access code and confirm with OK .	Factory setting is 0 .
3.	Use the down arrow key to select the second page.	
4.	Press the Configuration button.	
5.	Press the down arrow key.	
6.	To enter the time, press the currently displayed time at the Time menu item and enter the new time with the number pad. Confirm entry with OK .	The time must be entered in the format hh:mm .
7.	To enter the date, press the currently displayed date at the Date menu item and enter the new date with the number pad. Confirm entry with OK .	The date must be entered in the format DD.MM.YYYY .
8.	Press the Meas button.	Instrument again in normal operation.

7.13. Setting or changing the access code

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



	MANIPULATION	SUPPLEMENTARY INFORMATION
1.	Press the Menu button.	
2.	Set the access code and confirm with OK .	Factory setting is 0 .
3.	Use the down arrow key to select the second page.	
4.	Press the Configuration button.	
5.	Press button right at Access code description text.	
6.	Enter the access code and confirm with OK .	1 .. max. 6 digits
7.	Press the Meas button.	Instrument again in normal operation.



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

Enter your access code:

7.14. Back up configured data

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



	MANIPULATION	SUPPLEMENTARY INFORMATION
1.	Press the Menu button.	
2.	Set the access code and confirm with OK .	Factory setting is 0 .
3.	Press the down arrow key.	
4.	Press the System info. button.	
5.	In the User -> SD and Expert -> SD sub-menus, 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 normal operation.

8. Servicing



It is absolutely necessary to observe the following instructions when performing servicing duties:

- Observe the safety pointers before performing servicing duties.
- The instrument must never be operated when the housing is removed.
- The instrument may be opened only by trained personnel.
- Perform the work steps in exactly in the order instructed.
- When replacing parts, use only genuine original parts listed in the Spare Parts List.
→ Section 14
- Enter the work in the servicing log. → Section 15.1
- When returning components, be sure to follow the instructions in the Instruction Manual regarding packaging and transport.

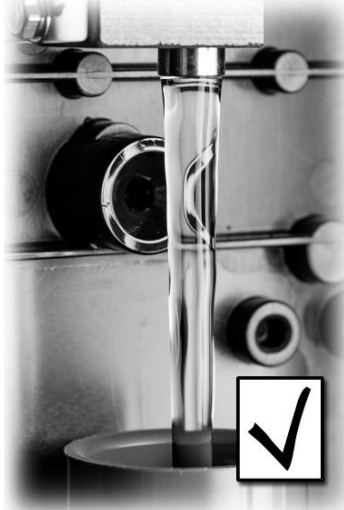

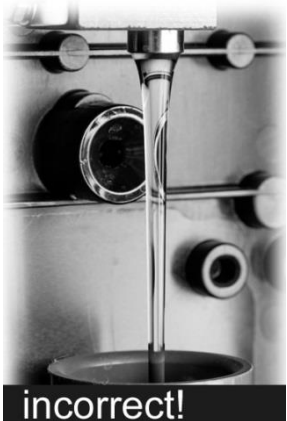


8.1. Servicing schedule


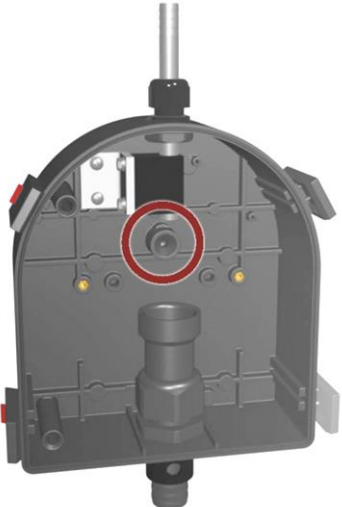

WHEN	WHO	WHAT	PURPOSE
Monthly or as needed	Operator	Check flow rate and cleanliness. → Section 8.2	Obligatory measure for maintaining measuring accuracy.
Every three months or as needed	Operator	Only for WTM / HT Manual adjustment. → Section 8.3	Obligatory measure for maintaining measuring accuracy.
		Only for WTM A: Initiate automatic adjustment. → Section 8.4	
		Clean parts which come into contact with water. → Section 8.5	
		Clean the optional accessory parts (e.g. deaeration tube). → Section 8.6	
Annually or as needed	Operator	Clean the optics. → Section 8.7	Obligatory measure for maintaining functional efficiency.
		Change air filter. → Section 8.8	
Every 10 years or as needed	Operator	Change battery. → Section 8.9	Obligatory measure for maintaining functional efficiency.


Table 1: Servicing schedule

8.2. Check flow rate and cleanliness



	WORKSTEP	PROCEDURE
1.	Remove the optics unit of the photometer and fasten onto the docking station.	→ Section 4.4
2.	Check flow rate of the sample according to the technical data → Section 2.4.	If the flow rate is incorrect, please refer to Section 8.5.
3.	<p>Check the water jet.</p>  <p>Normal jet without bubbles, only reflections (e.g. of the shutter) are visible in the water jet.</p> <p>i Small air bubbles are difficult or impossible to see and may occur in the normal jet!</p>	<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;">  <p>incorrect! Disrupted water jet after water stop</p> <p>i This can occur if air is drawn into the hose at the AquaScat 2 input after a water stop followed by the instrument being operated again.</p> </div> <div style="width: 48%;">  <p>incorrect! Too little water</p> </div> </div> <div style="display: flex; justify-content: space-between; margin-top: 20px;"> <div style="width: 48%;">  <p>incorrect! Too much water</p> </div> <div style="width: 48%;">  <p>incorrect! With big air bubbles</p> </div> </div>

	WORKSTEP	PROCEDURE
4.	<p>Check whether water continually flows at the overflow (X) and venting hose (Y).</p> <p>Perform this step only if a de-aeration tube with level control is present.</p>	 <p>The diagram shows a vertical metal rod assembly. At the top, there is a horizontal overflow arm labeled 'X'. A blue tube runs down the side of the rod, and a yellow tube with a black float valve is connected to the bottom of the rod, labeled 'Y'. A black rectangular device is connected to the yellow tube.</p>
5.	<p>Check light trap in the measuring cell for any residual water droplets (circle).</p> <p>Remove any residuals with a cloth.</p>	 <p>The image shows the internal components of the measuring cell. A red circle highlights a central lens or light trap area. Various mechanical parts, including a central tube and side components, are visible.</p>
6.	<p>Check aperture against residual water (circle).</p> <p>Remove any residuals with a cloth.</p>	 <p>The image shows the external view of the measuring cell. A red circle highlights a circular aperture on the front panel. The device has a grey, rounded rectangular shape with various ports and components on its surface.</p>

	WORKSTEP	PROCEDURE
7.	Replace optics unit back onto the photometer.	Replace the optics unit back onto the measuring cell unit and lock with the four mounting clips. Pay attention to the guide pins (see picture).
		



8.2.1. 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 $\pm 1\%$ at 2.5 l/min to $\pm 3\%$ 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 $\pm 3\%$.
- 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.

8.3. Manual adjustment



	WORKSTEP	PROCEDURE
1.	Interrupt the sample supply to the photometer.	
2.	Loosen conduit gland (X) and remove the inlet tube (Y).	
3.	Remove the optics unit of the photometer and fasten onto the docking station.	→ Section 4.4
4.	Install checking unit.	<p>4.1: Inspect the checking unit to ensure it is clean and dry.</p> <p>4.2: Install the checking unit and fasten with the knurled screws.</p> <p>Make sure that the pins enter the positioning holes (circles).</p> 

	WORKSTEP	PROCEDURE
5.	Re-mount optics unit on the photometer.	<p>Replace the optics unit back on the measuring cell unit and lock with the four mounting clips. Pay attention to the guide pins (see picture).</p> 
6.	Switch photometer to service operation.	→ Section 7.5
7.	Prepare adjustment.	7.1: Press the Recalibration and then the C1 Turb button.
		7.2: Check whether the saved nominal value matches the information on the checking unit.

	WORKSTEP	PROCEDURE
8.	Perform adjustment.	<p>Press the initiate button and wait.</p> <p>If the adjustment was successful, it is confirmed with Adjustment OK. This completes the adjustment.</p> <p>If the adjustment was not successful, it is indicated with Adjustment fault. In this case, check the points in the following list one after the other:</p> <ul style="list-style-type: none"> ■ Cleanliness of the checking unit. ■ Correct checking unit used. (Compare serial No) ■ Nominal value does not correspond to the value of the checking unit. ■ Soiled optics in the instrument. <p>In this case check the cleanliness of the optics as described in Section 8.7 and then repeat the procedure.</p> <p> If the check could not be successfully completed, contact your country representative. → Section 10</p>
9.	Remove checking unit.	
10.	Mount the inlet tube as described in Section 8.5, point 7, and assemble the instrument in the reverse order.	
11.	The instrument can now be operated again.	



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

8.4. Automatic adjustment for 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 timed actuation in the **Adjust interval** menu. This is described in the Reference Manual.

The following describes the manual initiation of the automatic adjustment:



	MANIPULATION	SUPPLEMENTARY INFORMATION
1.	Switch photometer to service operation.	→ Section 7.5
2.	Press the Recalibration and then the C1 Turb button.	
3.	<p>Press the initiate button. This starts the adjustment. If the adjustment was successful, it is confirmed with Adjustment OK. This completes the adjustment.</p> <p>If the calibration check was not successful, it is indicated with Adjustment fault. The following points can be checked:</p> <ul style="list-style-type: none"> ■ Check the cleanliness of the optics as described in Section 8.7. ■ Check whether the outlet cone is correctly mounted according to Section 8.5, point 6. <p>After performing the checks above, repeat the adjustment.</p> <p> If the adjustment could not be successfully completed, contact your country representative. → Section 10</p>	

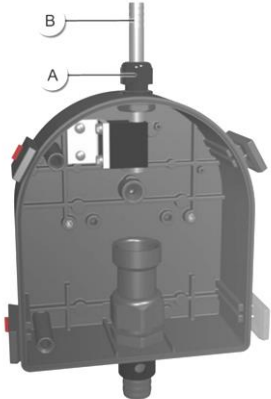
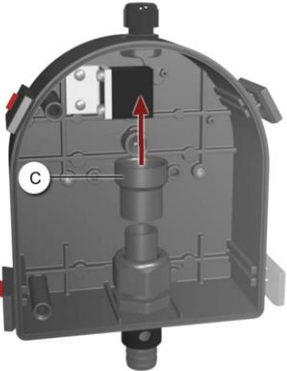


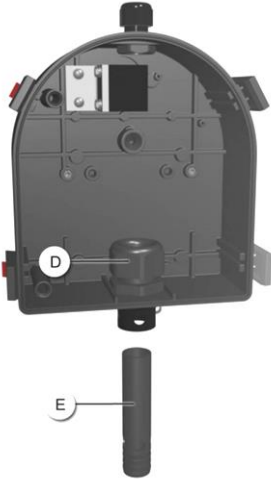
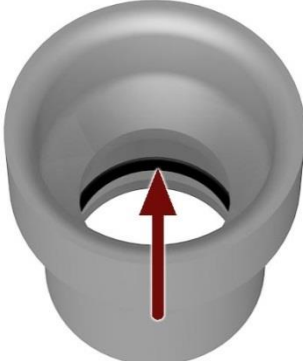
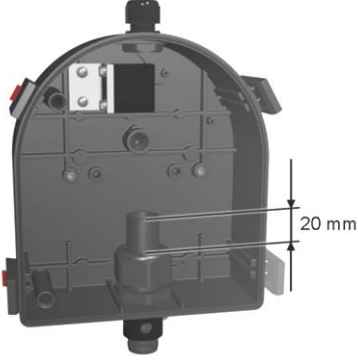
A new recalibration factor is determined during the adjustment. The deviation from the original state is displayed under **Curr. corr.**.


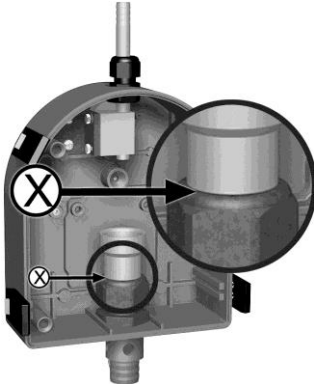
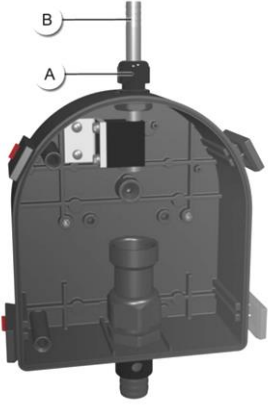
8.5. Clean parts which come into contact with water

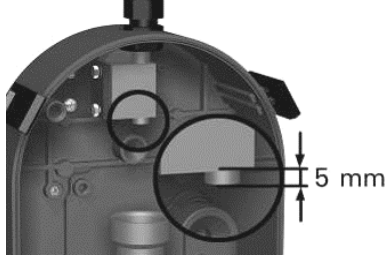

The following describes cleaning the parts which come into contact with water (Remember however there are no windows to clean in the AquaScat WTM 2):



	WORKSTEP	PROCEDURE
1.	Interrupt the sample supply to the photometer.	
2.	Remove inlet hose and drain hose from the photometer.	
3.	Remove the optics unit of the photometer and fasten onto the docking station.	→ Section 4.4
4.	Remove parts which come into contact with water.	4.1: Loosen conduit gland (A) and remove the inlet tube B). 
		4.2: Pull off the outlet cone (C) upward. 

	WORKSTEP	PROCEDURE
		<p>4.3: Loosen the conduit gland (D) and pull off the drain tube (E) downward.</p> 
5.	Clean parts which come into contact with water.	<p>Clean the removed parts or replace if necessary. When doing so, inspect the gasket in the outlet cone (arrow).</p> 
6.	Mount the drain tube.	<p>6.1: Insert the drain tube into the conduit gland and loosely tighten. The drain tube should protrude approx. 20 mm into the measuring cell unit.</p> 

	WORKSTEP	PROCEDURE
		<p>6.2: Put the outlet cone (C) onto the drain tube (E) to the stop. When doing so, hold the drain tube from below.</p>  <p>6.3: Now press the outlet cone together with the drain tube downward to the stop.</p> <p>6.4: Fasten this unit by tightening the conduit gland. At position X there should now not be any space between the outlet cone and the conduit gland!</p> 
7.	Mount the inlet tube.	<p>7.1: Insert the inlet tube (B) from above into the conduit gland (A) to the stop.</p> 

	WORKSTEP	PROCEDURE
		<p>7.2: Tighten the inlet tube (B) with the conduit gland (A). The inlet tube should protrude 5 mm out of the holder.</p> 
8.	<p>Replace the optics unit back on the measuring cell unit and lock with the four mounting clips. Pay attention to the guide pins (see picture).</p>	

8.6. Check and clean optional accessory parts



Damage to components due to aggressive cleaning agents.
Do not use aggressive cleaning agents when cleaning optional accessory parts. Commercially available dishwashing liquid can be used if needed.

When checking for cleanliness of the optional accessory parts, the following components must be checked for particle residues:

- Level control tube
- Flow meter and regulator valve if fitted
- Deaeration tube (pay particular attention to the connections to the hoses)
- Hoses

If particle residues are found, rinse or backflush the concerned components with clean water. Use commercially available dishwashing liquid if needed.

8.7. Clean the optics

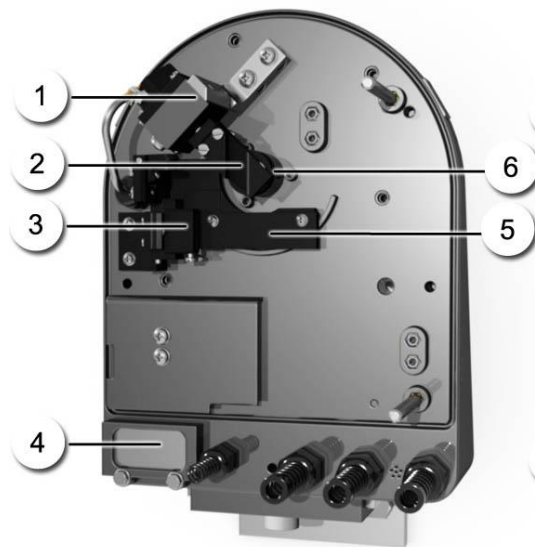


Figure 17: AquaScat 2 WTM A optics unit in adjustment position



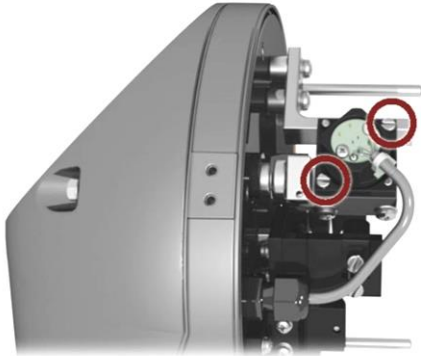
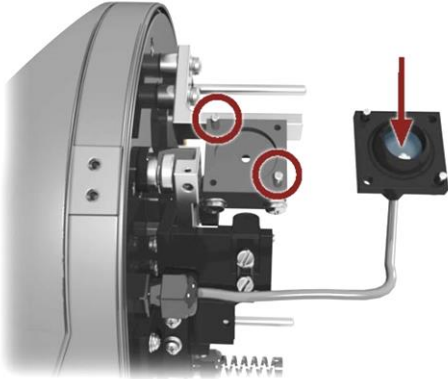
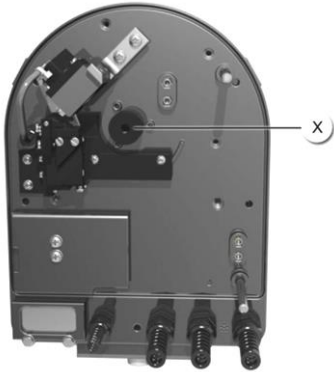
Figure 18: AquaScat 2 WTM IHT




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	Aperture assembly

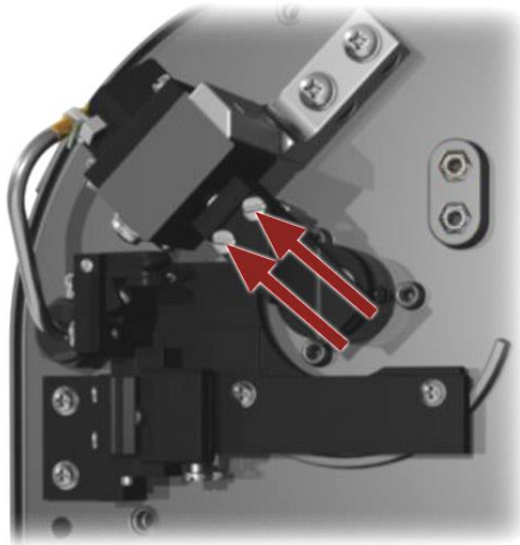
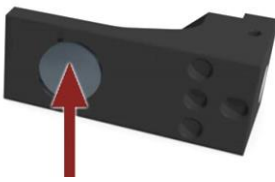

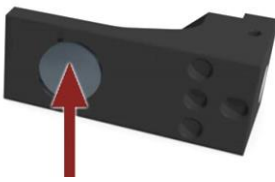

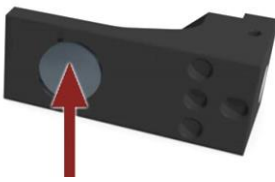

The following describes cleaning the optics:

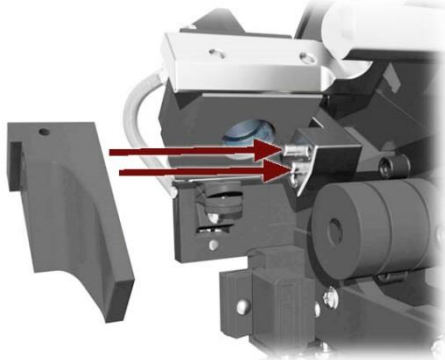



	WORKSTEP	PROCEDURE
1.	Interrupt sample supply.	
2.	Interrupt the service voltage to the photometer.	→ Section 5
3.	Remove the optics unit of the photometer and fasten onto the docking station.	→ Section 4.4

	WORKSTEP	PROCEDURE
4.	Clean the transmitter.	<p>4.1: Loosen the two screws (circles) and remove the transmitter.</p>  <p>4.2: Clean the lens (arrow) on the transmitter with a cotton-tipped applicator moistened with ethanol.</p>  <p>4.3: After cleaning, place the transmitter on the positioning pins (circles, picture above) and fasten with the two screws.</p>
5.	Clean the lens of the receiver.	<p>5.1: Screw out the aperture assembly (X) counter-clockwise.</p> 



	WORKSTEP	PROCEDURE
		<p>5.2: Clean the lens of the scattered light receiver with a cotton-tipped applicator moistened with ethanol.</p>  <p>5.3: Screw the aperture assembly into the optics holder clockwise. Ensure that the gasket on the aperture assembly is correctly mounted (arrow).</p> 
6.	<p>Replace the optics unit back on the measuring cell unit and lock with the four mounting clips. Pay attention to the guide pins (see picture).</p>	
7.	<p>Restore the service voltage to the instrument.</p>	<p>On instruments without automatic adjustment, carry out a manual adjustment as described in Section 8.3. This servicing duty is then completed. On instruments with automatic adjustment (AquaScat 2 WTM A) continue with Step 8.</p>

	WORKSTEP	PROCEDURE		
8.	Put the checking unit in the adjustment position.	<p>8.1: Change over the instrument to service operation as described in Section 7.5.</p> <p>8.2: In the Simulation menu, select the Motor position submenu. Now select the Adjustment menu item. The checking unit now moves to the adjustment position.</p>		
9.	Remove the optics unit of the photometer and fasten onto the docking station.	→ Section 4.4		
10.	Clean the head of the checking unit.	<p>10.1: Remove the two screws (arrows) and then remove the head of the checking unit.</p>  <p>10.2: Clean the two glass panes (arrows) with a cotton-tipped applicator moistened with ethanol.</p> <table border="1"> <tr> <td> <p>Position glass panel 1</p>  </td> <td> <p>Position glass panel 2</p>  </td> </tr> </table>	<p>Position glass panel 1</p> 	<p>Position glass panel 2</p> 
<p>Position glass panel 1</p> 	<p>Position glass panel 2</p> 			

	WORKSTEP	PROCEDURE
		<p>10.3: Put the head of the checking unit on the position pins (arrows) and then fasten with the two screws.</p> 
<p>11.</p>	<p>Place the optics unit again on the measuring cell unit and lock with the four mounting clips. Pay attention to the guide pins (see picture).</p>	
<p>12.</p>	<p>Perform adjustment.</p>	<p>→ Section 8.4</p>

8.8. Replace air filter



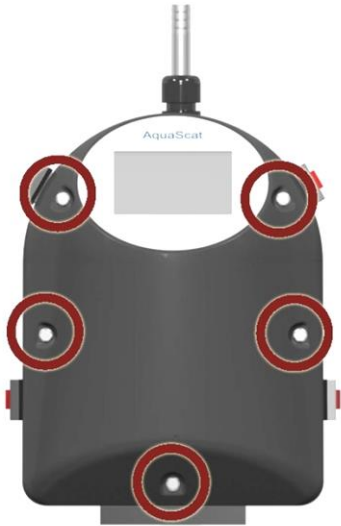


	WORKSTEP	PROCEDURE
1.	Interrupt sample supply.	
2.	Interrupt the service voltage to the photometer.	→ Section 5
3.	Remove the optics unit of the photometer and fasten onto the docking station.	→ Section 4.4
4.	Replace filter.	<p>4.1: Remove fastening screws (circles) and filter cover with filter (X).</p>  <p>4.2: Replace the old filter with a new one and fasten onto the photometer again along with the filter cover.</p>
5.	<p>Replace the optics unit back on the measuring cell unit and lock with the four mounting clips.</p> <p>Pay attention to the guide pins (see picture).</p>	
6.	The instrument is now ready for operation once again.	


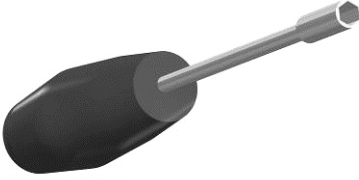
8.9. Change battery



Life threatening voltage inside the instrument:
 Connecting the electrical lines is extremely dangerous. Parts of the system can also be damaged. Local regulations must be observed at all times for electrical installations.



	WORKSTEP	PROCEDURE
1.	Interrupt the service voltage to the photometer.	→ Section 5
2.	Loosen the five screws on the front cover with a 7 mm key and remove the front cover.	
3.	Remove the old battery and replace with a new one (circle).  The battery is built into the front cover on the connection print (AQ2Conn).	

	WORKSTEP	PROCEDURE
4.	<p>Carefully mount front cover and fasten with the five screws.</p> <div style="border: 1px solid black; padding: 5px; background-color: #f0f0f0;"> <p> Damage to the threaded inserts in the housing due to excessive tightening of the front cover screws: Use a hex key without a T-handle to tighten the screws of the front cover finger-tight (approx. tightening torque 1 Nm).</p> </div>	<div style="text-align: center;">  <p><i>7 mm hex key</i></p> </div>
5.	<p>The instrument can now be operated again.</p>	
6.	<p>Set date and time as described in Section 7.12.</p>	

9. Troubleshooting

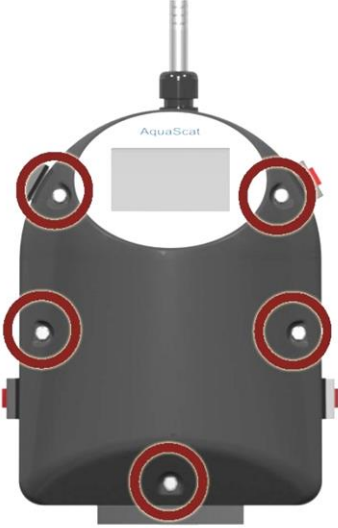
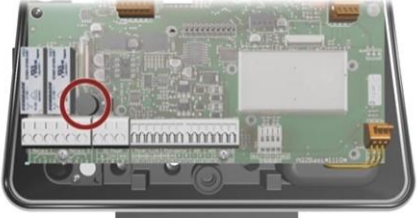
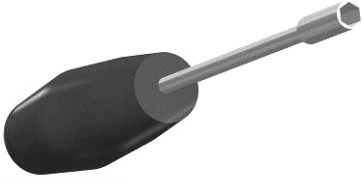
9.1. Pinpointing the cause of a malfunction

DETECTABLE MALFUNCTION	MEASURES
No reading.	<ul style="list-style-type: none"> ■ Check whether the service voltage is connected. → Section 5 ■ Check whether the fine-wire fuse in the instrument is OK. → Section 9.2
Fault report in the display.	<ul style="list-style-type: none"> ■ Analyze the error message. → Section 9.3
The measuring value appears wrong.	<ul style="list-style-type: none"> ■ Make sure there are no air bubbles in the sample. → Section 2.1 (deaeration tube) ■ Ensure that the sample to be measured corresponds to the operating conditions. → Section 2.4 ■ Perform adjustment. → Section 8.3/8.4 ■ Check whether the photometer is correctly mounted. → Section 4 ■ Ensure that the servicing duties have been performed according to the servicing schedule. → Section 8.1 ■ Clean the optics. → Section 8.7

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


9.2. Replace fine-wire fuse



	WORKSTEP	PROCEDURE
1.	Interrupt the service voltage to the photometer.	→ Section 5
2.	Loosen the five screws on the front cover with a 7 mm key and remove the front cover.	
3.	Remove the old fine-wire fuse (circle) from the base print (AQBasi) and replace with a new one (type T2A).	
4.	<p>Carefully mount front cover and fasten with the five screws.</p> <p>⚠ Damage to the threaded inserts in the housing due to excessive tightening of the front cover screws: Use a hex key without a T-handle to tighten the screws of the front cover finger-tight (approx. tightening torque 1 Nm).</p>	 <i>7 mm hex key</i>
5.	The instrument can now be operated again.	

9.3. Warning and error messages


9.3.1. Warning messages and effect on operation

<p>WARNING:</p> <p>If a warning occurs during operation, it has the following effects:</p> <ul style="list-style-type: none"> ■ Warnings indicate an unusual state. ■ The system continues to operate and delivers correct measuring values. The cause of the warning message should be remedied at the next possible opportunity. ■ If an output for warnings is programmed, it is activated. ■ When the cause of the warning has been remedied, it is automatically deleted. 	 <p>When the Warning message occurs, the color of the status display changes to orange and the warning text describes what the warning is about. (Example: WARNING CURRENT 1)</p>
---	--

The following warnings can be displayed:

WARNING MESSAGE	DESCRIPTION	POSSIBLE CAUSES
V IN	The input voltage is outside the permitted range (18-30 VDC).	<ul style="list-style-type: none"> ■ The service voltage is faulty.
ADJUSTMENT ADJUST FAULT	The adjustment of the instrument could not be performed.	<ul style="list-style-type: none"> ■ Ensure that the outlet cone is correctly mounted as described in Section 8.5. ■ The instrument is soiled. ■ The nominal value for the adjustment does not match the value of the checking unit.
CURRENT 1..8	Current output 1..8 is disturbed.	<ul style="list-style-type: none"> ■ Terminals open. ■ Interruption of the current loop of the reading output.
FLOW (Name ext.in.)	A flow rate fault is signaled via the digital input.	<ul style="list-style-type: none"> ■ Flow rate incorrect.
VENTILATOR	The fan does not reach its nominal speed.	<ul style="list-style-type: none"> ■ Fan is defective.
WATCHDOG	The internal error monitoring has been actuated. The program has been restarted.	<ul style="list-style-type: none"> ■ Program crash.


9.3.2. Error messages and their effect on operation

<p>FAULT:</p> <p>If an error occurs during operation, it has the following effects:</p> <ul style="list-style-type: none"> ■ A fault is a malfunction which prevents correct measurement value acquisition. ■ The measuring values go to 0. ■ The current output goes to the programmed electrical current If fault. ■ The limits will be deactivated. ■ If an output for faults is programmed, it is activated. ■ If the cause of the fault has been remedied, it is automatically deleted. 	 <p>Achtung diese Grafik ersetzen!</p> <p>When the Fault message appears, the color of the status display changes to red and the error text describes what the fault is about. (Example: MEASURING ERROR)</p>
---	--

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.	<ul style="list-style-type: none"> ■ Defect in the electronic system. → Service technician
MEASUR.FAULT	Measurement value acquisition is faulty.	<ul style="list-style-type: none"> ■ Air bubbles in the sample tube. ■ External light in the vicinity of the measuring station (e.g. transparent hoses). ■ Defect in the electronic system. → Service technician
AN.MEAS.FAULT	The measurement value acquisition of the analogue channels is disturbed.	<ul style="list-style-type: none"> ■ Defect in the electronic system. → Service technician
LED1 FAILURE	The detectors receive no light from the LED for the scattered light measurement.	<ul style="list-style-type: none"> ■ Defective light source. → Service technician
ANALOG IN 1	The input signal on analog input 1 is less than the fault limit.	<ul style="list-style-type: none"> ■ There is no input signal.
ANALOG IN 2	The input signal on analog input 2 is less than the fault limit.	<ul style="list-style-type: none"> ■ There is no input signal.
POWER LINK	Actuation of the extended inputs/outputs via the Powerlink is disturbed.	<ul style="list-style-type: none"> ■ Interrupted connection to the extended inputs/outputs.

9.3.3. Prio messages (prioritized error messages) and their effect

PRIO (PRIORITIZED FAULT):	
<p>If a prioritized fault occurs during operation, it has the following effects:</p> <ul style="list-style-type: none"> ■ When there is a prioritized fault, the cause of the malfunction is serious. ■ The measuring values go to 0. ■ The current output goes to the programmed electrical current If fault. ■ The limits will be deactivated. ■ If an output for prioritized faults is programmed, it is activated. ■ Prioritized faults can be cleared only by a service engineer. 	 <p>When the Prio message occurs, the color of the status display changes to red and the error text describes what the prioritized fault is about. (Example: PRIO DEFAULT VALUES)</p>

The following faults and prio messages can be displayed:

PRIO MESSAGE	DESCRIPTION	POSSIBLE CAUSES
DEFAULT VALUES	The default values were loaded.	<ul style="list-style-type: none"> ■ 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.	<ul style="list-style-type: none"> ■ Electromagnetic malfunctions. ■ Defect in the electronic system.
CRC USER	A fault was determined when the user data was checked.	<ul style="list-style-type: none"> ■ Electromagnetic malfunctions ■ Defect in the electronic system.
CRC DISPLAY	A fault was determined when the display data was checked.	<ul style="list-style-type: none"> ■ Electromagnetic malfunctions. ■ Defect in the electronic system.
EXT RAM	A fault was determined when the RAM in the graphic controller was checked.	<ul style="list-style-type: none"> ■ Defect in the electronic system.

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 on 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 the photometer. → Section 2.2
- A description of instrument behavior and the work steps 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



Life threatening voltage inside the instrument:
 Connecting the electrical lines is extremely dangerous. Parts of the system can also be damaged. Local regulations must be observed at all times for electrical installations.

The aim of decommissioning is to prepare the instrument properly for storage and to conserve it during storage.



	WORKSTEP	REMARKS
1.	Life threatening voltage inside the instrument: Connecting the electrical lines is extremely dangerous. Parts of the system can also be damaged. Local regulations must be observed at all times for electrical installations. Interrupt the service voltage to the photometer and safely remove electrical connections.	
2.	Stop the sample supply and remove the inlet hose and drain hose.	
3.	All surfaces which come into contact with the sample must be thoroughly cleaned and dried.	
4.	Remove the photometer from the measuring station.	
5.	Make sure that all covers are closed and all locks on the instrument are locked.	

Storage

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

- The photometer 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 longer period of time before being put into storage.
- The photometer and accessory parts must be protected from weather factors, condensing humidity, and aggressive gases.

12. Packaging & transport

The original packaging materials of the photometer should be used for packaging the photometer and its peripheral components if 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 2.2). This prevents confusion and mix-ups later while also making it easier to identify parts.
- When sending for repairs, ensure that the complete instrument (measuring cell unit, checking unit if present) is sent.

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 photometer and its peripheral devices is to be carried out in compliance with regional statutory regulations.

The photometer 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 plant
	Protective foils, polystyrene shells	Reuse as packaging material, recycling
Electronics	Print boards, electro-mechanical components	To be disposed of as electronic waste
Parts which come into contact with water	PVC	Local disposal center
	Steel	Waste metal disposal centers
Optics	Glass, aluminum	Recycling via centers for recycling glass and waste metal
Battery	Lithium	Recycling via locally organized collection point
Housing	Plastic, ABS	Local disposal center

Table 2: Materials and their disposal

14. Spare parts

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

ART.-NO.	ARTICLE NAME	REMARKS
116627	Air filter	→ Section 8.9
116468	Inlet tube stainless steel 1.4435	→ Section 8.5
116833	Inlet tube PVC	→ Section 8.5
117988	Outlet tube with flooding protection	→ Section 8.5
117442	Microfuse 250V 2AT RM5	→ Section 9.2
111834	Battery 3V CR 2032 (button battery)	→ Section 8.9

Table 3: Spare parts and part numbers

15. Appendix

The following section contains:

- Required drawings and dimension drawings for mounting.
- Servicing log

16. Index

- A**
- Access code, set 47
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 - Adjustment, automatic 55
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