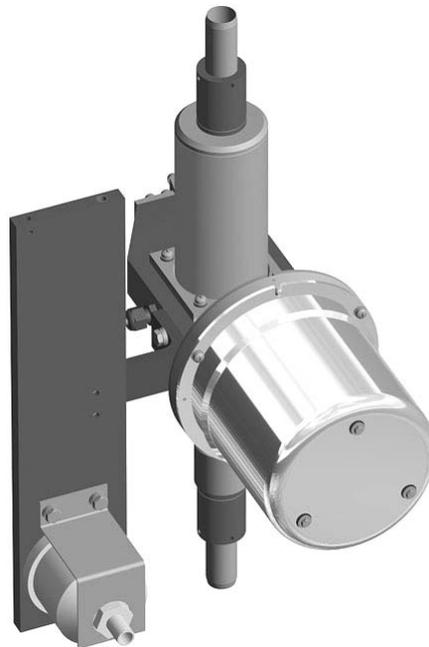


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# INSTRUCTION MANUAL

## StackGuard

### SIGRIST Dust Concentration Monitor for Hot Gasses



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# Foreword

This Instruction Manual describes the basic functions for operating the StackGuard. It is addressed to all persons who are responsible for operation of the instrument.



**Operate the instrument only after having familiarized yourself with the contents of this Instruction Manual. In particular, be sure to study the section on safety rules before starting operation!**

Further documentation

Doc. No.	Title	Contents
10267E	Brief Instructions	Main functions and complete menu structure for straightforward operation
10268E	Reference Handbook	More sophisticated menu functions and worksteps for advanced users
10269E	Service Manual	Repair and modification instructions for service technicians
10145DE	Questionnaire	Specifies the general conditions in which a system operates
10271DE	Parameter List	Configuration of the measuring system

Symbols used in this Manual

	Important instructions
	Actions
	Supplementary information
	Extremely dangerous voltage
	Warning: dangerous laser beams
	Warning: high temperatures (danger of burns)
	Separate disposal of electrical and electronic equipment



# 1 Equipment Description

## 1.1 Overall view of the measuring system

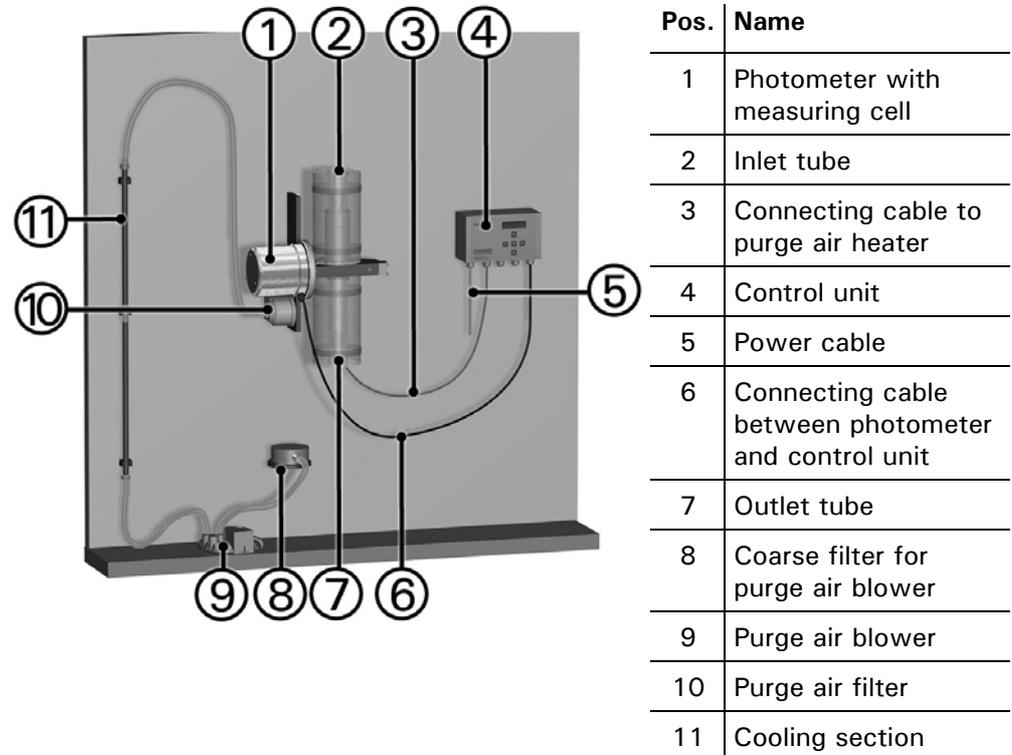


Figure 1: Overview of the measuring system

## 1.2 Scope of supply and accessories

Standard scope of supply:

Units	Name	Versions/remarks
1	Photometer	StackGuard
1	Control unit	SIREL SMD
1	Instruction Manual	German, English
1	Reference Handbook	German, English
1	Brief Instructions	German, English
1	Purge air blower	
1	Coarse filter	
2	Insulation shells	
1	Cooling section	
2	Inlet and outlet tubes	
1	Checking rod	

## 1.3 Intended use and conformity



**Use of the photometer for purposes other than those for which it was designed can produce incorrect measuring results, possibly with process-related consequential damage or even damage to the photometer itself!**

Intended use

The photometer is designed for the measurement of particles in gaseous, nonexplosive media up to 170° C.



The photometer is assembled and configured at the factory for the measurement duty specified by the user. The duty is specified with a questionnaire that is an essential tool for defining the measuring system's intended use.



State-of-the-art rules of engineering practice were observed in the design and manufacture of the measuring system. They comply with the usual directives relating to safety and the obligation to exercise due care.

The dust concentration monitoring instrument meets the requirements applicable within the European Union (EU):

- Electromagnetic Compatibility (EMC)
- Low Voltage Directives (LVD)
- Standards for the safety of laser installations IEC 60825 1:2001
- EN 14181:2004 and DIN EN ISO 14956

Therefore the photometer carries the CE mark.

## 1.4 Product marking

Position of the rating plate on the photometer

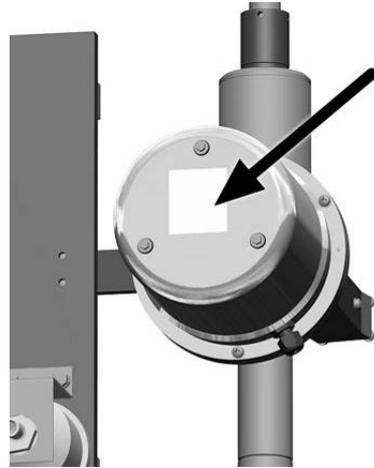


Figure 2 Location of the Stackguard rating plate

The photometer's rating plate carries the following information:

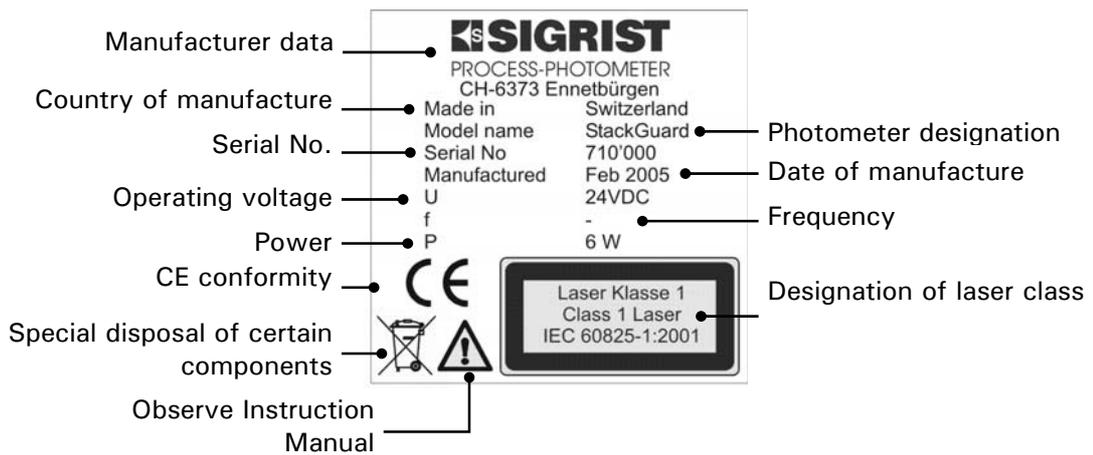


Figure 3: StackGuard rating plate



The photometer's serial number is also stated in the \* SYSTEM INFO\* menu (→ Reference Handbook).

Every control unit has an identification plate with the instrument number and electrical connection information:

Rating plate on the control unit



Figure 4 Location of the control unit rating plate



You will find the instrument number of the photometer in the – \*SYSTEM INFO\*/Instrument no. – menu (→ Reference Handbook).

The SIREL rating plate carries the following information:

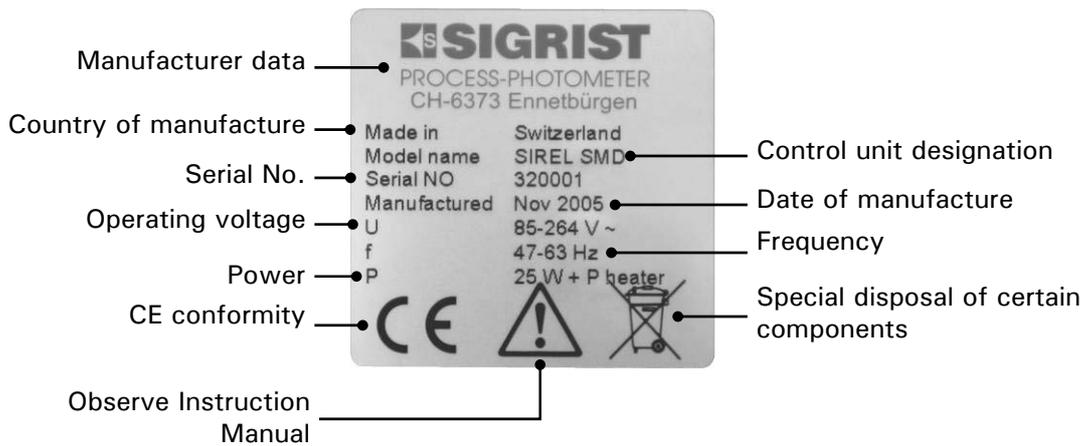


Figure 5: SIREL rating plate

## 1.5 Technical data

Measurement data	Measuring principle	scattered light measurement
	Scatter angle	20°
	Measuring span	0 .. 0.050 PLA to 0 .. 100 PLA
	Resolution	± 0.0002PLA
	Reproducibility	± 2% (referred to full scale)
	Repeatability	± 0.5% (referred to full scale)
	Linearity	± 0.5% (referred to full scale)
	Temperature stability	± 4% in the -20° C to 50° C range (referred to full scale)
	Heat-up time	at least 2 h
	Reaction time	less than 2 s (step response → limit monitor)
	Environment	-20 .. +50° C
	Service interval	see servicing schedule (→ Section 5.1)
Photometer	Operating voltage	24 VDC (from control unit)
	No. of measuring ranges	8
	Weight	about 8.4 kg
	Enclosure	stainless steel, anodized aluminium
	Protection degree	IP65
Flow cell	Material	stainless steel 1.4301
	Window material	borosilicate, B270
	Seals	FPM
	Medium pressure	max. ±3000 Pa (=±30 mbar) against ambient pressure at photometer location
	Medium temperature	max. 170° C (the medium temperature must be adapted to make it impossible for the medium to condense)
	Sample flow	25 .. 50 l/min
	Purge air	12 .. 16 l/min, max. 170° C

SIREL SMD control unit	Operating voltage	85 .. 264 V; 47 .. 63 Hz or 24 VDC; 25 W
	Space requirements	SIREL SMD: 200 mm x 157 mm x 96 mm SIREL robust: 220 mm x 160 mm x 90 mm (See Section ..... for detailed dimension sheet.)
	Interfaces	Profibus DP (optional)
	Weight	SIREL SMD: approx. 1.5 kg SIREL robust: approx. 2.0 kg
	Protection index	IP65
	Connections	0/4 .. 20 mA, max. 600 Ω, max. 24 V with galvanic isolation, max. 50V relative to earthing Relay contacts max. 250 VAC, max. 4 A Digital inputs/outputs max. 5 V
	Standard cable	Length: 5 m / 4-core

## 2 Safety Rules

### 2.1 Safety symbols used

The symbols used on the instrument draw attention to the following safety measures or precautions:



#### **DANGER (BLACK ON YELLOW)**

**Danger of a general hazard.**

This symbol marks areas or actions to which special safety rules apply. In these cases consult the Instruction Manual!



#### **VOLTAGE (BLACK ON YELLOW)**

**High voltage danger.**

This symbol marks areas with live parts carrying voltages higher than 48 VAC or higher than 65 VDC where electric shocks can occur. Consult the Instruction Manual!



#### **HOT (BLACK ON YELLOW)**

**Danger of hot surfaces.**

This symbol marks covers on surfaces hotter than 80°C. For safe operation, observe the Instruction Manual.



#### **LASER RADIATION (BLACK ON YELLOW)**

**Danger of laser radiation.**

This symbol marks covers that, when removed, can expose dangerous laser radiation. Therefore these covers may be removed only in the deenergized state and only by authorized service personnel!

### 2.2 Principles for safe handling



**Operate the measuring system only in flawless condition and under strict observance of the Instruction Manual!**

Also observe the following points:

- All components that come into contact with the measurement sample may have a high temperature. To avoid serious burns, wear temperature-resistant gloves !
- The measuring system should be operated only in the as-delivered condition. Whenever elements are replaced, be sure to use only genuine parts from the manufacturer!
- Any changes to software parameters that are normally unavailable to the user may compromise the safety of the measuring system!

## 2.3 Laser safety information



Installed in the StackGuard is an encapsulated laser that corresponds to Class 1 (IEC 60825-1: 2001) with regard to all aspects of the instrument's operation and maintenance. Whenever the laser guards are removed for servicing purposes, Class 3R laser radiation can be emitted. Hence these guards are allowed to be removed only in the deenergized state by authorized service personnel.



Caution – whenever operating or adjustment devices other than those specified by Sigrist are used or different procedures are carried out, exposure to dangerous radiation may result.

### 2.3.1 Laser data

Laser data IEC 60825-1: 2001	
Laser medium:	InGaAIP
Wavelength:	650nm
Emission time:	cw
Radiant flux:	2mW
Radiant energy:	-

Figure 6: Laser data

### 2.3.2 Laser labels

The following laser labels are applied to the StackGuard:

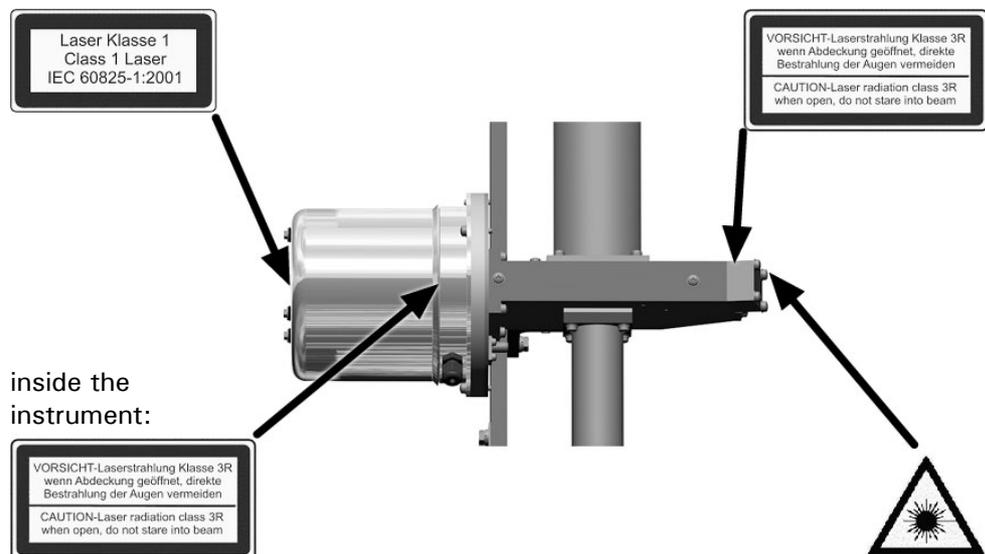


Figure 7: Laser labels

## 3 Installation/Start-up

### 3.1 Important information when installing the measuring system



- The purge air blower must be sized so that a purge air quantity of 12..16 l/min. is guaranteed under all pressure conditions in the measuring cell.
- A coarse filter must be installed before the purge air blower.
- The cooling section must be installed between purge air blower and purge air filter. Its purpose is to cool down the purge air that is heated by the compression of the purge air blower.
- At an ambient temperature of 50°C, the purge air temperature at the purge air filter must not exceed 50°C!

### 3.2 View of an installation example

Example of a measuring system

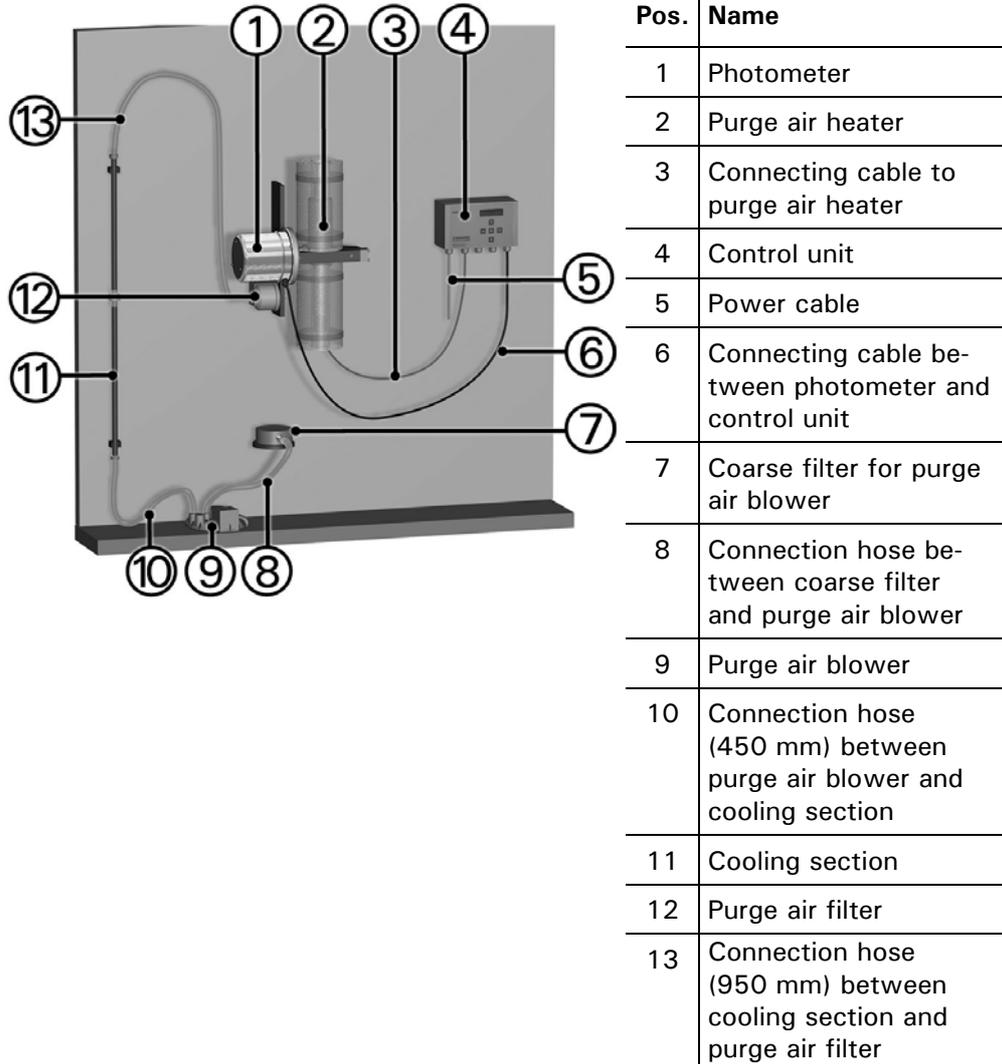
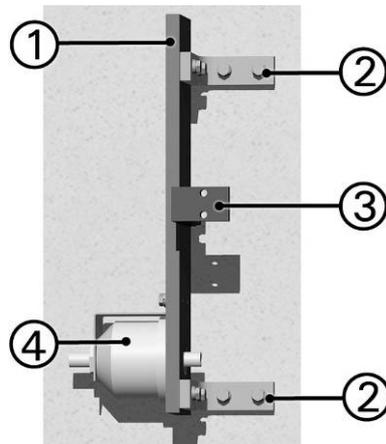


Figure 8: Overview of installation components

### 3.3 Installation of the photometer



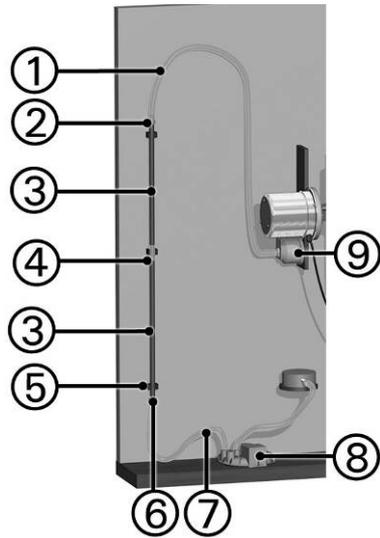
Pos.	Name
1	Mounting plate
2	Mounting bracket (customer-side)
3	Photometer mounting bracket
4	Purge air filter

Figure 9: Photometer installation



Action	Remarks
<p>1. Fasten the mounting plate (1) with the two mounting brackets vertically on a wall.</p> <p><b>i</b> The holes for the mounting brackets (2) have to be drilled in the mounting plate (1) by the customer!</p>	→ Figure 9
<p>2. Fasten the photometer to the mounting bracket (3) with the screws for that purpose.</p>	→ Figure 9

### 3.4 Installation of the cooling section



Pos.	Name
1	Connection hose (950 mm) between cooling section outlet and purge air filter
2	Cooling section outlet
3	Cooling section (consisting of two aluminum tubes)
4	Connection hose (40 mm)
5	Three tube clamps
6	Cooling section inlet
7	Connection hose (450 mm) between cooling section inlet and purge air blower
8	Purge air blower
9	Purge air filter

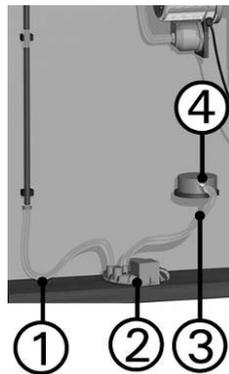
Figure 10: Cooling section installation example



Action	Remarks
<p>1. Fix the tube clamps (5) to the desired position on the wall as shown in the figure.</p>	<p>→ Figure 10</p>
<p>2. Connect the two aluminum tubes (3) with the 40 mm long hose piece (4). Place the entire unit into the prefixed tube clamps (5).</p>	
<p>3. Fasten the 950 mm long hose section (1) to the cooling section outlet (2). Attach the other end of the hose onto the purge air filter (9).</p>	<p>→ Figure 10</p>

	Action	Remarks
4.	Fix the 450 mm long hose section (7) to the cooling section inlet (6). ⓘ This hose section will be connected to the purge air blower later!	→ Figure 10

### 3.5 Installation of the purge air blower and coarse filter



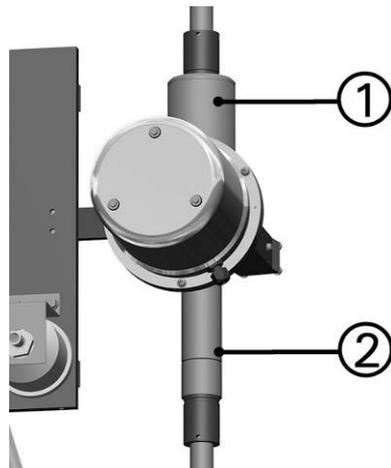
Pos.	Name
1	Connection hose (450 mm) between cooling section inlet and purge air blower
2	Purge air blower
3	Connection hose between purge air blower and coarse filter
4	Coarse filter for purge air blower

Figure 11: Purge air blower and coarse filter installation



	Action	Remarks
1.	Place the purge air blower (2) on the ground or on a firm surface.	→ Figure 11
2.	Fix the coarse filter (4) to the desired position.	→ Figure 11
3.	Connect the coarse filter outlet with the air intake supports of the purge air blower to the connection hose section (3)	→ Figure 11
4.	Fix the hose (450 mm long) coming from the cooling section inlet onto the purge air blower inlet.	→ Figure 11

### 3.6 Installation of the insulation shells



Pos.	Name
1	Purge air heater
2	Measuring cell outlet

Figure 12: Insulation shell position



Action	Remarks
<p>1. Attach the two insulation shells at positions (1) and (2) on the photometer.</p> <p><b>i</b> The insulation shells consist of two parts that are placed around the tube pieces and are held together by means of quick-release locks (see figure).</p>	<p>→ Figure 12</p>

### 3.7 Installation of the control unit

SIREL installation

The control unit can be installed directly on the wall, in a built-in grill, or on an instrument stand.

Distance up to 5 m

The length of the standard cable is 5 m. The control unit can therefore be positioned directly near the photometer if required.

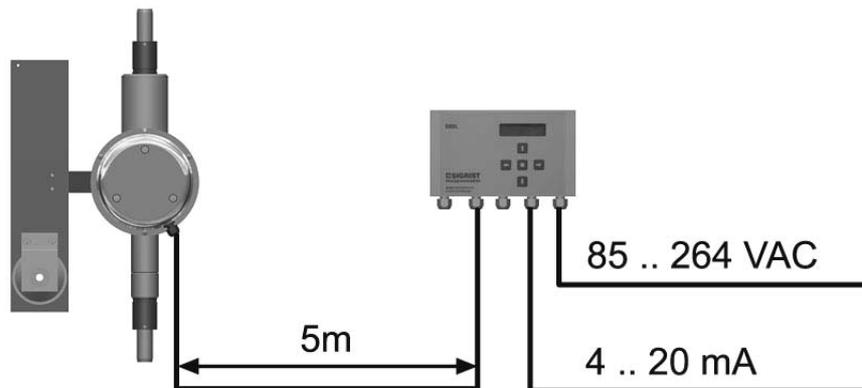


Figure 13: Control unit position with standard cable

Distances greater than 5 m

For distances greater than 5 m a terminal connection box must be inserted between photometer and control unit. This makes it possible to connect and disconnect the photometer to the control unit quickly.

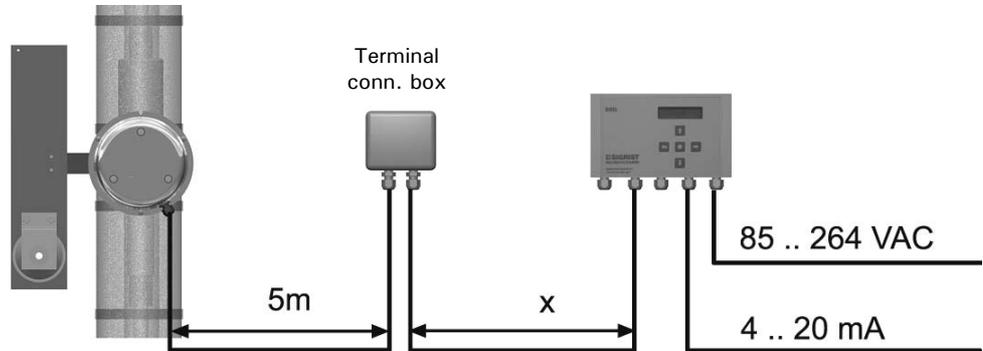


Figure 14: Arrangement with terminal connection box

Cable cross-section [mm <sup>2</sup> ]	Maximum length x [m]	
0.14	30	
0.25	60	
0.34	80	
<b>0.5</b>	<b>120</b>	<b>Standard cable</b>
0.75	190	
1	250	
1.5	360	

Greater distances

The use of a SITRA makes it possible to bridge SIREL distances of up to 1,400 m. The SITRA functions as a signal amplifier.

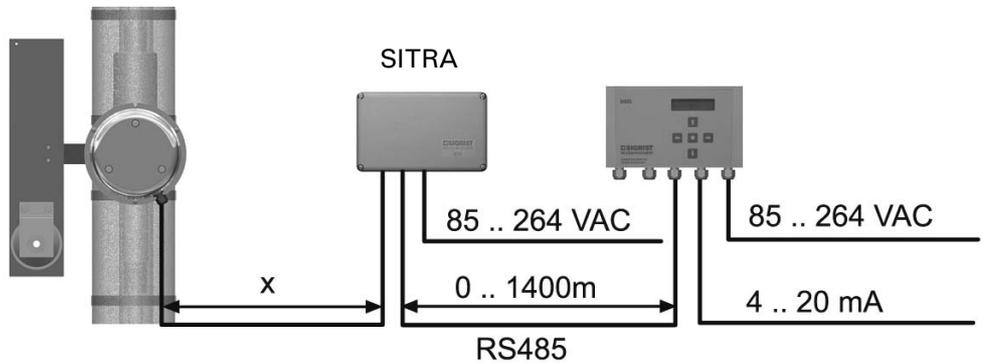


Figure 15: Arrangement with SITRA

Cable cross-section [mm <sup>2</sup> ]	Maximum length x [m]	
0.14	20	
0.25	50	
0.34	70	
<b>0.5</b>	<b>100</b>	<b>Standard cable</b>
0.75	160	
1	200	
1.5	290	

### 3.8 Electrical installation



Connecting electrically charged lines is extremely dangerous and parts of the system can be damaged. The local regulations must be observed at all times for electrical installations.

Further, the following basic principles must be observed:

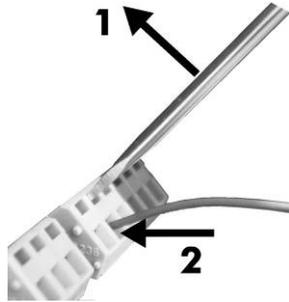
- It is essential that the protective conductor is connected.
- It is essential that the unit and purge air heater are connected to the mains via a fault-current automatic breaker (earth leakage circuit breaker).
- Because the unit has no mains switch, a suitable disconnecter (switch, plug) should be installed near the mains connection.
- The mains supply must have a back-up fuse with a tripping current of 16A.
- If faults cannot be remedied, the unit must be put out of operation and protected against inadvertent operation.

**Electrical connections** All electrical connections are made with spring clamps inside the control unit.

**Opening the control unit** The control unit can be opened by undoing the four screws under the side covers.



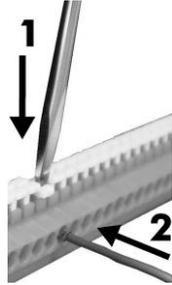
Figure 16: Opening the control unit



The large terminals are designed for mains voltage and can accommodate wires up to 2.5 mm<sup>2</sup> in cross-section (without wire end sleeves).

To open the terminals, use a size 1 screwdriver!

Figure 17: Large terminals



The small terminals are designed for low voltage and can accommodate wires up to 1.5 mm<sup>2</sup> in cross-section (without wire end sleeves).

To open the terminals, use a size 0 screwdriver!!

Figure 18: Small terminals

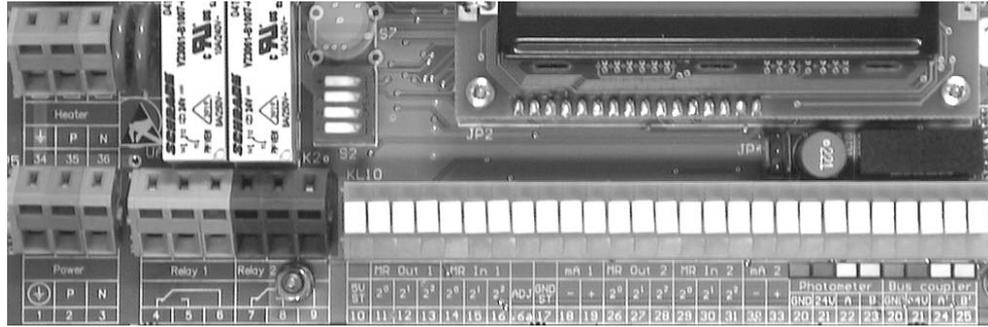


Figure 19: Terminal strip for 85..264 VAC



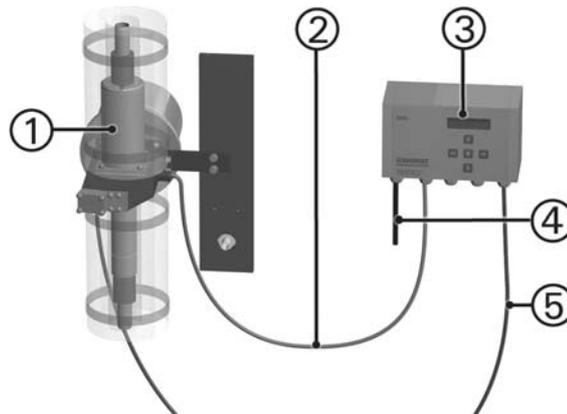
For information about control signals, please refer to Section 2 in the Reference Handbook.



Terminal assignment

	Terminals	Use	Remarks
1.	20 .. 23	Connection to the photometer	Wire colors as in connection plate.
	4 - 5 - 6	Relay output 1	Relay output 1 can be freely configured (→ Section 4.5).
	7 - 8 - 9	Relay output 2	The purge air heater is connected via relay output 2 (→ Section 3.9)
	18 - 19	Output signal 1	0/4..20 mA, max. load 600 Ω <b>If unused, short-circuit these terminals with a jumper!</b>
2.	32 - 33	Output signal 2	0/4..20 mA, max. load 600 Ω <b>If unused, short-circuit these terminals with a jumper!</b>
	10 .. 17	Inputs/outputs for measuring range 1	→ Reference Handbook
	26 .. 31	Inputs/outputs for measuring range 2	→ Reference Handbook
	16a	Remote triggering of a sensor check	→ Reference Handbook
3.	24 - 25	Connection to bus coupler	→Reference Handbook
	1 - 2 - 3	Mains voltage	85 .. 264 V; 47 .. 63 Hz or 24 VDC; 25 W
4.	34 - 35 -36	Purge air heater	→ Section 3.9

### 3.9 Purge air heater connection



Pos.	Name
1	Purge air heater
2	Connection cable for purge air heater
3	Control unit
4	Power cable
5	Connecting cable between photometer and control unit

Figure 20: Position of the purge air heater

	SIREL terminal	Leads of heater cable	Remarks				
1.	34	Earthing	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>34, gb/ gn</td> <td>36, bl</td> <td>8, br</td> <td>Jumper</td> </tr> </table>	34, gb/ gn	36, bl	8, br	Jumper
34, gb/ gn	36, bl	8, br	Jumper				
2.	36	Neutral conductor					
	8	Phase					
3.	35- 9	Jumper					



- If a fault occurs, purge air heating is switched off.
- Relay 2 must be configured after commissioning (→ Section 4.5)

### 3.10 Initial commissioning

For the initial commissioning, proceed according to the following table. If faults occur, see Section 6.



	Action	Remarks
1.	Make sure that all the components are correctly installed and connected.	→ Section 3
2.	Connect the voltage supply to the control unit.	A reading appears on the control unit display after a few seconds.
3.	Set the language for your region (→ Section 4.2).	The menu text now appears in the selected language.
4.	Set the measuring range(s) in accordance with your measuring conditions (→ Section 4.3)	
5.	Set the relay functions in accordance with your measuring task (→ Section 4.5).	
6.	Protect your settings against unauthorized access with an access code (→ Section 4.6).	If you do not require an access code, you can skip this step

# 4 Operation

## 4.1 Keypad and display

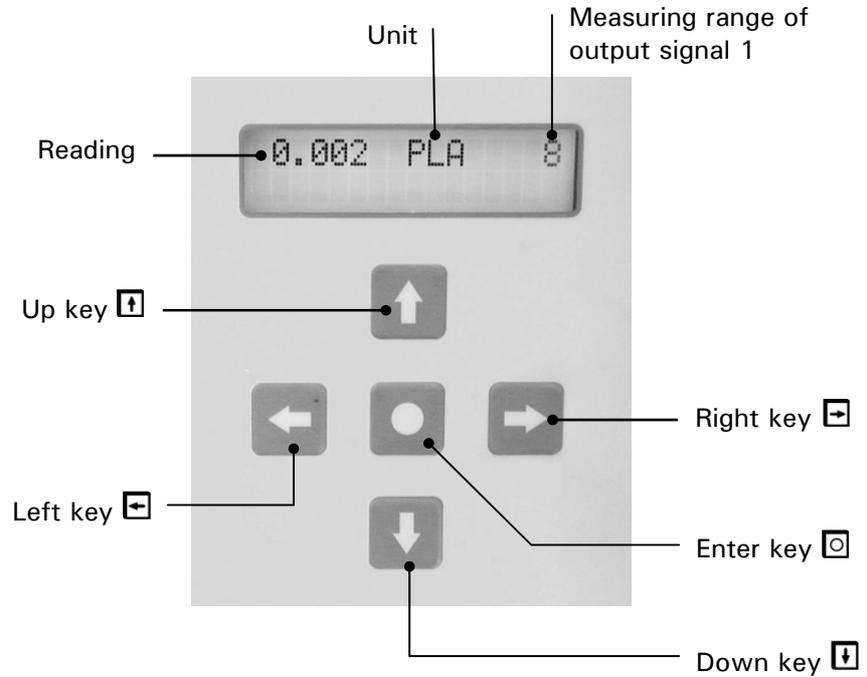


Figure 21: Operating elements and display.

Key functions

↑/↓	<ul style="list-style-type: none"> <li>Change from one menu line to another</li> <li>Change numbers in editing mode (see below)</li> </ul>
←/→	<ul style="list-style-type: none"> <li>Change from one function to another in a menu line</li> <li>Change function values or shift a number's decimal point in editing mode (see below)</li> </ul>
← + →	<ul style="list-style-type: none"> <li>Press both keys simultaneously to return to normal operation</li> </ul>
⏏	<ul style="list-style-type: none"> <li>Activate editing mode (display shows &gt; &lt;)</li> <li>Enter the setting</li> </ul>

### 4.1.1 Displays shown during normal operation

By pressing either of the keys  or , one can consult the following information (provided the instrument has been configured accordingly).

Information available in normal operation	The display...	Means	Remarks
	0.007 PLA 4	The photometer is operating normally. The momentary reading is displayed.	
	MR4: 0.000- 10.00 MR1: 0.000- 100.0	The measuring ranges selected for current output 1 (1st line) and 2 (2 <sup>nd</sup> line) are displayed.	In accordance with the configuration.

### 4.1.2 Display of malfunctions

Malfunction displays in normal operation	The display...	Means that...	So you should ...
	** Warning ** ... (The "Warning" message alternates with the reading display).	...a relay contact is switched in accordance with the configuration. ...when the cause of the warning has ceased to occur, the warning message is extinguished.	
	**** Fault **** ...	...the current output is set to 0 mA. ...if configured accordingly, a relay contact is switched	...try to narrow down the malfunction (→ Section 6.1).
	** Prior.fault** ...	...the automatic checking function is deactivated.	

### 4.1.3 Service mode

The photometer is configured in the service mode. The measurement operating is interrupted and the service menu control is displayed.



Activate the service mode

	Action	Display	Remarks
1.		Access code > 00000 <	If no user access code has been entered, continue with step 3
2.	Enter code: / change number / change place	Access code > ..... <	Here you enter your own access code
3.		* SENSORCHECK * * * *	Instrument in service mode

By simultaneously pressing the keys and , you can return to the normal operating mode from any menu level.

The relay states during the service mode are shown in this table:

Relay states in service mode:

LI (limit)	deactivated
AL (alarm)	deactivated
SE (service)	active
SE (check)	active
DI (digital input)	active



Depending on the configuration, the reading output switches to 0/4 mA or remains frozen at the last reading (→ Reference Handbook).

## 4.2 Setting the national language

Proceed as follows to set the language of your region for displaying the menus and messages:



	Action	Display	Remarks
1.	Activate service mode	* SENSORCHECK *	→ Section 4.1.3
2.	3 x ↓	* KONFIGURIEREN*	
3.	↩	> Sprache < Deutsch	
4.	⓪	Sprache > Deutsch <	Activate editing mode
5.	Select language: ↩/↩	Sprache > ... <	
6.	⓪	> Language < ...	Confirm selection
7.	↩ + ↩ (together)	0.007 PLA 4	Instrument in normal operation

## 4.3 Setting the measuring range

Measuring range for output signal 1



Below is how you set the measuring range for output signal 1.

	Action	Display (example)	Remarks
1.	Activate service mode.	* SENSORCHECK *	→ Section 4.1.3
2.	5 x ↓	* MEAS. RANGES *	
3.	↩ (2 x for meas. range 2)	> Meas. range 1< X..	
4.	Activate editing mode with ⓪.	Meas. range 1 > X.. <	
5.	Select measuring range with ↩/↩.	Meas. range 1 > 3.. <	e.g. measuring range 3
6.	Confirm selection with ⓪.	> Meas. range 1< 3..	
7.	↩ + ↩ (together)	0.007 PLA 3	Unit in normal operation. Set unit (→ Section 4.4).

Factory set measuring ranges

Measuring range no.	PLA measurement scope	Customer specific
Range 1	0 .. 100	
Range 2	0... 30	
Range 3	0 .. 10	
Range 4	0 .. 3	
Range 5	0 .. 1 (factory setting)	
Range 6	0 .. 0.3	
Range 7	0 .. 0.1	
Range 8	0 .. 0.05	
Range inputs	Remote controlled switching (→ Reference Handbook)	
Automatic*	0 .. 100	

Table 1: Measuring ranges



It is possible to have measuring ranges individually adjusted by a service technician. Changes can then be entered in Table 1 in the “customer specific” column.

\*applicable with meas. range 1 only

## 4.4 Setting the scaling and the unit

The unit can be switched to a different unit by the PLA.

For the display in mg/m<sup>3</sup> the corresponding scale factor must be defined using a reference measurement procedure!



The unit „PLA“ can be set only if the scaling factor has been set to 1.000 (→ Reference Handbook)



	Action	Display (example)	Remarks
1.	Activate service mode.	* SENSORCHECK *	→ Section 4.1.3
2.	3 x	* CONFIGURE *	
3.	3 x	> Scaling < 1.000	
4.	Activate editing mode with	Scaling > 1.000 <	
5.	Set value with /.	Scaling > 1.000 <	Values to be set: PLA = 1.000
6.	Confirm value with .	> Scaling < 1.000	
7.		> Unit < PLA	
8.	Activate editing mode with .	Unit > PLA <	
9.	Letter selection with /.	Unit > mLA <	Small letters and special characters are also possible by using the / keys.
10.	Change position with /.	Unit > mgA <	
11.	Confirm selection with .	> Unit < mg/m3	
12.	+  (together)	0.007 mg/m3 5	

## 4.5 Setting the relay functions

The control unit possesses two relay outputs (→ Section 3.1), whose functions are freely configurable. Several functions can be assigned simultaneously to a given relay. This relay then becomes active whenever one of the configured functions is active (OR operation).



Principle of a limit

If you have configured relay outputs as limits, it is also necessary to set the thresholds.

For relay 1 output, it is possible to program just one limit with an upper and a lower threshold (→ Figure 22).

Whenever the reading rises to the upper threshold, the limit is activated and remains active until the reading drops back below the lower threshold.

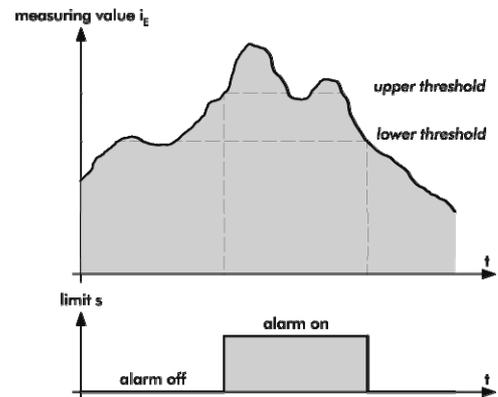


Figure 22: Upper and lower thresholds of a limit



Relay functions

	Action	Display	Remarks
1.	Activate service mode	* SENSORCHECK *	→ Section 4.1.2
2.	4 x	* Relay *	
3.		* RELAY 1 *	
4.		> Relay 1 < li al se di in	Configure relay 1
5.		Relay 1 >gw al se di in<	Activating editing mode
6.	Select main functions: /  change function confirm	Relay 1 >li al se di in<	li = limit 1 exceeded al = alarm se = service mode or sensor check di = digital control input (not supported) in = relay inverted  Functions written in CAPITAL LETTERS are activated (e.g. LI)
7.	Change number Change menu point confirm	Limit > 1 <	Limit monitor (active "1", inactive "0")
		Prio Fault Warn. > 0 0 0 <	Active in the case of: - prio fault - fault - warning (active "1", inactive "0")

	Action	Display	Remarks
		Serv. Check > 0 0 <	Active when: - instrument in service mode - sensor check running (active "1", inactive "0")
		Dig.input > 1 _ <	Active when: - signal at control input 1 - signal at control input 2 (active <i>number</i> , inactive "_")
		Inversed > 0 <	Invert relay function (active "1", inactive "0")
8.		Relay 1 >LI al se DI in<	<i>Select additional function (point 5) or terminate with point 8</i>
9.		> Relay 1 < LI al se DI in	Confirm selection
10.		> Upper limit < 1.000 PLA	The limit is monitored only when the limit function is activated for the relay in question
11.		Upper limit > 1.000 PLA <	Activate editing mode
12.	Change number Change place	Upper limit > 2.000 PLA <	Set upper threshold
13.		> Upper limit < 2.000 PLA	Confirm entry
14.		> Lower limit < 0.900 PLA	
15.		Lower limit > 0.900 PLA <	Activate editing mode
16.	Change number Change place	Lower limit > 1.800 PLA <	Set lower threshold
17.		> Lower limit < 1.800 PLA	Confirm entry
18.		* RELAY 1 *	
19.		* RELAY 2 *	
20.		> Relay 2 < li al se di in	Configure relay 2
21.		Relay 2 >gw al se di in<	Activating editing mode
22.	Select main functions:	Relay 2 >li al se di in<	li = limit 1 exceeded al = alarm

	Action	Display	Remarks
	⏪/⏩ change function ⏴ confirm		se = service mode or sensor check  di = digital control input (not supported)  in = relay inverted  Functions written in CAPITAL LETTERS are activated (e.g. LI)
23.	⏴/⏵ Change number ⏪/⏩ Change place	Limit > 0 <	Limit must be 0
		Prio Fault Warn. > 1 1 0 <	- Prio must be 1 - Fault must be 1 - Warning must be 0
		Serv. Check > 0 0 <	- Serv. must be 0 - Check must be 0
		Dig.input > _ _ <	Digital inputs must be inactive
		Inversed > 1 <	Inverse must be 1
24.	⏴	Relay 2 >li AL se di IN<	
25.	⏴	> Relay 2 < li AL se di IN	Confirm selection
26.	⏪ + ⏩ (together)	0.007 PLA 4	Instrument in normal operation

## 4.6 Setting the access code

With a self-defined access code, you can protect the StackGuard's settings against unauthorized manipulations .



	Action	Display	Remarks
1.	Activate service mode	* SENSORCHECK *	Section 4.1.2
2.	3 x	* CONFIGURATION*	
3.	4 x	> Access code < 000000	
4.		Access code > 000000 <	Activate editing mode
5.	Change number Change place	Access code > ..... <	Note the new code in the field below to make sure it is not forgotten!
6.		> Access code < ...	Confirm selection
7.	+  (together)	0.007 PLA 4	Instrument in normal operation

New access code:

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



A forgotten access code can be deleted only by a SIGRIST service technician!

## 4.7 Additional possibilities

This Instruction Manual describes only those options that are required for normal operation of the installation. Additional parameters enable you to adapt the StackGuard optimally to your particular measuring duty. For example, you can alter the behavior of the reading outputs or test the installation in the manual mode.

Information on these additional possibilities is given in the attached Reference Handbook.

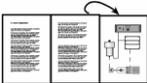
## 5 Servicing



Whenever the protective covers marked with the symbol  are removed, Class 3R laser radiation can be emitted. So these covers may be removed only in the deenergized state and only by authorized service personnel!



Whenever doing work on uninsulated parts of the installation, be absolutely sure to wear temperature-resistant gloves!



For the following servicing work, fold-out assistance is provided in Section 11 of the Appendix.

### 5.1 Servicing schedule



After the installation has been started up, the first two servicing chores listed here (Checking the zero and reference points) should be carried out at 14-day intervals. If the check values are in order, the interval can be successively increased to the intervals listed in the table :

When	Who	What	Purpose
Every 3 months / at every opportunity	User	Checking the zero and reference points (→ Section 5.2)	Absolutely necessary for maintaining measuring accuracy
Annually or as needed	User	Replacing filter (KZTN3) for purge air blower (→ Section 5.3)	
As needed or after a warning message	User	Replacing the desiccant (→ Section 5.4)	
Annually or as needed	User	Replacing the purge air filter (→ Section 5.5)	
Every 10 years	Service technician	Replace the back-up battery in the photometer	Necessary to make sure the internal clock keeps running during power outages

Table 2: Servicing schedule.

## 5.2 Checking the zero and reference points



When working on parts of the system that are not insulated, it is imperative that temperature-resistant gloves are worn!



The zero and reference point check is for ongoing quality assurance and should be performed when the unit is warm!

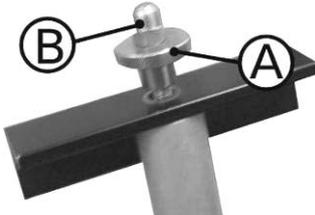
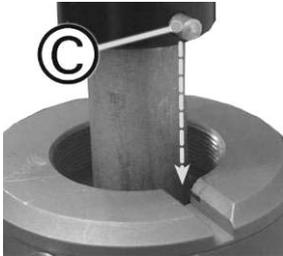


Be sure to use the checking rod supplied for this particular instrument. Make sure that the checking rod is in the photometer only for a short time, since the heat in the measuring cell changes the checking rod value and may result in an incorrect adjustment.



Zero and reference point check

	Action	Display (example)	Remarks
1.	Activate service mode	* SENSORCHECK * * * *	→ Section 4.1.3
2.		* RECALIBR. * * * *	
3.	 check the adjustment nominal value. <b>i</b> Nominal value must correspond to the value on the checking rod!	- Adjust. Nominal - 7.52 PLA	If the nominal value does not match the value on the checking rod, contact your service partner.
4.		- Reading < 0.0010	
5.	Disconnect the sample supply from the photometer.		
6.	Check the glasses on the checking rod for cleanliness. Clean them if dirty with a non-fluffy cotton cloth.		
7.	<i>If a zero air filter is present:</i> Screw it in place of the inlet tube (A) directly onto the measuring cell inlet.  <i>If no zero air filter is present:</i> Remove the sample return line at position (B) and close it with a temperature resistant plug.		

	Action	Display (example)	Remarks
8.	<p>Wait until the measuring cell has been vented by the purge air and then check the reading.</p> <p>The reading must now reduce to less than 0.001 PLA.</p> <p>If this is not the case, the optics of the measuring cell to be cleaned. Contact your service partner.</p>		
9.	<p>Loosen the knurled nut (A) on the checking rod and then press in the pin (B).</p> <p>Now you can pull the checking rod out of the protective sleeve</p>		
10.	<p>Insert the checking rod into the photometer. The pin (C) must snap into the groove (figure).</p> <p>Turn the checking rod clockwise to the stop and re-tighten the knurled nut (A).</p>		
11.	<p>Wait until a stabile reading is displayed</p>	<p>- Reading - 7.52</p>	<p>If the value differs from the nominal value only a little, you can continue at point 26.</p>
12.		<p>&gt; Recalibr. &lt; Retain</p>	<p>Recalibration is carried out</p>
13.		<p>Recalibr. &lt; &gt; Retain</p>	
14.		<p>Recalibr. &lt; &gt; Adapt</p>	
15.	<p>Initiate the recalibration by pressing the  key.</p>	<p>Recalibr. running ...</p>	
16.	<p>Wait until the StackGuard has determined the calibration factors and the display changes.</p>	<p>Remove checking rod!</p>	<p>Remove the checking rod</p> <p> If "out of tolerance" appears in the display, consult the following section.</p>
17.		<p>Acquire check value...</p>	<p>The values of the internal control unit are updated</p>

	Action	Display (example)	Remarks
18.		Check value updated	<b>i</b> If the display shows "out of tolerance" or "Measurement" error, check whether the checking rod has really been removed. Otherwise there is a fault. If that is the case, contact your service partner.
19.		* RECALIBR. * * * *	
20.	8 x	* ADJUSTMENT * * INFO *	
21.		Recall -0.5% 24.11.04 16:05h	Enter the value of the deviation in the maintenance protocol
22.	+  (simultaneously)	0.007 PLA 4	Unit in normal mode.
23.	Rebuild the unit to the initial state.		
24.	Enter the work in the maintenance protocol.		

What to do if value is "out of tolerance"?

If the difference between nominal and actual values is too great when recalibrating, "Recalibr. out of tolerance" is displayed. If this happens, check the following:



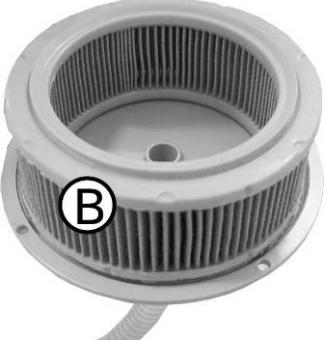
Check list for recalibration

	Action	Bemerkung
1.	Check whether the measured value corresponds to the value on the control unit.	→ Point 3
2.	Check the control unit for cleanliness.	→ Point 6
3.	Has the minimum warm-up time of two hours been observed?	
4.	Repeat the recalibration.	<b>i</b> Let the checking rod cool down before trying again!
5.	If the recalibration is still not OK, contact your service partner.	

### 5.3 Replacing filter (KZTN3) for purge air blower

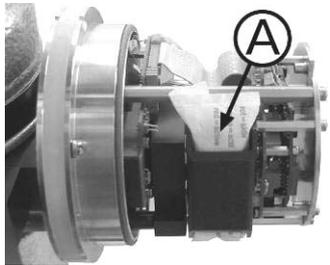
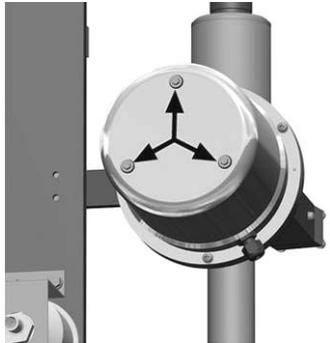
The location of the purge air blower is shown in the fold-out illustration in the Appendix.



	Action	
1.	Disconnect the voltage supply to the SIREL.	
2.	Loosen the four knurled screws and remove the cover (A).	
3.	Remove the filter insert (B) and replace it with a new one.	
4.	Replace cover (A) and fasten it with the knurled screws.	
5.	Reconnect the voltage supply to the SIREL.	

## 5.4 Replacing the desiccant



	Action	
1.	Disconnect the voltage supply to the SIREL.	
2.	Loosen the three screws (arrows) and remove the housing.	
3.	Remove the saturated desiccant sachet (location A) from its holder by carefully working it out.	
4.	Roll the new desiccant sachet together and insert it carefully into the holder.	
5.	Replace the housing and fasten it with the three screws.	
6.	Reconnect the voltage supply to the SIREL.	

## 5.5 Replacing the purge air filter

Find the location of the purge air filter on the fold-out illustration in the Appendix.



	Action	
1.	Disconnect the voltage supply to the SIREL.	
2.	Detach the purge air hose (A) from the purge air filter (B).	
3.	Remove the two screws (C) and take off the filter mount.	
4.	Replace the purge air filter (B) with a new one and fasten it in place with the filter mount.	
5.	Attach the purge air hose (A).	
6.	Reconnect the voltage supply to the SIREL.	

## 6 Troubleshooting

### 6.1 Narrowing down the malfunction

To narrow down the cause of a malfunction, work your way through this table step by step. If the corrective measures do not produce the desired result, please consult Customer Service (→ Section 6.3).

Perceived malfunction	Corrective measures
No display	<ul style="list-style-type: none"> <li>- Make sure the main switch is in the on position and that mains voltage is applied (→ Section 3.8)</li> <li>- Check the fuses in the SIREL (→ Reference Handbook – extended troubleshooting)</li> </ul>
Fault message in the display	<ul style="list-style-type: none"> <li>- Analyze the fault message (→ Section 6.2)</li> </ul>
The reading appears to be false	<ul style="list-style-type: none"> <li>- Make sure the medium in the product pipe meets the operating conditions (→ Section 1.5)</li> <li>- Make sure the servicing duties have been carried out in accordance with the servicing schedule (→ Section 5.1)</li> <li>- Carry out a recalibration of the photometer (→ Section 5.2)</li> </ul>

### 6.2 Fault messages

If a malfunction occurs during operation, an appropriate message will appear in the display to help you narrow down the fault and its cause. Malfunctions are divided into the following categories:

- Warnings (W)**      Warnings draw your attention to an unusual condition. The installation remains operable and continues to deliver correct readings. You should correct the cause of the warning message at the next opportunity.
- Faults (F)**        A fault is defined as a malfunction that makes it impossible to obtain correct readings. The current output switches to 0 mA.
- Prio faults (P)**    In the case of a prioritized fault, the cause of the fault is extremely serious. The current output switches to 0 mA.



To correct the malfunctions, please consult the extended troubleshooting procedures in the Reference Handbook.

Message	W	F	P	Means	Possible causes
connection lost ...			x	Something is wrong with the connection between control unit and photometer.	<ul style="list-style-type: none"> <li>- break in the connection between control unit and photometer</li> <li>- defect in the electronics</li> </ul>
Temp.	x			The maximum admissible temperature of 70°C in the electronics space has been exceeded, or the laser temperature cannot be stabilized at 35°C.	<ul style="list-style-type: none"> <li>- ambient temperature too high</li> <li>- purge air temperature too high</li> <li>- defective electronics</li> </ul>
Moisture	x			The maximum admissible humidity level has been exceeded.	<ul style="list-style-type: none"> <li>- desiccant is spent and must be renewed</li> </ul>
Dirt	x			The maximum admissible contamination level has been exceeded.	<ul style="list-style-type: none"> <li>- the optical interfaces are contaminated and need to be cleaned</li> <li>- the purge air filter is defective</li> </ul>
Measurement		x		The AD converter is overloaded.	<ul style="list-style-type: none"> <li>- too much external light (enclosure or connection nozzles open)</li> <li>- defective electronics</li> </ul>
Current 1/2		x		Current output 1 (2) is faulty.	<ul style="list-style-type: none"> <li>- open connection terminals at the reading output</li> <li>- open circuit in the current loop of the reading output</li> <li>- loose contact</li> </ul>
SensCheck	x			The internal check value indicates excessively high deviations.	<ul style="list-style-type: none"> <li>- dirty optics</li> <li>- defective correction mechanism</li> </ul>
PurgeAir		x		The correct purge air supply for the measuring cell is no longer guaranteed.	<ul style="list-style-type: none"> <li>- amount of purge air is insufficient</li> <li>- purge air blower failure</li> <li>- purge air filter clogged</li> </ul>
Light		x		The detectors are not receiving any light.	<ul style="list-style-type: none"> <li>- defective light source</li> </ul>
CRCFRAM			x	The checksum of the parameter values is incorrect.	<ul style="list-style-type: none"> <li>- parameter loss (defective electronics, EMC)</li> </ul>
Default value			x	The default values of the parameters loaded.	<ul style="list-style-type: none"> <li>- parameter loss (defective electronics, EMC)</li> </ul>

### 6.3 Customer service information

Whenever you have questions about SIGRIST products, please start by reading the documentation supplied with the equipment. Also check the Errata accompanying the documentation. These contain information that became available subsequently.

If you do not find the answer, please contact the Service Office responsible for your country or your region. If you don't know where to find it, Customer Service of SIGRIST-PHOTOMETER AG in Switzerland will gladly give you the relevant contact address.

You will also find the current list of all SIGRIST country representatives in the Internet at [www.photometer.com](http://www.photometer.com). Whenever you contact a SIGRIST Service Office or Customer Service, please make sure you have the following information at hand:

- A description of the instrument behavior and the worksteps being performed as the problem arose.
- A description of how you proceeded when trying to solve the problem yourself.
- Documentation on any non-SIGRIST product operated together with the photometer or its peripheral devices.

**Instrument data**

If you have problems with the reading, please have the following additional information at hand; you can find it in the "info" section of the menu structure:

Name	Option	Value	Remarks
Serial No.			
Fault history Warning messages	W01		
	W02		
	W03		
	W04		
	W05		
Fault history Fault messages	F01		
	F02		
	F03		
	F04		
	F15		
Fault history Prio fault messages	P01		
	P02		
	P03		
	P04		

Name	Option	Value	Remarks
Serial No.			
	P05		
System information	Dirt		
	Laser temp.		
	Electr.temp.		
	Max-Temp.		
	Moisture		
Adjustment information	Recal1		
	Recal2		
	Recal3		
	Recal4		
	Recal5		
	Recal6		
	Moni1/meas		
	Moni1/moni2		
Sensorcheck information	1		
	2		
	3		
Condition of desiccant			

## 7 Taking Out of Service/Storage

The goal of the takingout of service procedure is to prepare the photometer properly for storage and to keep it in good condition during the storage period.



Taking out of service

	Action
1.	Switch off the power supply to the control unit and disconnect all electrical connections.
2.	Dismantle the measuring unit.
3.	Thoroughly clean the inside of all parts of the ring pipe. No corrosive or loose dirt deposits should remain inside the ring pipe.
4.	Make sure that all components are closed.

No special conditions are required for storage of the equipment, but be sure to observe the following:

- Photometer and control unit contain electronic components. The storage conditions must satisfy the normal requirements for such components. In particular, the storage temperature should remain within the -20 .. +50°C range.
- All components that come into contact with the medium during operation must be kept dry and clean for an extended period of time before being put into storage.
- During storage, the photometer and accessories must be protected against weathering, condensing moisture and aggressive gases.

## 8 Packing/Transport

Whenever possible, use the original packing materials when packing the photometer and its peripherals for shipment. If the materials are no longer available, observe these instructions:

- Prior to packing, close all openings of the photometer with pressure-sensitive tape or plugs to prevent any packing materials from penetrating them.
- The photometer contains optical and electronic components. Pack the instrument in such a way that it is protected against impact and blows during shipment.
- Pack all of the peripheral devices and accessories separately, and mark each part with the serial number (→ Section 1.4). This will prevent mixups later on and facilitate identification of the parts.

Packed this way, the photometer can be shipped by any normal mode of transport and in any position.

## 9 Disposal



This product is covered by the European Directive **2002/95/EG (RHS)** in Category 9 "Monitoring and Control Instruments".



**The photometer and its peripherals must be disposed of in accordance with the regional statutory regulations!**

The StackGuard dust emissions system does not contain any environmentally polluting sources of radiation. Its material should be disposed of or recycled in accordance with the following table:

Category	Materials	Disposal possibilities
Packing	Cardboard, wood, paper	Reuse as packing material, local waste disposal points, incinerators.
	Protective films, polystyrene shells	Reuse as packing material, recycle.
Electronics	Printed circuit boards, electromechanical components	Disposal as electronics scrap.
Optics	Glass, aluminum, brass	Recycle via used glass and scrap metal collection points.
Insulation	Aluminum	Scrap metal collection points
	Rock wool	Construction waste, refuse collection
Flow cell	Glassfiber reinforced polyester	Recycle via local collection points.
	Steel	Scrap metal collection points
Enclosure	Sheet steel, steel, aluminum	Scrap metal collection points

*Table3: Materials and their disposal*

## 10 Spare Parts

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

<b>Art. No.</b>	<b>Article name</b>
108710	Filter insert for air filter ZCTN-20
112407	Purge air filter
111391	Desiccant sachet, 1 pc

*Table 3: Spare parts and article numbers*

# 11 Appendix

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