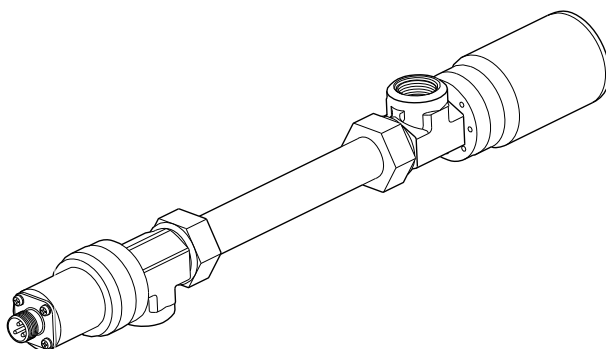


Operating Instructions





OUSAF21

Optical sensor for the measurement of low color concentrations










1 Document information


1.1 Warnings

Structure of information	Meaning
<div></div> <div>Causes (/consequences) Consequences of non-compliance (if applicable) ► Corrective action</div>	This symbol alerts you to a dangerous situation. Failure to avoid the dangerous situation will result in a fatal or serious injury.
<div></div> <div>Causes (/consequences) Consequences of non-compliance (if applicable) ► Corrective action</div>	This symbol alerts you to a dangerous situation. Failure to avoid the dangerous situation can result in a fatal or serious injury.
<div></div> <div>Causes (/consequences) Consequences of non-compliance (if applicable) ► Corrective action</div>	This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or more serious injuries.
<div></div> <div>Cause/situation Consequences of non-compliance (if applicable) ► Action/note</div>	This symbol alerts you to situations which may result in damage to property.

1.2 Symbols

Symbol	Meaning
	Additional information, tips
	Permitted or recommended
	Not permitted or not recommended
	Reference to device documentation
	Reference to page
	Reference to graphic
	Result of a step

1.3 Symbols on the product

Symbol	Meaning
	Reference to device documentation

2 Basic safety instructions

2.1 Requirements for the personnel

- Installation, commissioning, operation and maintenance of the measuring system may be carried out only by specially trained technical personnel.
- The technical personnel must be authorized by the plant operator to carry out the specified activities.
- The electrical connection may be performed only by an electrical technician.
- The technical personnel must have read and understood these Operating Instructions and must follow the instructions contained therein.
- Measuring point faults may be repaired only by authorized and specially trained personnel.



Repairs not described in the Operating Instructions provided may only be carried out directly by the manufacturer or by the service organization.

2.2 Designated use

The sensor is used to measure color concentrations in the low measuring range of the visible electromagnetic spectrum. The sensor is suitable for use in a wide range of applications in a variety of industrial sectors, such as:

- Color scale measurement
APHA/Hazen, potassium permanganate in water
- Measurement of color concentration
 - Outgoing goods inspection/purity monitoring
 - Color assurance
 - Discoloration control
 - Distillation monitoring

Use of the device for any purpose other than that described, poses a threat to the safety of people and of the entire measuring system and is therefore not permitted.

The manufacturer is not liable for damage caused by improper or non-designated use.

2.3 Occupational safety

As the user, you are responsible for complying with the following safety conditions:

- Installation guidelines
- Local standards and regulations
- Regulations for explosion protection

Electromagnetic compatibility

- The product has been tested for electromagnetic compatibility in accordance with the applicable European standards for industrial applications.
- The electromagnetic compatibility indicated applies only to a product that has been connected in accordance with these Operating Instructions.

2.4 Operational safety

1. Before commissioning the entire measuring point, verify that all connections are correct. Ensure that electrical cables and hose connections are undamaged.

2. Do not operate damaged products, and safeguard them to ensure that they are not operated inadvertently. Label the damaged product as defective.
3. If faults cannot be rectified:
Take the products out of operation and safeguard them to ensure that they are not operated inadvertently.


2.5 Product safety

2.5.1 State of the art

The product is designed to meet state-of-the-art safety requirements, has been tested, and left the factory in a condition in which it is safe to operate. The relevant regulations and European standards have been observed.

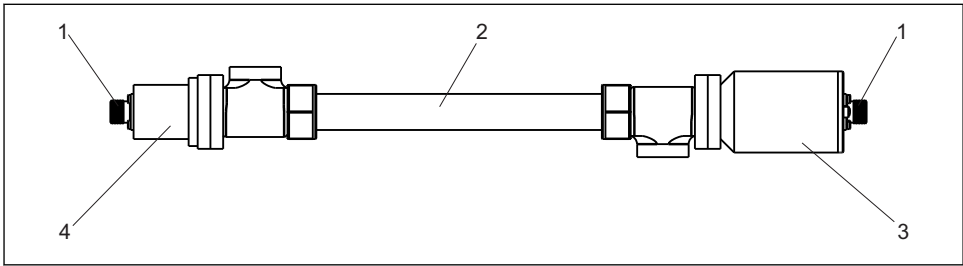
2.5.2 Versions with hazardous area lamp

Also observe the safety instructions in the XA for these Operating Instructions.

 Safety instructions for electrical apparatus in hazardous areas, photometer sensors, XA01403C/07/A3

3 Product description

3.1 Sensor design



A0014690

 1 Design of OUSAF21

- 1 Cable connector
- 2 Flow assembly
- 3 Detector module
- 4 Lamp module

The detector and lamp can vary on account of the individual options ordered.

3.2 Measuring principle

Light absorption

The measuring principle is based on the Lambert-Beer law.

There is a linear dependency between the absorption of light and the concentration of the absorbing substance:

$$A = -\log(T) = \epsilon \cdot c \cdot OPL$$

$$T = I/I_0$$

T ... Transmission

I ... Intensity of received light at detector

I₀ ... Intensity of transmitted light of light source

A ... Absorption

ε ... Extinction coefficient

c ... Concentration

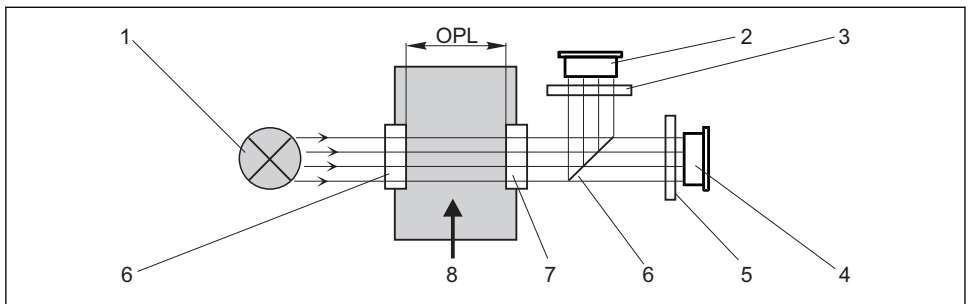
OPL ... Optical path length

A light source emits radiation through the medium and the incident radiation is measured on the detector side.

A beam splitter splits the light into two beams. One beam is used for measuring while the other acts as a reference to compensate for particles, bubbles and lamp aging.

Once the light has passed through a filter for wavelength selection, the intensity of the light is determined by a photodiode and converted to a photocurrent.

The subsequent conversion to absorbance units (AU, OD) is performed in the associated transmitter.



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2 Absorption measurement (double wavelength) with reference

- 1 Light source
- 2 Reference detector
- 3 Reference filter
- 4 Measuring detector
- 5 Measurement filter
- 6 Beam splitter
- 7 Optical windows
- 8 Medium flow

4 Incoming acceptance and product identification

4.1 Incoming acceptance

1. Verify that the packaging is undamaged.
 - ↳ Notify your supplier of any damage to the packaging.
Keep the damaged packaging until the matter has been settled.
2. Verify that the contents are undamaged.
 - ↳ Notify your supplier of any damage to the delivery contents.
Keep the damaged products until the matter has been settled.
3. Check the delivery for completeness.
 - ↳ Check it against the delivery papers and your order.
4. Pack the product for storage and transportation in such a way that it is protected against impact and moisture.
 - ↳ The original packaging offers the best protection.
The permitted ambient conditions must be observed (see "Technical data").

If you have any questions, please contact your supplier or your local sales center.

4.2 Product identification

4.2.1 Nameplate

The nameplate provides you with the following information on your device:

- Manufacturer identification
 - Order code
 - Extended order code
 - Serial number
 - Safety information and warnings
 - Ex labeling on hazardous area versions
- Compare the data on the nameplate with your order.

4.2.2 Product identification

Product page

www.endress.com/ousaf21

Interpreting the order code

The order code and serial number of your product can be found in the following locations:

- On the nameplate
- In the delivery papers

Obtaining information on the product

1. Go to the product page for your product on the Internet.

2. At the bottom of the page, select the "Online Tools" link followed by "Check your device features".
 - ↳ An additional window opens.
3. Enter the order code from the nameplate into the search field, and then select "Show details".
 - ↳ You will receive information on each feature (selected option) of the order code.

4.3 Scope of delivery

The scope of delivery consists of the following :

- Detector and lamp module mounted on flow assembly
- Operating Instructions



Ordering the sensor together with a transmitter:

If you select the calibration option in the **Product Configurator for the transmitter**, the complete measuring system (transmitter, sensor, cable) is factory-calibrated and shipped as one package.

If you have any questions, please contact your supplier or your local sales center.

4.4 Certificates and approvals

4.4.1 CE mark

Declaration of Conformity

The product meets the requirements of the harmonized European standards. As such, it complies with the legal specifications of the EC directives. The manufacturer confirms successful testing of the product by affixing to it the CE mark.

4.4.2 Hazardous area approvals

- ATEX II 2G Ex db IIC T5 Gb
- FM Cl.1, Div. 1, Groups B, C, D

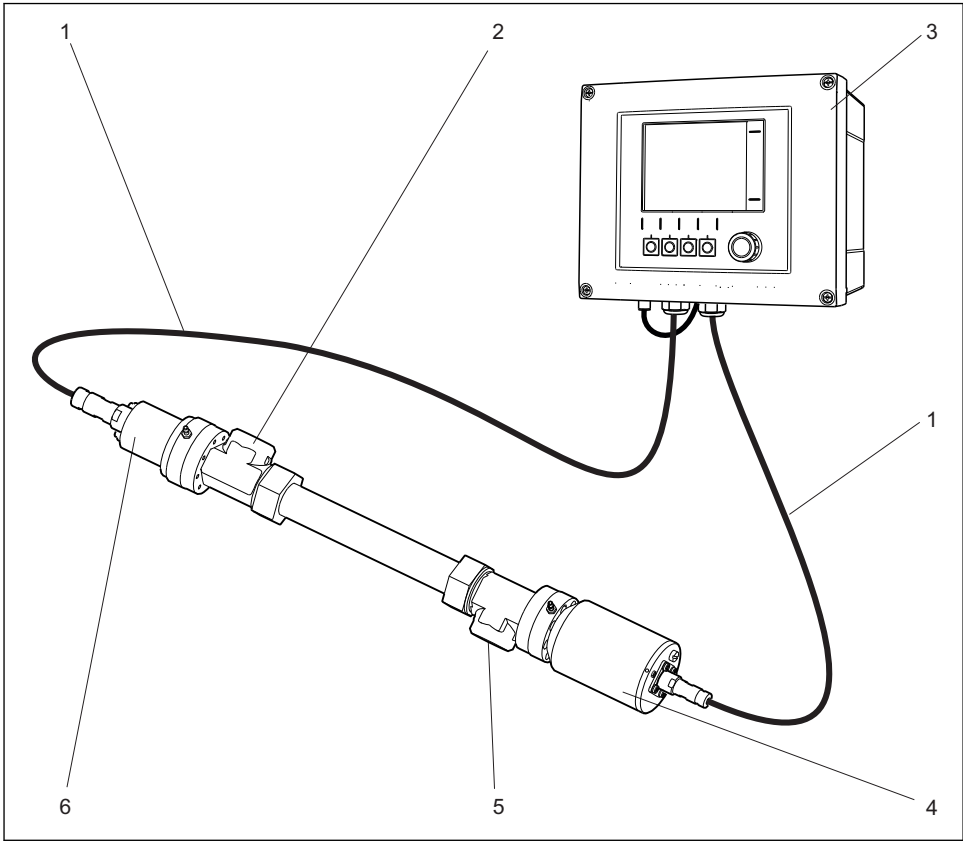
5 Installation

5.1 Installation conditions


5.1.1 Measuring system

An optical measuring system comprises:

- OUSAF21 sensor (photometer) with flow assembly
- Transmitter, for example Liquiline CM44P
- Cable set, for example CUK80




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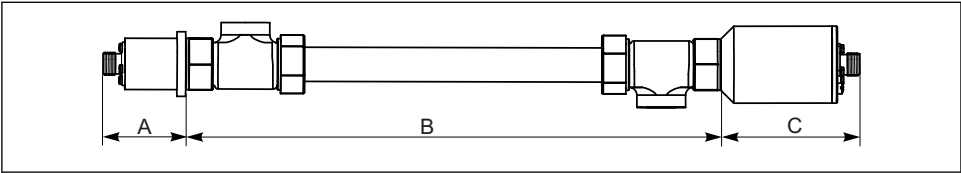
 3 Example of a measuring system with OUSAF21


- | | | | |
|---|------------------------------|---|---------------------------|
| 1 | CUK80 cable set | 4 | OUSAF21 detector unit |
| 2 | Medium outflow from assembly | 5 | Medium inflow to assembly |
| 3 | CM44P transmitter | 6 | OUSAF21 lamp unit |

5.1.2 Dimensions

Lamp type	Dimension A in mm (inch)
High-luminescence lamp incandescent lamp	33.78 (1.33)
Gas-filled lamp	33.78 (1.33)
Detector type	Dimension B in mm (inch)
Standard version with test filter	102.8 mm (4.05)

 The total length of the sensor module is derived from the lengths of the lamp, the detector and the assembly.



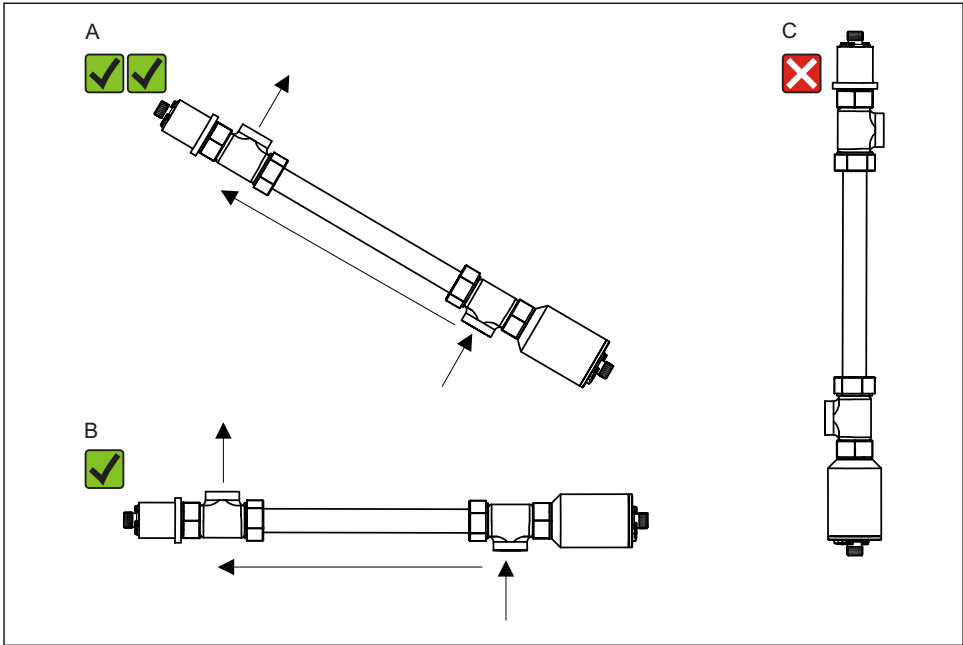
 4 Dimensions → Table

- A Lamp module
- B Flow assembly
- C Detector module

Lamp module	Dimension A in mm (inch)
High-luminescence lamp and standard incandescent lamp	33.78 (1.33)
Gas-filled lamp	33.78 (1.33)
Flow assembly	Dimension B in mm (inch)
Path length 100 mm	150 (5.9)
Path length 150 mm	200 (7.9)
Path length 200 mm	250 (9.8)
Path length 250 mm	300 (11.8)
Detector module	Dimension C in mm (inch)
Standard version	101.6 (4.0)

- ▶ When connecting the sensor cable, make sure you maintain an additional distance of 5 cm (2") on both the lamp side and the detector side of the sensor.

5.1.3 Mounting angles



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5 Mounting angles. The arrows indicate the direction of medium flow through the assembly.

- A Optimum mounting angle, best installation position
- B Suitable mounting angle
- C Forbidden mounting angle

5.2 Mounting the sensor

The sensor is supplied with the assembly ready-mounted and can be integrated into the measuring point in this way.

- Install the sensor upstream from the pressure regulators.
- Leave enough room for the cable connector at the end of the lamp and at the end of the detector housing. Unimpeded access to these areas is also required for connection/removal tasks.

NOTICE**Mounting errors**

Possibility of sensor damage, twisted cables or similar

- ▶ Make sure that the sensor body is protected against damage from external forces - such as trolleys on adjacent paths.
- ▶ Remove the cable before you screw the lamp or detector onto the flow assembly.
- ▶ Make sure to avoid exerting excessive tensile force on the cable (e.g. from jerky pulling movements).
- ▶ Make sure to observe the national grounding regulations when using metal assemblies.



The lamp and detector can be installed in and removed from the assembly without this affecting the process line.

5.3 Post-installation check

Put the sensor into operation only if you can answer "yes" to the following questions:

- Are the sensor and cable undamaged?
- Have you chosen a correct mounting angle?

6 Electrical connection

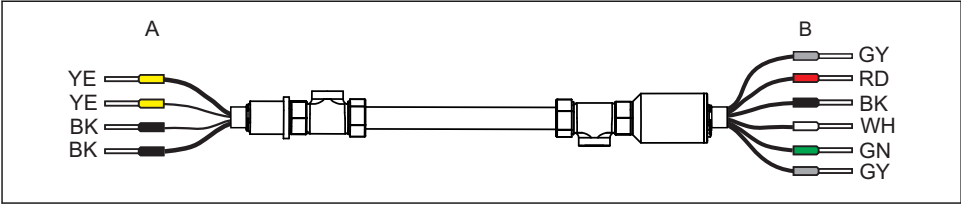
⚠ WARNING**Device is live**

Incorrect connection may result in injury or death

- ▶ The electrical connection may be performed only by an electrical technician.
- ▶ The electrical technician must have read and understood these Operating Instructions and must follow the instructions contained therein.
- ▶ **Prior** to commencing connection work, ensure that no voltage is present on any cable.

6.1 Connecting the sensor

The sensor is connected to the transmitter using the pre-terminated or labeled cable set CUK80 (for connection to CM44P) or OUK20 (for connection to CVM40). The terminals and labeling may vary depending on the transmitter in use. The cable set must be ordered separately.



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6 OUSAF21 connecting cable

- A Light source (lamp) power supply
- B Signals of detector

CM44P terminal	CVM40 terminal	Cable color	Assignment
P+	V1.1	YE (thick)	Lamp voltage +
S+	V1.3	YE (thin)	Detection of lamp voltage +
S-	V1.4	BK (thin)	Detection of lamp voltage -
P-	V1.2	BK (thick)	Lamp voltage -
A (1)	S1.1	RD	Measuring detector sensor +
C(1)	S1.2	BK	Measuring detector sensor -
SH (1)	S1.S	GY	Shield
A (2)	S2.1	WH	Sensor reference +
C(2)	S2.2	GN	Sensor reference -
SH (2)	S2.S	GY	Shield

6.2 Lamp voltage

Sensor version	Lamp type	Lamp voltage [V]
OUSAF21-xxxxx	High-luminescence or gas-filled high-performance lamp	4.9 ± 0.1

6.3 Versions for use in hazardous areas¹⁾

 Safety instructions for electrical apparatus in explosion-hazardous areas, XA01403C

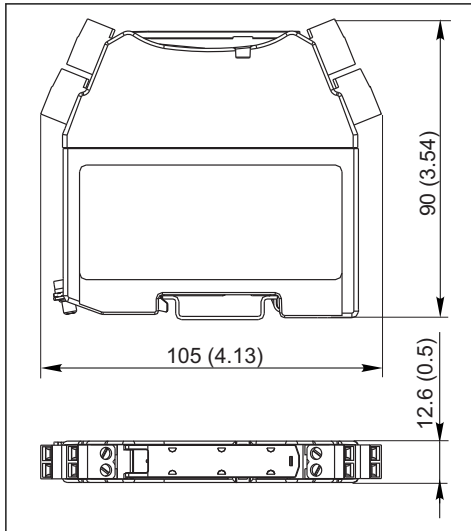
1) Only applies for measuring points consisting of a photometer, CUK80 cable set and Liquiline CM44P transmitter.

12 Endress+Hauser

6.3.1 Connecting the detector using a safety barrier

The photometer sensors use silicon photovoltaic cells as detectors which are operated in the current mode. The detectors are intrinsically safe and can be deployed in Zone 1 and Class I, Division 1 environments.

The safe area is separated from the hazardous area by two safety barriers MTL7760AC.

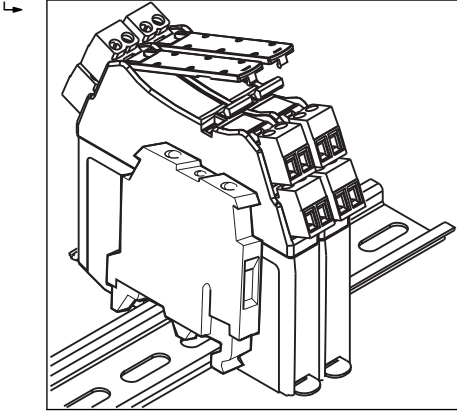


7 Safety barrier, dimensions in mm (inch)

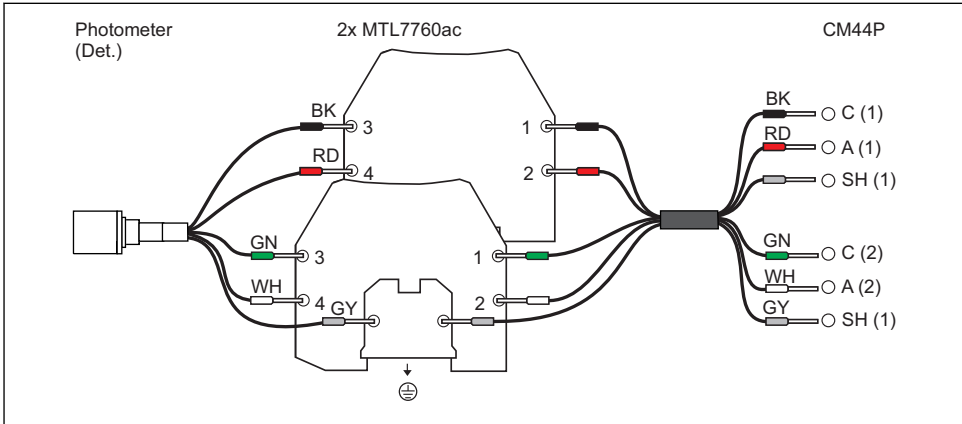
i The safety barrier may only have a very low leak current since the optical signals from the sensor can be in the nanoampere range. Therefore, the sensor cable shield is connected to the ground terminal of the barrier.

On delivery, the CUK80 detector cable is permanently wired to the safety barriers. All you have to do is simply connect the individual cable ends to the detector and transmitter.

1. Mount the safety barriers along with the grounding module on a DIN rail.



2. Connect the detector plug of the cable to the detector.
3. Connect the other end of the cable to the transmitter.

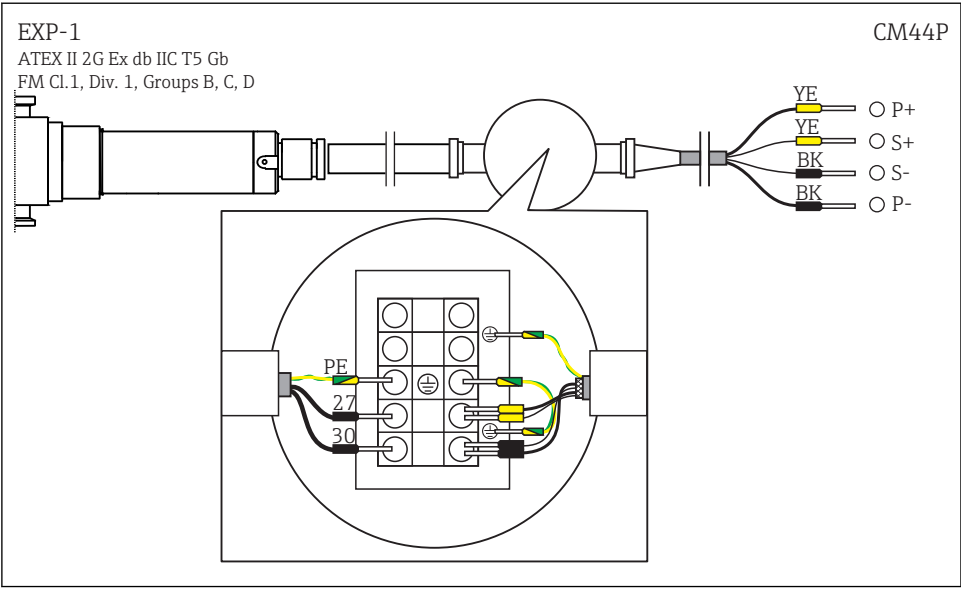


6.3.2 Connecting the hazardous area lamp using a junction box

The hazardous area lamp (EXP-1) must be connected to the transmitter using a certified junction box.

i For versions with FM approval, the junction box is included in the delivery and already pre-terminated on the lamp side. You simply have to connect the cable of the transmitter (CUK80) to the terminals of the junction box.

For versions with ATEX approval, the junction box is not included in the delivery and it and the cable glands required must be provided by the customer at the place of installation. You must connect the cables entirely on your own (CUK80 of transmitter and lamp cable of photometer sensor).



8 Connecting the hazardous area lamp to CM44P using a junction box

6.4 Ensuring the degree of protection

Only the mechanical and electrical connections which are described in these instructions and which are necessary for the required, designated use, may be carried out on the device delivered.

- Exercise care when carrying out the work.

Individual types of protection permitted for this product (impermeability (IP), electrical safety, EMC interference immunity, Ex protection) can no longer be guaranteed if, for example:

- Covers are left off.
- Different power units to the ones supplied are used.
- Cable glands are not sufficiently tightened (must be tightened with 2 Nm for the confirmed level of IP protection).
- Modules are not fully secured.
- The display is not fully secured (risk of moisture entering due to inadequate sealing).
- Loose or insufficiently tightened cables/cable ends.
- Conductive cable strands are left in the device.

6.5 Post-connection check

Device condition and specifications	Notes
Are the sensor, assembly and cable free from damage on the outside?	Visual inspection

Electrical connection	Notes
Does the supply voltage of the connected transmitter match the data on the nameplate?	Visual inspection
Are the installed cables strain-relieved and not twisted?	
Has the cable been routed without loops and cross-overs?	Check that it is firmly seated (by pulling gently)
Are the signal cables connected correctly according to the connection diagram?	
Are all cable entries mounted, tightened and leak-tight?	For lateral cable entries, make sure the cables loop downwards to allow water to drip off.
Are the PE distributor rails grounded (if present)?	Grounding at the point of installation

7 Commissioning

7.1 Function check

Before first commissioning, check if:

- ▶ the sensor is correctly installed
- ▶ the electrical connection is correct.

7.2 Calibrating/adjusting the sensor

Measuring points consisting of a photometer sensor, flow assembly (if provided) and a transmitter are adjusted at the factory. Normally adjustment is not required when commissioning for the first time.

If an adjustment is necessary nevertheless, you have the following adjustment options:

- Adjustment with calibration standards
- Use of EasyCal

7.2.1 Calibration/adjustment with standard solutions

Use solutions with a known absorbance (at the sensor wavelength) for the calibration/adjustment.

WARNING

Potassium dichromate is toxic, flammable, carcinogenic and has mutagenic effects.

Can cause cancer, genetic defectives, affect fertility, harm the unborn child and intensify fires. Potentially life-threatening if inhaled, toxic if swallowed, harmful if it comes into contact with skin. Causes severe skin burns and severe eye damage.

- ▶ When working with potassium dichromate, always wear protective gloves and protective goggles.
- ▶ Seek special advice before use.
- ▶ Observe all the additional information on the manufacturer's safety sheet.

Use calibration solutions that are suitable for the measuring task. Examples of solutions which are commonly used include:

- Potassium dichromate, $K_2Cr_2O_7$
A solution of 182 ml 0.1N $K_2Cr_2O_7$, diluted to one liter, has an absorbance of approx. 10 OD at 280 nm. By diluting the solution, you can produce a series of calibration solutions which you can use to adjust the measuring point.
- D-tryptophan
A protein which is also frequently used for optical calibration. A solution with a concentration of 100 ppm has an absorbance of around 2.6 OD at 280 nm.



$AU = OD \cdot OPL [cm]$

AU ... absorbance units, OD ... optical density, OPL optical path length

Producing a D-tryptophan parent solution

1. Dissolve 1 g D-tryptophan in a beaker containing 200 ml deionized water by heating (at 30 °C (86 °F)) and stirring (magnetic stirrer).

2. While the D-tryptophan is dissolving, add deionized water until the beaker contains an approximate volume of 450 ml.
3. Continue stirring at 30 °C (86 °F) until the tryptophan is completely dissolved.
4. Dilute the solution to 1000 ml in a volumetric flask.
 - ↳ You now have a parent solution of D-tryptophan with a concentration of 1000 mg/l (ppm).
5. Create a series of calibration solutions from the parent solution by diluting, and determine the absorbance of the solutions at the sensor wavelength using a laboratory spectrometer.
 - ↳ Use these value pairs (concentration and absorbance values) in the transmitter for the data sets for application calibration.



Instead of potassium dichromate or D-tryptophan you can also use your process medium for calibrating/adjusting and for application calibration. Here, also produce a series of dilutions of known concentration and determine the absorbance in the laboratory.

7.2.2 Easycal

Easycal enables you to perform a calibration/an adjustment which is traceable to NIST without any liquid standards.

The filter(s) is scanned with traceable testing equipment and the actual absorbance at individual wavelengths is determined.

It is very important that you use the actual values of the optical Easycal filter. These values are given in the calibration certificate supplied.

- ▶ Enter the absorbance values (CM44P): **Menu/Setup/Inputs/Photometer/Extended setup/Measurement channel/Calib. settings/EasyCal = Yes.**

8 Maintenance

Take all the necessary precautions in time to ensure the operational safety and reliability of the entire measuring system.

NOTICE

Effects on process and process control

- ▶ When carrying out any work on the system, take into account possible repercussions for process control or the process itself.
- ▶ For your own safety, only use genuine accessories. With genuine parts, the function, accuracy and reliability are also ensured after maintenance work.

NOTICE**Sensitive optical components**


If you do not proceed with care, you can damage or severely dirty the optical components.

- ▶ Maintenance work may only be carried out by appropriately qualified staff.
- ▶ Use ethanol and a lint-free cloth which is suitable for cleaning lenses to clean all the optical components.

8.1 Maintenance schedule

- Maintenance and servicing intervals are based on the individual application.
- Cleaning intervals depend on the medium.

Maintenance checklist

- Replace lamp
The lamp is typically replaced after 8000 to 10 000 operating hours (→  28).
- Replace sensor window and seal
The window only needs to be replaced if it is damaged.
- Replace O-rings in contact with the medium
The replacement of O-rings in contact with the medium depends on the specific requirements of the process.
Never re-use a used O-ring.

8.2 Replacing the hazardous area lamp

The disassembly and assembly process for the hazardous area lamp is the same as for the non-hazardous area version.

The only difference is the type of lamp used.

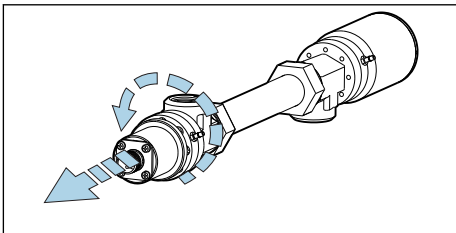


Make sure you use the right spare parts kit.

8.3 Replacing the gas-filled lamp

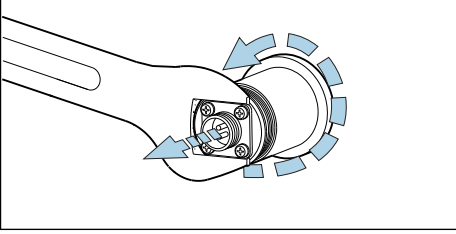
- ▶ Switch off the lamp at the transmitter using the software function.
- ▶ Remove the lamp cable.
- ▶ Allow the lamp to cool down (30 minutes).

1.



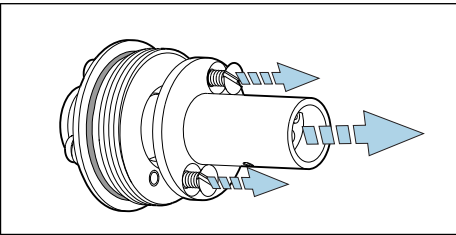
Turn the lamp module counterclockwise to remove it from the flow assembly.

2.



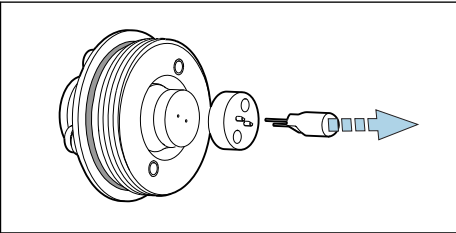
Use a 1" open-ended wrench. With the wrench, hold the base plate of the cable connector in position and unscrew the lamp housing in a counterclockwise direction by hand.

3.



Remove the two 6-32 screws, and carefully remove the lens module.

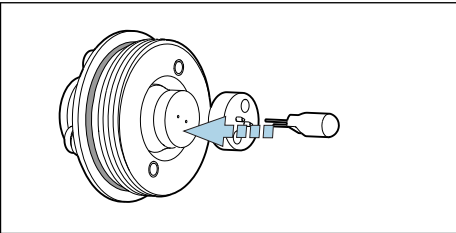
4.



Carefully remove the halogen lamp and the spacer.

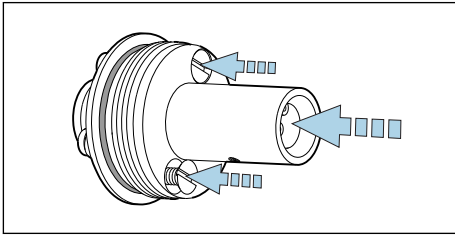
↳ Check the O-ring and replace it if necessary.

5.



Do not touch the lamp with your bare hands. Always use talc-free latex gloves. Clean the new lamp with alcohol and insert it into the fitting with the spacer in-between.

6.



Mount the lens module back on the lamp unit.

7.

Without graphics:

Screw the housing of the lamp unit back on (in the clockwise direction).

8.

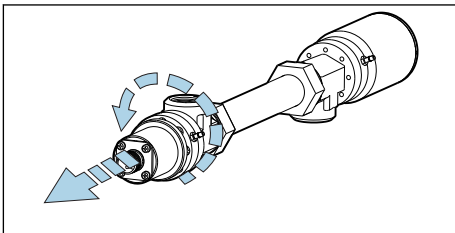
Screw the lamp module back onto the flow assembly by tightening it in the clockwise direction.

A zero point adjustment is required after replacing the lamp.

8.4 high-luminescence lamp

- ▶ Switch off the lamp at the transmitter using the software function.
- ▶ Remove the lamp cable.
- ▶ Allow the lamp to cool down (30 minutes).

1.

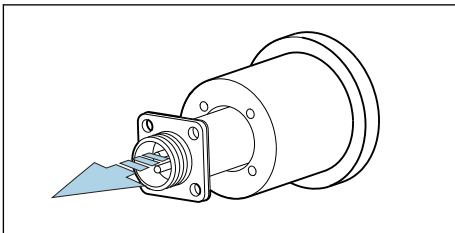


Turn the sensor lamp module counterclockwise to remove it from the flow assembly.

2.

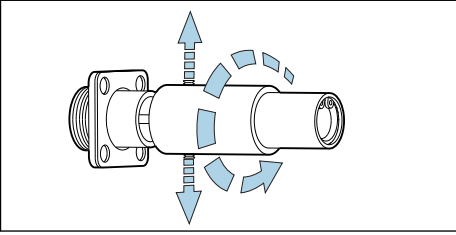
Remove the 4 screws and washers used to secure the cable connector.

3.



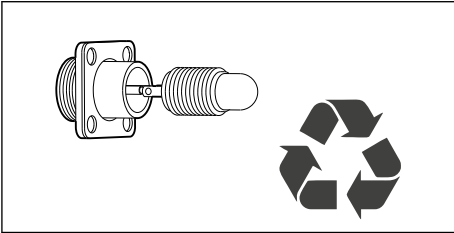
Remove the connection, along with the lamp unit, from the lamp housing.

4.



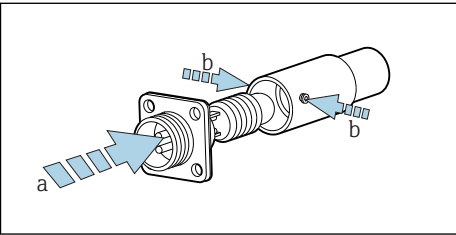
Loosen the 2 securing screws on the cover and carefully unscrew the cover in a counterclockwise direction.

↳ Dispose of the used lamp in accordance with local regulations.



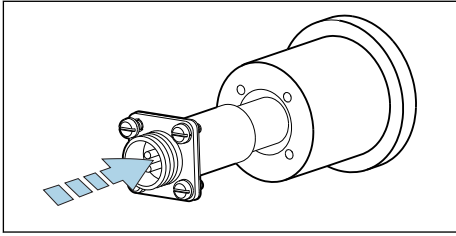
5. Do not touch the new lamp with your bare hands. Always use talc-free latex gloves. Clean the new lamp with a lint-free cloth.

6.



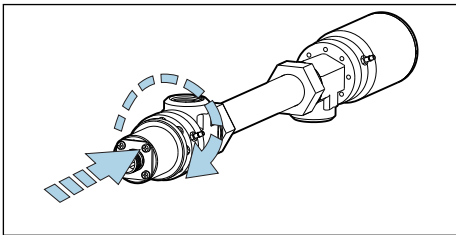
Insert the new lamp into the cover (a). Tighten the securing screws again (b).

7.



Insert the new lamp unit back into the housing and then screw the connection together with the 4 securing screws.

8.



Mount the lamp module back on the flow assembly by tightening it in the clockwise direction.

A zero point adjustment is required after replacing the lamp.

8.5 Replacing the sensor window and seal

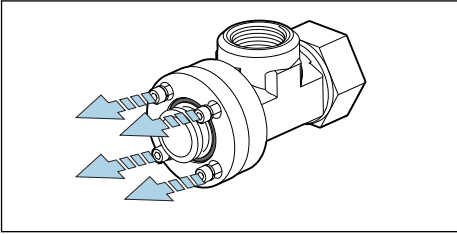
Always replace windows with windows of the same type in order to maintain the path length.

The flow assembly must be removed from the process line in order to replace the windows and seals.

1. Stop the flow in the process pipe and remove the assembly from the **dry** process line.
2. Remove the lamp and detector housing from the assembly.

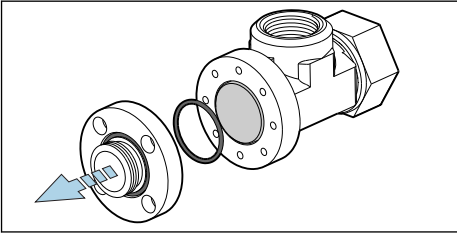
The following description applies for both sides, i.e. the detector side and the lamp side.
Always replace the O-rings or optical windows on both sides.

3.



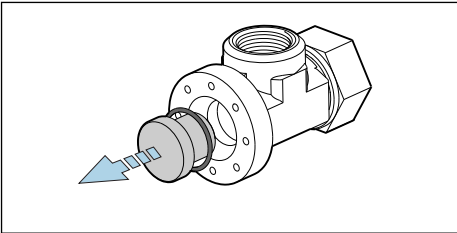
Remove the 4 Allen screws (1/8" or 3 mm) from the window retaining ring. Make sure to loosen the screws evenly and alternately around the retaining ring of the window.

4.



Remove the window retaining ring along with the O-ring on the inside towards the assembly.

5.



Gently force the optical window out of the assembly. If the window jams, apply some acetone around the window seal and wait a few minutes for it to take effect. This should help you remove the windows from the seals. **The seal cannot be reused afterwards!**

6. Check the area around the window for residue or fouling. Clean it if necessary.

7. Check the windows for signs of chipping or wear from abrasion.

↳ Replace the windows if such signs are visible.

8. Dispose of all the O-rings and replace them with new O-rings from the relevant maintenance kit.

9. Mount the optical window and then fit the window retaining ring, along with the new O-rings, back on the assembly. Make sure to tighten the screws of the window retaining ring uniformly in a diagonally opposite sequence. In this way, you ensure that the ring is seated correctly.
10. Then mount the lamp and the detector on the assembly.



If you have changed the path length by installing other optical windows, you then have to configure the measuring system appropriately.

In any case, you must always perform an adjustment with liquids after disassembling and assembling the windows.



Some window surfaces might not be parallel to one another. This is normal, particularly in the case of windows made of fire-polished quartz. Make absolutely sure that the measuring gage does not scratch the window surfaces.

9 Repairs

9.1 Spare parts

9.1.1 Sensor

Sensor spare parts

Description	Order number
KIT OUSAFxx, interference filter 400 nm	71136331
KIT OUSAFxx, interference filter 420 nm	71136333
KIT OUSAFxx, interference filter 430 nm	71136334
KIT OUSAF21/22, interference filter 520 nm	71136337
KIT OUSAF21/22, interference filter 720 nm	71136342
KIT OUSAFxx, gas-filled lamp	71142978
Kit OUSAFxx, high-luminescence lamp	71142977
Kit OUSxFxx, connector dust cover	71210161

9.1.2 Assembly

OUA260 spare parts

Description	Order number
KIT OUA260, EPDM window O-rings (USP)	71136357
KIT OUA260, KALREZ window O-rings	71136358
KIT OUA260, silicon window O-rings	71136359

Description	Order number
KIT OUA260, VITON window O-rings (USP)	71136360
KIT OUA260, quartz window 24 mm	71136395
KIT OUA260, borosilicate window 24 mm	71321644
KIT OUA260, sapphire window 24 mm	71142623

9.2 **Return**

The product must be returned if repairs or a factory calibration are required, or if the wrong product was ordered or delivered. As an ISO-certified company and also due to legal regulations, Endress+Hauser is obliged to follow certain procedures when handling any returned products that have been in contact with medium.


To ensure swift, safe and professional device returns, please read the return procedures and conditions at www.endress.com/support/return-material.

9.3 **Disposal**

The device contains electronic components and must therefore be disposed of in accordance with regulations on the disposal of electronic waste.

Observe the local regulations.

10 **Accessories**

 The following are the most important accessories available at the time this documentation was issued. For accessories not listed here, please contact your service or sales office.

10.1 **Cable**

CUK80 cable set

- Pre-terminated and labeled cables for connecting analog photometer sensors
- Product Configurator on the product page: www.endress.com/cuk80

OUK20 cable set

- Pre-terminated and labeled cables for connecting OUSTF10- and OUSAF2x-type sensors to Memograph CVM40
- Order as per product structure

11 Technical data

11.1 Input

11.1.1 Measured variable

process absorption

11.1.2 Measuring range

- 0 to 2.5 AU
- Max. 50 OD (depending on the optical path length)

11.1.3 Wavelength

Measurement 400 nm, 420 nm, 520 nm

Reference 720 nm

11.2 Environment

11.2.1 Ambient temperature range

Non-hazardous area versions

0 to 55 °C (32 to 130 °F)

Hazardous area versions

2 to 40 °C (36 to 100 °F)

11.2.2 Storage temperature

-10 to +70 °C (+10 to +160 °F)

11.2.3 Humidity

5 to 95 %

11.2.4 Degree of protection

IP66 and NEMA 4X

11.3 Process

11.3.1 Process temperature

0 to 90 °C (32 to 194 °F) continuous

Max. 130 °C (266 °F) for 2 hours

11.3.2 Process pressure

Max. 6 bar (84 psi) absolute, depending on the material, pipe size and process connection of the flow assembly

11.4 Mechanical construction

11.4.1 Dimensions

→  9

11.4.2 Weight

1.225 kg (2.7 lbs.), without flow assembly

11.4.3 Materials

Sensor housing	Stainless steel 316L
Cable connector ends	Nickel-plated brass

11.4.4 Light source

High-luminescence lamp (wavelength filter 450 nm and above)

Gas-filled high-performance lamp (wavelength filter below 450 nm)

Lamp operating life: typically 10 000 h

11.4.5 Detector

silicon detector, hermetically sealed

11.4.6 Filter

Multilayer narrow-band interference filter

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