

Operating Instructions

OUSAF22

Optical sensor combined with the OUA260 flow assembly for the measurement of color concentrations

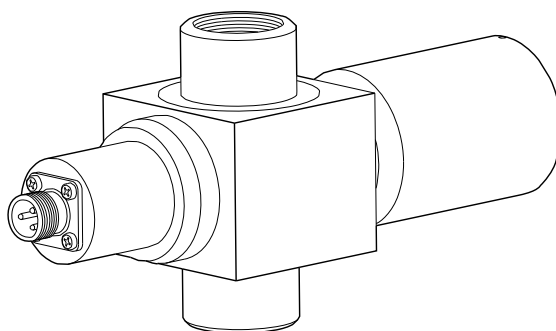






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
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1 Document information


1.1 Warnings

Structure of information	Meaning
<div> DANGER</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> WARNING</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> CAUTION</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> NOTICE</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 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, EBC, ASBC, ASTM, ICUMSA
- 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.

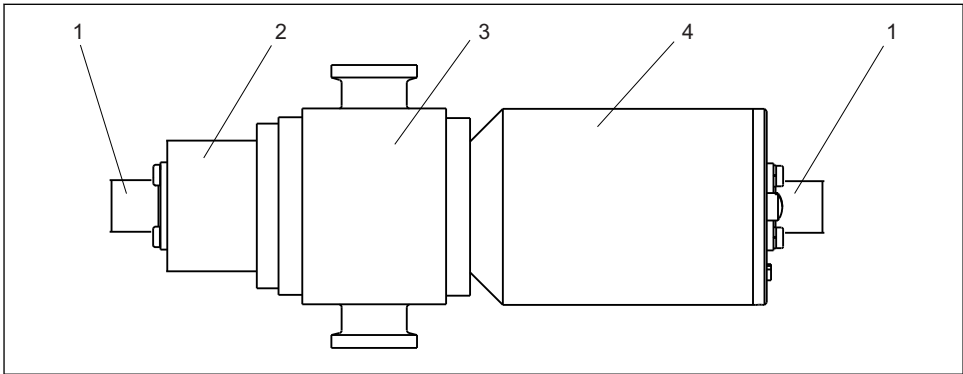
2.5.2 Versions with hazardous area lamp

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



A0014796

 1 Sensor with flow assembly OUA260

- 1 Cable connector
- 2 Lamp module
- 3 Flow assembly OUA260 (depending on version)
- 4 Detector 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

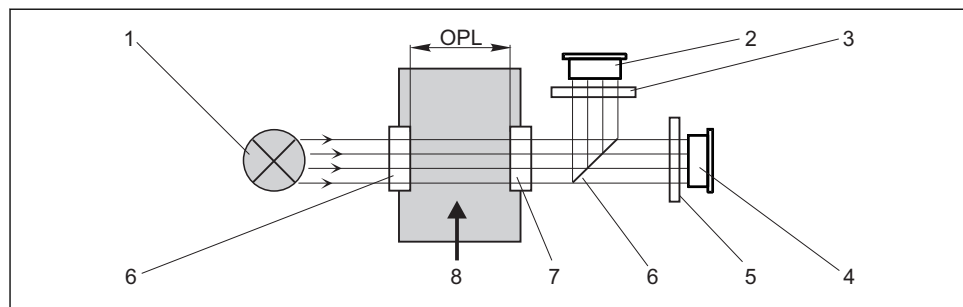
OPL ... Optical path length

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.



A0029408

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/ousaf22

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 depending on the version ordered:

- Detector and lamp module without flow assembly or
- Detector and lamp module mounted on OUA260 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 C€ 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 C€ mark.

4.4.2 Hazardous area approvals

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

4.4.3 FDA conformity

All non-metal parts in contact with medium, such as rubber and plastic parts, meet the requirements of FDA 21 CFR 177.2600. The plastic and elastomer parts of the sensor in contact with medium have passed the biological reactivity tests according to USP <87> and <88> Class VI.

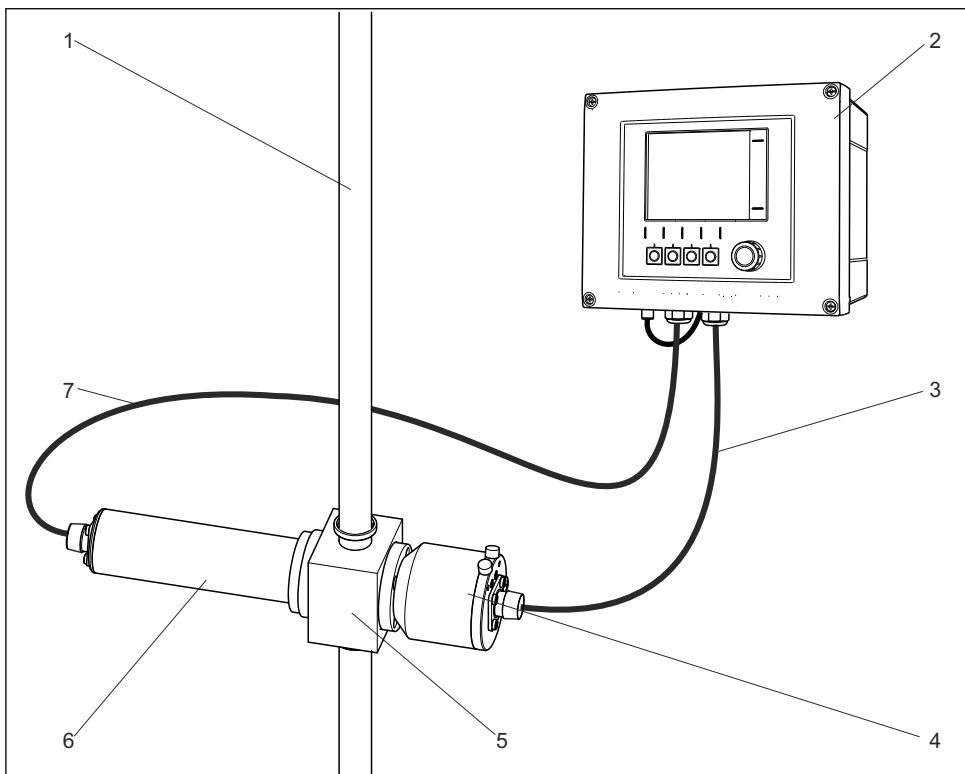
5 Installation


5.1 Installation conditions

5.1.1 Measuring system

An optical measuring system comprises:

- Sensor (photometer) OUSAF22
- Transmitter, for example Liquiline CM44P
- Cable set, for example CUK80
- Assembly OUA260



 3 Example of a measuring system with a photometer sensor

1 pipe

2 CM44P transmitter

3 CUK80 cable set

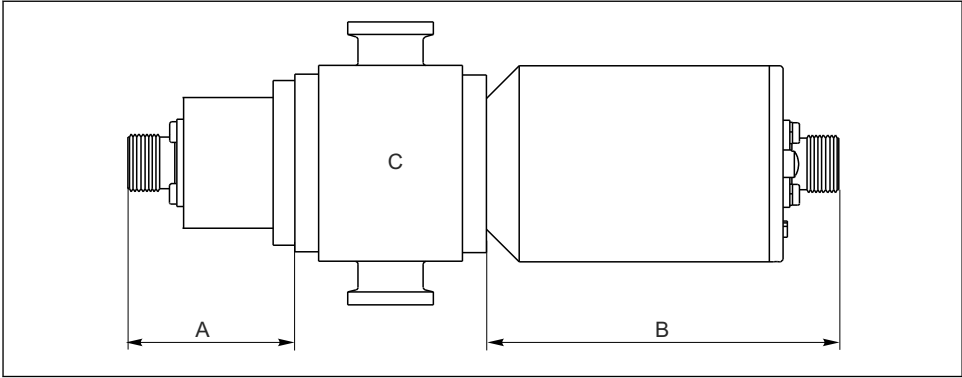
4 Sensor: detector

5 Flow assembly OUA260

6 Sensor: light source (lamp)

7 CUK80 cable set

5.1.2 Dimensions



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4 Sensor module

- A Dimension of lamp, depends on lamp type → Table
- B Dimension of detector → Table
- C Assembly, see Technical Information for assembly

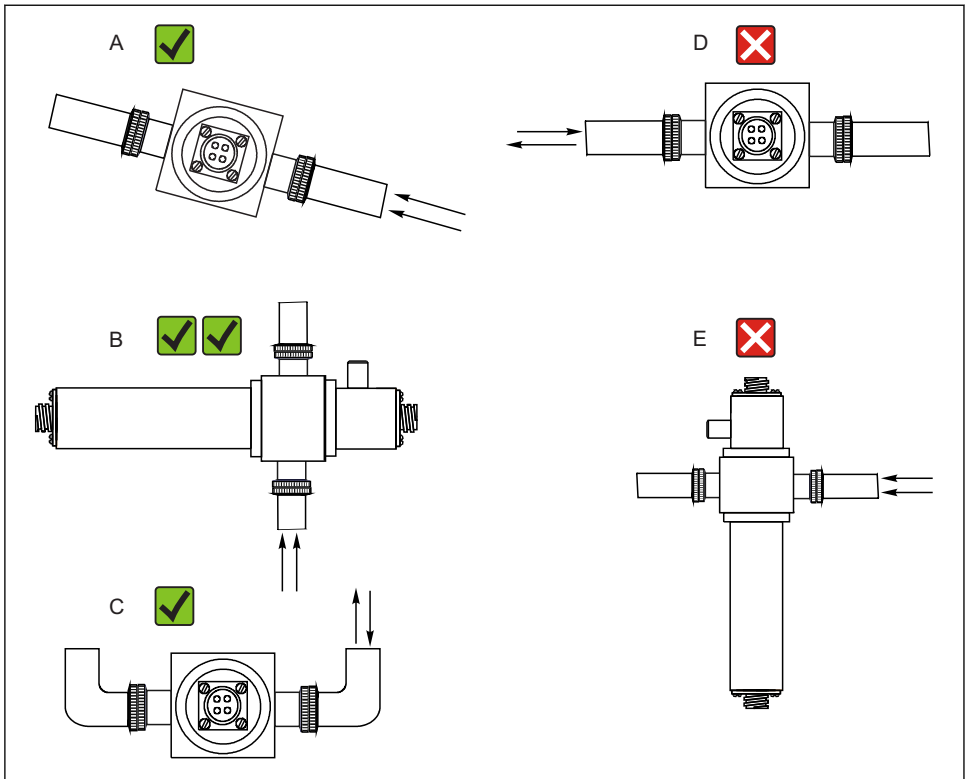
Lamp type	Dimension A in mm (inch)
High-luminescence lamp incandescent lamp	33.78 (1.33)
Gas-filled lamp	33.78 (1.33)
Detector type	Dimension B in mm (inch)
Standard version with test filter	101.6 (4.0)

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

The dimensions of the OUA260 assembly are provided in Technical Information, TI00418C.

- ▶ 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 in the pipe.

- A Suitable mounting angle, better than C
- B Optimum mounting angle, best installation position
- C Acceptable mounting angle
- D Mounting angle to be avoided
- E Forbidden mounting angle

5.2 Mounting the sensor

The sensors have been specifically designed so that they can be installed in the process together with the flow assembly OUA260. The flow assembly can be installed either directly in a process line or in a bypass line.

The sensor cannot be used without the assembly OUA260.

- ▶ Make sure that the sensor and detector housing are aligned horizontally. This ensures that the optical windows are vertically aligned as this prevents buildup on the window surfaces.
- ▶ 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.
- ▶ The operation of sensors under pressure prevents the formation of air or gas bubbles.

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.

If the sensor is ordered together with the assembly OUA260, the flow assembly is ready-mounted on the sensor upon delivery. The sensor is ready for use immediately.

If the sensor and assembly are ordered separately, you must mount the sensor as follows:

1. Install the flow assembly OUA260 in the process via the process connections.
2. Make sure to fit the O-ring seals on the lamp and detector.
Screw the lamp and detector onto the flow assembly.



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

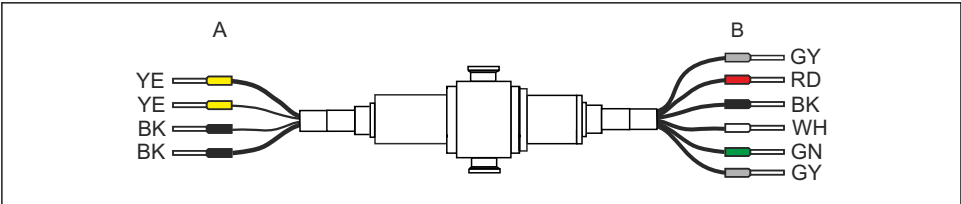
Incorrect connection may result in injury or death

- ▶ 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 OUSAF22 connecting cable

A Light source (lamp) power supply


B Signals of measurement and reference 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]
OUSAF22-xxxxx	High-luminescence or gas-filled high-performance lamp	4.9 ± 0.1

6.3 Versions for use in hazardous areas ¹⁾

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

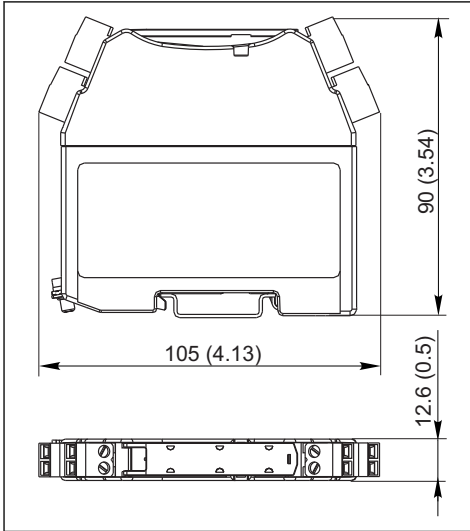
1) Only applies for measuring points consisting of a photometer, CUK80 cable set and Liquiline CM44P transmitter.

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.

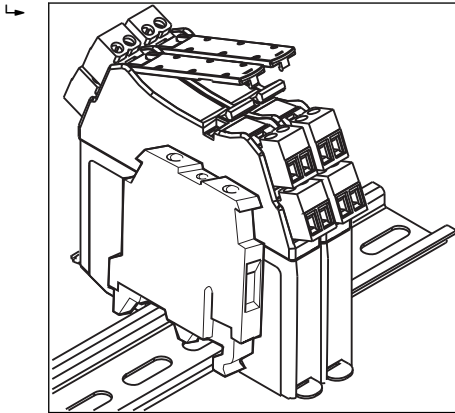


7 Safety barrier, dimensions in mm (inch)

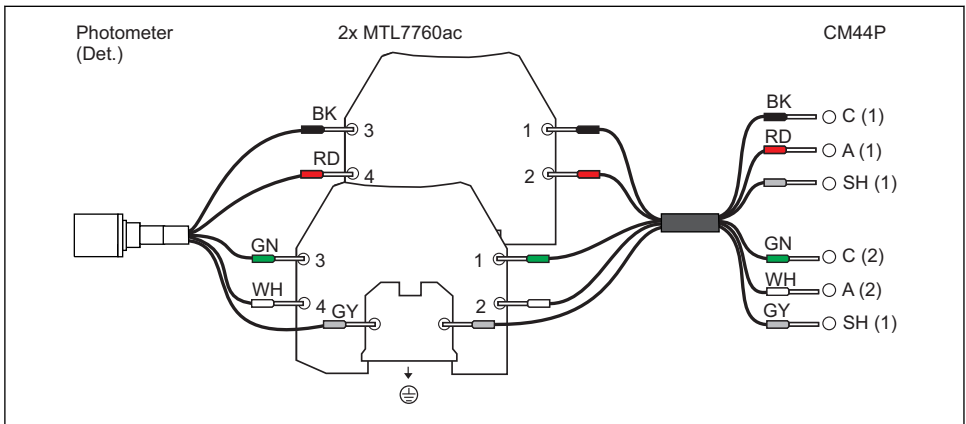
i The safety barrier may only have a very low leak current since the optical signals from the sensor can be in the nanoampere range. Therefore, the sensor cable shield is connected to the ground terminal of the barrier.

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.



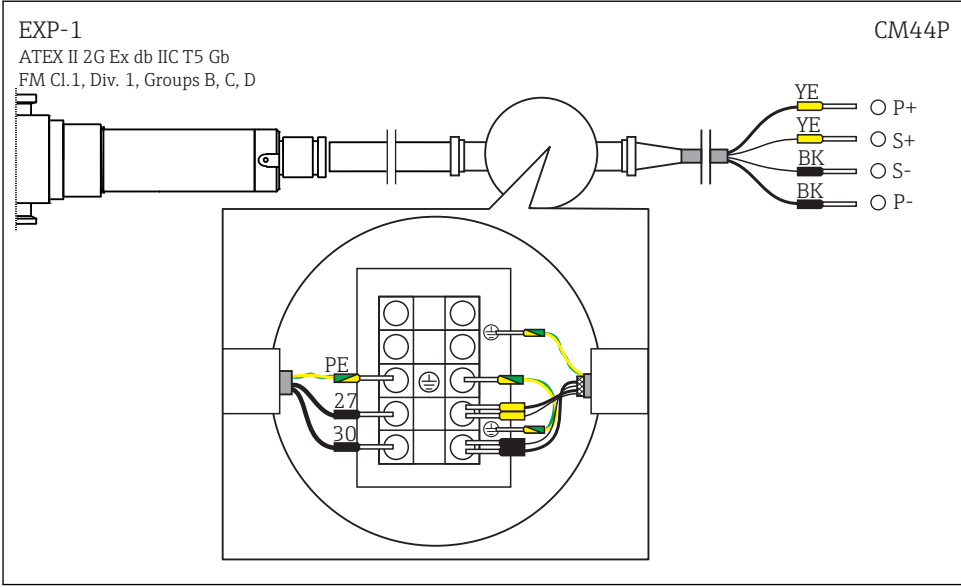
6.3.2 Connecting the hazardous area lamp using a junction box

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



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 (→  36).
- 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.

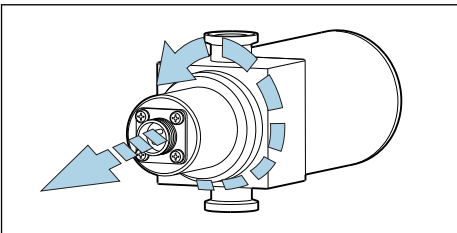


Make sure you use the right spare parts kit.

8.3 Replacing the gas-filled lamp

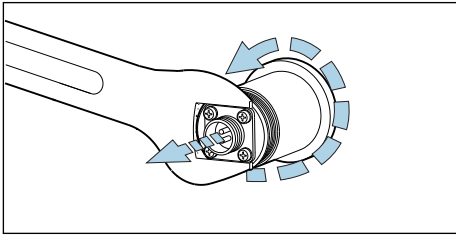
- ▶ Switch off the lamp at the transmitter using the software function.
- ▶ Remove the lamp cable.
- ▶ Allow the lamp to cool down (30 minutes).

1.



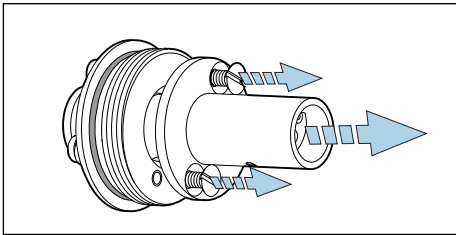
Turn the lamp module counterclockwise to remove it from the flow assembly.

2.



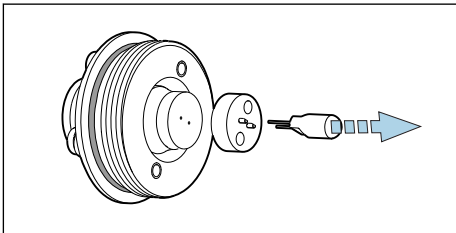
Use a 1" open-ended wrench. With the wrench, hold the base plate of the cable connector in position and unscrew the lamp housing in a counterclockwise direction by hand.

3.



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

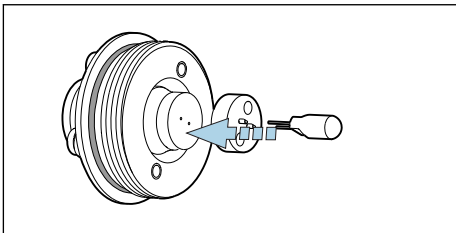
4.



Carefully remove the halogen lamp and the spacer.

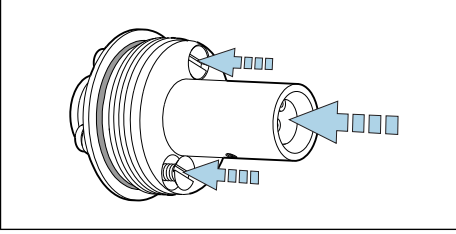
➤ Check the O-ring and replace it if necessary.

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).

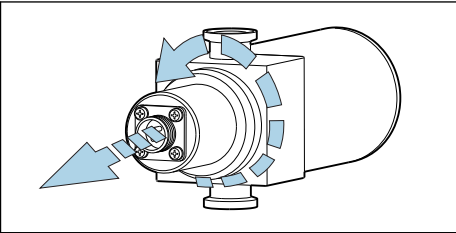
8. Screw the lamp module back onto the flow assembly by tightening it in the clockwise direction.

A zero point adjustment is required after replacing the lamp.

8.4 high-luminescence lamp

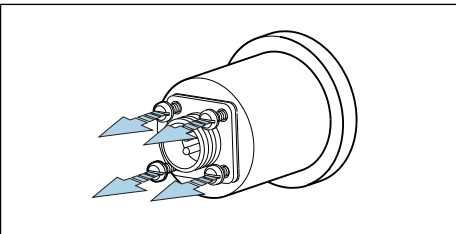
- ▶ Switch off the lamp at the transmitter using the software function.
- ▶ Remove the lamp cable.
- ▶ Allow the lamp to cool down (30 minutes).

1.



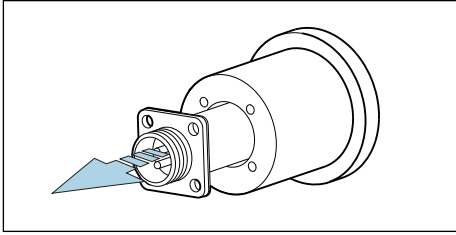
Turn the sensor lamp module counterclockwise to remove it from the flow assembly.

2.



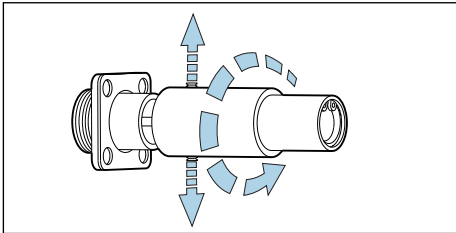
Remove the 4 screws and washers used to secure the cable connector.

3.



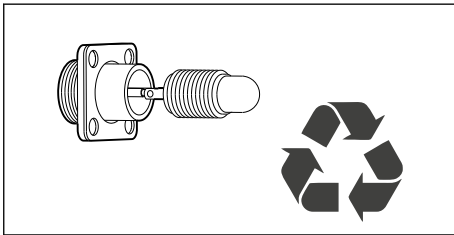
Remove the connection, along with the lamp unit, from the lamp housing.

4.



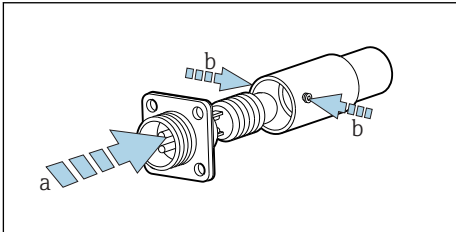
Loosen the 2 securing screws on the cover and carefully unscrew the cover in a counterclockwise direction.

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



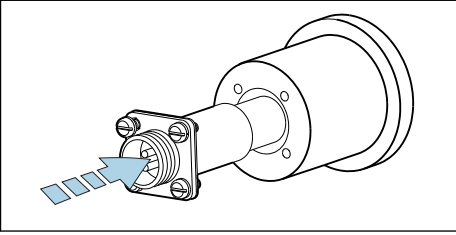
5. Do not touch the new lamp with your bare hands. Always use talc-free latex gloves. Clean the new lamp with a lint-free cloth.

6.



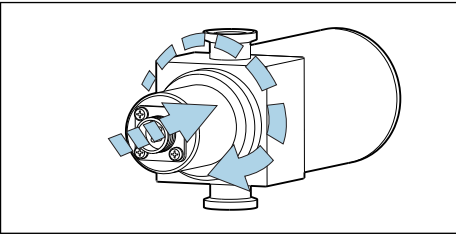
Insert the new lamp into the cover (a). Tighten the securing screws again (b).

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



Operating Instructions for Flowcell OUA260, BA01600C

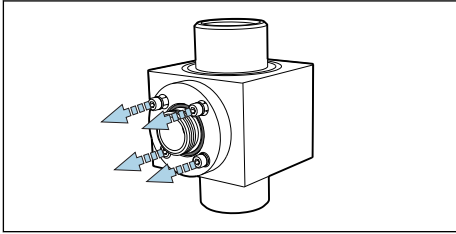
Always replace windows with windows of the same type in order to maintain the path length.

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.

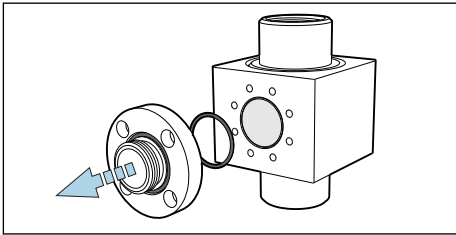
The following description applies for both sides, i.e. the detector side and the lamp side. Always replace the O-rings or optical windows on both sides.

3.



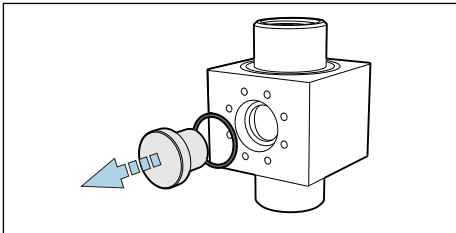
Remove the 4 Allen screws (1/8" or 3 mm) from the window retaining ring. Make sure to loosen the screws evenly and alternately around the retaining ring of the window.

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. If the optical windows and the window retaining rings are not identical, make sure the lamp is on the right side. The lamp should be on the side with the "shorter" window length. (→  32)

Then mount the lamp and the detector on the assembly.



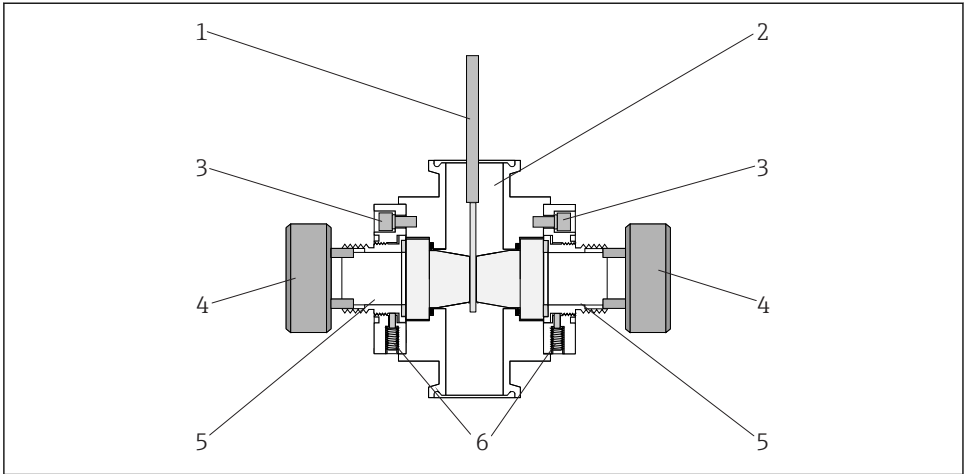
If you have changed the path length by installing other optical windows, you then have to configure the measuring system appropriately.

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

Assemblies with an adjuster for the precision optical pathlength (POPL)

The precision optical pathlength (POPL) adjuster makes it possible to adjust the optical pathlength to the exact distance necessary for the measurement.

POPL is only required for measuring systems with Easycal and optical pathlengths < 5 mm.



A0030205

 9 Assembly with POPL function, sectional view

- 1 Measuring gage
- 2 Assembly OUA260
- 3 Screws of the window retaining ring
- 4 Path length adjuster
- 5 Actuators with gaskets
- 6 Securing screws




The following description applies for assemblies with POPL already fitted. If you are retrofitting POPL, please refer to the instructions supplied with the spare parts kit.

1. Replace O-rings and damaged windows in the same way as for assemblies without POPL. Follow the steps until you have re-installed the window rings on either side of the assembly.
2. Release the 2 securing screws (item 6) on every window ring.
3. Clean the measuring gage (item 1) and insert it so far into the assembly that it is located between the windows.
4. Now use the path length adjuster (item 4). Reduce the path length by screwing in the actuator (item 5) in small steps on both sides until the measuring gage just touches both windows (→ Figure). Do not tighten too tightly.
5. Carefully remove the measuring gage from the assembly again.
6. Then tighten the securing screws to secure the actuator in place.
 - Now remove the path length adjuster.

If possible: perform a pressure test with double the process pressure on the mounted flow assembly. Perform another test with the measuring gage and adjust the path length if necessary. Pressure tests guarantee the compression of the O-ring window seals and the

adjustment thread during mounting. This compensates for any initial changes to the path length.

 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

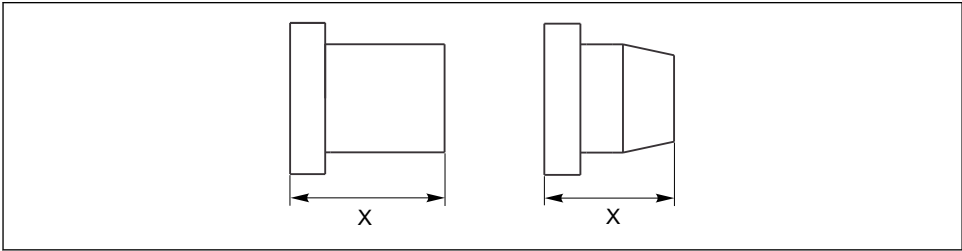
9.1.1 Sensor

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 490 nm	71136336
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

9.1.2 Assembly

For both window types, the length is measured over the entire length.



A0024807

 10 Length measurement of both window types

Example:

To obtain a path length of 10 mm with the Tri-Clamp 2.5" process connection, take one window with a length of 34 mm and one with a length of 36.8 mm.

Window types and path lengths for the various pipe sizes with NPT SS and RFF 150/300 process connections

Path length	NPT SS 0.5" / 1.0" / 2.0"	RFF 150/300 1.0" / 2.0"	RFF 150/300 3.0"	RFF 150/300 4.0"
0.5 mm POPL	33.5 + 34	33.5 + 34		
1 mm POPL	33.5 + 33.5	33.5 + 33.5		
2 mm				
2 mm POPL				
5 mm	31.5 + 31.5	31.5 + 31.5		
5 mm POPL	31.5 + 31.5	31.5 + 31.5		
10 mm	29 + 29	29 + 29		
20 mm	24 + 24	24 + 24	34 + 34	
30 mm	19 + 19	19 + 19	29 + 29	
40 mm	14 + 14	14 + 14	24 + 24	36.8 + 36.8
50 mm	9 + 9	9 + 9	14 + 24	31.5 + 31.5
60 mm			14 + 14	24 + 29
70 mm			9 + 9	21.5 + 21.5
80 mm				16.5 + 16.5
90 mm				9 + 14

Dimensions of the window types given in mm (e.g. 19 mm + 18.5 mm)

Window types and path lengths for the various pipe sizes with the Tri-Clamp process connection

Path length	0.25" 0.50" 0.75"	1.0" LV 1.5" LV	2.0"	2.5"	3.0"	4.0"
0.5 mm POPL	19 + 18.5	24 + 23.5	33.5 + 34			
1 mm POPL	18 + 19	23 + 24	33.5 + 33.5			
2 mm	18 + 18	23 + 23				
2 mm POPL	18 + 18	23 + 23				
5 mm	14 + 19	19 + 24	31.5 31.5			
5 mm POPL	16.5 + 16.5	21.5 + 21.5	31.5 + 31.5			
10 mm	14 + 14	19 + 19	29 + 29	34 + 36.8		

Path length	0.25" 0.50" 0.75"	1.0 " LV 1.5" LV	2.0"	2.5"	3.0"	4.0"
20 mm	9 + 9	14 + 14	24 + 24	29 + 31.5	34 + 34	
30 mm		9 + 9	19 + 19	21.5 + 29	29 + 29	
40 mm			14 + 14	19 + 21.5	24 + 24	36.8 + 36.8
50 mm			9 + 9	14 + 16.5	19 + 19	31.5 + 31.5
60 mm				9 + 9	14 + 14	24 + 29
70 mm					9 + 9	21.5 + 21.5
80 mm						16.5 + 16.5
90 mm						9 + 14

Dimensions of the window types given in mm (e.g. 19 mm + 18.5 mm)

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
KIT OUA260, VITON window O-rings (USP)	71136360
KIT OUA260, quartz window 14 mm	71136387
KIT OUA260, quartz window 16.5 mm	71136388
KIT OUA260, quartz window 18.5 mm	71136389
KIT OUA260, quartz window 18 mm	71136390
KIT OUA260, quartz window 19 mm	71136391
KIT OUA260, quartz window 21.5 mm	71136392
KIT OUA260, quartz window 23.5 mm	71136393
KIT OUA260, quartz window 23 mm	71136394
KIT OUA260, quartz window 24 mm	71136395
KIT OUA260, quartz window 31.5 mm	71136397
KIT OUA260, quartz window 33.5 mm	71136398
KIT OUA260, quartz window 34 mm	71136400
KIT OUA260, quartz window 9 mm	71136406
KIT OUA260, lamp and detector O-rings	71142537
KIT OUA260, borosilicate window 24 mm	71321644

Description	Order number
KIT OUA260, sapphire window 24 mm	71142623
KIT OUA260, borosilicate window 9 mm	71321643
KIT OUA260, borosilicate window 14 mm	71321645
KIT OUA260, sapphire window 14 mm	71210134
KIT OUA260, borosilicate window 16.5 mm	71321646
KIT OUA260, borosilicate window 19 mm	71321647
KIT OUA260, sapphire window 19 mm	71210137
KIT OUA260, borosilicate window 23 mm	71321648
KIT OUA260, sapphire window 23 mm	71210139
KIT OUA260, POPL adjuster	71210140
KIT OUA260, Buna "N" window O-rings	71210142
KIT OUA260, retrofit kit 0.5 mm POPL certified	71210155
KIT OUA260, retrofit kit 1 mm POPL certified	71210154
KIT OUA260, retrofit kit 2 mm POPL certified	71210143
KIT OUA260, retrofit kit 5 mm POPL certified	71210144
KIT OUA260, certified POPL measuring device 0.5 mm	71210145
KIT OUA260, certified POPL measuring device 1.0 mm	71210146
KIT OUA260, certified POPL measuring device 2.0 mm	71210147
KIT OUA260, certified POPL measuring device 5.0 mm	71210148
KIT OUA260, retrofit kit 0.5 mm POPL with air purge	71210157
KIT OUA260, retrofit kit 1 mm POPL with air purge	71210158
KIT OUA260, retrofit kit 2 mm POPL with air purge	71210159
KIT OUA260, retrofit kit 5 mm POPL with air purge	71210160

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 Flow assembly

OUA260

- Flow assembly for hygienic sensors
- For sensor installation in pipes
- Materials: stainless steel 316, 316L or Kynar (other materials available on request)
- Wide variety of process connections and path lengths available
- Product Configurator on the product page: www.endress.com/oua260



Technical Information TI00418C

10.2 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, 430 nm, 490 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. 100 bar (1450 psi) absolute, depending on the material, pipe size and process connection of the flow assembly

11.4 Mechanical construction

11.4.1 Dimensions

→  12

11.4.2 Weight

1.225 kg (2.7 lbs.), without flow assembly

11.4.3 Materials

Sensor housing

Stainless steel 316L

Assembly OUA260

Stainless steel 316, 316L or Kynar

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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