
INSTRUCTION MANUAL

ColorPlus Ex

SIGRIST Absorption Measuring Instrument

with SIREL SMD / SIREL Ex



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Foreword

This Instruction Manual describes the basic functions for operating the ColorPlus Ex. 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

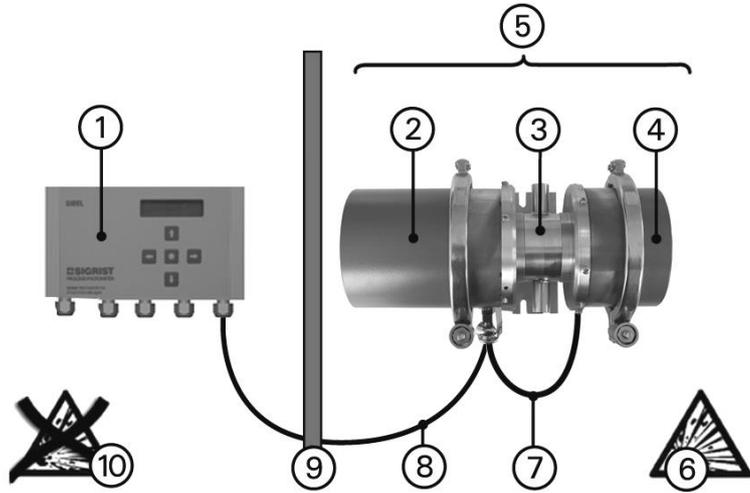
Doc. No.	Title	Contents
10211E	Reference Handbook	Detailed menu functions and worksteps for trained personnel
10213E	Service Manual	Repair and modification instructions for service technicians
10212E	Brief Instructions	Most important functions and complete menu structure
13284E	Data Sheet	Descriptions and technical data about the instrument.
10735DEF	Declaration of Conformity	Compliance with the underlying directives and standards.
10662E	White Paper	Technical Instruction of the interfaces Modbus and Profibus DP
11044DEF	SIREL Ex Instruction Manual	Contains additional information about the SIREL Ex control unit

Symbols used in this Manual

	Important information
	Action
	Supplementary information
	Extremely dangerous voltage
	Warning: explosion hazard (CAN BE FATAL!)
	Separate disposal of electrical and electronic equipment

1 Instrument Description

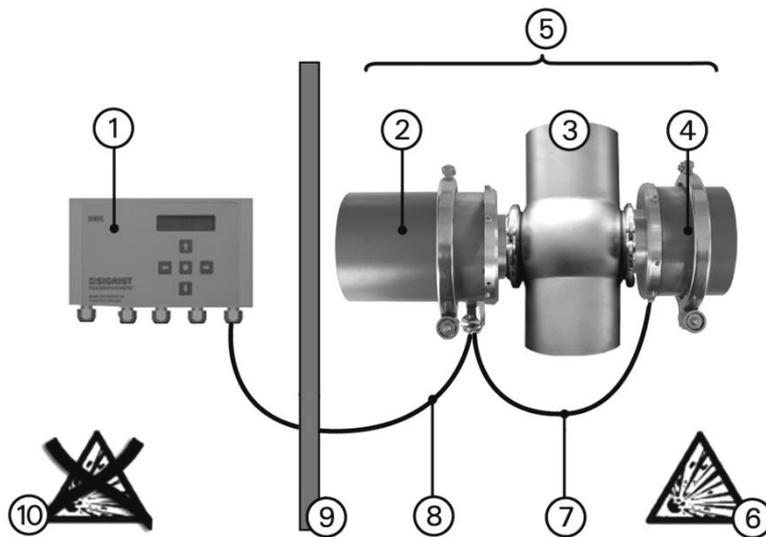
1.1 General view of a bypass measuring setup



Pos.	Name
1	Control unit Example with SIREL SMD
2	Transmitter
3	Flow cell
4	Receiver
5	Photometer
6	Ex-zone
7	Transmitter-receiver connecting cable
8	Photometer-SIREL connecting cable
9	Partition
10	Non-Ex zone

Figure 1: General view of a bypass measuring setup

1.2 General view of an inline measuring setup



Pos.	Name
1	Control unit Example with SIREL SMD
2	Transmitter
3	Flow cell
4	Receiver
5	Photometer
6	Ex-zone
7	Transmitter-receiver connecting cable
8	Photometer-SIREL connecting cable
9	Partition
10	Non-Ex zone

Figure 2: General view of an inline measuring setup

1.3 Scope of supply and accessories

Standard scope
of supply

Units	Name	Alternatives	Optional
1	Photometer	ColorPlus Ex for bypass, for Varivent® installation (inline) or in user-specific version	
1	Control unit SIREL SMD <i>or</i> SIREL Ex	SIREL, SIREL robust 85..264 VAC, 24 VDC	with SITRA/ SIBUS
1	Flow cell	- bypass - Varivent® - user-specific	
1	Bus coupler	Profibus DP	X
1	Cooling	Depends on medium temperature and ambient temperature	X
1	Wrench for dismantling flow cell windows	SW32 (for bypass flow cell) or OPL bit wrench (for Varivent® version)	
1	Housing key (118771)	Only for SIREL Ex	
1	Instruction Manual	English, German, French	
1	Reference Handbook	English, German	
1	Brief Instructions	English, German, French	
1	Parameter list	English, German	

1.4 Purpose and conformity



Use of the photometer for purposes other than that for which it was designed can produce incorrect measuring results, possibly with consequential damage to the process and damage to the photometer itself.



Installation and operation of the control unit and any supplementary components in areas at risk of explosion is prohibited (**DANGER OF FATAL INJURY!**)



If a control unit SIREL Ex is used to read the manufacturer's documentation 11044DEF advance.

Use in accordance with design purpose

The photometer and its periphery are designed for measuring the absorption of liquids and gases in areas at risk of explosion designated Zone 1, (Ex db IIC T3/T4/T5/T6 Ga/Gb).



The photometer complies with the following standards for electrical equipment and for areas at risk of explosion:

EN IEC 60079-0:2018	General requirements
IEC 60079-0:2017	General requirements
EN 60079-1:2014	Instrument protection with pressure-proof encapsulation "d"
IEC 60079-1:2014	Flameproof enclosure
EN 60079-26:2015	Operating materials with instrument protection level (EPL) Ga
IEC 60079-26:2014	Equipment with equipment protection level (EPL) Ga
Directive 2014/34/EU	

Tabelle 1: Standards

The photometer possesses the following certifications:

- EC-Type Examination Certificate BVS 10 ATEX E 102 X
- IECEx BVS 13.0058X

The current rules of engineering practice were observed in its design and manufacture. They meet the usual directives with regard to safety and the obligation to exercise due care.



The photometer and the control unit comply with the electromagnetic compatibility (EMC) requirements applicable within the European Union (EU) and with the Low Voltage Directives (LVD) and carry the CE mark.

1.5 Marking of the Product

The electrical connection figures and the serial number of the control unit are shown on the sticker at the bottom left:



Figure 3: Plates for the serial number and the electrical connection figures.



Figure 4: Photometer rating plate.



Figure 5: Position of the SIGRIST rating plate on the SIREL Ex

The photometer rating plate provides the following information:

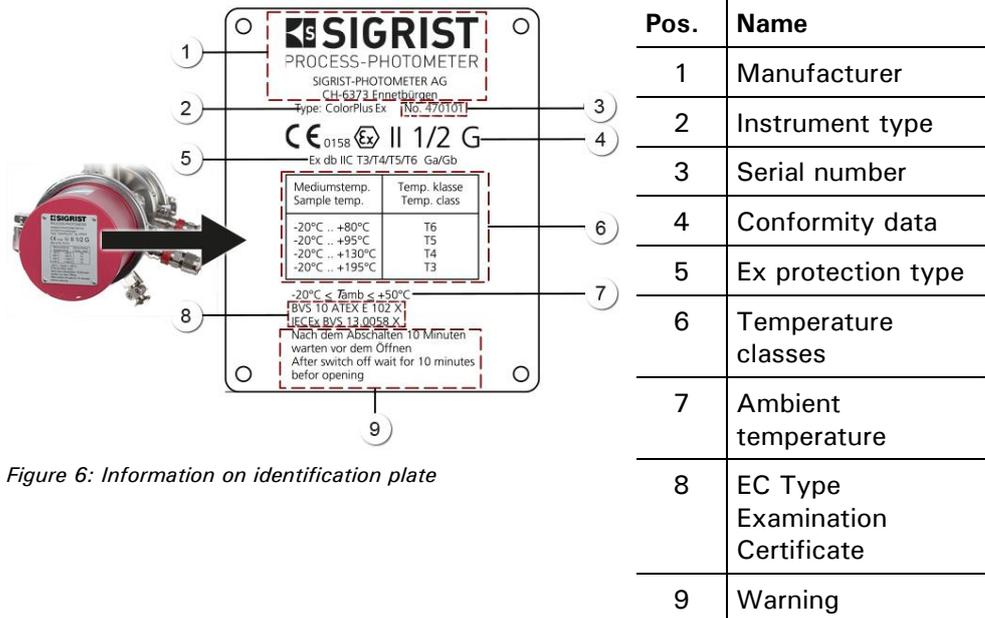


Figure 6: Information on identification plate



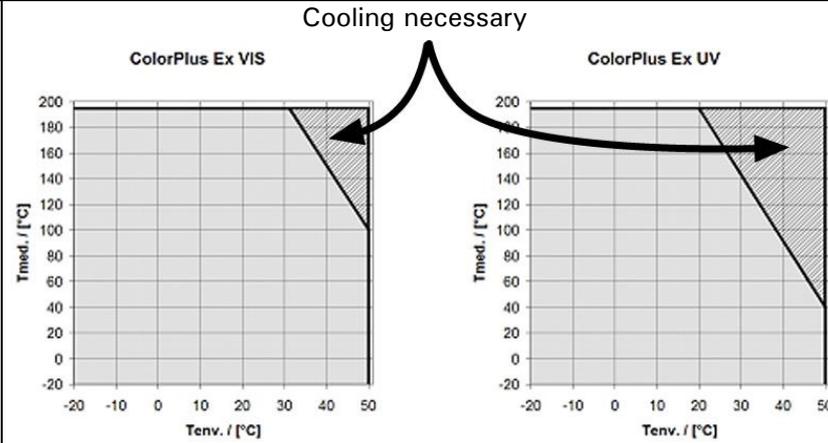
You can also consult the photometer's serial number in the menu * SYSTEM INFO * (→ Reference Handbook).

1.6 Technical data

Absorption measurement

Measuring principle:	Absorption at 1 .. 3 different wavelengths: 254, 313 or 365 .. 700nm
Measuring span:	0 .. 0.05 E to 0 .. 3 E
Resolution:	0.001 E
Reproducibility:	± 1 %
Ambient temperature:	-20 .. 50°C
Medium temperature:	-20 .. 195° C
Cooling medium:	minimum 0.17 l/min @ 10°C

Cooling:



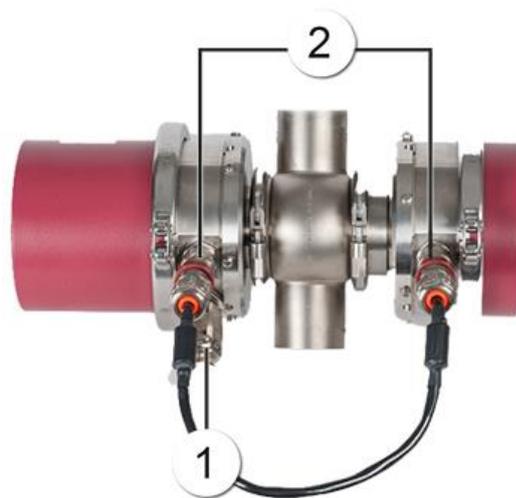
Photometer	Operating voltage:	24 V DC (from control unit)	
	Interfaces:	Modbus / with optional bus coupler Profibus DP	
	Flow cell	Stainless steel 1.4435, connections G ¼" female thread	
	- bypass flow cell		
	- inline flow cell		
	- user-specific (inline flow cell)	Titanium, Hastelloy, PVDF etc.	
	Enclosure:	Aluminum AlSi1MgMn, painted	
	Dimensions:	Detailed dimension drawing: see Section 11	
	Weight:	About 10 kg (not including flow cell)	
	Degree of protection:	IP65	
Type of Ex protection/temperature class:	Ex db IIC T3/T4/T5/T6 Ga/Gb, temperature class dependent upon the temperature of the medium:		
	Medium temperature	Temperature class	
	-20 .. +80° C	T6	
	-20 .. +95° C	T5	
	-20 .. +130° C	T4	
	-20 .. +195° C	T3	
SIREL SMD/robust	Operating voltage:	85 .. 264 V; 47 .. 63 Hz or 24 VDC; 25 W	
	Space required:	SIREL: 200 mm x 157 mm x 96 mm SIREL robust: 220 mm x 160 mm x 90 mm Detailed dimension drawing: see Section 11	
	Weight:	SIREL: about 1.5 kg SIREL robust: about 2.0 kg	
	Degree of protection:	IP65	
	Connections:	0/4 .. 20 mA, max. 600 Ω, max. 24 V, with electrical isolation, max. 50V against earth Relay contacts max. 250 VAC, max. 4 A Digital inputs and outputs max. 5 V	

SIREL Ex	Service voltage	85 .. 264 V, 47 .. 63 Hz
	Mains switch	None
	Dimensions	320 mm x 645 mm x 203 mm Detailed dimension drawing see Section 11
	Weight	Approx. 25 kg
	Protection type	IP66
	Ambient temperatures	-20°C to +50°C
	Connections	See SIREL SMD



Additional technical data of the SIREL Ex is provided in Instruction Manual 11044DEF.

1.7 Cable gland positions and versions



Pos.	Name
1	1 x cable gland Ex d IIC, M16 x 1.5, nickel-plated brass, clamping range 7 .. 9 mm (connection cable to the SIREL (Ex) control unit)
2	2 x cable glands HAWKE Ex d IIC, M20, nickel-plated brass, cable diameter 7.9 mm (connection cable between transmitter and receiver)

Figure 7: Cable glands on the ColorPlus Ex

2 Safety Rules

The symbols used in this Manual and on the photometer draw attention to the following safety steps or precautions:



WARNING: EXPLOSION HAZARD (CAN BE FATAL)!

Thoughtless action can result in explosions! Before undertaking maintenance work, always consult the Instruction Manual!



DANGER (BLACK ON YELLOW)

Warning: general source of danger. This symbol marks areas or manipulations requiring the observance of special safety rules, which are specified in this Instruction Manual.



VOLTAGE (BLACK ON YELLOW)

Warning: dangerous voltage. This marks live parts with voltages higher than 48 V AC or 65 V DC, which can cause electric shocks. In this case observe the safety precautions and safe behavior prescribed in this Instruction Manual.

Before starting up the instrument, be absolutely sure to observe these requirements:

- To avoid disabling the type of protection, make sure no mechanical or electrical modifications are carried out on the instrument or its parts.
- Only properly instructed personnel are allowed to open and close the photometer.
- Carry out the operating steps contained in this documentation exactly in the order stated. They are marked by the symbol  in the margin.

3 Installation/start-up

3.1 Photometer installation for the bypass version

The photometer must be installed in the horizontal position. To make it possible to vent the flow cell properly, make sure the medium outlet is on top.



Mounting of the bypass version

	Action	
1.	Fasten the photometer horizontally to a wall with four screws on fastening plate (A). The transmitter (B) must be on the right, the receiver (C) on the left.	
2.	Now connect the sample inlet and outlet. D: Medium inlet E: Medium outlet	

3.2 Photometer installation in inline housing

The photometer can be installed using a standardized inline housing (Varivent® or equivalent) in either vertical or horizontal product pipes.



- The groove (A) on the transmitter and receiver must be installed pointing upward!
- Be sure to install the ColorPlus Ex so the transmitter and receiver are positioned horizontally opposite each other! Only install a housing that makes this possible!
- The photometer must be installed in the pipe at least 2 m away from sight glasses or other sources of stray light.



Installation position

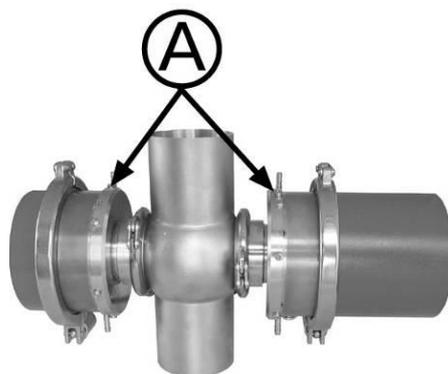


Figure 8: Installation in vertical product pipes.

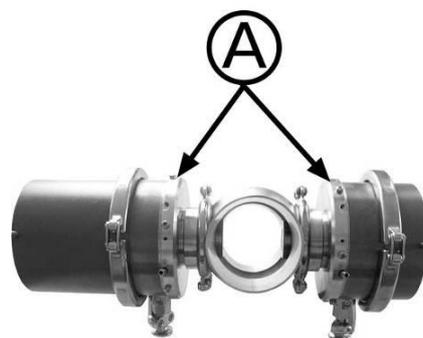


Figure 9: Installation in horizontal product pipes.

3.2.1 Sectional view of measuring setup



For detailed dimension drawings of ColorPlus Ex, refer to Section 11.
The inline housing is flanged into the pipe.

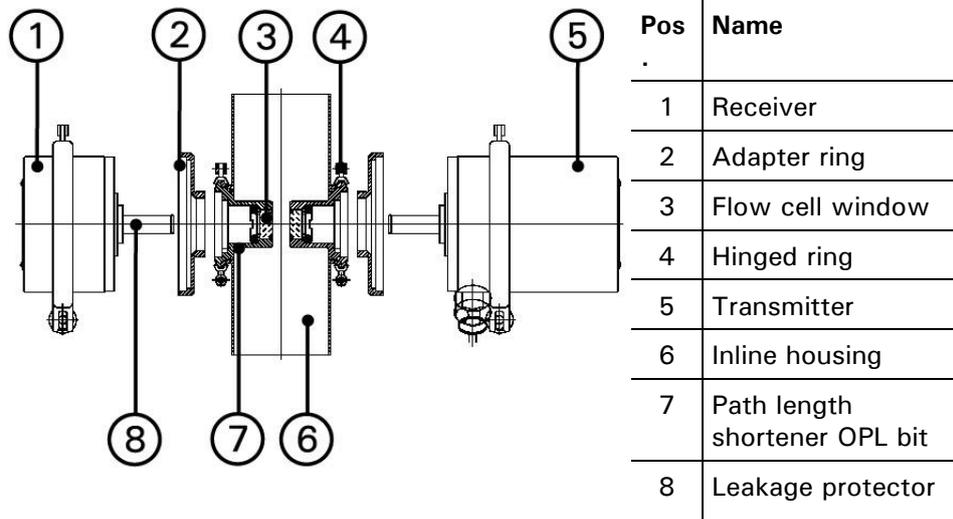


Figure 10: Sectional view of ColorPlus Ex

3.2.2 Installation with shortened path length

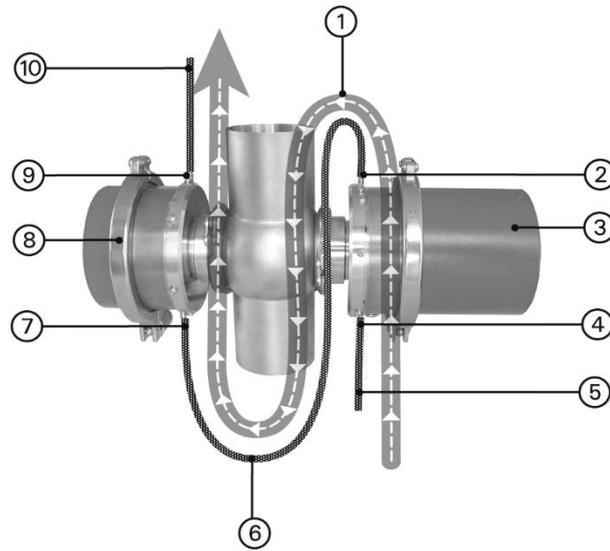


The ColorPlus Ex is delivered for installation in an inline housing with a shortened path length (7) on both sides. The path length shorteners (OPL bits) with flow cell window (3), matching leakage protector (8) and adapter ring (2) are installed at the factory to meet the customer's requirements.



	Action	Remarks
1.	Insert the completely assembled transmitter / receiver (including flow cell window (3), adapter ring (2), leakage protector (8) and screwed-on OPL bit) into the receptacle of the inline housing. ⚠ The groove (A) on transmitter and receiver must be installed pointing upward!	
2.	Fasten the transmitter / receiver with the hinged ring (4) and tighten nut (A).	

3.3 Installation of the cooling system (option)



Pos.	Name
1	Direction of flow of the cooling water
2	Cooling water outlet transmitter
3	Transmitter
4	Cooling water inlet transmitter
5	Inlet tube
6	Connecting tube between transmitter and receiver
7	Cooling water inlet receiver
8	Receiver
9	Cooling water outlet receiver
10	Outlet tube

Figure 11: Cooling water connection.

3.4 Installation of user-specific versions

For the installation of user-specific versions, refer to the drawing in Section 11.

3.5 Installation of the control units SIREL SMD



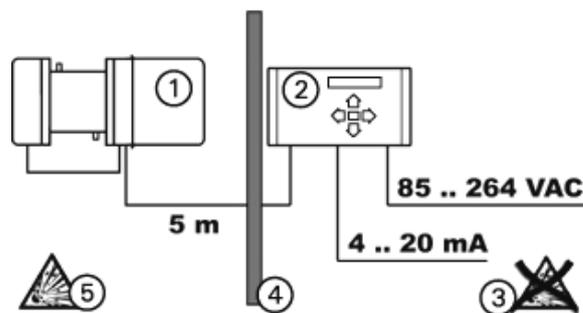
Do not install or operate the control unit or any supplementary components in areas at risk of explosion (CAN BE FATAL)!

Mounting SIREL

The control units can be mounted right on the wall, on a mounting frame or on a stand.

Distance up to 5 m

The standard cable supplied is 5 m long. This ensures that the control unit will be positioned close to the photometer.

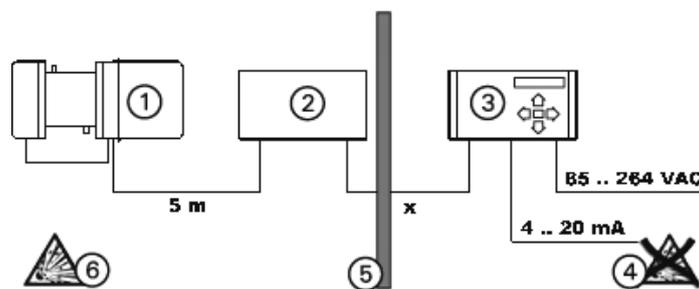


Pos.	Name
1	Photometer
2	SIREL control unit
3	Non Ex-zone
4	Partition
5	Ex-zone

Figure 12: Control unit position with standard cable

Distances longer than 5 m – variant 1

For distances longer than 5 m it is necessary to insert an additional Ex-tested terminal box between photometer and control unit. This permits quick connection and disconnection of the photometer and control unit.

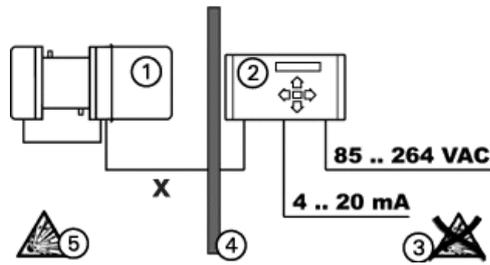


Pos.	Name
1	Photometer
2	Ex-tested terminal box
3	SIREL control unit
4	Non Ex-zone
5	Partition
6	Ex-zone

Figure 13: Arrangement of control units located at distances longer than 5 m

Distances longer than 5 m – variant 2

The control unit can be placed in larger distance to the Photometer by using a customized cable length:



Pos.	Name
1	Photometer
2	SIREL control unit
3	Non Ex-zone
4	Partition
5	Ex-zone

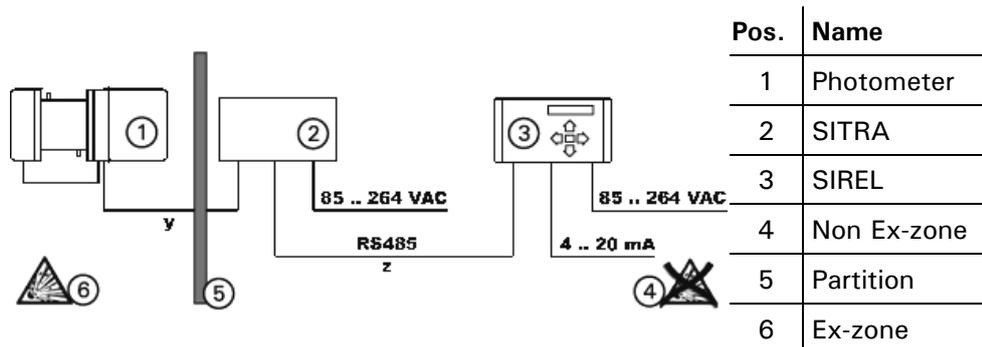
Figure 14: Arrangement of control unit with user-specific cable

The maximum distance (x) between control unit and terminal box depends on the photometer type and the cable cross-section used:

Cable cross-section [mm ²]	ColorPlus Ex UV Max. length x [m]	ColorPlus Ex VIS Max. length x [m]	
0.14	21	60	
0.25	37	108	
0.34	51	149	
0.5	73	214	
0.75	109	321	standard cable
1	142	417	
1.5	203	595	

Longer distances

The installation of a SITRA makes it possible to increase the distance between the SIREL and the photometer to as much as 1200 m. In this case the SITRA performs the signal amplifier function.



Pos.	Name
1	Photometer
2	SITRA
3	SIREL
4	Non Ex-zone
5	Partition
6	Ex-zone

Figure 15: Arrangement for very long distances

The maximum distance (y) between SITRA and photometer depends on the photometer type and the cable cross-section used:

Cable cross-section [mm ²]	ColorPlus Ex UV Max. length y [m]	ColorPlus Ex VIS Max. length y [m]	
0.14	16	48	
0.25	30	87	
0.34	41	119	
0.5	59	171	
0.75	87	256	standard cable
1	114	333	
1.5	162	476	

The maximum distance (z) between SITRA and control unit depends on the cable cross-section used:

Cable cross-section [mm ²]	ColorPlus Ex UV + VIS Max. length z [m]	
0.14	471	
0.25	844	
0.34	1161	
0.5	1200	
0.75	1200	standard cable
1	1200	
1.5	1200	

3.6 Installation of the SIREL Ex control unit



Please consult manufacturer documentation 11044DEF when installing the SIREL Ex.



A detailed dimension drawing of the SIREL Ex is in Section 11.

Refer to the table in Section 3.5 for distance dependency on cable cross-section.

3.7 Electrical connections

3.7.1 Voltage equalizing cable connection on the flow cell housing



It is absolutely necessary for the flow cell housing to be connected to the voltage equalizing cable!

The following rules apply for the different versions:

Inline version

In the case of the inline version, the piping system including the Varivent® housing must be connected to the voltage equalizing cable.

Bypass version

In the case of the bypass version, the voltage equalizing cable must be connected to the designated earthing point on the transmitter enclosure.

User-specific flow cells

In the case of user-specific flow cells, the voltage equalizing cable must be connected to the designated earthing point on the transmitter enclosure if the material suited.

3.7.2 Connecting the control unit SIREL



Connecting live conductors is extremely dangerous, and parts of the installation can be damaged. Always observe the local codes when performing electrical installation work.

In addition, observe the following rules:

- It is absolutely necessary to connect the protective earth conductor.
- Because the instrument has no mains switch, a suitable disconnection device (switch, plug) must be provided near the mains connection.
- If malfunctions cannot be eliminated, take the instrument out of service and take precautions against it being put back into service inadvertently.

3.7.3 Opening the SIREL SMD

Opening the control unit

All electrical connections are made with spring-loaded terminals inside the control unit. To open the control unit, unscrew the four screws underneath the side covers (→ Figure 16).

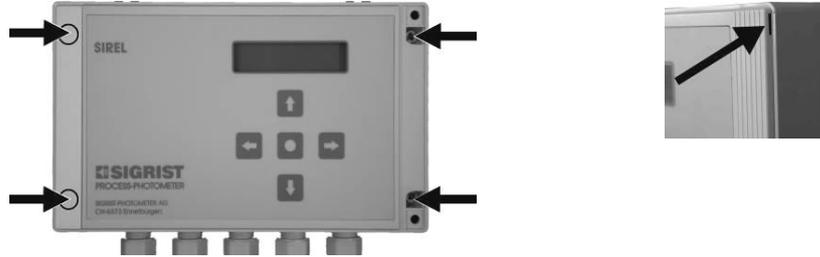


Figure 16: Opening the control unit.

3.7.4 Opening the SIREL Ex housing



You must interrupt the service voltage (explosion hazard) before opening the SIREL Ex housing.



Action	Remarks
1. Interrupt the service voltage to the SIREL Ex.	→ Section 3.7.5
2. Place a square wrench on the square element (arrow) and unlock the cover by rotating a quarter turn to the left. Square wrench (→ Section 1.3).	
3. Pull down the cover to open.	

3.7.5 Establish SIREL SMD/Ex electrical connections



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

The terminals of the SIREL Ex are located in the lower part of the housing (Figure 17). The housing must be open in order to connect the electrical connections → Section 0.

The terminal assignment is identical for the SIREL SMD and SIREL Ex (→ Figure 18).

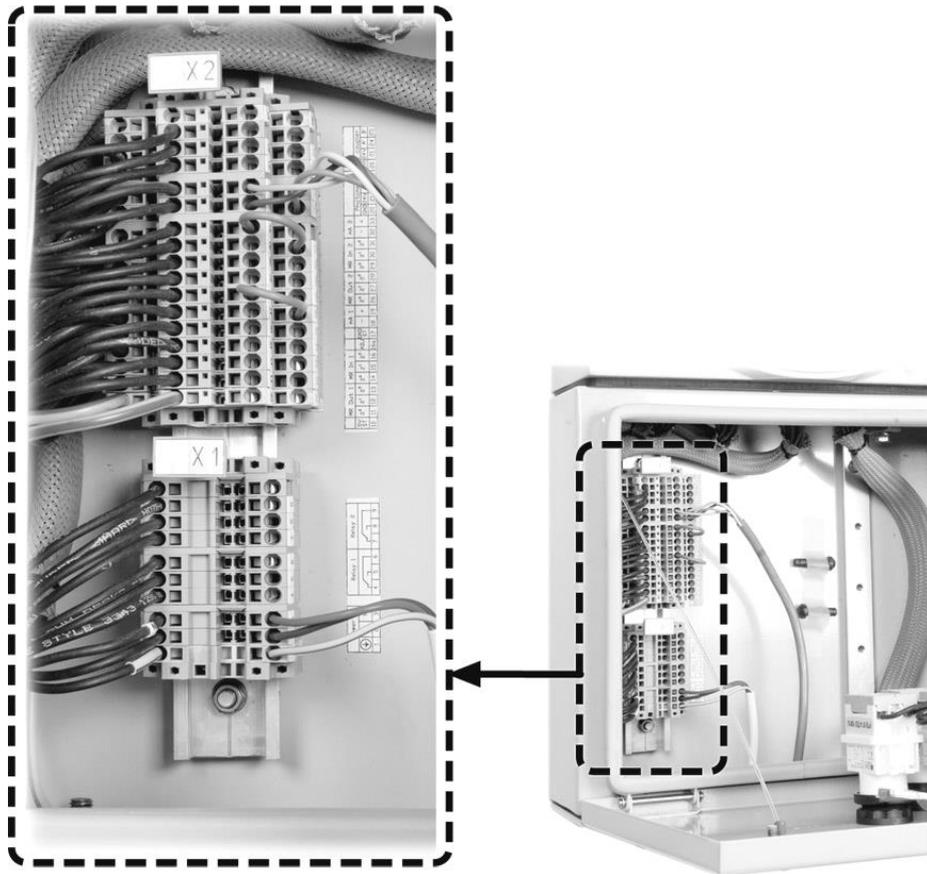


Figure 17: Position of SIREL Ex terminals

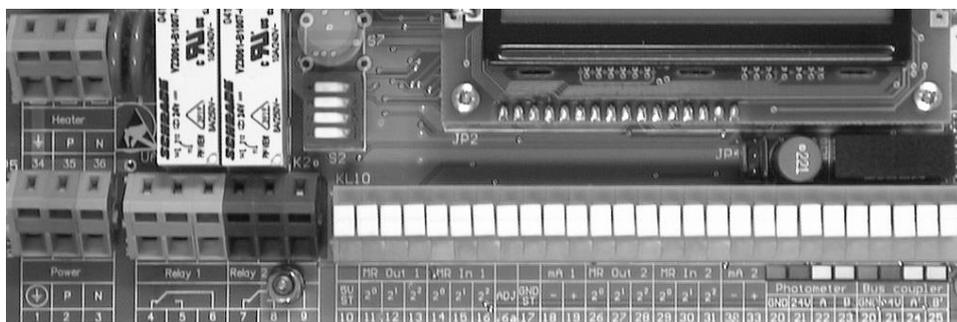


Figure 18: Terminal block for SIREL SMD 85..264 VAC.

Make up the electrical connections in the following order:



	Terminals	Used for	Remarks
1.	20	Connection to photometer	green
	21		brown
	22		white
	23		yellow
2.	4 - 5 - 6	Relay output 1	The relay outputs are freely configurable (→ Reference Handbook).
	7 - 8 - 9	Relay output 2	
	18 - 19	Reading output for 1 st meas. angle (90° reading in the case of dual-angle instrument)	0/4 .. 20 mA, max. burden 600 Ω i If unused, these terminals must be shorted with a jumper!
	32 - 33	Reading output for 2 nd meas. angle (25° reading in the case of dual-angle instrument)	
3.	10 .. 17	Control signals for 1 st meas. angle	→ Reference Handbook
	26 .. 31	Control signals for 2 nd meas. angle	Provided on dual-angle instrument only.
	16a	Control signal for sensor check	→ Reference Handbook
	24 - 25	Connection to bus coupler	→ Reference Handbook
4.	1 - 2 - 3	Mains voltage	85 .. 264 V; 47 .. 63 Hz or 24 VDC; 25 W

3.8 Initial start-up

Carry out the initial start-up according to the following table. In the event of malfunctions, consult Section 6.

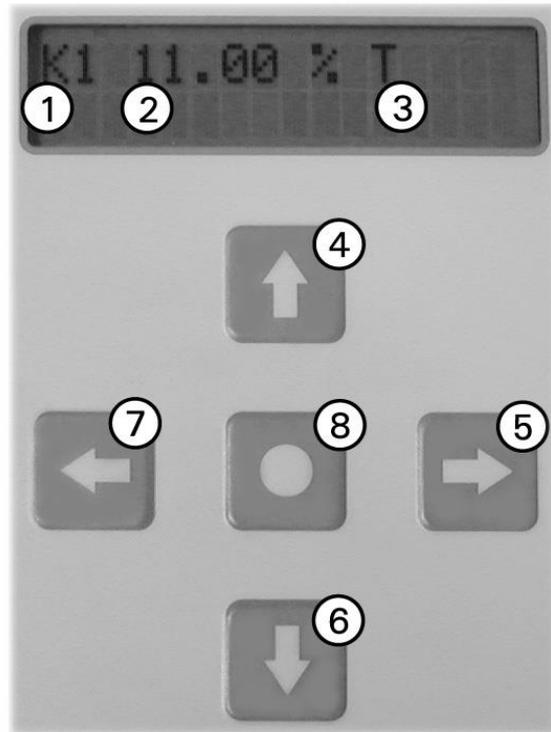


	Action	Remarks
1.	Make sure the photometer and control unit are correctly mounted and connected.	→ Section 3
2.	Switch on the power supply to the control unit.	After a few seconds, a reading will appear on the control unit display (depends on the instrument type and which unit is set).
3.	Set the language of your region (→ Section 4.4).	Now the menu text appear in the desired language.
4.	Set the measuring range you require for your measurement conditions (→ Section 4.5).	
5.	Set the relay functions you require for your measuring duty (→ Section 4.7).	
6.	Secure your settings against tampering with an access code (→ Section 4.9).	If you don't require an access code, skip this step.
7.	Carry out a 100% adjustment.	→ Section 5.2

4 Operation

4.1 Operating elements and display SIREL SMD

SIREL

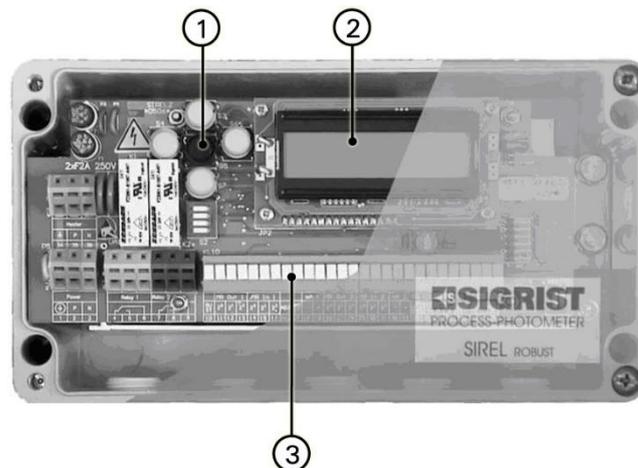


Pos.	Name
1	Channel number and reading
2	Measuring value
3	Unit set (e.g. E/m or %T (→ Reference Handbook))
4	Arrow key up
5	Arrow key right
6	Arrow key down
7	Arrow key left
8	Enter key

Figure 19: Operating elements and display.

SIREL robust

The user guidance is the same as for SIREL. The only differences between SIREL robust and SIREL are the integrated keypad/display and the enclosure.



Pos.	Name
1	Integrated keypad
2	LC display
3	Connection terminals

Figure 20: SIREL robust

SIREL Robust (cover removed)

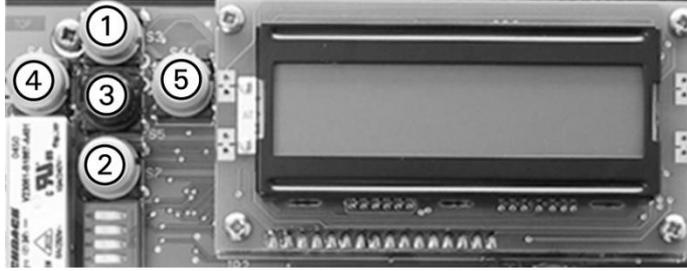


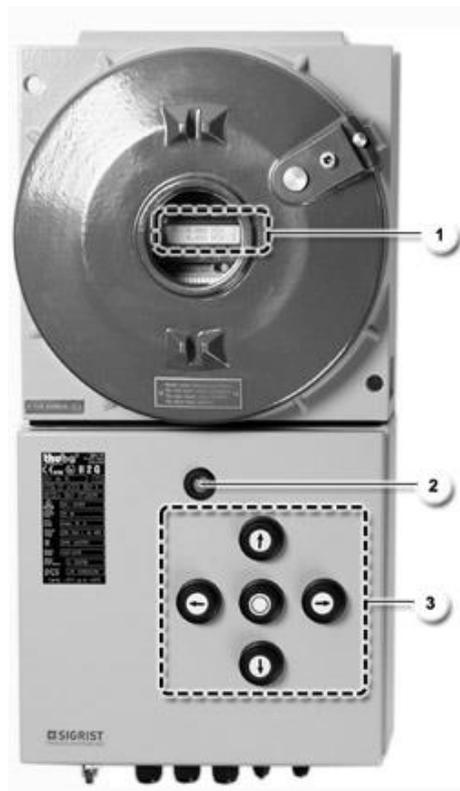
Figure 21: Operating elements of SIREL robust

Key functions:

Pos.	Symbols	Key functions
1, 2	↑/↓	<ul style="list-style-type: none"> • Switch between menu lines • Change numbers in the editing mode (see below)
4, 5	←/→	<ul style="list-style-type: none"> • Switch between the functions of a menu line • Change function values, shift a number's decimal point in the editing mode (see below)
4, 5	← + →	<ul style="list-style-type: none"> • Press both simultaneously to return to normal operation
3	□	<ul style="list-style-type: none"> • Activate the editing mode (display shows > <) • Enter the setting (as confirmation)

4.1.1 Control components and display of the SIREL Ex

The operator prompting of the SIREL Ex is identical to that of the SIREL SMD. Only the integrated keyboard and the housing differentiate the SIREL Ex from the SIREL SMD.



Pos.	Name
1	LC display
2	Square element for opening the cover
3	Integrated keyboard

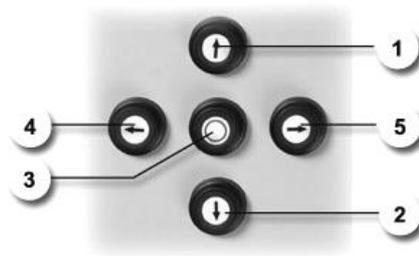


Figure 22: SIREL Ex control components

Figure 23: SIREL Ex

Key functions,
SIREL Ex

Pos.	Symbols	Key functions
1, 2	↑/↓	<ul style="list-style-type: none"> Switch between menu lines Change the numerical values in editing mode (→ below)
4, 5	←/→	<ul style="list-style-type: none"> Switch between functions in a menu line Change the function values and/or change the decimal place of a numerical value in editing mode (→ below)
4, 5	←+→	<ul style="list-style-type: none"> Return to normal operation by pressing simultaneously
3	□	<ul style="list-style-type: none"> Activate editing mode (display of > <) Apply the settings (confirmation)

4.2 Normal operation (operating mode)

When the instrument is switched on, ColorPlus Ex first checks which control units are connected to it. Then it switches automatically to normal operation.



If several SIRELs are connected to the photometer, all of the control units must be switched on for operation!

The following displays appear in normal operation:

Displays in normal operation

Display (Examples)	Signifies
K1 92,80 E/m	The reading of channel 1 is displayed. There is no second channel.
K1 90,60 E/m K2 95,20 E/m	The readings of channels 1 and 2 readings are displayed. Use to switch to the display for channel 3, if any. The math channel is not active.
M1 90,60 E/m or M2 95,20 E/m	Math channel 1 (or math channel 2) is active and is displayed. Use to switch to the display of the two channels 1 and 2. Press again to show the display for channel 3, if any.
M1 90,60 E/m M2 95,20 E/m	Both math channels are active. Use to switch to the display of the two channels 1 and 2. Press again to show the display for channel 3, if any.
K1 0.000-3.000	Display of the actual measuring ranges (press to switch).

Besides the display shown during normal operation, it is also possible to show the following displays:

Special displays

The display...	signifies ...	so you should...
K1 ***** E/m K2 ***** E/m K3 ***** E/m M1 ***** E/m M2 ***** E/m	...that the reading is outside the momentary measuring range.	...make sure that the absorption lies within the set range (max. 3E). If necessary, alter the path length. ... ignore the display if the process happens to be in an irregular phase.
**** Fault ****that a malfunction has occurred.	...try to pinpoint the cause of the malfunction (→ Section 6).
**** Warning ***that a warning situation has occurred.	...try to determine the cause of the warning (→ Section 6).

Table 2: Display examples and what they signify.

4.3 Service mode

The photometer can be configured in the service mode. Measuring is interrupted. The following menu control appears on the display:



	Action	Display (example)	Remarks
1.		Access code > 000000 <	If no personal access code has been set, confirm with . Then continue with step 3.
2.	Enter code: / Change number / Change place	Access code > <	Now enter your own access code, or the factory default 000000.
3.		* 100% ADJUST. * * * *	Instrument is in the service mode.

Applies in service mode:

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

4.4 Set your language

The control unit's display can be set to English, German, French or Italian.



	Action	Display (example)	Remarks
1.	Switch to service mode.	* 100% ABGL. * * * *	→ Section 4.3
2.	3 x to →	* KONFIGURIEREN* * * *	
3.		> Sprache Deutsch <	
4.	Activate editing mode with .	Sprache > Deutsch <	
5.	Select language: /	Sprache > ... <	
6.	Confirm selection with .	> Language ... <	
7.	+ (together)	K1 68.2 %T K2 85.8 %T	Instrument in normal operation.

4.5 Set the measuring range



	Action	Display (example)	Remarks
1.	Activate service mode.	* 100% ADJUST. *	→ Section 4.3
2.		* MEAS.RANGE *	
		> Meas.range < X...	Set the range for output signals 1 + 2.
	Activate editing mode with	Meas.range > X... <	
5.	Select measuring range with /.	Meas.range > 1.. <	e.g. range 1
6.	Confirm selection with .	> Meas.range < 1..	
7.	+ (together)	K1 68.2 %T K2 85.8 %T	Instrument in normal operation.

Measuring ranges set at the factory

Measuring range No.	Measuring span in E	User-specific
MR 1 (Standard setting)	0 .. 3	
MR 2	0 .. 2	
MR 3	0 .. 1	
MR 4	0 .. 0.5	
MR 5	0 .. 0.2	
MR 6	0 .. 0.1	
MR 7	0 .. 0.05	
MR 8	0 .. 0	
MR inputs	Remotely controlled range switching → Reference Handbook	
Automatic	0 .. 3	

Table 3: Measuring ranges



The measuring ranges are set at the factory to suit the user's requirements. Depending on the instrument version, certain measuring ranges can be masked out (→ Configuration sheet).

It is also possible to modify the measuring ranges individually (→ Reference Handbook). Changes can be entered in Table 3: Measuring ranges in the column "User-specific" as well as noted on the parameter list.

4.6 Configure the channels

Depending on the instrument type, the instrument can have 1..3 channels (wavelengths) and two calculation channels (math channels).



All of the channels are configured at the factory to suit the user's needs. No setting is required upon installation.

4.7 Set the relay functions

All control units have two freely configurable relay outputs.

Several functions can be assigned to a given relay. The relay in question will be activated whenever *one* of the configured functions becomes active (OR link).



	Action	Display (example)	Remarks
1.	Activate service mode.	* 100% ADJUST. *	→ Section 4.3
2.	3 x	* CONFIGURATION* *	
3.	Configure relay 1 8 x	> Relay 1 < li al se wa in	
4.	Activate editing mode with	Relay 1 >li al se wa in<	
5.	Assign functions: Function on/off Change function	Relay 1 >LI al se wa in<	li = Limit 1 exceeded al = Alarm (fault has occurred) se = Instrument in service mode wa = Warning (warning situation has occurred) in = Relay inverted Functions in CAPITAL LETTERS are activated (e.g. LI).
6.	Confirm selection with	> Relay 1 < LI al se wa in	
7.	Configure relay 2 with	> Relay 2 < li AL se WA in	
8.	Activate editing mode with	Relay 2 >li AL se WA in<	

	Action	Display (example)	Remarks
9.	Assign functions: ↑/↓ Function on/off ⇐/⇒ Change function	Relay 2 >li AL se wa in<	li = Limit 2 exceeded al = Alarm (fault has occurred) se = Instrument in service mode wa = Warning (warning situation has occurred) in = Relay inverted Functions in CAPITAL LETTERS are activated (e.g. AL).
10.	Confirm selection with	> Relay 2 < li AL se wa in	
11.	+ (together)	K1 68.2 E/m K2 85.8 %T	Instrument in normal operation.



After the relays have been configured, it is necessary to set the limits (→ Section 4.8).

4.8 Set the limits

Up to two limits can be programmed, each with an upper and a lower threshold value (→ Figure 24: Upper and lower thresholds of a limit.). If the reading reaches the *upper threshold*, the limit becomes active and remains activated until the reading drops back below the *lower threshold*.

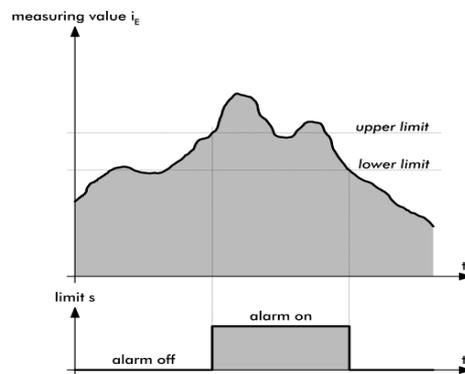


Figure 24: Upper and lower thresholds of a limit.



The limits are available only if the relay has been so configured (→ Section 4.7).



	Action	Display (example)	Remarks
1.	Switch to the service mode.	* 100% ADJUST. * * * * *	→ Section 4.3
2.	→	* MEAS.RANGE * * LIMITS * *	
3.		> LI1 source < Channel 1	LI1 = Limit 1 LI2 = Limit 2
4.	Activate editing mode with .	LI1 source > Channel 1 <	
5.	Select source: /	LI1 source > ... <	Channel to which the limit should apply (channel 1 .. 3 or math channel 1 or 2)
6.	Confirm selection with .	> LI1 source < ...	
7.		> Upper limit1 < 1.000 E/m	
8.	Activate editing mode .	Upper limit1 > 1.000 E/m <	
9.	Set upper threshold value: / Change number / Change place	Upper limit1 > ... <	Set the value at which the limit should be activated.
10.	Confirm setting with .	> Upper limit1 < ...	
11.		> Lower limit1 < 0.800 E/m	
12.	Activate editing mode with .	Lower limit1 > 0.800 E/m <	
13.	Set lower threshold value: / Change number / Change place	Lower limit1 > ... <	Now set the value at which the limit should be deactivated again.
14.	Confirm setting with .	> Lower limit1 < ...	
15.		> LI2 source < Channel 2	Repeat procedure for limit 2 → steps 6 to 16.
16.	+ (together)	K1 68.2 E/m K2 85.8 %T	Instrument in normal operation.

4.9 Set the access code

You can use a self-defined access code to protect the ColorPlus Ex settings against tampering.



	Action	Display (example)	Remarks
1.	Activate service mode.	* 100% ADJUST. * * * *	→ Section 4.3
2.	3 x	* CONFIGURATION* * * *	
3.	2 x	> Access code < 000000	
4.	Activate editing mode with .	Access code > 000000 <	
5.	Enter new code: /↓ Change number /→ Change place	Access code > <	Note the code in the field below so you don't forget it!
6.	Confirm selection with .	> Access code <	
7.	+ (together)	K1 68.2 E/m K2 85.8 %T	Instrument in normal operation.

New access code:

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



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

5 Servicing



Do not open the photometer before the power supply to the control unit has been disconnected and then a waiting time of ten minutes has passed to allow the light source to cool down sufficiently (EXPLOSION HAZARD)!



- The electric power supplied to the UV light source CAN CAUSE FATAL INJURY. So it is absolutely necessary to disconnect the power supply to any instrument with a UV light source before opening the instrument!
- The UV radiation from the bulb can damage your eyes!
- The UV light source and the light source housing can reach temperatures above 80°C!

This section describes the activities that have to be performed either preventively or as required in order to ensure proper operation of the photometer.



Activities that are not mentioned in this Instruction Manual may be carried out only by personnel specifically trained to perform them!

5.1 Service schedule

Recommended service work

When	Who	What	Purpose
Every 3 months or more frequently (as needed)	User	100% adjustment of the photometer (→ Section 5.2)	Necessary in order to maintain measuring accuracy. Interval depends on measuring environment.
Once a year or as needed	User	Functional check with reference glass (→ Section 5.3)	Absolutely necessary for maintaining measuring accuracy.
Once a year or as needed	User	Replacement of desiccant in sensor head (transmitter and receiver) (→ Section 5.4)	Absolutely necessary in order to maintain measuring accuracy.
In the event of "Sealing" warning	User	Replacement of desiccant in transmitter / receiver (→ Sections 5.5 and 5.6)	Absolutely necessary in order to maintain measuring accuracy.
As needed	User	Cleaning or replacement of flow cell windows (→ Sections 5.7 and 5.8)	Absolutely necessary in order to maintain measuring accuracy.
In the event of "UV- lamp" fault	User	Replace UV light source (→ Section 5.9)	Correction of malfunction.
As needed	Service office	Cleaning of optics	In the event of unsatisfactory measuring results.

Table 4: Service schedule

5.2 100% adjustment of the photometer



Recalibration of the photometer can change the readings slightly from the previous ones, because the instrument is reset to a reference standard (e.g. distilled water)!

Before the 100% adjustment is started, the photometer must have reached the operating temperature (UV > 2h/LED > 10 min)!



	Action	Display (example)	Remarks
1.	Fill flow cell with zero medium ¹ e.g. with distilled water or air	K1 00.70 E K2 90.50 %T	Make sure there are no air bubbles in the flow cell during the zero adjustment.
2.	Activate service mode.	* 100% ADJUST. * * * *	→ Section 4.3
3.	2 x	> 100% Adjust. < No	
4.	Activate editing mode with .	100% Adjust. > No <	
5.	1 x or	100% Adjust. > Yes <	
6.	Confirm selection with .	Adjustment running ...	The process takes about 30 seconds...
7.		M100.0 100.2 99.8 K 0.0 0.1 -0.0	Instrument in service mode. M = reading for transmission (must be around 100%) K = compensation (must be around 0)
8.	+ (together)	K1 00.10 E/m K2 100.1 %T	Instrument in normal operation.



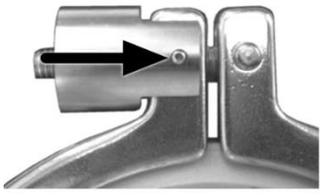
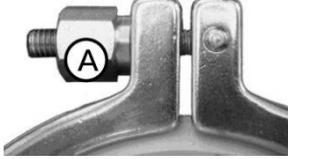
If the 100% adjustment could not be carried out, the message 100% adjustment outside tolerance appears in the display. If that occurs, check the following points:

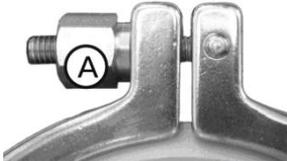
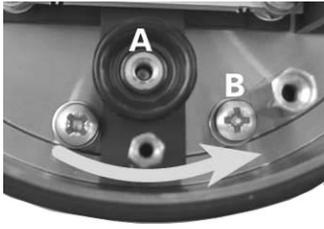
- Ensure the device is properly mounted
- The measuring cell may be too dirty
- Ensure the correct zero medium is used

¹ In the UV range (254nm, 313nm) distilled water is used as zero medium; in the visible range (365..700nm) either clear, colorless water or any colorless sample else is normally adequate enough.

5.3 Functional check with reference glass

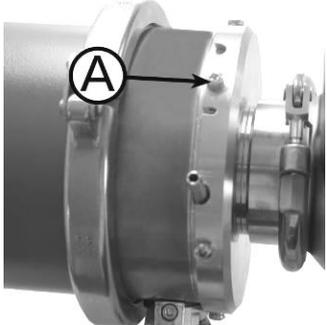
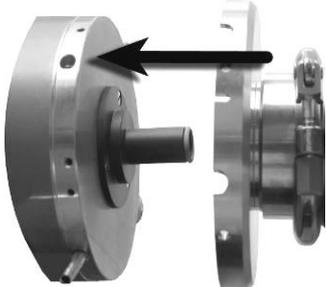
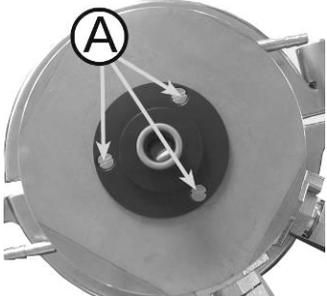
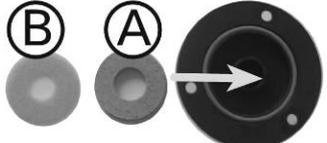


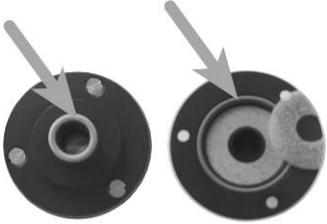
	Action	Remarks
1.	Fill the flow cell with zero medium. i Do not empty the flow cell again until you have taken the reading (point 10)!	
2.	⚠ Do not open the photometer before the power supply to the control unit has been disconnected and then a waiting time of ten minutes has passed to allow the light source to cool down sufficiently (EXPLOSION HAZARD!) Disconnect the power supply of the photometer to the control unit.	
3.	Loosen the Allen screw (arrow) at the receiver enclosure by about ½ turn and pull off the locking piece.	
4.	Loosen nut (A) enough to be able to swing the hinged ring away easily. Take off the entire clamping ring and then remove the receiver enclosure.	
5.	Loosen knurled nut (A) and rotate the checking glass into the checking position (arrow). Fix the checking glass in place with knurled nut (A) and replace and fasten the enclosure cover. ⚠ The checking glass must be in contact with stop (B)! Make a note of the reading stated inside the enclosure.	
6.	Replace the receiver enclosure and fasten it with the clamping ring.	
7.	Restart the photometer and wait until it has reached its operating temperature (UV > 2h/LED > 10 min).	
8.	Set the menu *100% Adjust.* on the control unit (→Section 5.2).	

	Action	Remarks
9.	Press key  . Depending on the configuration, between one and three transmission values will appear in the top line.	
10.	Take the reading(s) and note it down.	
11.	Compare the measured value with the value noted down from inside the enclosure. <i>If the variance is more than $\pm 0.1\%T$, repeat steps 1 – 11. If the measured value varies too much again, contact your service office.</i> <i>If the measured value agrees with the value stated inside the enclosure, proceed with step 12.</i>	
12.	 Do not open the photometer before the power supply to the control unit has been disconnected and then a waiting time of ten minutes has passed to allow the light source to cool down sufficiently (EXPLOSION HAZARD)! Disconnect the power supply of the photometer to the control unit.	
13.	Loosen nut (A) enough to be able to swing the hinged ring away easily. Take off the entire clamping ring and then remove the receiver enclosure.	
14.	Loosen knurled nut (A) and turn the checking glass back to the normal position. Tighten knurled nut (A).  The checking glass must be in contact with stop (B)!	
15.	Reclose the instrument in the reverse order.	

5.4 Replacement of the desiccant in the sensor head



	Action	Remarks
1.	<p>⚠ Do not open the photometer before the power supply to the control unit has been disconnected and then a waiting time of ten minutes has passed to allow the light source to cool down sufficiently (EXPLOSION HAZARD)!</p> <p>(Cooling down of instrument to a safe temperature level and fading of the residual charges.)</p> <p>Disconnect the power supply of the photometer to the control unit.</p>	
2.	<p>Remove the six screws (A) around the periphery of the sensor head.</p>	
3.	<p>Withdraw the sensor head from the adapter ring.</p>	
4.	<p>Loosen the three screws (A) and remove the leakage protector.</p>	
5.	<p>Remove the old desiccant.</p> <p>Place the new desiccant (A) in the leakage protector and then cover it with the dust protector (B).</p>	

	Action	Remarks
6.	Replace the seals (arrows) on the leakage protector (seals are supplied together with new desiccant).	
7.	Clean window (A) with a cotton rag.	
8.	Reassemble the instrument in reverse order and restart it.	



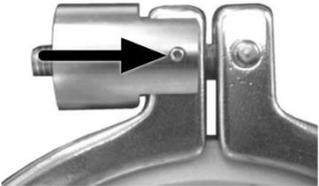
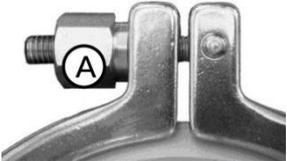
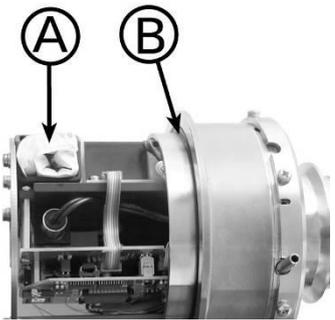
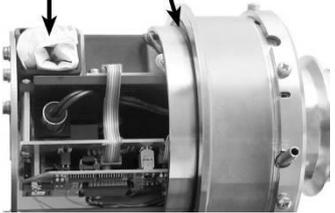
If you have to replace the desiccant frequently, you should have a SIGRIST service technician check the tightness of the Ex enclosure.

5.5 Replacement of the desiccant in the transmitter



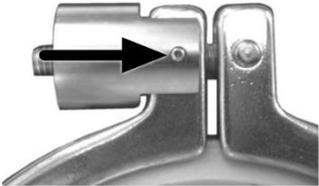
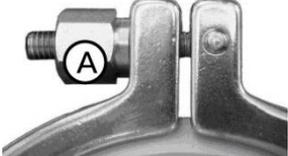
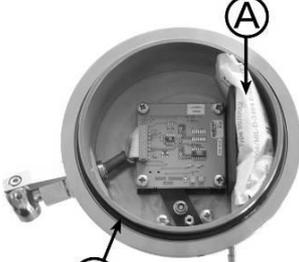
- The electric power supplied to the UV light source **CAN CAUSE FATAL INJURY!** So for all instruments with a UV light source, it is absolutely necessary to disconnect the power supply before opening the enclosure!
- The UV radiation from the bulb can damage your eyes!
- The UV light source and the light source housing can reach temperatures above 80°C!



	Action	Remarks
1.	<p> Do not open the photometer before the power supply to the control unit has been disconnected and then a waiting time of ten minutes has passed to allow the light source to cool down sufficiently (EXPLOSION HAZARD!) (Cooling down of instrument to a safe temperature level and fading of the residual charges)</p> <p>Disconnect the power supply of the photometer to the control unit.</p>	
2.	Loosen the Allen screw (arrow) at the transmitter enclosure by about ½ turn and pull off the locking piece.	
3.	Loosen nut (A) enough to be able to swing the hinged ring away easily. Take off the entire clamping ring and then remove the transmitter enclosure.	
4.	Remove the saturated desiccant bag (A). Take the new desiccant bag, shake its contents to one end and roll the bag up. In this form it can be inserted easily into the transmitter.	
5.	Check the enclosure seal (B) and replace it if necessary.	
6.	Reassemble the photometer in reverse order and restart it.	

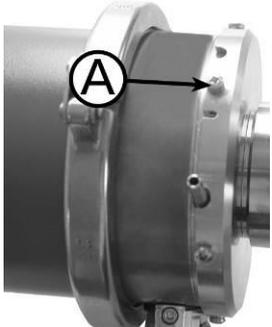
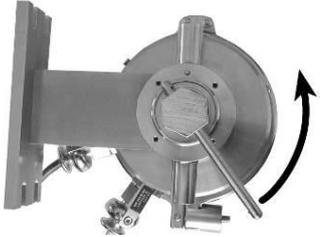
5.6 Replacement of the desiccant in the receiver



	Action	Remarks
1.	<p>⚠ Do not open the photometer before the power supply to the control unit has been disconnected and then a waiting time of ten minutes has passed to allow the light source to cool down sufficiently (EXPLOSION HAZARD)! (Cooling down of instrument to a safe temperature level and fading of the residual charges)</p> <p>Disconnect the power supply of the photometer to the control unit.</p>	
2.	<p>Loosen the Allen screw (arrow) at the receiver enclosure by about ½ turn and pull off the locking piece.</p>	
3.	<p>Loosen nut (A) enough to be able to swing the hinged ring away easily. Take off the entire clamping ring and then remove the receiver enclosure.</p>	
4.	<p>Remove the saturated desiccant bag (A). Take the new desiccant bag, shake its contents to one end and roll the bag up. In this form it can be inserted easily into the receiver.</p>	
5.	<p>Check the enclosure seal (B) and replace it if necessary.</p>	
6.	<p>Reassemble the photometer in reverse order and restart it.</p>	

5.7 Cleaning/replacement of the flow cell windows in bypass flow cells

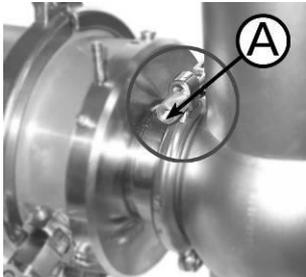


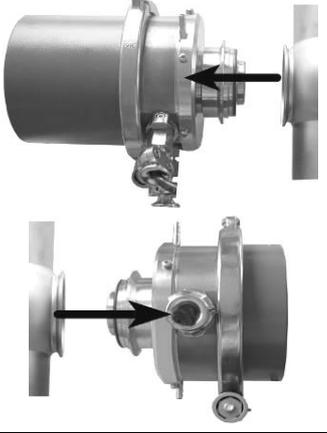
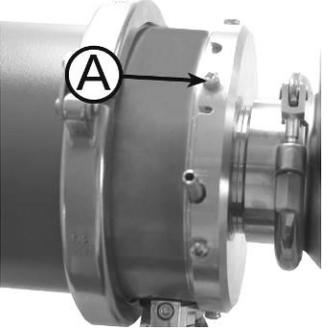
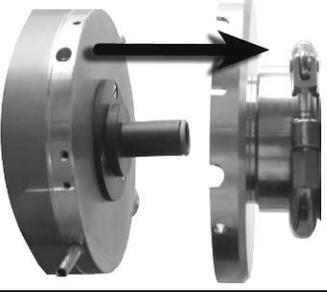
	Action	Remarks
1.	<p>⚠ Do not open the photometer before the power supply to the control unit has been disconnected and then a waiting time of ten minutes has passed to allow the light source to cool down sufficiently (EXPLOSION HAZARD)! (Cooling down of instrument to a safe temperature level and fading of the residual charges)</p> <p>Disconnect the power supply of the photometer.</p>	
2.	<p>Interrupt the sample flow through the flow cell and let it run empty. Now remove the sample inlet and the sample outlet.</p>	
3.	<p>Remove the photometer from the measuring setup and place it aside on a firm surface.</p>	
4.	<p>Take off the transmitter/receiver by removing the six screws (A).</p> <p>⚠ Get a firm grip on the transmitter/receiver while doing this!</p>	
5.	<p>Remove the four screws from the adapter plate (B) and take the plate out of the measuring setup.</p>	
6.	<p>Loosen the fitting on the flow cell with the special wrench (SW32).</p>	

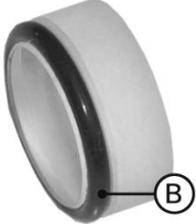
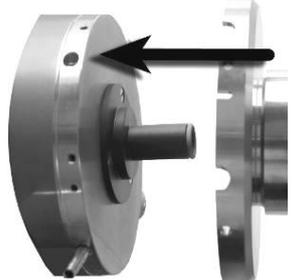
	Action	Remarks
7.	Now you can remove the threaded ring, thrust ring, seal and flow cell window.	
8.	Clean the flow cell window with a suitable cleaning agent. Take care not to dirty it again during reinstallation. If necessary, replace the flow cell window and seal.	
9.	<p>If necessary, replace the leakage protector seal (A). Remove the old seal and place the new seal into the groove on the leakage protector.</p> <p>i If necessary, replace the desiccant and the seal (→ Section 5.6).</p>	
10.	Reassemble the photometer in reverse order and restart it.	
11.	Carry out a 100% adjustment as directed in Section 5.2.	

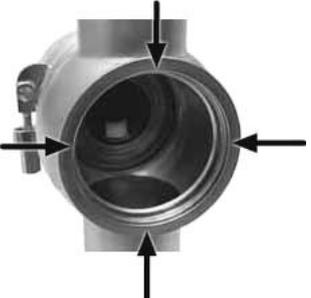
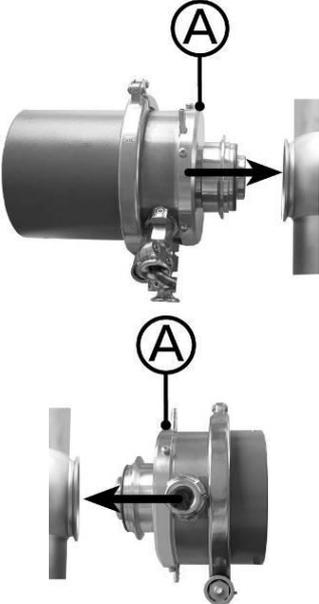
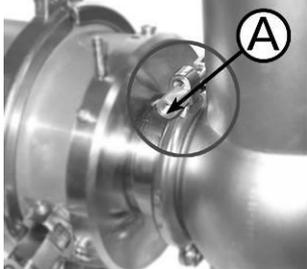
5.8 Cleaning/replacement of the flow cell windows on the Varivent® flow cell



	Action	Remarks
1.	Interrupt the sample flow through the in-line flow cell and let it run empty. Switch off the photometer's power supply.	
2.	<p>Remove first nut (A) and then the hinged rings on the transmitter and receiver sides.</p> <p>⚠ Get a firm grip on the transmitter / receiver while doing this!</p>	

	Action	Remarks
3.	Remove the transmitter / receiver, including the OPL bit from the inline flow cell.	
4.	Loosen the six screws (A) on the adapter ring of the transmitter / receiver.	
5.	Withdraw the adapter ring (including the screwed-on OPL bit) from the transmitter / receiver.	
6.	Remove the threaded ring (A) in the OPL bit with an OPL bit wrench.	

	Action	Remarks
7.	<p>Take the thrust ring and the flow cell window with seal out of the OPL bit. Remove the seal from the flow cell window and clean the window with a cleaning paper or rag, possibly using warm soapy water. Take care not to dirty the window again during reinstallation. If necessary, replace the window.</p>	
8.	<p>If necessary, replace the seal (B). Place the seal into the window's groove. Insert the window into the OPL bit with the seal facing downward.</p>	
9.	<p>Place the thrust ring into the OPL bit with the ring's groove facing downward.</p>	
10.	<p>Screw in the threaded ring and tighten it with the OPL bit wrench.</p>	
11.	<p>If necessary, place a new seal (arrow) into the groove on the OPL bit.</p>	
12.	<p>If necessary, replace the leakage protector seal (A). Remove the old seal and place the new seal into the groove on the leakage protector.</p> <p>i If necessary, replace the desiccant and the seal (→ Section 5.4).</p>	
13.	<p>Slip the adapter ring (with the screwed-on OPL bit) on the transmitter / receiver and fasten it with the six screws.</p>	

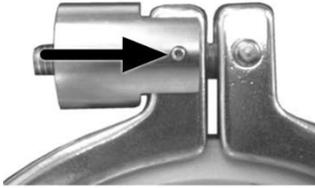
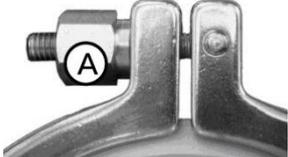
	Action	Remarks
14.	Clean all contact surfaces on the inline housing.	
15.	Insert the transmitter / receiver with screwed-on adapter ring and OPL bit back into the inline housing. ⚠ Make sure the groove (A) of the transmitter / receiver is pointing upward after reassembly!	
16.	Refasten the transmitter / receiver to the inline housing with the hinged ring and secure it with nut A.	
17.	Carry out a 100% adjustment as directed in Section 5.2.	
18.	Restart the sample flow and switch the power supply back on.	

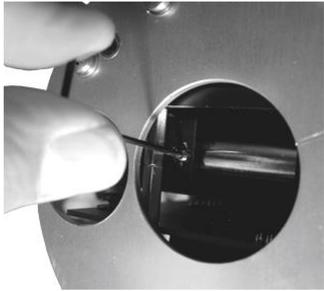
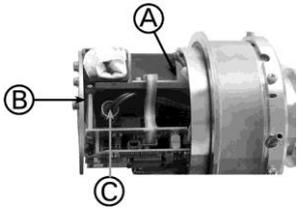
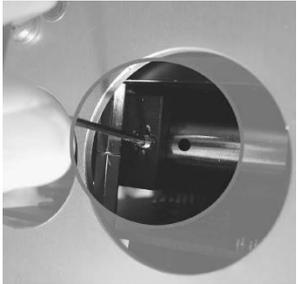
5.9 Replacement of the UV light source



- The electric power supplied to the UV light source **CAN CAUSE FATAL INJURY!** So for all instruments with a UV light source, it is absolutely necessary to disconnect the power supply before opening the enclosure!
- The UV radiation from the bulb can damage your eyes!
- The UV light source and the light source housing can reach temperatures above 80°C!



	Action	Remarks
1.	<p> Do not open the photometer before the power supply to the control unit has been disconnected and then a waiting time of ten minutes has passed to allow the light source to cool down sufficiently (EXPLOSION HAZARD!) (Cooling down of instrument to a safe temperature level and fading of the residual charges)</p> <p>Disconnect the power supply of the photometer to the control unit.</p>	
2.	<p>Loosen the Allen screw (arrow) at the transmitter enclosure by about ½ turn and pull off the locking piece.</p>	
3.	<p>Loosen nut (A) enough to be able to swing the hinged ring away easily. Take off the entire clamping ring and then remove the transmitter enclosure.</p>	

	Action	Remarks
4.	Pull the UV light source's plug (A) out of the circuit board.	
5.	Loosen the fastening screw (B) of the UV light source. 	
6.	<p>i Don't touch the glass of the UV bulb with your fingers! Clean it with alcohol before installation!</p> <p>Withdraw the UV bulb (C) from its base.</p> 	
7.	Insert the new UV bulb (C) into the socket all the way to the stop (the mark on the bulb must line up with that on the socket) and tighten the fastening screw (B). Reinsert the plug (A) into the circuit board.	
8.	Reassemble the photometer in the reverse order and restart it.	
9.	Carry out a 100% adjustment as directed in Section 5.2.	

6 Troubleshooting

6.1 Pinpointing the cause of a malfunction

To narrow down the cause of a malfunction, proceed step by step according to the following table. If the action taken fails to produce the desired result, consult Customer Service (→ Section 6.5).

Perceived fault	Action
No display	<ul style="list-style-type: none"> ▪ Make sure the control unit is properly connected to the supply voltage (→ Section 3.7) ▪ Check the fuses in the control unit (→ Reference Handbook)
Fault message or warning in the display	<ul style="list-style-type: none"> ▪ Analyze the fault message / warning (→ Sections 6.2 and 6.3)
The reading seems suspect	<ul style="list-style-type: none"> ▪ Check whether the photometer is correctly mounted (→ Section 3.1) ▪ Make sure the servicing chores have been carried out properly in accordance with the Service Schedule (→ Section 5.1). ▪ Carry out a 100% adjustment on the photometer (→ Section 5.2) ▪ Replace the desiccant in the sensor head (→ Section 5.4). ▪ Carry out a functional check with the checking glass (→ Section 5.3).
No measured value output signal (0 mA)	<ul style="list-style-type: none"> - This status signals that a fault has occurred in the photometer. - Analyze the fault displayed fault message (→ Section 6.2).

Table 5: Pinpointing a malfunction

6.2 Fault messages

In the ColorPlus Ex, readings are measured, inputs monitored and outputs updated continuously. If the ColorPlus Ex detects a fault during this process, a fault message will be emitted and displayed on the control unit.

The ColorPlus Ex can detect the following faults:

Message	Signifies	Possible causes
connection lost ...	The control unit has no connection to the photometer.	<ul style="list-style-type: none"> ▪ Connection to photometer interrupted ▪ Defective electronics (→ Service technician)
Fault UV-lamp	The detectors are not receiving any light.	<ul style="list-style-type: none"> ▪ Defective UV light source (→ Section 5.9) ▪ Defective electronics (→ Service technician)
Fault LED	The detectors are not receiving any light from the LED.	<ul style="list-style-type: none"> ▪ Defective LEDs (→ Service technician)
Fault Measurement	The AD converter is overloaded.	<ul style="list-style-type: none"> ▪ The detectors are receiving too much light ▪ Enclosure not tight ▪ Defective electronics (→ Service technician)
Fault-Current 1	Incorrect reading being measured at reading output 1.	<ul style="list-style-type: none"> ▪ Open connection terminal at reading output (→ Section 3.7) ▪ Interruption in control loop of reading output ▪ Loose contact at reading output
Fault-Current 2	Incorrect reading being measured at reading output 2.	<ul style="list-style-type: none"> ▪ Open connection terminal at reading output (→ Section 3.7) ▪ Interruption in control loop of reading output ▪ Loose contact at reading output
Fault AnalogIn 1	Analog signal 1 has fallen below a preset threshold	<ul style="list-style-type: none"> ▪ Signal below the configurable fault threshold
Fault AnalogIn 2	Analog signal 2 has fallen below a preset threshold	<ul style="list-style-type: none"> ▪ Signal below the configurable fault threshold
System fault	At the program start, at least 5 system errors were entered in the history within two minutes (Reference Handbook)	<ul style="list-style-type: none"> ▪ The parameter memory has lost its data (→ Service technician) ▪ The error history is overfilled (→ Service technician)

Table 6: Fault messages

6.3 Warnings

Temperature, leakage and degree of contamination are monitored continuously in the ColorPlus Ex. If this monitoring shows that a limit has been exceeded, a warning is emitted and displayed on the control unit.

These warnings can be detected by ColorPlus Ex:

Message	Signifies	Possible causes
Warning Temperature	The temperature in the transmitter has exceeded 65°C	<ul style="list-style-type: none"> ▪ Excessively high medium or ambient temperature and a defective cooling system or none at all.
Warning Sealing	The relative humidity in the transmitter (and possibly also in the receiver) has risen above the preset limit	<ul style="list-style-type: none"> ▪ The desiccant is saturated (→ Sections 5.5 and 5.6) ▪ Seals are no longer sealing properly
Warning Soiling	Contamination of the flow cell has exceeded the preset limit (only present in the version for water).	<ul style="list-style-type: none"> ▪ Badly contaminated medium ▪ Cleaning interval too long ▪ Incorrect installation position (→ Section 3)
Warning Neg.Ext.	The measuring value has exceeded the negative limit (Neg.Ext. LI)	<ul style="list-style-type: none"> ▪ The device is dirty (→ Section 5.7, 5.8)

Table 7: Warnings

6.4 Information

The ColorPlus Ex provides information messages in the case of automatically executed configuration changes:

Message	Signifies	Causes
Caution!! MR changed	One or more measuring ranges has been automatically adapted	<ul style="list-style-type: none"> ▪ One or more measuring ranges has been adapted because it lies outside the maximum permissible extinction of 3E (→ Reference Handbook)
Caution!! Tab. changed	The table has been automatically adapted	<ul style="list-style-type: none"> ▪ The automatic adaptation of the measuring range prompted a table adaptation (→ Reference Handbook)
Caution!! Scal. changed	The scaling was adapted automatically	<ul style="list-style-type: none"> ▪ The automatic adaptation of the measuring range prompted a scaling adaptation (→ Reference Handbook)

6.5 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.

When you contact a SIGRIST Service Office or Customer Service, please make sure you have the following information at hand:

- The serial number of the control unit (→ Section 1.5).
- 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.



If you have problems with the reading, please have the following additional information at hand. It can be found in the menus for the sections Info, Adjustment, Compensation and Calibration:

Name	Option	Value
System information	→ Section 1	
Instr. No.	No.	
Software Version	No.	
Error History	F01	
	F02	
	F03	
	F04	
	F05	
	F06	
	F07	
	F08	
	F09	
	F10	
Adjustment values	Adjust.value 1a	
	Adjust.value 2a	
	Adjust.value 3a	
	Adjust.value 1b	
	Adjust.value 2b	
	Adjust.value 3b	
Calibration values	Calibr. value 1a	
	Calibr. value 2a	
	Calibr. value 3a	
	Calibr. value 1b	
	Calibr. value 2b	
	Calibr. value 3b	
Contamination compensation	Channel 1	
	Channel 2	
	Channel 3	
Compensation Analog input 1 / 2	Zero scal.	
	100%-Scal.	
	Ref.value	

Table 8: Customer service information

7 Taking Out of Service/storage



Do not open the photometer before the power supply to the control unit has been disconnected and then a waiting time of ten minutes has passed to allow the light source to cool down sufficiently (**EXPLOSION HAZARD**)! (Cooling down of the device to a safe temperature level and elimination of residual charges.)



Taking out of service

	Action
1.	Switch off the power supply to the control unit and disconnect all of the electrical connections to the control unit.
2.	Dismount the control unit.
3.	 Thoroughly clean all surfaces that have come into contact with the medium. Now no toxic, corrosive or loose deposits should remain inside.
4.	Make sure that all covers and hoods are closed and all closures on the photometer and control unit are secured.

Storage of the equipment

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

- The photometer and control unit contain electronic components. The storage must satisfy the normal conditions required for such components. In particular, the storage temperature should remain within the -20 .. 50°C range.
- During storage, the photometer, control unit 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 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 1.5). This will prevent mixups later on and facilitate identification of the parts.

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

9 Disposal



This product falls in Category 9 "Monitoring and Control Instruments" of European Directive **RL 2002/95/EC (RoHS)**.



Disposal of the photometer and its peripheral devices must be carried out in accordance with the regional legal provisions!

Neither the photometer nor the control unit contains any sources of pollutant radiation. Dispose of or reuse the materials in question 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.
UV bulb	Contains mercury! Metal, glass, porcelain	As special waste via the local disposal point.
Enclosure	Stainless steel / aluminum	Scrap metal collection points.
Flow cells	Stainless steel	Scrap metal collection points.
	PVDF	As special waste via the local disposal point.
Desiccant		Ordinary waste disposal (chemically harmless)

Table 9: Materials and their disposal

10 Spare Parts

The parts mentioned in this documentation and their Article Numbers are listed in the following table:

Art. No.	Article name
114679	ColorPlus UV-Light source
112860	Housing seal sender/receiver ColoPlusEx O-Ring EPDM 117,10x3,53, 75 Shore
111391	Desiccant bag, 30g
115555	Desiccant ring to sensor head for ColorPlus Ex with two seals
106069	Tempax glass window for KPA0.5 44/35.5x4.75/2.25, Pos. 6a
106076	Suprasil window for KPA0.5 44/35.5x4.75/2.25
106072	Tempax glass window for KPA2 44/35.5x5.5/1.5, Pos. 6a
106079	Bypass flow cell window, UV version, path 2mm
107633	Measuring cell window for KPA & ColorPlus 44 x 3.5 Pos. 6, Tempax
107717	Measuring cell window for KPA & ColorPlus 44 x 3.5, Pos. 6, Suprasil
114901	OPL-Bit window borosilicate ColorPlus Inline
114902	OPL-Bit window quartz ColorPlus Inline
114903	OPL-Bit window sapphire ColorPlus Inline
113296	Leakage protector seal, ColorPlus in-line (VITON O-Ring 11.91x2.62)
114947	1 set EPDM seals for OPL-Bit, for ColorPlus
114948	1 set NBR seals for OPL-Bit, for ColorPlus
114949	1 set FPM seals for OPL-Bit, for ColorPlus
114950	1 set FFPM seals for OPL-Bit, for ColorPlus
114098	O-Ring FEP/FKM 37.69x3.53 ColorPlus Measuring cell SS
115556	Cooling for ColorPlus Ex
116268	Control unit SIREL SMD 85..264 VAC
116547	SIREL SMD 24V
118583	Control unit SIREL SMD EX 85..264 VAC
108157	SIREL: cover with membrane keypad

Table 10: Spare parts and Article Numbers

11 Appendix

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