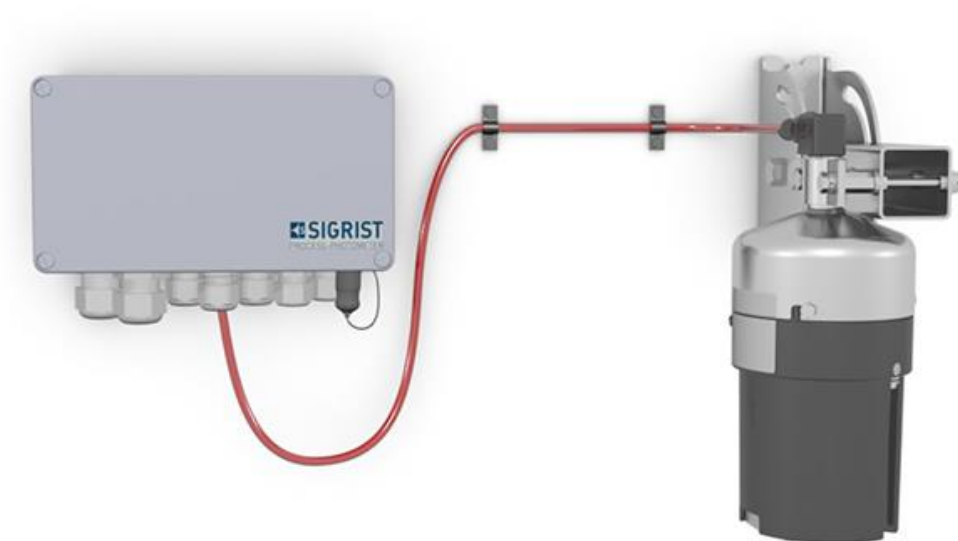


INSTRUCTION MANUAL

FireGuard 2



Tunnel smoke detector

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1 General user information

1.1 Terms used in this document (glossary)

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

1.2 Purpose of the Instruction Manual

This Instruction Manual provides the user with helpful information about the entire life cycle of the FireGuard 2 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
13544E	Brief Instructions	The most important functions and the servicing schedule.
13543E	Reference Handbook	More sophisticated menu functions and worksteps for advanced users.
13654E	Data Sheet	Descriptions and technical data about the instrument.
13545E	Service Manual	Repair and conversion instructions for service engineers.
13692DEF	Declaration of Conformity	Compliance with the underlying directives and standards.

1.5 Copyright provisions

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

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 photometer and its peripherals are designed detecting smoke in tunnels for ambient temperatures according to the technical data (Section 2.4).

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.



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, set up or transported.
- 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.
- The instrument is exposed to vibrations, shocks or other mechanical forces.

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 notice 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

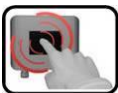
All **pictograms** used in this document are explained below:



Additional information about the current topic.



Practical procedures when working with the FireGuard 2.



Manipulations on the touchscreen.



The screenshot is an example and may differ from current device.

2 Instrument overview

2.1 Overview of a measuring point

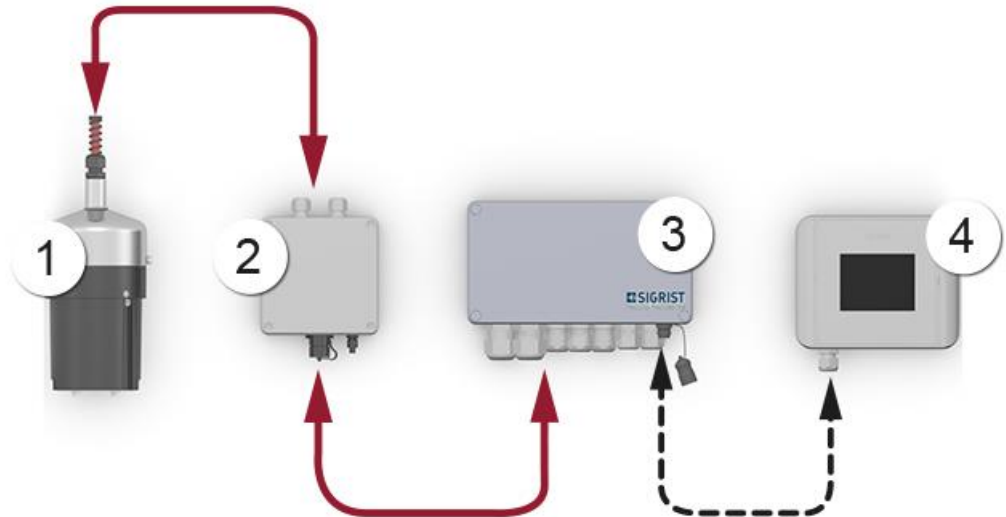


Figure 1: Overview of a measuring point

①	FireGuard 2 photometer (smoke detector)	②	Junction box (optional)
③	SIPOINT 2 connection box	④	SICON-C portable control unit, can be connected to the SIPOINT 2 via cable

2.2 Designation of the instruments

2.2.1 Rating plate on FireGuard 2

The FireGuard 2 photometer is fitted with the following rating plate:

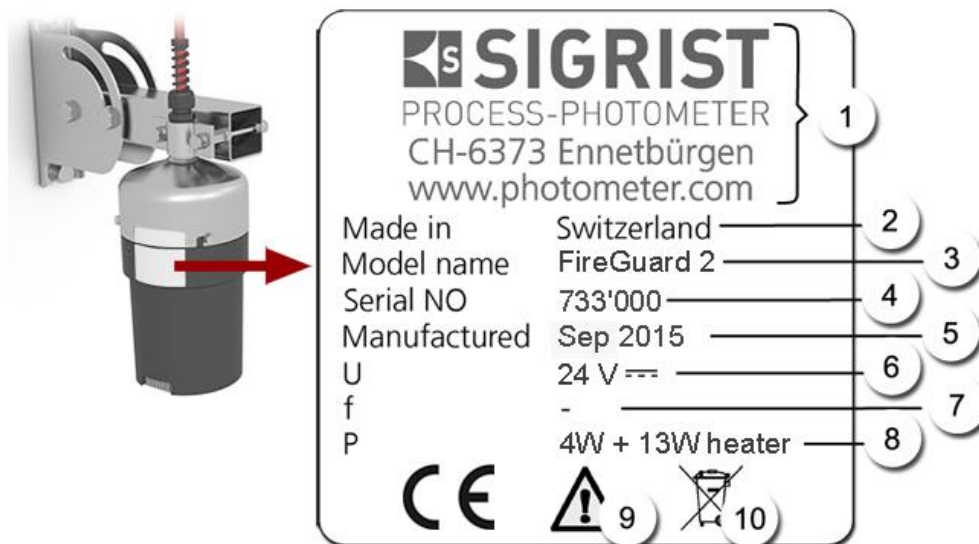


Figure 2: Rating plate on FireGuard 2

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	Observe the disposal information

A red sticker is attached to the FireGuard 2 (arrow). This distinguishes it from instruments with a similar appearance.

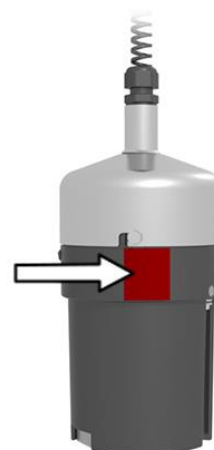


Figure 3: Identification on FireGuard 2

2.2.2 Designation of the SICON-C

The SICON-C portable control unit is fitted with the following rating plate:

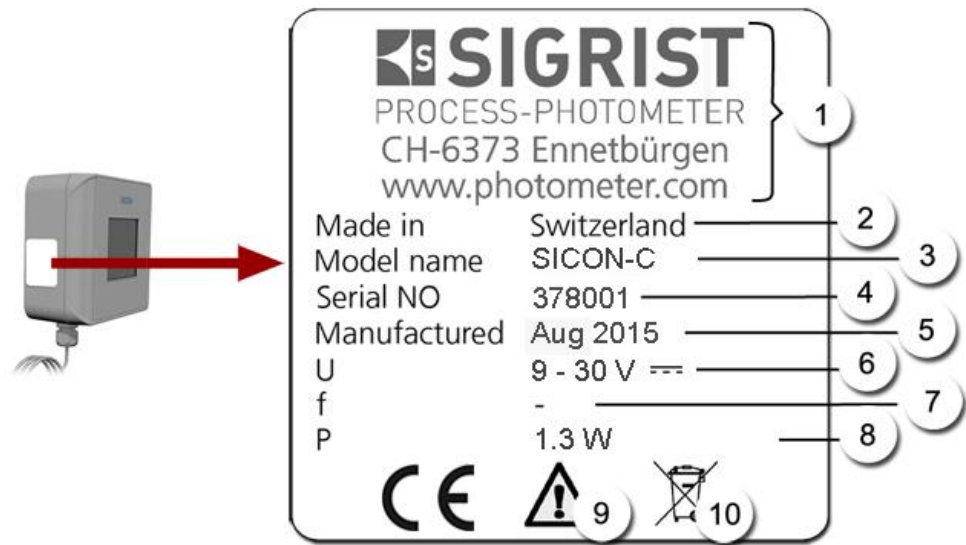


Figure 4: Rating plate on SICON-C

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

2.2.3 Designation of the SIPORT 2

The SIPORT 2 connection box is fitted with the following rating plate:

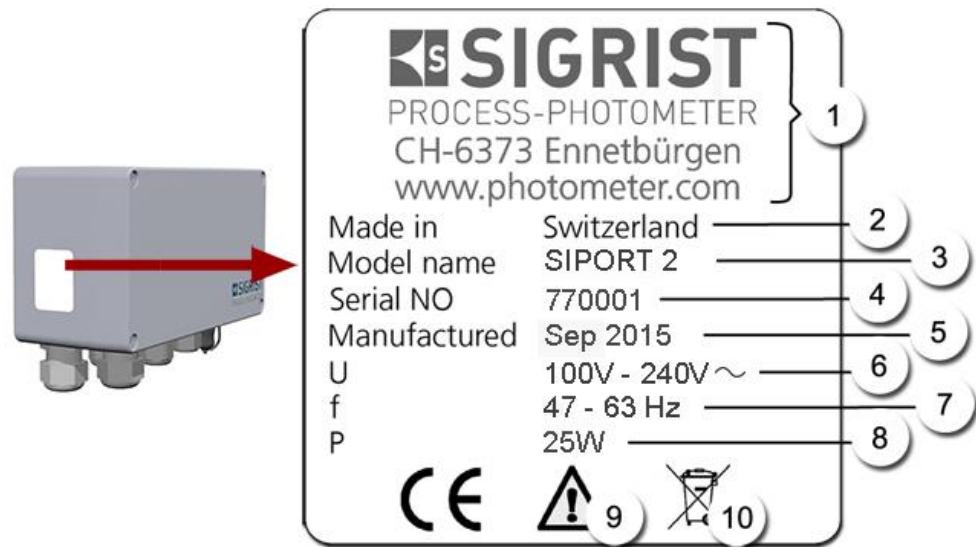







Figure 5: Rating plate on SIPORT 2


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	Observe the disposal information

2.3 Scope of supply and accessories









Standard scope of supply for the FireGuard 2:

PCS.	ART. NO.	NAME	VIEW	VARIANT
1	120283 120284 120285 120286	FireGuard 2		
1	120242	Mounting set for variable mounting bracket 0 .. 90°		
	120312	Mounting set for installation in suspended ceilings		
1	120287 120288 120289 121118	SIPORT 2 connection box with integrated Profibus DP StromRel Modbus RTU Profinet IO		Option: Instrument socket with protection cover 120387
1	120389 120390 120391 121119	Connection print for SIPORT 2 without housing, with integrated Profibus DP StromRel Modbus RTU Profinet IO		

Attached documents:

PCS.	ART. NO.	NAME	VIEW	VARIANT
1	13542	Instruction Manual		German French English
1	13543	Reference Handbook		German English
1	13544	Brief Instructions		German French English

Optional accessory parts:

PCS.	ART. NO.	NAME	VIEW	VARIANT
1	120290	SICON-C portable control unit		<ul style="list-style-type: none"> With plug for direct connection to the SIPORT 2. With print plug for connection to the SIPORT 2 without housing.
1	117390	Checking unit		
1	120309	WLAN module		
1		Connector, Fire-Guard 2 to SIPORT 2 / junction box		
1	120342	Junction box		
1	117396	Sample heater pair		
1	118358	High temperature cable, L = 1.5m		
1	120393	High temperature cable incl. Plug, L = 1.5m		

2.4 Technical data for the FireGuard 2

General:

Data	Values
Measuring principle	Scattered light measurement
Measurement span	0 .. 3000 mE/m
Wavelength	670 nm
Resolution	0.1 mE/m
Reproducibility	± 2 % from measuring value (at least +/- 1 mE/m) Reproducibility: Measuring value of two FireGuard under identical conditions.
Reaction time	5 s (at a wind speed of 1.5 m/s)
Measuring angle	120 °
Ambient temperature	-30 .. +55 °C
Ambient humidity	0 .. 100 % rel. humidity

FireGuard 2 photometer:

Data	Values
Service voltage	24 VDC
Power consumption	4 W + optional heater 13 W
Weight	0.9 kg (up to max. 2.6 kg with sample heater and fastening material)
Protection class	IP66 (electronics only)
Photometer material	Stainless steel 1.4571 (316L)
Measuring cell material	PC/ABS
Cable standard	High-temperature cable for wall or ceiling mounting: <ul style="list-style-type: none"> ▪ Length: as needed ▪ Type: 4 x 2 x 0.50 mm² ▪ FE180, E30-E90
Dimensions	ca. Ø 110 mm x 274 mm (see detailed dimension sheet)

SICON-C portable control unit:

Data	Values
Service voltage	24 VDC
Power consumption	1.3 W
Display	<ul style="list-style-type: none"> ▪ ¼ VGA with touchscreen ▪ Resolution: 320 x 240 pixels with 3.5" diagonal
Protection class	IP66
Weight	0.6 kg
Dimensions	160 x 152 x 60 mm
Housing material	ABS

SIPORT 2 connection box:

Data	Values
Service voltage	100 .. 240 VAC; 47 .. 63 Hz
Power consumption	25 W (maximum) <ul style="list-style-type: none"> ▪ With FireGuard 2, sample heater OFF: 5 W / 14 VA ▪ With FireGuard 2, sample heater ON: 19 W / 33 VA
Interfaces	Profibus DP, Modbus RTU with repeater, StromRel module, WLAN-Modul, Profinet IO
Protection class	IP66
Weight	1.3 kg
Dimensions	ca. 220 mm x 155 mm x 91 mm (see detailed dimension sheet)
Housing material	Glass-fiber reinforced polyester

3 General safety points

3.1 Dangers when properly used



DANGER!

Damaged instrument or cabling.

Touching damaged cables may lead to electrical shocks or 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 instrument.

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

- The instrument must not be operated when the housing is removed.



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!

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

If moisture enters the instrument, the FireGuard 2 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 cause damage to instrument components.

- Do not use aggressive chemicals or cleaning agents when cleaning.
- Should the instrument come in contact with aggressive chemicals, clean it thoroughly with a neutral cleaning agent.

3.2 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.
- Change the password when using the optional WLAN module.
- Perform the specified servicing duties.

3.3 Warning and danger symbols on the instrument



WARNING!

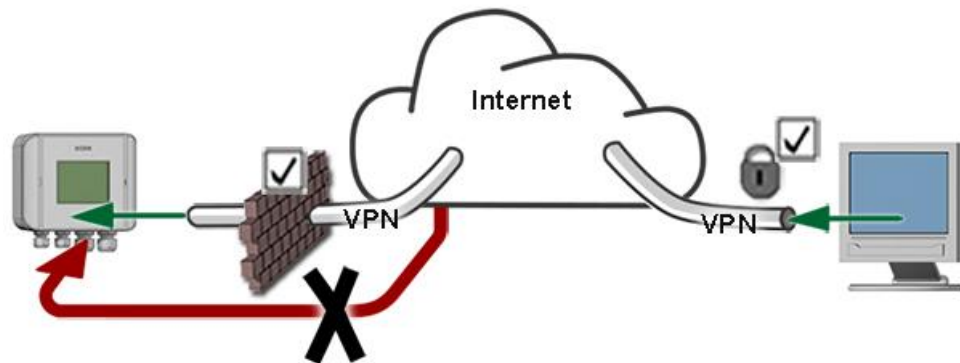
There are no warning or danger symbols on the instrument.

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, even if no warning or danger symbols are attached to the instrument.

The following sections must be internalized:

- Section 1.8
- Section 1.11
- Section 1.12
- Section 1.13
- Section 3.2
- Observe safety pointers when performing the described procedures.
- Observe local safety pointers.

3.4 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).

4 Mounting



CAUTION!

Danger of the photometer falling onto the road if improperly mounted.

The following requirements must be met when fastening the instruments in place:

- When fastening the photometer, screws with a diameter of at least **M8** must be used.
- The material quality of the screws used must correspond to the local mounting and installation guidelines.

4.1 General information on mounting the FireGuard 2

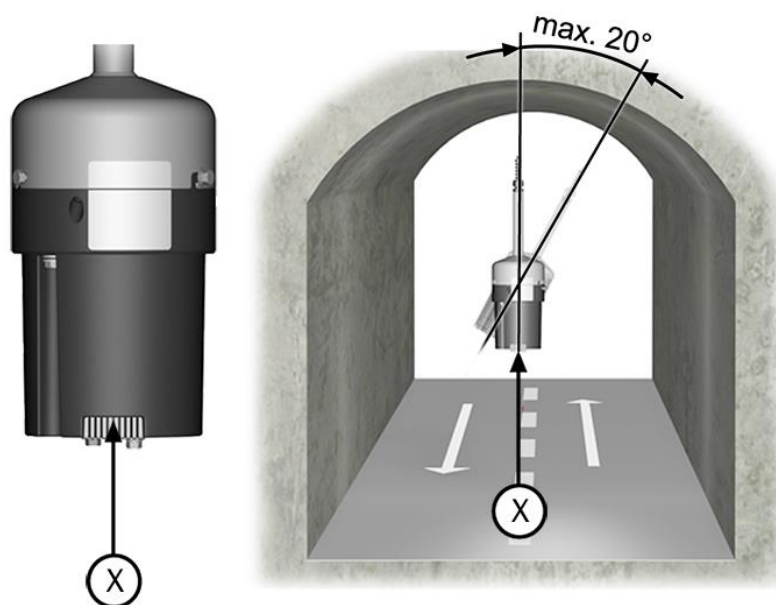


Figure 6: Installation position in the air flow

- The opening on the sampling point (X) must point in the direction of travel in the tunnel.
- The inclination of the photometer must not exceed 20°.

Installation of the measuring system is carried out in the following steps:



	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	Mount the photometer at the measuring position. <ul style="list-style-type: none"> ▪ Installation with a variable mounting bracket 0 .. 90° is made according to Section 4.2. ▪ Installation in suspended ceilings is made according to Section 4.3. 	
2.	Mount the SIPORT 2 connection box according to Section 4.6.	
3.	Carry out the electrical installation according to Section 5.	

4.2 Installation with variable mounting bracket 0 .. 90°

A variable mounting bracket 0 .. 90° allows the FireGuard 2 to be mounted horizontally on walls (1), at an angle between 0 and 90° (2) and vertically in suspended ceilings (3). Carry out the installation according to the **FIREGUARD2_0-90-MB** drawing.

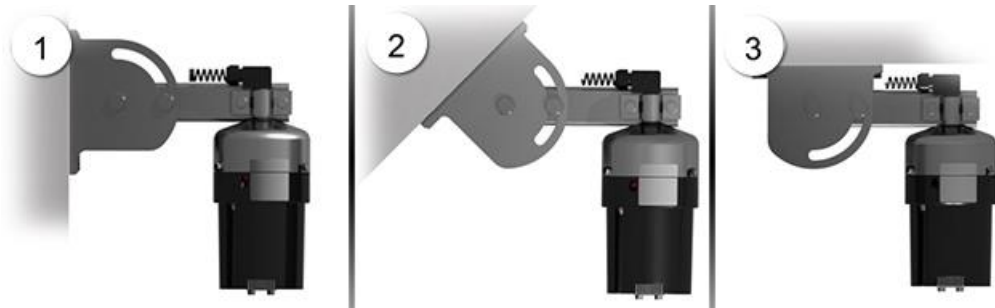


Figure 7: Mounting variations with the variable mounting bracket 0 .. 90°

4.3 Installing the FireGuard 2 in suspended ceilings



CAUTION!

Damage to the photometer in the event of fire due to incorrect selection of the measuring position.

If the photometer is mounted in the exhaust air duct, then it can become damaged in the event of fire due to the high temperatures.

- Installation in suspended ceilings is only practical in the supply air duct.

The following requirements must be met for installation in suspended ceilings:

- The photometer must be pre-assembled for installation in suspended ceilings at the factory using the corresponding mounting set.
- The bore hole must already be available beforehand according to the drawing **FIREGUARD_Z-MB**.
- The bores for fastening the mounting set must be available according to the drawing **FIREGUARD_Z-MB**.
- The photometer must protrude at least 6.5 cm out of the tunnel ceiling.
- The length of the drop arrester must be adjusted to the ceiling thickness in advance at the factory.

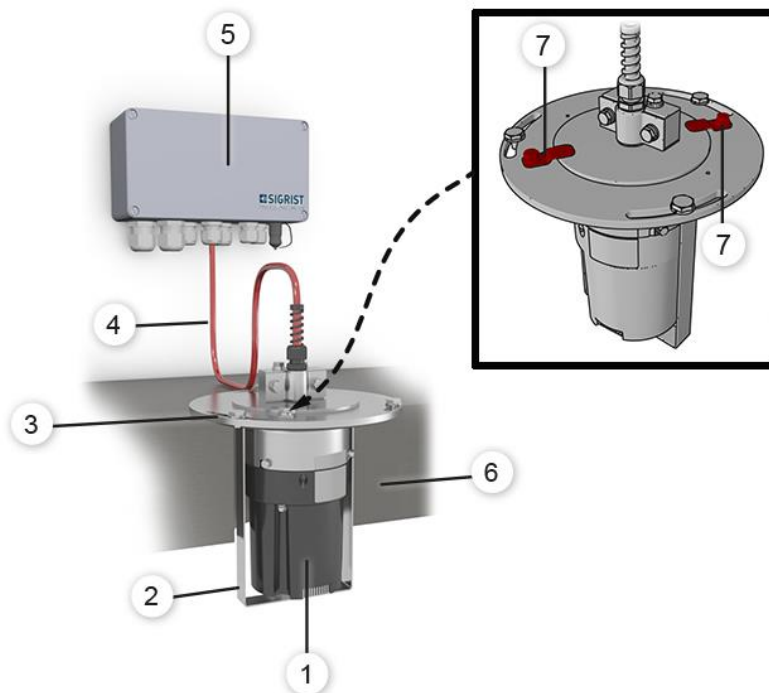


Figure 8: Installation in suspended ceilings

①	Photometer (smoke detector)	②	Fall protection
③	Mounting flange	④	Connection cable
⑤	SIPOINT 2 connection box	⑥	Tunnel ceiling with bore hole
⑦	Fastening clip		

Proceed as follows to install the mounting set:



	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	Position the completely assembled mounting set in the bore hole. i The mounting set is delivered assembled together with the FireGuard 2.	
2.	Fasten the mounting set with pre-mounted FireGuard 2 on the mounting flange (Figure 8, pos. 3) with the three screws (circles). A: Tunnel ceiling i The bore holes for fastening the mounting set must be available.	
3.	Align the photometer as follows: 1. Loosen the two fastening clips (Figure 8, pos. 7). 2. Align the photometer in the direction of travel. i The marking (X) must be aligned to the flow direction (Y) of the tunnel. 3. Tighten the two fastening clips (Figure 8, pos. 7) again.	

4.4 Distances and corresponding cable cross-sections

The maximum distance (X) between the photometer and connection box is limited and depends on the cable cross-section used and the possible use of a sample heater. Shielded cables must be used.

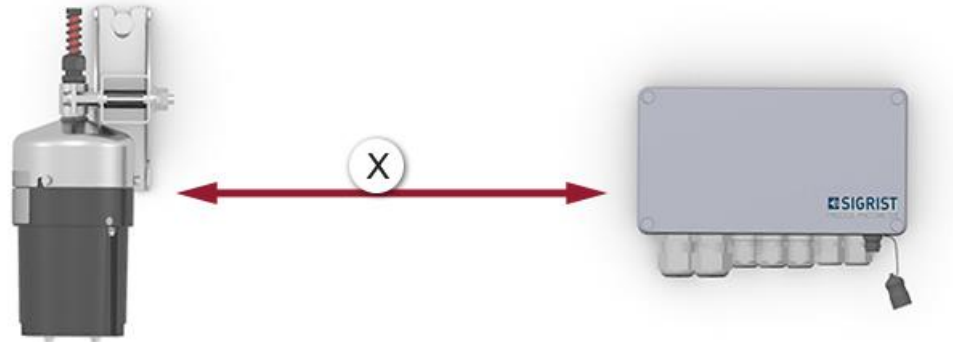


Figure 9: Arrangement of the components with the SIPORT 2 connection box

Cable cross-section **without** sample heater:

Cable cross-section [mm ²]	Max. length (X) [m]	Supplementary information
0.25	90	
0.34	120	
0.41	160	
0.50	180	Standard for connection to SICON
0.75	270	
1.00	350	Standard for connection to SIPORT 2
1.50	500	

Cable cross-section **with** sample heater:

Cable cross-section [mm ²]	Max. length (X) [m]	Supplementary information
0.25	25	
0.34	35	
0.41	45	
0.50	50	Standard for connection to SICON
0.75	75	
1.00	100	Standard for connection to SIPORT 2
1.50	140	

4.5 Mounting the optional junction box

A junction box is recommended in the event of longer cable distances. This should be positioned close to the photometer. The junction box is fastened using four screws on a solid, level surface according to the drawing **VDV1-MB**.

4.6 Mounting the SIPORT 2 connection box

The SIPORT 2 connection box is fastened using four screws on a solid, level surface according to the drawing **SIPORT2-MB**.

4.7 Mounting the SIPORT 2 without housing



WARNING!

Life-threatening voltage on the SIPORT 2 without housing.

Touching the SIPORT 2 without housing (SIPORT 2 connection print) can be potentially fatal. System components can also be damaged.

- The printed circuit board must be protected from environmental factors such as soiling and humidity.
- The SIPORT 2 without housing must only be accessible to authorized personnel.
- ⚠ Electrical contact protection must be ensured by the customer. Otherwise, the mains voltage is freely accessible on the rear of the printed circuit board.

The SIPORT 2 without housing is designed for installation in an electrical cabinet and is fastened using four screws (circles).

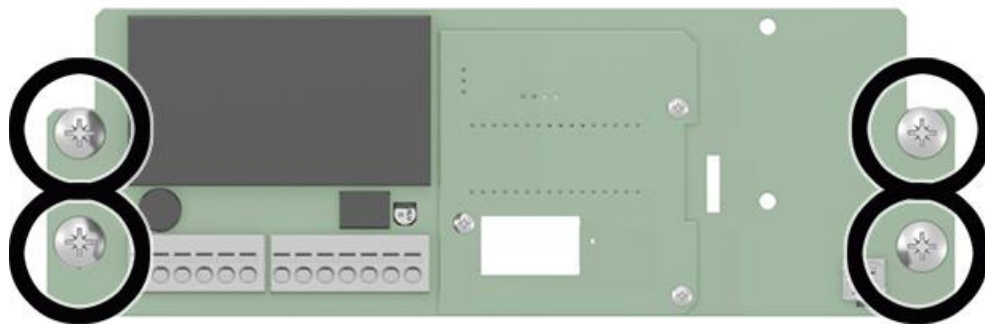


Figure 10: SIPORT 2 connection print without housing

5 Electrical installation

5.1 Safety pointers for the electrical connection



DANGER!

The improper electrical connection of the components can be potentially fatal. The components can also be damaged.

Note the following basic principles for the electronic connection:

- Local regulations must be observed at all times.
- 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.
- The power supply must have a back-up fuse with a max. tripping current of 16 A. The cables must be able to withstand this load.
- The mains cable must be able to withstand an ambient temperature of 70 °C.
- 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.
- If faults cannot be remedied, the system must be put out of operation and protected against inadvertent operation.

5.2 Connecting the SIPORT 2



DANGER!

Life-threatening voltage due to accidentally released voltage-carrying wires.

The cable glands must be adjusted according to the outer diameter of the cables. The following cable glands are available:

2 x 8 .. 17 mm

3 x 8 .. 13 mm

2 x 5 .. 10 mm

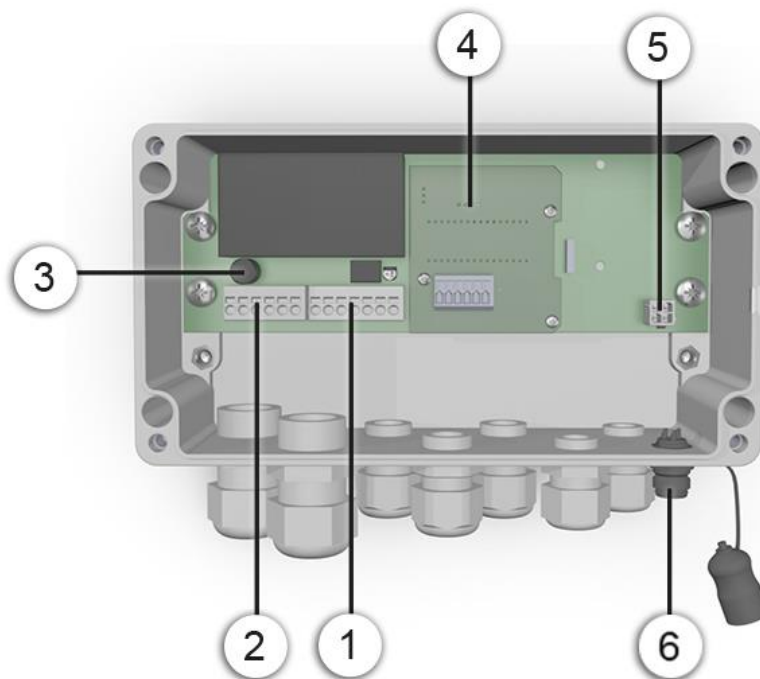



Figure 11: SIPORT 2 when open

<p>① Photometer connection (cable cross-section: 0.2 .. 4.0 mm²)</p> <p> optional version with connector</p>	<p>② Mains voltage connection (cable cross-section: 0.2 .. 4.0 mm²)</p>
<p>③ Fine-wire fuses (microfuse 250V 2AT RM5)</p>	<p>④ The SIPORT 2 is always fitted with one of the following interface modules:</p> <ul style="list-style-type: none"> ▪ Profibus DP ▪ Modbus RTU ▪ StromRel ▪ Profinet IO <p>(cable cross-section: 0.08 .. 1.5 mm²)</p>
<p>⑤ Connection of portable control unit on SIPORT 2 without housing</p>	<p>⑥ Connection of portable control unit on SIPORT 2 with housing</p>

A high-temperature cable must be used for the connection. Establish the electrical connections in the SIPORT 2 in the following sequence:



TERMINAL NUMBER	MEANING	CABLE COLOR (SIGRIST)	REMARKS
4	GND	Black and white	Photometer connection (Figure 11, pos. 1)
5	+24 V	Green and brown	
6	SA (RS-485)	Blue	
7	SB (RS-485)	Red	
8	A (RS-485)	Gray	
9	B (RS-485)	Yellow	
10		Drain wire	
1	P	Live	Mains voltage connection (Figure 11, pos. 2) Terminal pair for forwarding to other instruments (max. 16 A).
2	N	Neutral	
3		Protective ground	

5.3 Connecting the SIPORT 2 without housing

Installation is made according to Section 5.2.

The following requirements apply when installing the SIPORT 2 without housing:



DANGER!

Life-threatening voltage on the SIPORT 2 without housing.

Touching the SIPORT 2 without housing (SIPORT 2 connection print) can be potentially fatal. System components can also be damaged.

- Local regulations for electrical installations must be observed at all times.
- Installation may only be carried out by a trained electrician.
- The printed circuit board must be protected from environmental factors such as soiling and humidity.
- The SIPORT 2 without housing must only be accessible to authorized personnel.
- Electrical contact protection must be ensured by the customer. Otherwise, the mains voltage is freely accessible on the rear of the printed circuit board.

5.4 Profibus DP: Overview and installation

- To connect to the Profibus DP, the Profibus module must be integrated in the SIPOINT 2.
- In the **Digi.interf. \ General** menu, the **Module type** must be set to **Profibus DP** and the **Module location** to **SIPOINT 2**.
- To be able to work with the Profibus, the bus parameters in the **Digi. interf. \ Profibus** menu must be set correctly. If the associated parameters are changed, the function becomes effective only after a restart.
- If the photometer is used as a terminal device, DIL switch S2/1 must be switched ON on the connection module (Figure 13, pos. 3).
- The addressing of the Profibus DP interface is described in Section 8.5.

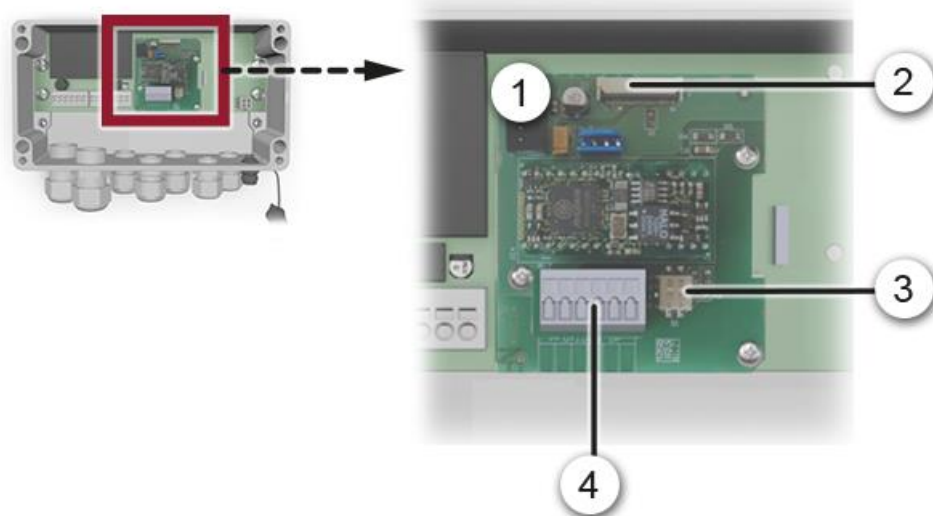


Figure 12: Overview of the Profibus DP module in the SIPOINT 2


①	Fieldbus interface (connection print) for Profibus DP	②	Connector for SIPOINT 2 print
③	DIL switch for end resistors. Switches (1 and 2) must be ON	④	Profibus DP terminals (Cable cross-section: 0.08 .. 1.5 mm²)

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

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

5.5 Profinet IO: Overview and installation

- To connect to the Profinet IO, the Profinet IO module must be integrated in the SIPOINT 2.
- The module has an internal switch and provides two Ethernet ports.
- The cable is connected directly to the RJ45 plug of the Profinet IO module inside the instrument or via external M12 connectors.

 When connecting directly to the RJ45 plug, please note that only plugs with a short and flat design can be used.

- In the **Digi.interf. \ General** menu, the **Module type** must be set to **Profinet IO** and the **Module location** to **SIPOINT 2**.
- In the **Digi.interf. \ Profinet** menu, the station name, MAC address and connection status are shown. Moreover, it can be defined here whether the data should only be read or be read and written.

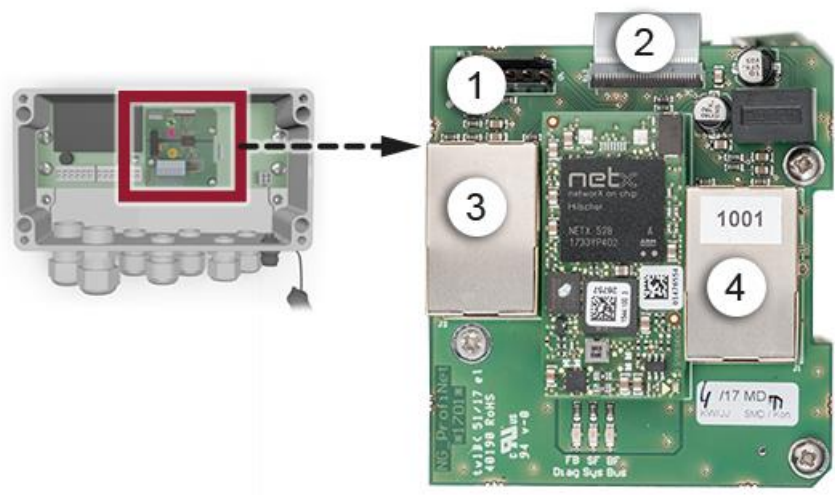


Figure 13: Overview of the Profinet IO module in the SIPOINT 2

①	Fieldbus interface (connection print) for Profinet IO	②	Connector for SIPOINT 2 print
③	Ethernet port 1	④	Ethernet port 2

5.6 Modbus RTU with repeater: Overview and installation

- To connect to the Modbus RTU with repeater, a Modbus module must be integrated in the SIPOINT 2.
- In the **Digi.interf. \ General** menu, the **Module type** must be set to **Modbus** and the **Module location** to **SIPOINT 2**.
- To be able to work with the Modbus, the bus parameters in the **Digi. interf. \ Modbus** menu must be correctly set. If the associated parameters are changed, the function becomes effective only after a restart.
- If the photometer is used as a terminal device, DIL switch S2/1 must be switched ON on the connection module (Figure 14, pos. 3).
- The addressing of the Modbus RTU interface is described in Section 8.7.
- Either a SICON M control unit or in-house control unit can be used as the Modbus master.
- A twisted pair, shielded cable (SF/UTP) should be used. Characteristic impedance $120 \pm 20 \text{ Ohm}$, capacitance $< 60 \text{ pF/m}$.
- In order to prevent equalizing currents on the shielding, the shielding is grounded via a capacitor on the insulated connection.

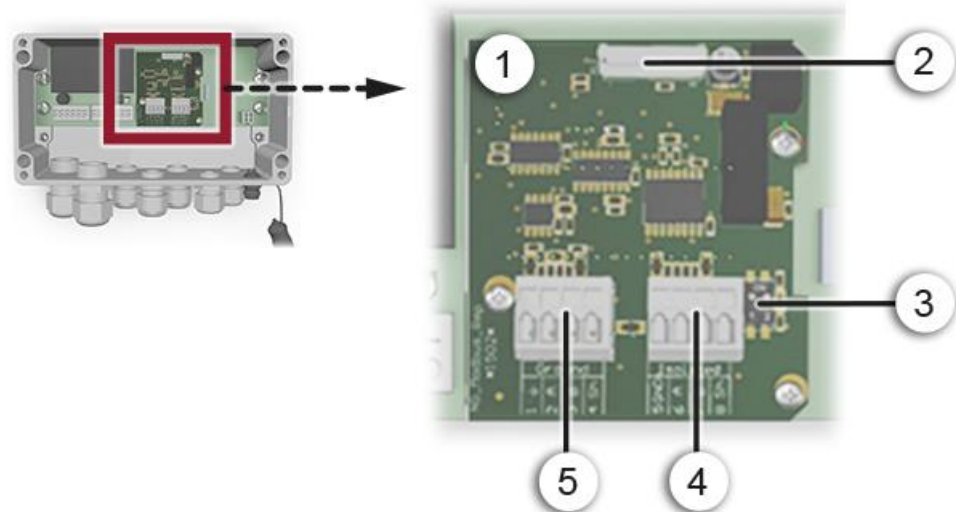


Figure 14: Overview of the Modbus RTU module in the SIPOINT 2

①	Fieldbus interface (connection print) for Modbus RTU with repeater	②	Connector for SIPOINT 2 print
③	DIL switch for matching resistors. Switches (1 and 2) must be ON	④	Modbus RTU terminals. Galvanically isolated. (Cable cross-section: $0.08 \dots 1.5 \text{ mm}^2$)
⑤	Modbus RTU terminals. Connected to ground potential. (Cable cross-section: $0.08 \dots 1.5 \text{ mm}^2$)		

The terminals of the RTU module are configured as follows:

TERMINALS	MODBUS	POTENTIAL	FUNCTIONAL DESCRIPTION
1 \equiv	GND – to ground potential	Ground potential	Connection of the GND line
2 A	RS485-A IN		Data connection
3 B	RS485-B IN		Data connection
4 Sh	Shield		Connection for cable shielding
5 GND	GND	Galvanically isolated	Connection of the GND line
6 A	RS485-A OUT		Data connection
7 B	RS485-B OUT		Data connection
8 Sh	Shield		Shielding via capacitor to ground potential

Additional information on the Modbus RTU with repeater

This module has a connection related to ground potential and a galvanically isolated connection. The signals are amplified so that several modules can be connected in series. To do this, a connection related to ground potential must always be connected to a galvanically isolated connection. The ground line must be used.

5.7 StromRel module: Overview and installation

- The configuration of the StromRel module is described in the Section 8.8.
- In the **Digi.interf.** \ **General** menu, the **Module type** must be set to **StromRel** and the **Module location** to **SIPORT 2**.
- The current outputs can be loaded with up to 500 Ohm.
- Using the semiconductor relay, currents up to 120 mA and voltages up to 50 V can be connected.
- The typical resistance when switched on is 20 Ohm. The switch is normally open.
- A connection diagram can be found in the reference manual.

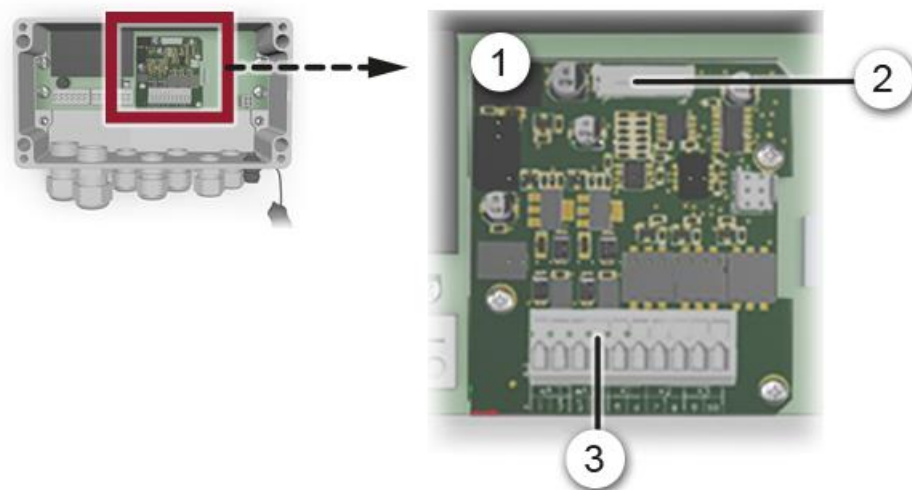


Figure 15: Overview of the StromRel module in the SIPORT 2

①	Interface for StromRel module	②	Connector for SIPORT 2 print
③	Terminals for StromRel module (Cable cross-section: 0.08 .. 1.5 mm ²)		

The terminals of the StromRel module are configured as follows:

TERMINALS	FUNCTION	DESCRIPTION
1	mA 1 -	Current output 1
2	mA 1 +	
3	mA 2 -	Current output 2
4	mA 2 +	
5, 6	C1	Semiconductor relay 1
7, 8	C2	Semiconductor relay 2
9, 10	C3	Not available

5.8 Connecting the optional junction box

The photometer is connected to the junction box via a connector (1). There is the possibility of connecting the junction box to the SICON-C (2) portable control unit. This enables operation directly on the photometer during servicing duties. Two cable glands (4) are available for connecting to the control system.

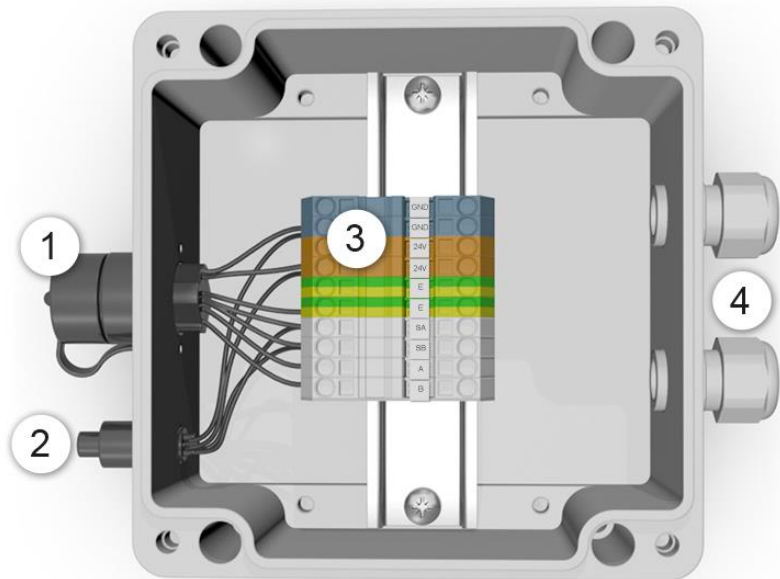


Figure 16: Junction box when open

①	Instrument socket for connecting the photometer	②	Instrument socket for connecting the SICON-C
③	Terminal strip (cable cross-section: 0.08 .. 1.5 mm²)	④	Two cable glands, clamping range 8 .. 13 mm

Establish the electrical connections in the junction box as follows:



TERMINAL DESIGNATION	CABLE COLOR (SIGRIST) 8 WIRES WITH SIPORT 2	CABLE COLOR (SIGRIST) 4 WIRES WITH SICON	REMARKS
GND	Black	Blue	Are connected to each other
GND	White	–	
24V	Green	Red	Are connected to each other
24V	Brown	–	
E, ground / \perp	–	Cable shielding	
E, ground / \perp	–	–	
SA	Blue	Gray	
SB	Red	Yellow	
A	Gray	–	
B	Yellow	–	




6 Commissioning



The initial start-up of the web user interface via the optional WLAN interface is described in the Reference Handbook.

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



	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	Ensure that all components are correctly mounted and connected.	Section 4 and Section 5
2.	2.1: Establish the service voltage to the instrument.	
	2.2: Plug the SICON-C into the instrument according to Section 7.3 and wait until the welcome screen appears in the display.  The factory setting language is English.	
	2.3: The instrument is ready for measurement.	
3.	Set the language.	Section 8.1
4.	Set the limits.	Section 8.2
5.	Set the outputs.	Section 8.3
6.	Configure the adjustment.	Section 8.4
7.	If an optional Profibus module is present, set the Profibus parameters.	Section 8.5
8.	If an optional Profinet IO module is present, set the Profinet parameters.	Section 8.6
9.	If an optional Modbus module is present, set the Modbus parameters.	Section 8.7
10.	If an optional StromRel module is present, set the current outputs.	Section 8.8
11.	Enter the access code.	Section 8.9
12.	Carry out recalibration.	Section 9.4
13.	Back up the configured data.	Section 8.10

7 Operation

7.1 Operation basics

In this document we describe the practical examples only for the first steps of the menu configuration. All other setting options are described in the Reference Handbook. The connection to the optional WLAN module and the web user interface are described in the Reference Handbook.

7.2 LED display on the photometer

The FireGuard 2 has a red LED display in order to indicate the most important events during measuring mode without SICON-C.



Figure 17: Position of the LED display

The events are indicated on the LED according to the following table:

LED status on the photometer	Meaning	Next steps
LED permanently off	Instrument is powered off or defective.	Power on the instrument.
LED flashes every 15 seconds	The instrument is in measuring mode without faults.	
LED flashes twice every 15 seconds	The instrument is in measuring mode without faults. The WLAN access point is active.	
LED switches on and off in one-second intervals	Checking unit recording is running.	Wait until the LED goes out for 5 seconds.
LED switches on and off in four-second intervals	Limit is exceeded	Carry out the measures for when the limit is exceeded.
LED permanently lit	Fault	Isolate the malfunction according to Section 10.

7.3 Connecting SICON-C to SIPORT 2

The SICON-C (2) is connected to the SIPORT 2 (1) on the connector (X). The protection cap on the SIPORT 2 must be removed beforehand. If the SIPORT 2 is connected to the service voltage, the SICON-C starts automatically.

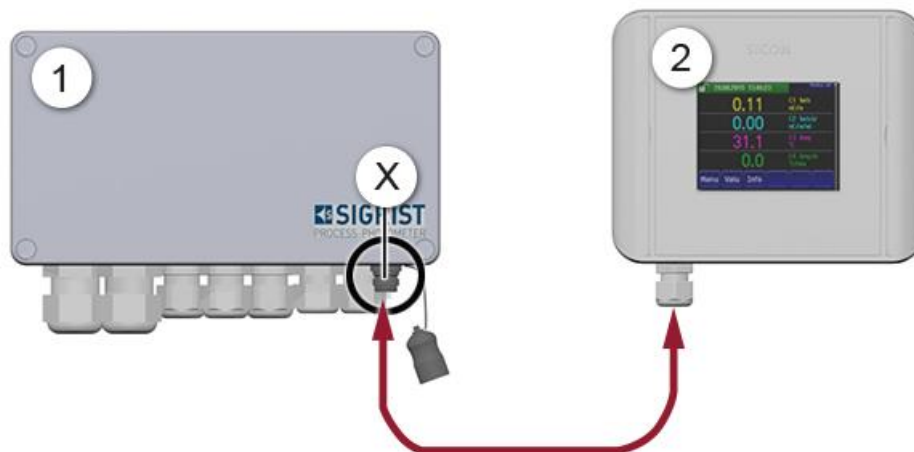


Figure 18: Connecting the SICON-C to the SIPORT 2 with housing

①	SIPORT 2	②	SICON-C
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The SICON-C has a touchscreen. Operation is made by touching the screen 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.

Protection class IP66

If the Sicon-C connection plug is not used, the protective cap must always be mounted and be completely closed to ensure the protection class IP66.

7.4 Connecting the SICON-C to the SIPORT 2 without housing

The SICON-C (2) is connected to the SIPORT 2 without housing (1) on the connector (X). If the SIPORT 2 is connected to the service voltage, the SICON-C starts automatically.

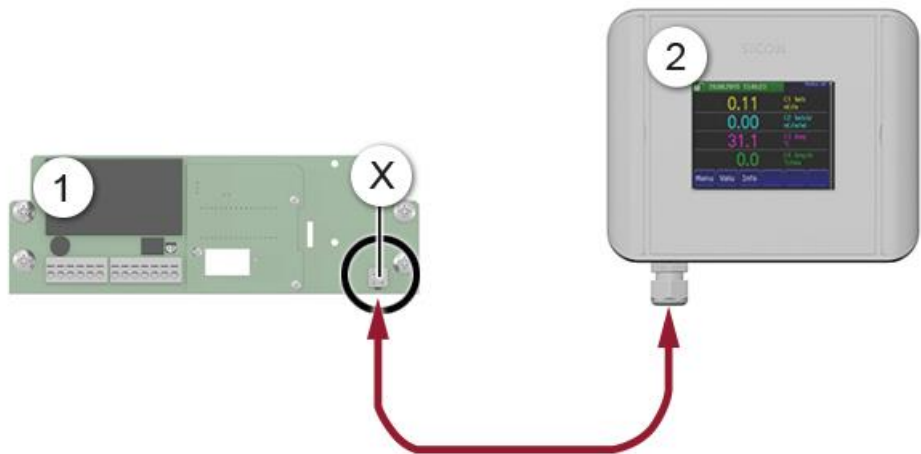


Figure 19: Connecting the SICON-C to the SIPORT 2 without housing

①	SIPORT 2	②	SICON-C
---	----------	---	---------



The SICON-C has a touchscreen. Operation is made by touching the screen with your finger. The navigation elements change color when touched.



CAUTION!

Sensitive touchscreen.

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

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

7.5 Control elements in measuring mode



Figure 20: Control elements in measuring mode

①	Menu button Calls up the menu structure. Section 7.6	②	Valu button Numerical representation of the measuring values. Section 7.7
③	Info button Displays the information screen. Section 7.8	④	Up arrow Goes to the previous page.
⑤	Down arrow Goes to the next page.		

7.6 Menu button

Pressing the **Menu** button and entering the access code takes you to the menu structure. Now the instrument is in service mode. Operator prompting in service mode is described in Section 7.12.

7.7 Valu button

Pressing the **Valu** button displays the measuring values in numerical form. This is described in detail in Section 7.9.

7.8 Info button

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

7.8.1 Page 1 Info button

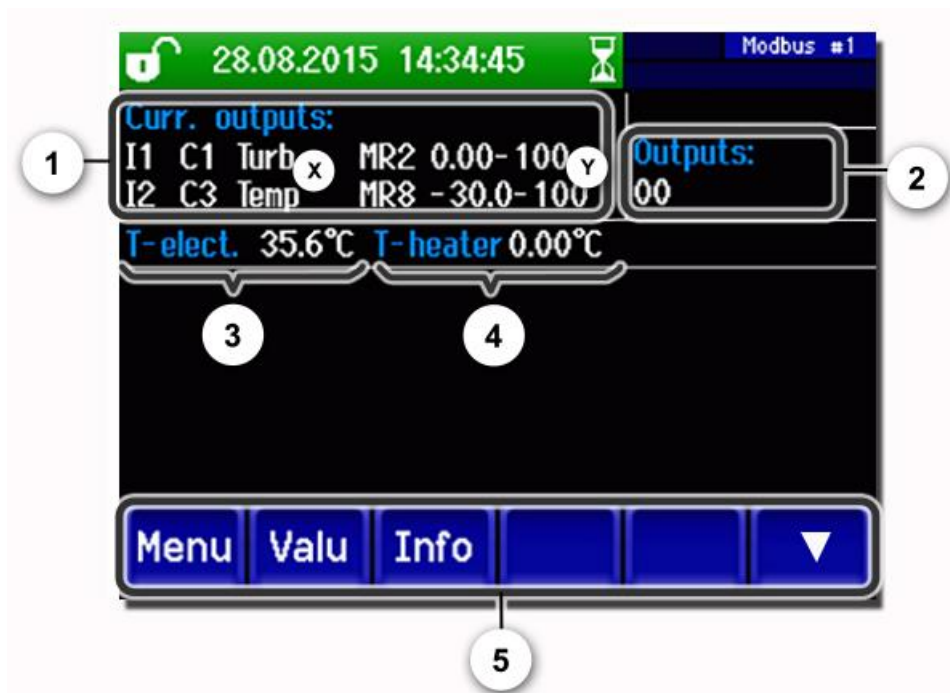


Figure 21: Information screen page 1

①	Information about the available current outputs X: Source of the current output Y: Measuring range of the current output	②	Status of the outputs → Reference Handbook
③	Temperature of the electronics	④	Heater temperature (if heater is inactive: 0 °C) → Reference Handbook
⑤	Main menu buttons		

7.8.2 Page 2, Info button

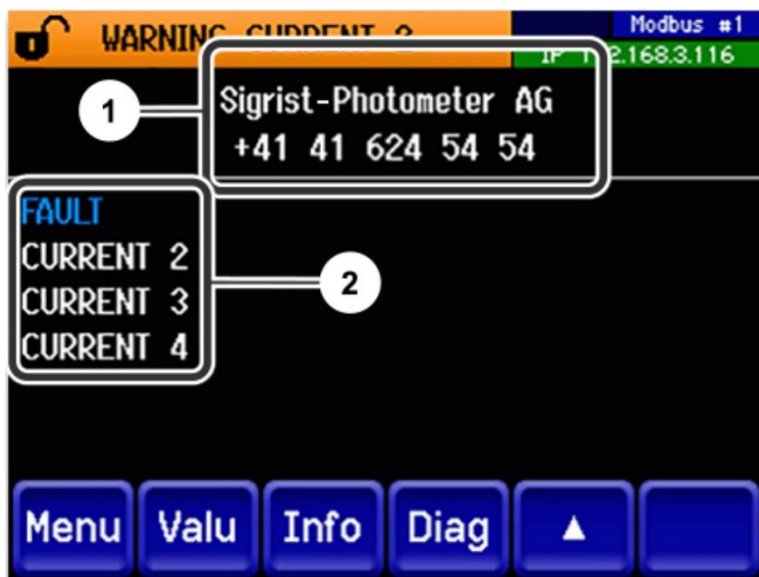


Figure 22: Info screen, page 2

①	Contact information	②	Display of up to 5 pending fault messages
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7.9 Display in measuring mode

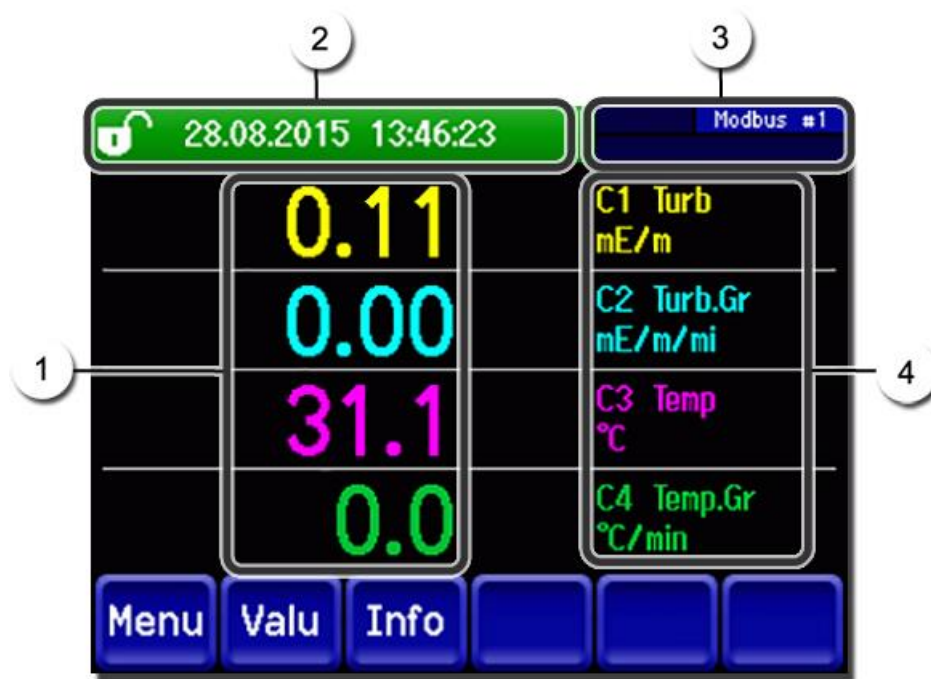


Figure 23: Display in measuring mode

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

7.10 Lock / unlock the touch screen




	MANIPULATION					
1.	Press the lock icon top left.					
2.	<p>Within one second press the key bottom at the outside right.</p> <p>Depending on the initial state, the lock icon changes as follows:</p> <table><tr><td></td><td>Touch screen unlocked</td></tr><tr><td></td><td>Touch screen locked</td></tr></table>		Touch screen unlocked		Touch screen locked	
	Touch screen unlocked					
	Touch screen locked					

7.11 Switching to service mode

The system is configured in service mode. The measuring procedure is interrupted and the main menus appear on the display. Service mode is accessed as follows:



	MANIPULATION	ADDITIONAL INFO / IMAGES
1.	Press the Menu button.	
2.	Enter the access code and confirm with OK .	 Factory setting is 0 .
3.	The main menus appear.	The instrument is now in service mode.

The following applies in service mode:

- * 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 values.
- The limits are deactivated.
- If an output for service is programmed, it is activated.
- Fault messages are suppressed.

* This does not apply when the **Current outputs\General\For service** parameter is set to **Measure**.



For measuring mode, press the **Meas** button. When switching from service mode to measuring mode, an hourglass appears in the information bar for about 10 seconds. The measuring values are frozen during this time.

7.12 Control components in service mode

7.12.1 Input elements in service mode

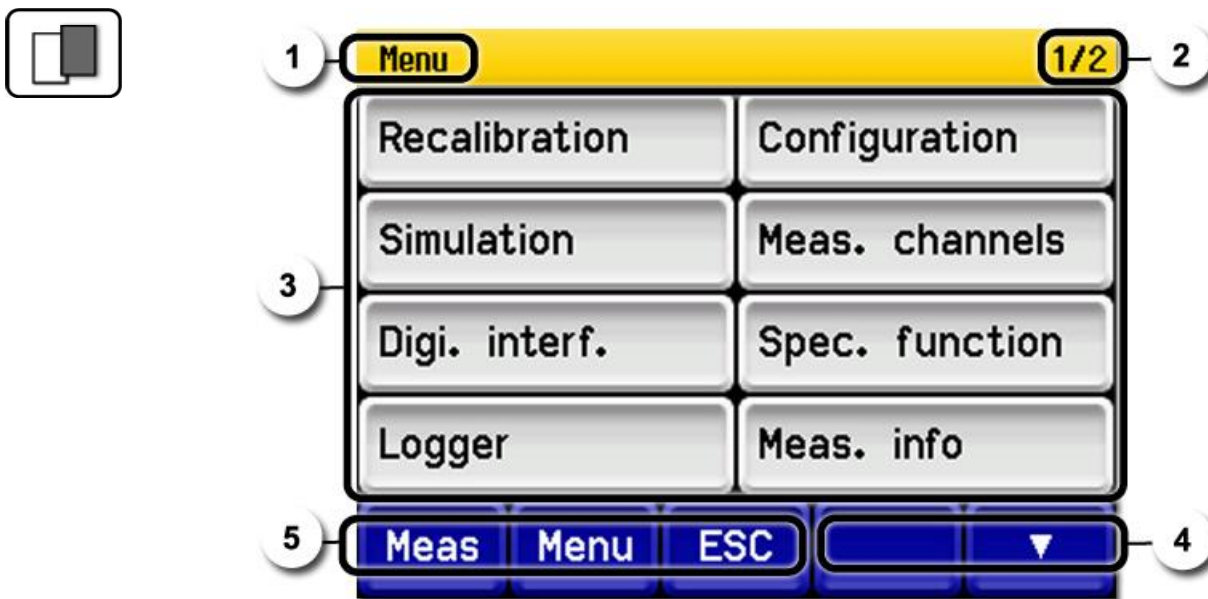


Figure 24: Input elements in service mode

①	Path specification	②	Page number / total number of pages
③	Main menus Instrument-specific menus of the photometer.	④	Next page
⑤	Meas button: The instrument changes to measuring mode. Menu button: The display goes back to main menus and remains in service mode. ESC button: The display goes back one level in the menu hierarchy until the measuring mode finally is reached.		

7.12.2 Numerical entry

The following screen is for entering numbers and data:

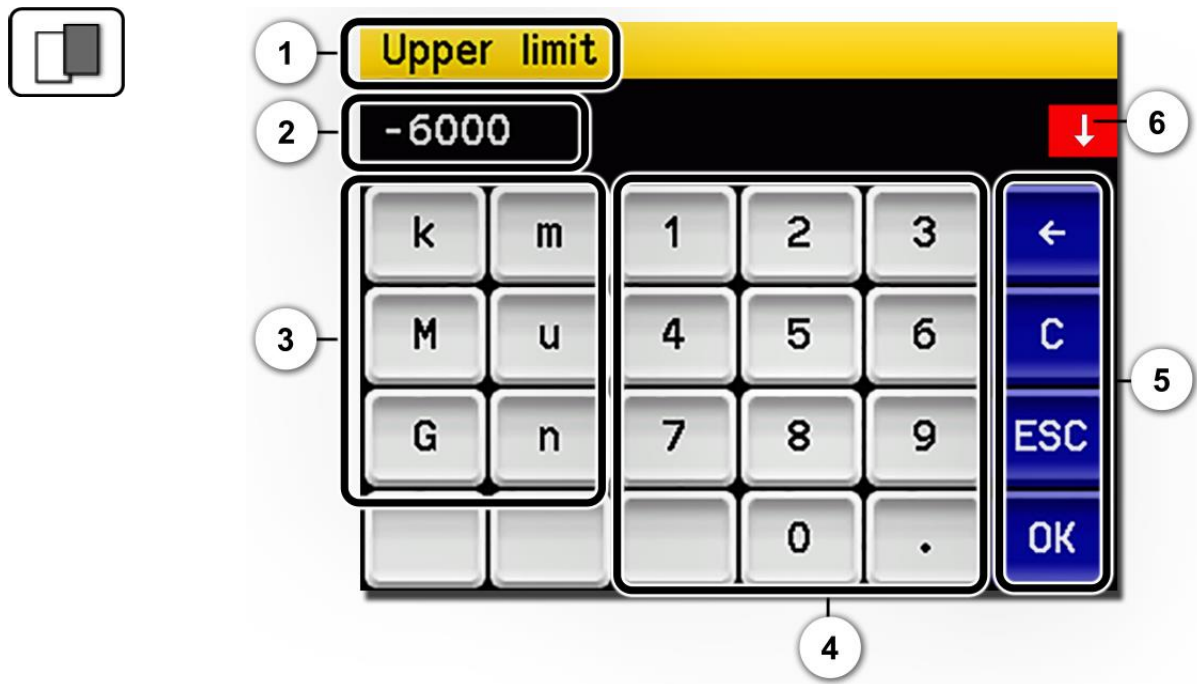


Figure 25: Numerical entry

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

7.12.3 Single selection of functions



The single selection is identifiable by the **ESC** button in the lower right corner.

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 26: Example of single selection

7.12.4 Multiple selection of functions



The multiple selection is identifiable by the **OK** button in the lower right corner.

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 27: Example of multiple selection

8 Settings

8.1 Setting the operating language



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

8.2 Configuring the limits

8.2.1 General information on setting the limits

The monitoring mode of the FireGuard 2 is defined by the settings of the limit function. The following parameters can be monitored:

- Turbidity limit
- Limit for turbidity gradient (→ Section 8.2.6)
- Temperature limit
- Limit for temperature gradient (→ Section 8.2.6)

The following limits are set in the standard configuration:

Limit	Source	Limit	Cut-in delay	Cut-out delay	Remarks
1	Turbidity	10.0	6 s	0 s	Pre-alarm
2	Turb.Grad.	0.0	6 s	0 s	Inactive
3	Tempera- ture	-30.0	6 s	0 s	Inactive
4	Temp.Grad	0.0	6 s	0 s	Inactive
5	Turbidity	30.0	8 s	0 s	Main alarm
6	Turb.Grad.	0.0	8 s	0 s	Inactive
7	Tempera- ture	-30.0	8 s	0 s	Inactive
8	Temp.Grad	0.0	8 s	0 s	Inactive

On the temperature limits, the value -30.0 indicates that the function is deactivated. On all other limits, the value 0.0 indicates that the function is deactivated.

The following applies for limit monitoring:



CAUTION!

The limits used must be adjusted according to the local conditions.

- Limits 1 .. 4 are intended for the lower limit level (pre-alarm) and are assigned to output A1.
- Limits 5 .. 8 are intended for the higher limit level (main alarm) and are assigned to output A2.
- In the standard setting, only the monitoring of the turbidity value is used.
- In order for a pre-alarm to always be triggered first before a main alarm, the cut-in delay of the main alarm must be greater than that of the pre-alarm.







The limits have to be configured according to Section 8.3 so that they are not only displayed, but also output accordingly.

8.2.2 Setting the limits

The limits can be set as follows:



	MANIPULATION	ADDITIONAL INFO / IMAGES
1.	Press the Menu button.	
2.	Enter the access code and confirm with OK .	 Factory setting is 0 .
3.	Press the Limits button.	 If the desired menu does not appear, press the arrow at the bottom right.
4.	Select between Limit 1 .. 8 .	
5.	Define the source.	The following selection is available (when present): <ul style="list-style-type: none"> ▪ C1: Turbidity ▪ C2: Turbidity gradient ▪ C3: Temperature ▪ C4: Temperature gradient
6.	Define the upper limit, cut-in delay (Section 8.2.4) and cut-out delay (Section 8.2.5) with the number pad.  Limits of -30.0 °C for the temperature and 0.0 for the turbidity and gradient values mean that the function is inactive .	 Pressing the current number value takes you to the entry mode.
7.	Press the Meas button.	The instrument is in measuring mode again.

8.2.3 How a limit is formed

A **non-integrated measuring value** is used internally to form the limit for the turbidity value. If all measuring values are above the limit across the set cut-in delay time, then an alarm is triggered. This procedure prevents false alarms caused by individual peaks in the measuring values. The limit status (relay) can also be read via the fieldbus interface.

An integration time of 6 seconds is set as standard for the turbidity value (→ Reference Handbook). This only affects the display and output value on the customer interface, but **not** the formation of the limit.



If monitoring of the limits is made using external software, then the following procedure is recommended:

1. Set integration to 0.
 2. Read the measuring value every 0.5 seconds.
 3. Trigger an alarm if all measuring values are above the limit across the cut-in delay time (typically 6 seconds for a pre-alarm and 8 seconds for a main alarm).
 4. Integrate the turbidity value, for displaying as needed.
-

8.2.4 Defining the cut-in delay

A cut-in delay prevents alarms caused by individual peaks in the measuring values. Setting this value too low can lead to an increase in the amount of false alarms. Setting this value too high can lead to a delay in the alarm being triggered.

To prevent false alarms, we recommend setting a cut-in delay of **at least six seconds** for monitoring the turbidity limit.

In order to enable a quick reaction if the turbidity limit is exceeded, monitoring of the turbidity is made based on the **non**-integrated measuring value.

The event (E) must persist for at least the cut-in delay time (T_{EV}) for the relay (R) to switch on.

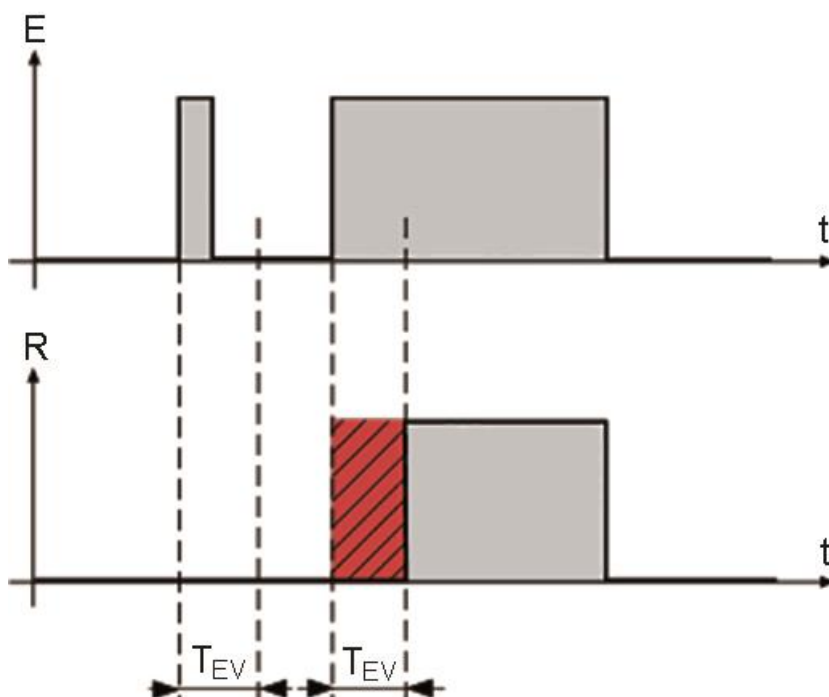


Figure 28: Cut-in delay

8.2.5 Defining the cut-out delay

The event (E) must be interrupted for at least the cut-out delay time (T_{AV}) for the relay (R) to switch off. Short interruptions to an active event can thus be bridged.

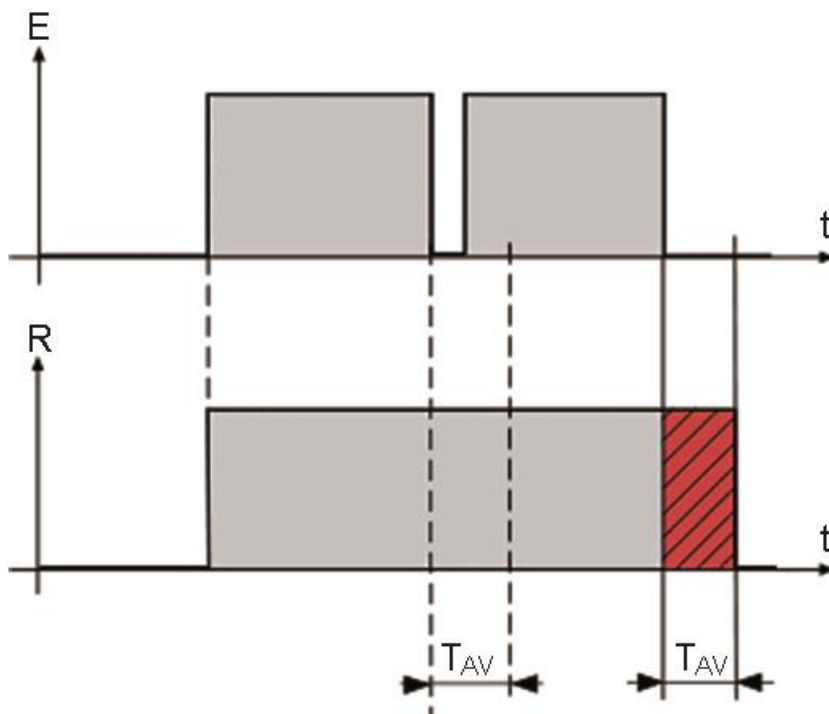


Figure 29: Cut-out delay

8.2.6 Calculating the gradient

A constant mean value ($M_w 1/2$) is calculated from two consecutive five-second intervals (first block with 10 measuring values, second block with 10 measuring values). The difference between both mean values forms the gradient, which is then scaled to one minute. The gradient of the turbidity value and temperature is calculated.

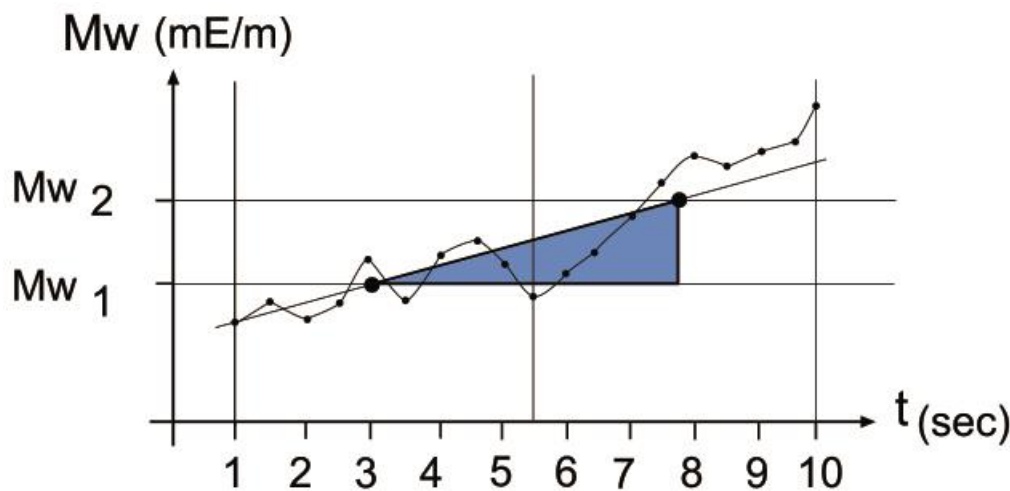


Figure 30: Calculating the gradient



The turbidity gradient is determined from the integrated measuring value. Changing the integration time thus also has an effect on the turbidity gradient.

8.2.7 Reading if limit exceeded or undershot



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

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

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



8.3 Setting the outputs for limit monitoring

8.3.1 General information on limit monitoring

Two digital outputs (O1/O2) are available for the status output of faults and limits. These two outputs (O1/O2) are coded. The states of these outputs are also available via the fieldbus interface, although no physical outputs are present in this case.

The following two modes are available for monitoring the limits:

- In mode 1, one limit level (alarm) is monitored
- In mode 2, two limit levels (pre-alarm and factory-set main alarm) are monitored

Both modes are described in detail in the following Section 8.3.2 and Section 8.3.3:

8.3.2 Mode 1

Mode 1 is active if the limits 5 .. 8 in the **Limits** menu are all set to **inactive**. Output 1 is used for when the limit is exceeded (alarm) and output 2 for the fault messages. Outputs O1 and O2 can be inverted. On output 1, the behavior in the event of a fault can also be defined. If **Fault** is activated on output 1 (O1), then this is activated both when a limit is exceeded and in the event of a fault on the instrument. The three states Normal, Alarm and Fault are not coded.

The following table shows how the behavior of the outputs (A1/A2) can be influenced:

O1 Limit																
Invert	No		Yes		No		Yes		No		Yes		No		Yes	
Fault	No		No		No		No		Yes		Yes		Yes		Yes	
O2 Fault																
Invert	No		No		Yes		Yes		No		No		Yes		Yes	
State	O2	O1	O2	O1	O2	O1	O2	O1	O2	O1	O2	O1	O2	O1	O2	O1
Normal	0	0	0	1	1	0	1	1	0	0	0	1	1	0	1	1
Alarm 1	0	1	0	0	1	1	1	0	0	1	0	0	1	1	1	0
Fault	1	0	1	1	0	0	0	1	1	1	1	0	0	1	0	0

0 = high-resistance output

1 = low-resistance output

8.3.3 Mode 2 (factory setting)

Mode 2 is active if one of the limits 5 .. 8 is active. Two limit levels are monitored. The four states "Normal", "Pre-alarm", "Main alarm" and "Fault" are coded in binary. The following table shows how the behavior of the outputs (O1/O2) can be influenced:

O1 Limit Invert	No		Yes		No		Yes	
O2 Fault Invert	No		No		Yes		Yes	
State	O2	O1	O2	O1	O2	O1	O2	O1
Normal	0	0	0	1	1	0	1	1
Alarm 1 (pre-alarm)	0	1	0	0	1	1	1	0
Alarm 2 (main alarm)	1	0	1	1	0	0	0	1
Fault	1	1	1	0	0	1	0	0

0 = high-resistance output

1 = low-resistance output

Bold = factory setting





The **Fault** parameter on output 1 has no effect here. Limits 5 .. 8 are prioritized. If the same event should be monitored on different levels on output 1 and 2, then it is absolutely essential that the lower level (pre-alarm) is configured on output 1 and the higher level (main alarm) is configured on output 2.

8.3.4 Setting the outputs

The outputs can be set as follows:



	MANIPULATION	ADDITIONAL INFO / IMAGES
1.	Press the Menu button.	
2.	Enter the access code and confirm with OK .	 Factory setting is 0 .
3.	Press the Inp./outputs button.	 If the desired menu does not appear, press the arrow at the bottom right.
4.	Press the Outputs button.	
5.	Select O1 Limit .. O2 Fault .	
6.	Activate the outputs (multiple selection possible).	Activated outputs are highlighted green. <ul style="list-style-type: none"> ▪ Invert: Inverts the outputs ▪ Fault (on O1 only)
7.	Press the Meas button.	The instrument is in measuring mode again.

8.4 Setting the recalibration

If the **Auto start recal.** parameter is activated, then the installation of the checking unit in the photometer automatically triggers a recalibration. This allows servicing duties to be carried out without the use of a control unit. The state of the recalibration can be monitored via the LED display (Section 7.2).



	MANIPULATION	ADDITIONAL INFO / IMAGES
1.	Press the Menu button.	
2.	Enter the access code and confirm with OK .	i Factory setting is 0 .
3.	Press the Recalibration button.	
4.	Press the General button.	
5.	Set Auto start recal. to Active or Inactive .	
6.	Press the Meas button.	The instrument is in measuring mode again.

8.5 Setting the Profibus DP parameters

This setting only has to be carried out if the optional Profibus module is used.





	MANIPULATION	ADDITIONAL INFO / IMAGES
1.	Press the Menu button.	
2.	Enter the access code and confirm with OK .	i Factory setting is 0 .
3.	Press the Digi. interf. button.	
4.	Press the Profibus DP button.	
5.	In the Control menu, select either Local or External .	<ul style="list-style-type: none"> ▪ Local: Values can only be read via Profibus. ▪ External: Values can be read and written via Profibus.
6.	Enter the desired number under Slave no.	Values between 1 and 240 are possible.
7.	Press the Meas button.	The instrument is in measuring mode again.
8.	To activate the parameters, the instrument must be switched off and then switched on again.	

8.6 Setting the Profinet IO parameters

This setting only has to be carried out if the optional Profinet IO module is used.




	MANIPULATION	ADDITIONAL INFO / IMAGES
1.	Press the Menu button.	
2.	Enter the access code and confirm with OK .	 Factory setting is 0 .
3.	Press the Digi.interf. button.	
4.	Press the Profinet IO button.	
5.	In the Control menu, select either Local or External .	<ul style="list-style-type: none"> ▪ Local: Values can only be read via Profinet. ▪ External: Values can be read and written via Profinet.
6.	If the station name has been changed since starting the program, this can be updated by pressing the Station name load... button.	 Loading the station name results in a brief interruption in communication.
7.	Press the Meas button.	The instrument is in measuring mode again.
8.	To activate the parameters, the instrument must be switched off and then switched on again.	

8.7 Setting the Modbus RTU parameters

This setting only has to be carried out if the optional Modbus module is used.



	MANIPULATION	ADDITIONAL INFO / IMAGES
1.	Press the Menu button.	
2.	Enter the access code and confirm with OK .	 Factory setting is 0 .
3.	Press the Digi. interf. button.	
4.	Press the Modbus button.	
5.	Enter the desired number under Slave no..	Values between 1 and 240 are possible.
6.	Select the Baudrate menu.	Values between 4800 and 230400 baud are possible.
7.	Select the Parity menu.	The settings None , Even and Odd are possible.
8.	Select the Stopbit menu.	1 or 2 Stopbit are possible.
9.	Press the Meas button. The parameters are activated.	The instrument is in measuring mode again.

8.8 Setting the current outputs

This setting only has to be carried out if the optional StromRel module is used.



	MANIPULATION	ADDITIONAL INFO / IMAGES
1.	Press the Menu button.	
2.	Enter the access code and confirm with OK .	i Factory setting is 0 .
3.	Press the Curr. outputs button.	
4.	Select between C 1 .. 2 .	
5.	Select the Source menu.	For C1: C1 Turb For C2: C3 Temp
6.	Select the Range menu.	For C1: MR1 0 .. 50 mE/m For C2: MR2 -20 .. 80 °C
7.	Press the Meas button.	The instrument is in measuring mode again.

Measuring range no.	Measuring range (standard)	Measuring range (customer-specific)
MR1	0 .. 50	
MR2	-20 .. 80	
MR3	0 .. 0	
MR4	0 .. 0	
MR5	0 .. 0	
MR6	0 .. 0	
MR7	0 .. 0	
MR8	0 .. 0	



If other measuring ranges are needed, the table above can be reprogrammed as required. Other parameters for the current outputs are described in the Reference Handbook.

8.9 Setting or changing the access code

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



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



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

Enter your personal access code here:

--	--	--	--	--	--

8.10 Backup 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.	Enter the access code and confirm with OK .	i Factory setting is 0 .
3.	Press the System info. button.	i If the desired menu does not appear, press the arrow bottom right.
4.	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.
5.	Press the Meas button.	The instrument is in measuring mode again.

9 Servicing



Damage to the instrument due to servicing duties that have not been carried out or have been carried out improperly.

If servicing duties are not carried out according to the servicing schedule or non-original SIGRIST spare parts are used, this can lead to damage to the instrument or measuring errors.

In this case, SIGRIST-PHOTOMETER AG accepts no warranty claims made by the customer and is not responsible for any subsequent costs. To avoid this situation, please adhere to the following steps:

- Carry out servicing duties according to the servicing schedule (Section 9.1).
- When carrying out servicing duties, use original SIGRIST spare parts according to the spare parts list (Section 15). The use of third-party spare parts requires the written approval of SIGRIST-PHOTOMETER AG.
- If the instruments are subjected to heavy use or exposed to severe environmental conditions, servicing duties must be carried out more often as required. Wear parts in particular must be replaced more often depending on the circumstances.

9.1 Servicing schedule



Alarms can be triggered during servicing duties. Therefore, evaluations of the alarm events should be suppressed in advance.

WHEN	WHO	WHAT	PURPOSE
Annually or as needed	Operator	Cleaning the measuring cell Section 9.2	Obligatory measure for maintaining measuring accuracy.
As needed or in the event of an adjustment fault	Operator	Cleaning the optics Section 9.3	Obligatory measure for maintaining measuring accuracy.
Annually	Operator	Recalibration of the photometer Section 9.4	Obligatory measure for maintaining measuring accuracy.
Every 10 years or as needed	Operator	Replacing the battery in the SICON-C Section 9.5	Obligatory measure for maintaining functional efficiency.

Table 1: Servicing schedule

9.2 Cleaning the measuring cell

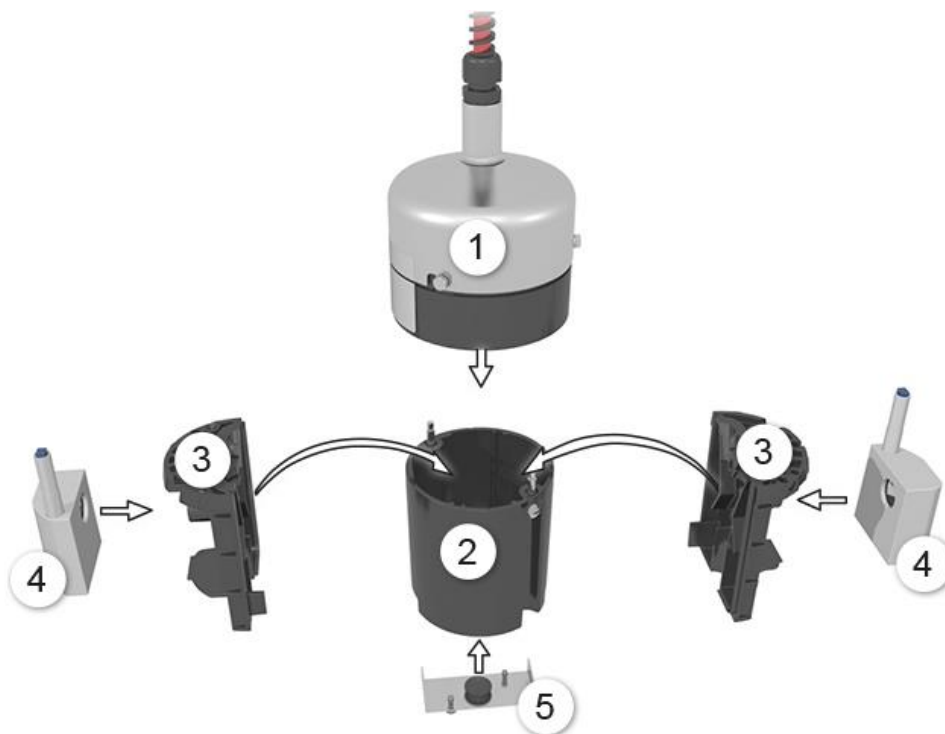


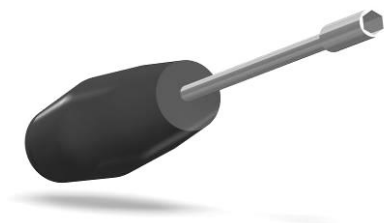
Figure 31: Exploded drawing of the FireGuard 2


①	Electronic component	②	Measuring cell housing
③	Measuring cell inserts, left and right	④	Heater, left and right (depending on equipment)
⑤	Contamination protection		

The following procedure describes how to clean the measuring cell on the FireGuard 2:



- The photometer can be disassembled using an Allen wrench (size 7).

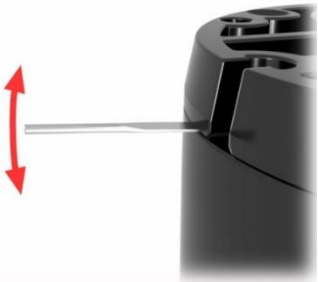


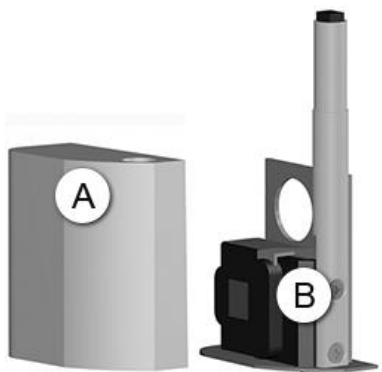


-  The screws must not be overtightened, as the thread may then be damaged. **Do not exceed a tightening torque of 1 Nm.**
- Check all removed parts for possible damages or signs of wear and replace with new parts when necessary.


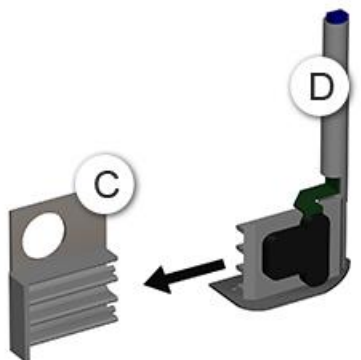
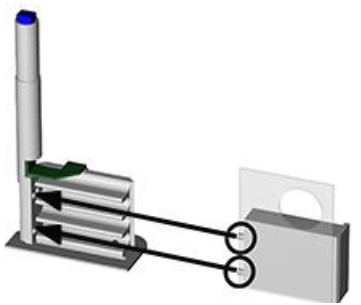
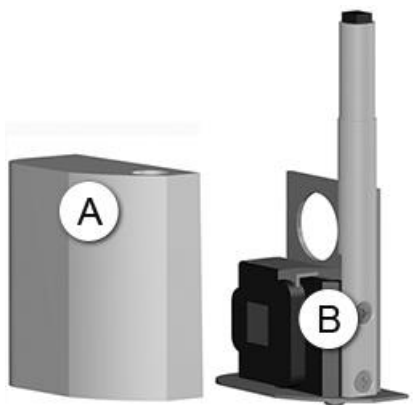



	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	<p>1 Only carry out this step for installation in suspended ceilings.</p> <p>Loosen and swing away the two fastening clips (circles). Lift the photometer out of the measuring position.</p>	
2.	<p>Remove and clean the contamination protection (circles).</p>	
3.	<p>Remove the measuring cell housing (Figure 31, pos. 2) by loosening the screws on both sides of the electronic component.</p> <p>⚠ If present, The sample heater can reach temperatures of up to 80 °C!</p>	



	WORKSTEP	ADDITIONAL INFO / IMAGES
4.	<p>Clean the measuring cell inserts.</p> <p>Lift the measuring cell inserts (Figure 31, pos. 3) out of the measuring cell housing and clean them.</p> <p>Pay special attention to the radiation absorption surfaces (circle) when doing this – these must be clean.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p> Use a soft brush and damp cloth for cleaning (no solvents!)</p> </div> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>i If the measuring cell inserts (Figure 31, pos. 3) are stuck in the measuring cell housing, insert the screwdriver into the gap and carefully lever out the inserts.</p>  </div>	
5.	<p>Clean the sample heaters.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>i Only carry out this step if sample heaters are present.</p> </div> <p>5.1: Let the sample heaters (Figure 31, pos. 4) cool down first.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p> The sample heater can reach temperatures of up to 80 °C!</p> </div> <p>5.2: Pull the sample heaters (Figure 31, pos. 4) from the measuring cell inserts (Figure 31, pos. 3).</p> <p>5.3: Using your thumb (see arrow in figure below), push the heating element (B) out of the insulating shell (A).</p> 	





	WORKSTEP	ADDITIONAL INFO / IMAGES
	<p>5.4. Clean the heating element with the brush.</p> <p>The heating element can be disassembled into the following two elements:</p> <p>C: Heating body 1 D: Heating body 2</p> <div>  Do not use moisture when cleaning the heating elements. </div>	
	<p>5.5: Assemble the two heating elements (C) and (D) together with the sample heater. Pay attention to the pins (circles).</p>	
	<p>5.6: Insert the heating elements (B) into the insulating shell (A).</p>	
	<p>5.7: Reinsert the sample heaters (Figure 31, pos. 4) into the measuring cell inserts (Figure 31, pos. 3).</p>	
6.	<p>Clean the inside of the measuring cell housing (Figure 31, pos. 2).</p> <div>  Use a brush and damp cloth for cleaning (no solvents!) </div>	



	WORKSTEP	ADDITIONAL INFO / IMAGES
7.	<p>Assemble the measuring cell housing:</p> <p>Put the two measuring cell inserts together (Figure 31, pos. 3) and insert into the measuring cell housing (Figure 31, pos. 2).</p> <p>The cam on the measuring cell housing (arrow) must be aligned to the continuous slot on the measuring cell insert.</p> <p>Check that the two white points (circle) are aligned to one another.</p>	
8.	<p>Connect the measuring cell housing to the electronic component.</p> <p>The pin on the optics holder (arrow) must be aligned to the bore, and the white markings on the electronic component and measuring cell housing must be aligned to one another.</p> <p>If sample heaters (Figure 31, pos. 3) are present, then these must be aligned to the bores on the optics holder (circles). See figure below.</p>	



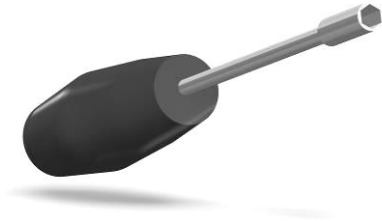
	WORKSTEP	ADDITIONAL INFO / IMAGES
9.	<p>Fasten the measuring cell housing in place on the electronic component with both screws.</p> <p>⚠ The screws must not be overtightened, as the thread may then be damaged. Do not exceed a tightening torque of 1 Nm.</p> <p>⚠ In order to prevent cold welding, the fastening screws must be greased before assembly (Molykote 1000 has proven a suitable grease for this purpose).</p>	
10.	<p>Refasten the foreign body protector (Figure 31, pos. 5).</p> <p>⚠ The screws must not be overtightened, as the thread may then be damaged. Do not exceed a tightening torque of 1 Nm.</p> <p>⚠ In order to prevent cold welding, the fastening screws must be greased before assembly (Molykote 1000 has proven a suitable grease for this purpose).</p>	
11.	<p>The photometer is now ready for operation and can be fastened back in the measuring position.</p>	


9.3 Cleaning the optics

The following procedure describes how to clean the optics on the FireGuard 2:


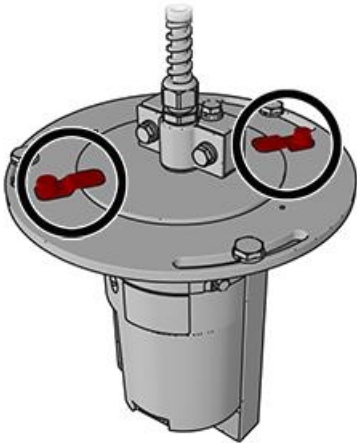




- The photometer can be disassembled using an Allen wrench (size 7).



-  The screws must not be overtightened, as the thread may then be damaged. **Do not exceed a tightening torque of 1 Nm.**
- Check all removed parts for possible damages or signs of wear and replace with new parts when necessary.



	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	<div> Only carry out this step for installation in suspended ceilings. Loosen and swing away the two fastening clips (circles). Lift the photometer out of the measuring position.</div>	
2.	<div>Remove the measuring cell housing (Figure 31, pos. 2) by loosening the screws on both sides of the electronic component.</div> <div> The sample heater can reach temperatures of up to 80 °C!</div>	



	WORKSTEP	ADDITIONAL INFO / IMAGES
3.	<p>Clean the lens and window on the optics holder with a cotton-tipped applicator soaked in ethanol (circles).</p> <p>The optics holder is found on the electronic component (Figure 31, pos. 1).</p> <p>Also inspect the gasket (X) on the optics holder and replace, if necessary. The article numbers are listed in the Section 15.</p>	
4.	<p>Connect the measuring cell housing to the electronic component.</p> <p>The pin on the optics holder (arrow) must be aligned to the bore, and the white markings on the electronic component and measuring cell housing must be aligned to one another.</p> <p>If sample heaters (Figure 31, pos. 3) are present, then these must be aligned to the bores on the optics holder (circles). See figure below.</p>	
5.	<p>Fasten the measuring cell housing in place on the electronic component with both screws.</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p> The screws must not be overtightened, as the thread may then be damaged. Do not exceed a tightening torque of 1 Nm.</p> </div> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p> In order to prevent cold welding, the fastening screws must be greased before assembly (Molykote 1000 has proven a suitable grease for this purpose).</p> </div>	
6.	<p>The photometer is now ready for operation and can be fastened back in the measuring position.</p>	

9.4 Recalibrating the FireGuard 2

9.4.1 General information on recalibrating the FireGuard 2



Recalibrating the photometer can result in deviations from the previous measuring value as the instrument is newly reset to a reference value (checking unit). The instrument should be cleaned before recalibration according to Section 9.2.

- Recalibration can be triggered via the SICON-C portable control unit, or automatically by plugging in the checking unit. The automatic triggering of a recalibration can be activated under **Recalibration\General\Auto start recal.**
- The nominal values on two checking units can be saved in the FireGuard 2. The checking units are identified via a serial number.
- The checking unit currently in use must be defined in the **Recalibration\C1\Cont. active** menu. Checking unit 1 is set as standard.

9.4.2 Setting checking unit number in use








	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	Switch to service mode as described in Section 7.11.	
2.	Select the checking unit currently in use in the Recalibration \ C1 \ Cont. active menu.	

9.4.3 Manual adjustment with a SICON-C

The following procedure describes how manual adjustment is made with a SICON-C:



	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	Plug in the SICON-C on the SIPORT 2 connection box.	
2.	Remove the contamination protection by removing both screws (circles) on the photometer.  The photometer can be left in the measuring position when installed in walls and ceilings. When installed in suspended ceilings, the instrument has to be removed from the measuring position according to Section 4.3.	
3.	Switch the photometer to service mode as described in Section 7.11.	
4.	Check the serial number of the checking unit against the number of the instrument. These must match.	

	WORKSTEP	ADDITIONAL INFO / IMAGES
5.	Insert the checking unit up to the stop.  The markings on the checking unit and FireGuard 2 must match (circles) and the pin (arrow) must be aligned to the bore on the FireGuard 2.	
6.	Switch to the Recalibration\C1 menu.	
7.	Check whether the saved nominal value matches the information on the checking unit.	
8.	Carry out the adjustment as follows: Press the initiate... key and wait. The LED on the photometer also starts to flash. If the adjustment was successful, this is confirmed with Adjustment OK . This completes the adjustment. 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: <ul style="list-style-type: none"> ▪ Cleanliness of the checking unit. ▪ Correct checking unit used. ▪ Does the nominal value match the value on the checking unit? ▪ Soiled optics in the instrument. In this case, check the cleanliness of the optics as described in Section 9.2 and then repeat the procedure. 	 If the check could not be successfully completed, contact your country representative. Section 11
9.	Remove the checking unit again and mount the contamination protection back on the photometer.	
10.	The instrument can now be operated again.	



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

9.4.4 Automatically triggered adjustment without SICON-C



WARNING!

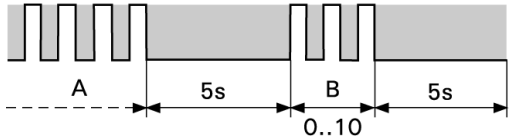
Alarms can also be triggered as a result of the automatically triggered adjustment.

Therefore, switch the instrument to service mode in advance or inform the responsible alarm center.

The following procedure describes how adjustment is made automatically without a SICON-C control unit. However, this can only be carried out when **Auto start recal.** has been activated according to Section 8.4.



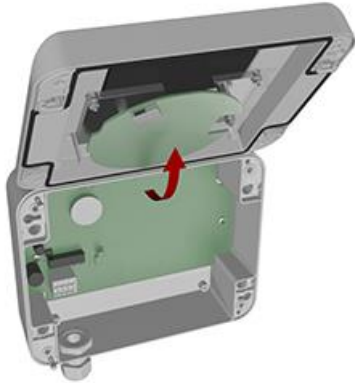
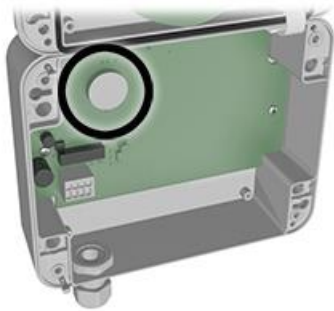


	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	<p>Remove the contamination protection by removing both screws (circles) on the photometer.</p> <p>1 The photometer can be left in the measuring position when installed in walls and ceilings. When installed in suspended ceilings, the instrument has to be removed from the measuring position according to Section 4.3.</p>	
2.	<p>Check the serial number of the checking unit against the number of the instrument. These must match.</p>	
3.	<p>Insert the checking unit as follows.</p> <p>1. Insert the checking unit up to the stop.</p> <p>1 The markings on the checking unit and FireGuard 2 must match (circles) and the pin (arrow) must be aligned to the bore on the FireGuard 2.</p> <p>2. The LED flashes in four-second intervals.</p>	

	WORKSTEP	ADDITIONAL INFO / IMAGES
4.	<p>The checking unit is detected</p> <p>If the checking unit is detected by the instrument, then the LED starts flashing in one-second intervals and the adjustment is carried out automatically.</p> <p>The checking unit is not detected</p> <p>If the checking unit is not detected by the instrument, then the LED continues to flash in four-second intervals. 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? ▪ Does the nominal value match the value on the checking unit? ▪ Soiled optics in the instrument. <p>In this case, check the cleanliness of the optics as described in Section 9.2 and then repeat the procedure.</p>	
5.	<p>After the adjustment has been made successfully, the current soiling level is indicated by a flash code on the LED:</p> <ol style="list-style-type: none"> 1. The LED goes out for five seconds. 2. The flash code indicates the current soiling level. 3. A second phase where the LED goes out for five seconds indicates that the code is finished.  <p>If the LED flashes more than five times, then the soiling level is too high. The FireGuard 2 must be cleaned according to the servicing schedule.</p> <p>4. Remove the checking unit.</p>	<p>A: Adjustment flashes approximately 20 times in one-second intervals.</p> <p>B: Flash code key: Flashes zero times = clean Flashes up to ten times = soiling limit reached</p>
6.	Return the instrument to its initial state.	

9.5 Changing the battery in the control unit



	WORKSTEP	ADDITIONAL INFO / IMAGES
1.	Unplug the connection tot he instrument.	
2.	Open the flaps on the instrument.	
3.	Loosen the four screws (circles).	
4.	Open the cover of the instrument.	
5.	Remove the battery (circle) and replace with a new one.	
6.	Close the instrument.	

10 Troubleshooting

10.1 Pinpointing malfunctions

MALFUNCTION	MEASURE
No reading	<ul style="list-style-type: none">▪ Check whether the supply voltage is connected.
Fault message in the display	<ul style="list-style-type: none">▪ Analyze the fault message according to the following sections.
The reading appears to be wrong	<ul style="list-style-type: none">▪ Carry out recalibration. Section 9.4▪ Check whether the instrument is correctly mounted. Section 4▪ Ensure that the servicing duties have been performed according to the servicing schedule. Section 9.1

Table 2: Pinpointing malfunctions



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

10.2 Warning messages and effect on operation

Warnings indicate an unusual state.



WARNING

If a warning occurs during operation, it has the following effects:

- The system continues to operate. However, the measuring results must be evaluated with caution. The cause of the warning message should be remedied at the next possible opportunity.
- When the cause of the warning has been remedied, it is automatically deleted.
- When the **Warning** message occurs, the color of the status display changes to **orange** and the warning text describes the warning in question.



Example: **WARNING CURRENT 1**

The following warning messages can be displayed:


WARNING MESSAGE	DESCRIPTION	POSSIBLE CAUSES
V IN	The input voltage is outside the permitted range (9 to 30 VDC).	<ul style="list-style-type: none"> ▪ The service voltage is faulty
ADJUST FAULT	Recalibration could not be carried out.	<ul style="list-style-type: none"> ▪ The instrument is soiled ▪ The nominal value for the adjustment does not match the value of the checking unit
SOILING	The soiling level is greater than the set limit.	<ul style="list-style-type: none"> ▪ The measuring cell is soiled and has to be cleaned ▪ The cleaning interval is too long ▪ The installation position is incorrect
FLOW RATE	The flow rate monitoring has been actuated. In the last 4 days, the value of the turbidity gradient was always smaller than the flow rate limit.	<ul style="list-style-type: none"> ▪ No air flow in tunnel ▪ No traffic ▪ The foreign body protector is extremely soiled ▪ The optics are extremely soiled
HEATER	The sample heater does not reach its nominal temperature.	<ul style="list-style-type: none"> ▪ Very cold environment with high winds ▪ The heater is defective
OVER TEMP	The temperature in the instrument has exceeded 65 °C.	<ul style="list-style-type: none"> ▪ The medium or ambient temperature is too high and defective/no cooling

WARNING MESSAGE	DESCRIPTION	POSSIBLE CAUSES
CURRENT 1 .. 2	Current output 1 .. 2 is disturbed.	<ul style="list-style-type: none"> Terminals are open Interruption of the current loop of the reading output
TEMP.SENSOR	The inner temperature sensor failed.	<ul style="list-style-type: none"> Defect in the electronic system → Service technician
SERVICE	Shows when service work is due.	<ul style="list-style-type: none"> Service work is due.
VERS.SD CARD	The data on the microSD card does not match the current software.	<ul style="list-style-type: none"> Update was performed incorrectly.
WATCHDOG	The internal fault monitoring has been actuated. The program has been re-started.	<ul style="list-style-type: none"> Program crash

Table 3: Possible warning messages

10.3 Fault messages and effect on operation



FAULTS	
<p>If a fault 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 of the concerned photometer go to 0. Assigned current outputs go to the programmed electrical current If fault. Assigned limits are deactivated. When the Fault message appears, the color of the status display changes to red and the text describes the fault in question. If an output for faults is programmed, it is activated. 	 <p>Example: FAULT SERIAL 1</p> <p>1 If the cause of the fault has been remedied, it is automatically deleted.</p>

The following fault messages can be displayed:

FAULT MESSAGE	DESCRIPTION	POSSIBLE CAUSES
SLAVE SW VERS	The software version of the photometer does not match that of the control unit.	<ul style="list-style-type: none"> Different delivery data on instrument and control unit. Carry out a slave update with a SICON-C → Reference Handbook

FAULT MESSAGE	DESCRIPTION	POSSIBLE CAUSES
SERIAL 1	The control unit cannot establish a connection to the photometer.	<ul style="list-style-type: none"> Interrupted connection to the photometer. Defect in the electronic system. → Service technician
V ANALOG	One of the internal analog voltages is outside the permitted range.	<ul style="list-style-type: none"> Defect in the electronic system. → Service technician
MEASUR.FAULT	Measuring value acquisition is faulty.	<ul style="list-style-type: none"> External light (e.g. measuring cell removed). Defect in the electronic system. → Service technician
LIGHTSOURCE 1	The detector for monitoring the light source receives no light from the corresponding light source.	<ul style="list-style-type: none"> Defective light source. → Service technician
MASTER SW VERS	This fault message is displayed when the software version of the SICON-C is older than the version of the connected photometer.	<ul style="list-style-type: none"> Software is not the most recent version. In this case, the software of the control unit must be updated to the most recent version. → Reference Handbook

Table 4: Possible fault messages

10.4 Prioritized fault messages and their effect on operation



CAUTION!

When there is a prioritized fault, the cause of the malfunction is serious.



PRIO (PRIORITIZED FAULT)

If a prioritized fault occurs during operation, it has the following effects:

- The measuring values go to 0.
- Prioritized faults can be cleared only by a service engineer.
- When the **Prio** message occurs, the color of the status display changes to **red** and the text describes the prioritized fault in question.



Example: **PRIO DEFAULT VALUES**

The following prioritized fault 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.
SW VERS	Software which is unsuitable for this instrument type was loaded.	<ul style="list-style-type: none"> ▪ Faulty software update. → Service technician

Table 5: Possible prioritized fault messages

11 Customer service information

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

A current list of all SIGRIST country representatives is available online at www.photometer.com.

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

- The serial numbers of the connected instruments.
- 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 FireGuard 2.
- Description of operation conditions (place, power supply, measured medium, temperature etc.)
- Application and Instruction Manual.

12 Decommissioning/Storage

12.1 Decommissioning the photometer

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.	
2.	Remove the electrical connections.	Section 5
3.	Remove the FireGuard 2 from the measuring position and clean thoroughly.	
4.	Remove all other components.	
5.	Close all openings on the components.	

12.2 Storing the photometer

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

- The FireGuard 2 and the belonging components contains electronic parts. Storage for such components must fulfill the usual conditions. It is important to note that the storage temperature must be between -30 and +55 °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.
- The measuring equipment with all of the accessory parts must be protected against weather factors, condensing humidity and aggressive gases during storage.

13 Packaging / Transport / Returning



DANGER!

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

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

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

The original packaging materials should be used for packaging the FireGuard 2 if possible. If the original packaging is no longer available, note the following information:

- Before packaging, close the openings of the instrument with adhesive tape or plugs so that no packaging materials can enter the instrument.
- The instrument contains optical and electronic components. Make sure that the packaging protects the instrument from being damaged by impacts during transport.
- All peripheral devices and accessory parts must be packaged separately and marked with the serial number of the photometer (Section 2.2). This prevents confusion and mix-ups later while also making it easier to identify parts.
- A RMA form (14711E) must be filled in and enclosed for all returned instruments and spare parts. This can be downloaded at www.photometer.com.

When packaged as described above, the instruments can be transported via all usual shipping methods.

14 Disposal



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

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

CATEGORY	MATERIALS	DISPOSAL POSSIBILITIES
Packaging	Cardboard, wood, paper	Reuse as packaging material, local disposal center, incineration plants
	Protective foils, polystyrene shells	Reuse as packaging material, recycling
Electronics	Circuit boards, electromechanical components, display, touchscreen, transformer and cables	To be disposed of as electronic waste
Optics	Glass, aluminum, brass	Recycling via centers for recycling glass and waste metal
Measuring cell	PC/ABS	Recycling via centers for recycling plastics
Battery on SICON-C	Lithium	Recycling via locally organized collection point
FireGuard 2 housing	Stainless steel	Local disposal center

Table 6: Materials and their disposal

15 Spare parts list

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



An overview of the spare parts can be found in the Section 16.1.

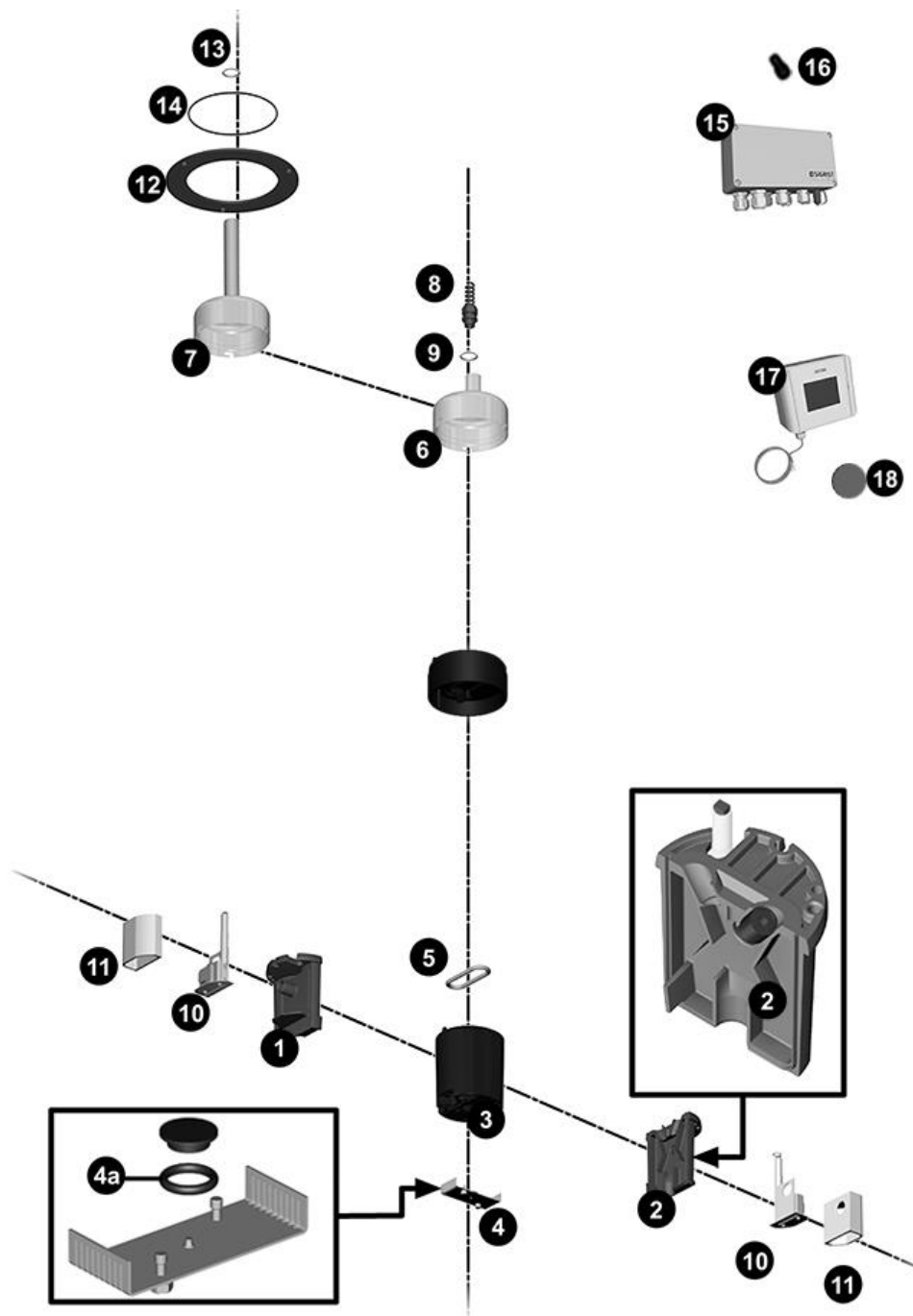
ARTICLE NUMBER	NAME	REMARKS
118128	Measuring cell insert left	→ Section 9.2 / Section 16.1, Pos. 1
117373	Measuring cell insert right (with shutter)	→ Section 9.2 / Section 16.1, Pos. 2
117381	Measuring cell housing	→ Section 9.2 / Section 16.1, Pos. 3
117380	Contamination protection	→ Section 9.2 / Section 16.1, Pos. 4
117231	O-Ring silicon 14 x 3 for contamination protection	→ Section 9.2 / Section 16.1, Pos. 4a
117152	O-Ring EPDM to optics holder	→ Section 9.3 / Section 16.1, Pos. 5
117159	Electronics housing, short fixing tube, stainless steel 1.4571	→ Reference Handbook (Replacement of the instrument cable FireGuard 2) Section 16.1, Pos. 6
117158	Electronics housing, long fixing tube, stainless steel 1.4571	→ Reference Handbook (Replacement of the instrument cable FireGuard 2) Section 16.1, Pos. 7
118361	Cable gland M16 x 1.5, 5 - 10mm straight	→ Reference Handbook (Replacement of the instrument cable FireGuard 2) Section 16.1, Pos. 8
118429	Cable gland M16 x 1.5, 5 - 10mm 90 °	→ Reference Handbook (Replacement of the instrument cable FireGuard 2) Section 16.1, Pos. 8
116387	O-Ring FPM 12 x 1.5	→ Reference Handbook (Replacement of the instrument cable FireGuard 2) Section 16.1, Pos. 9
117273	Heater complete with insulation	→ Section 9.2 / Section 16.1, Pos. 10 and Pos. 11
117160	Seal for mounting plate	→ Reference Handbook (Replacement of the FireGuard 2) Section 16.1, Pos. 12
117232	O-Ring EPDM 19 x 4	→ Reference Handbook (Replacement of the FireGuard 2) Section 16.1, Pos. 13
117233	O-Ring EPDM 113, 97 x 2,62	→ Reference Handbook (Replacement of the FireGuard 2) Section 16.1, Pos. 14

ARTICLE NUMBER	NAME	REMARKS
120287	Connection box SIPORT 2 with Profibus DP	→ Reference Handbook, Section 16.1, Pos. 15
120288	Connection box SIPORT 2 with StromRel	→ Reference Handbook, Section 16.1, Pos. 15
120289	Connection box SIPORT 2 with Modbus RTU	→ Reference Handbook, Section 16.1, Pos. 15
117442	Microfuse 250V 2AT RM5	→ Reference Handbook, Section 16.1, Pos. 16
120290	SICON-C, 24 VDC	→ Section 16.1, Pos. 17
111834	Batterie 3V CR 2032	→ Section 16.1, Pos. 18

16 Appendix

16.1 Disassembly diagram for the FireGuard 2

The position numbers in the following disassembly diagram refer to the spare parts list (Section 15).



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