

# Technical Information

## OUSAF46

Optical sensor combined with flow assembly  
OUA260 for UV absorption



### Application

The OUSAF46 sensor is used for measuring the spectral absorbance of process liquids simultaneously at two specific wavelengths in the ultraviolet region of the electromagnetic spectrum. It is suitable for a variety of applications.

- Measurement of protein concentrations
- Chromatography control
- Product purification
- Concentration measurement of organic compounds
- Aromatics detection
- Filtration monitoring

Color measurement for

- Quality control/Purity monitoring
- Color insurance
- Decolorization control
- Distillation monitoring

### Your benefits

- Accurately measures UV absorbance up to 50 OD (dependent upon sensor optical pathlength)
- Configurable to measure UV absorbance at any two of many discrete wavelengths between 254 nm and 365 nm
- Dedicated reference detector channels compensate for lamp decay drift
- Measurement detector housing accommodates reference rod for checking sensor functionality and calibration status

The OUA260 flow assembly used with the sensor offers the following benefits:

- Hygienic design
  - FDA and USP acceptable seal materials available for pharmaceutical applications
  - Ultra-hygienic, CIP and SIP resilient flow cell design available with material finish of 15µinch (0.4 µm) R<sub>a</sub>
- Wide variety of process connections and line sizes available

## Function and system design

### Measuring principle

#### Absorption light method

The measuring principle is based on the Lambert-Beer law. There is a linear dependency between the light absorption and the concentration of the absorbing substance. A light source emits radiation through the medium and the transmitted radiation is measured on the detector side. After passing a filter for wavelength selection, the light intensity is determined by a photodiode and converted into a photo current. The final conversion into transmission (%) or absorbance (AU, OD) units is done by the related transmitter.

The OUSAf46 has two sets of reference and measurement detectors. Only one set is shown for clarity.

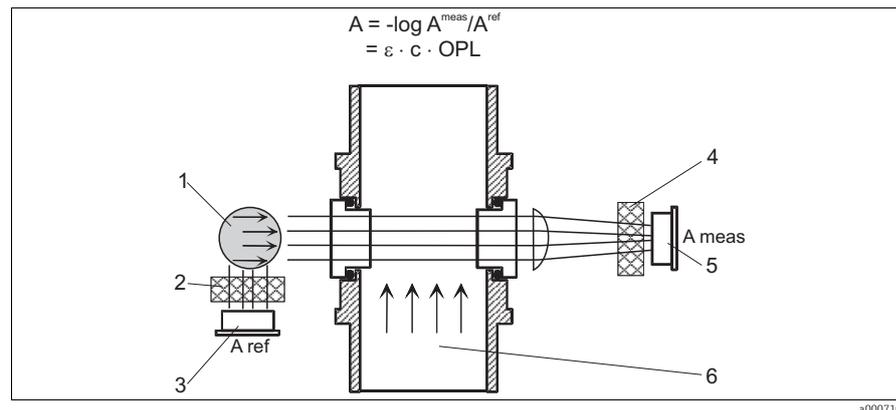


Fig. 1: Absorption sensor with no reference

$A$	Absorbance	1	Light source
$\varepsilon$	Extinction coefficient	2	Reference filter
$c$	Concentration	3	Reference detector
OPL	Optical pathlength	4	Measurement filter
		5	Measurement detector
		6	Medium

**Measuring system**

A complete measuring system comprises:

- Transmitter Memograph CVM40
- Optical sensor OUSAF46
- Flow assembly OUA260
- Cable set OUK40

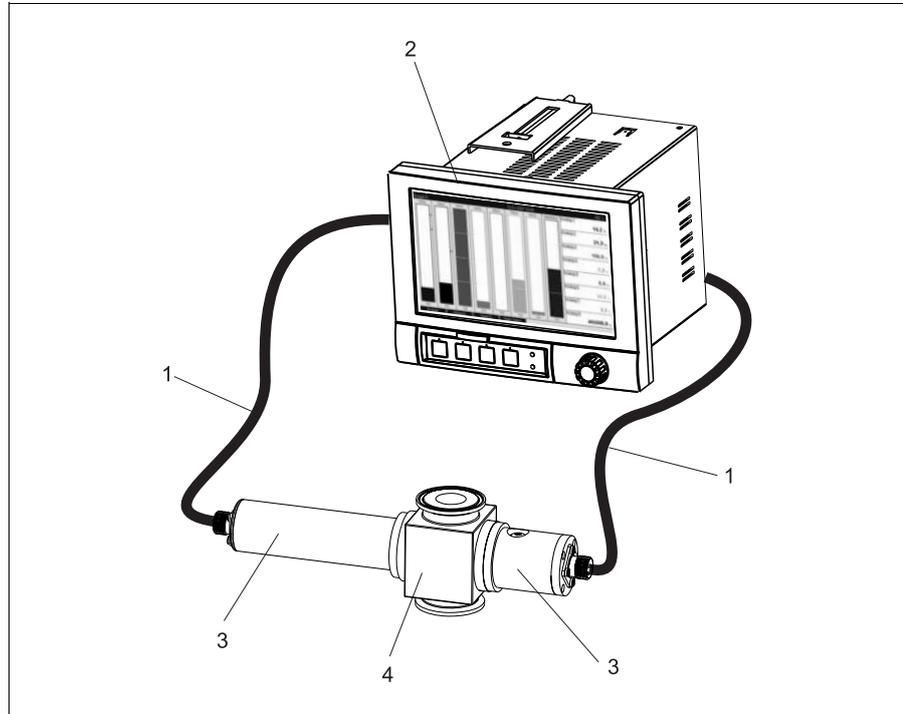


Fig. 2: Example of a measuring system

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- 1 Cable set OUK40
- 2 Transmitter Memograph CVM40
- 3 Optical sensor OUSAF46
- 4 Flow assembly OUA260

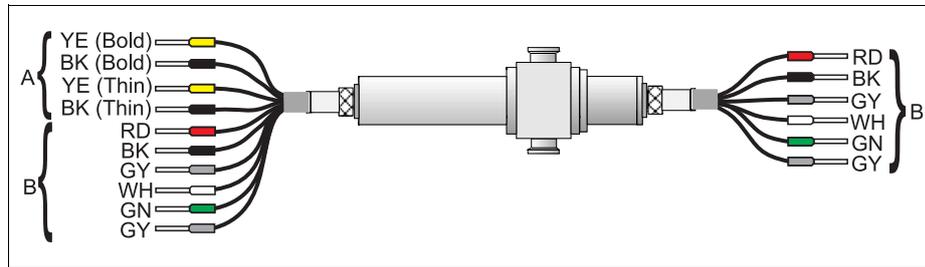
## Input

<b>Measured variable</b>	UV absorbance in absorbance units (AU) or optical density (OD)
<b>Measuring range</b>	Measuring range 0 to 2.5 AU, 0 to 50 OD (depending on optical path length)
<b>Wavelengths</b>	Discrete wavelength at 254, 280, 295, 302 or 313 nm; further versions available on request

## Wiring

### Electrical connection

The OUSAF46 sensor is connected to the transmitter via the pre-terminated or labeled cable set OUK40 (to be ordered separately). Terminals and labeling might vary with the transmitter in use.



Connecting cable for OUSAF46

A Power supply for lamp

B Signal transmission of measurement detector and reference detector

Terminal CVM40	Cable OUK40 for sensor OUSAF46	
	Core	Assignment
V1.1	YE (Bold)	Lamp voltage +
V1.2	BK (Bold)	Lamp sense -
V1.3	BK (Thin)	Lamp sense
V1.4	YE (Bold)	Lamp voltage +
S2.1	RD(Lamp)	Reference +
S2.2	BK (Lamp)	Reference -
S2.S	GY (Lamp)	Shield
S4.1	WH (Lamp)	Reference +
S4.2	GN (Lamp)	Reference -
S4.S	GY (Lamp)	Shield
S1.1	RD	Detector +
S1.2	BK	Detector -
S1.S	GY	Shield
S3.1	WH	Detector +
S3.2	GN	Detector -
S3.S	GY	Shield

**Cable length** max. 100 m (328 ft)

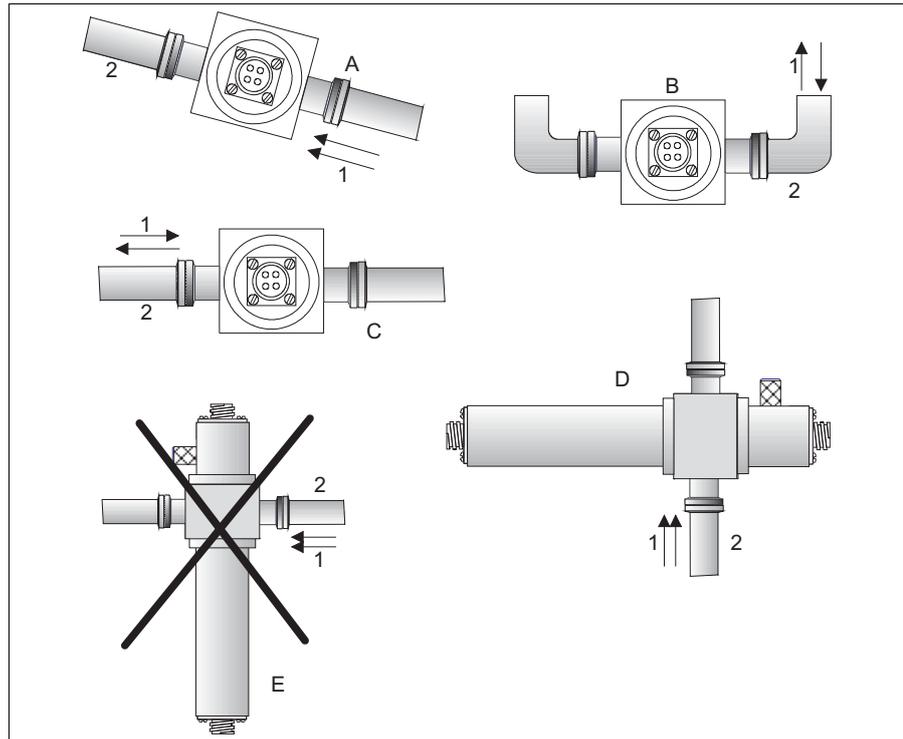
**Cable connectors** Nickel-plated brass

# Installation

## Installation instructions

Sensors are designed for in-line use with the related OUA260 flow assembly. The flow assembly can be installed either directly in a process line or in a by-pass line. The OUSAF46 sensor cannot be used without the OUA260.

- i** Make sure that the sensor and detector housings are horizontal. This will ensure that the optical window surfaces are in a vertical position which will help to prevent buildup on the window surfaces. Install the sensor upstream of pressure regulators. Allow adequate space for the connection of cables at the ends of the lamp and the detector housing. Operating sensors under pressure will help to avoid air or gas bubble creation.



Sensor installation  
 A Preferred  
 B Avoid  
 C Acceptable  
 D Best

E Never  
 1 Process flow  
 2 Process piping

## Environment

Ambient temperature 0 to 55 °C (32 to 131 °F)

Storage temperature -20 to 70 °C (-4 to 158 °F)

Relative humidity 5 to 95 %

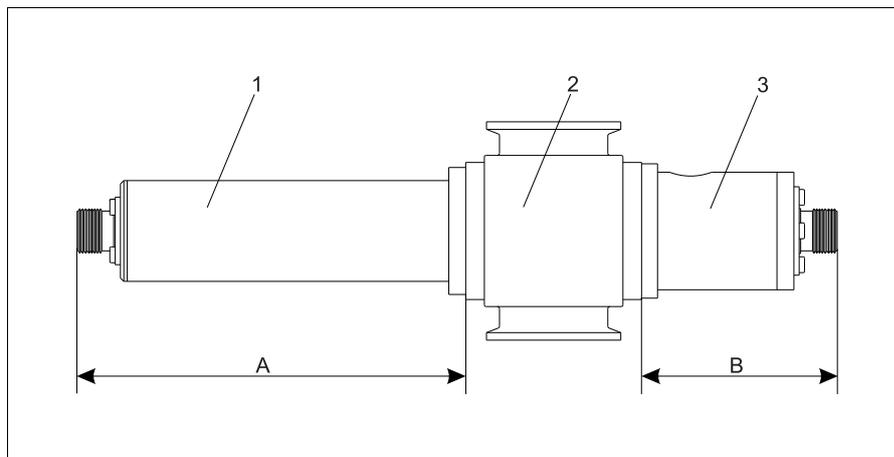
Ingress protection IP 65 (NEMA 4)

## Process

<b>Process temperature</b>	0 to 90 °C (32 to 194 °F) continuous max. 130 °C (266 °F) for 2 hours
<b>Process pressure</b>	up to 100 bar (1450 psi), depending on material, line size and process connection of flow assembly

## Mechanical construction

**Design, dimensions** The sensor dimensions depend on the flow assembly.



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Design of OUSAF46 with OUA260 flow assembly

- 1 Lamp assembly
- 2 OUA260 flow assembly (to be ordered separately)
- 3 Detector assembly

Lamp assembly type	"A" Dimension	Detector assembly type	"B" Dimension
Standard Lamp	146.1 mm (5.75")	Standard with verification filter	80.01 mm (3.15")

Detector and lamp may vary depending on options ordered.

### Flow assembly OUA260

Process connections: Tri-clamp, weld stubs, tube compression fittings, Swagelok, ANSI flange, DIN flange

(further connections available on request)

Materials: SS316L, Kynar

(further materials such as titanium, Hastelloy, etc. available on request)

Line size: ¼" to 4" (DN 6 to DN 100)

Path lengths: 0.5 to 100 mm (0.02" to 3.94"), depending on line size and process connection

Windows: Quartz, Sapphire

O-rings: EPDM, Viton, Kalrez, Silicone

(further materials available on request)

For flowcell dimensions please refer to OUA260 documentation.

**i** Make sure to leave an additional clearance of approx. 5 cm (2") at the lamp end and detector end of the sensor to allow for installation of the sensor cables.

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<b>Weight</b>	<b>Sensor</b>	
	Lamp housings	
	UV Lamp:	0.58 kg (1.28 lbs)
	Detector housings	
	Standard detector:	0.36 kg (0.794 lbs)
	<b>Flow assembly OUA260 (assembled with windows and window rings, no sensor)</b>	
	TC ¼", 316 SS:	1.14 kg (2.51 lbs)
	TC 1", 316 SS:	1.39 kg (3.07 lbs)
	TC 2", 316 SS:	1.88 kg (4.15 lbs)
	TC 4", 316 SS:	3.38 kg (7.45 lbs)

For other options please consult the Technical Information for the OUA260 flowcell.

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<b>Materials</b>	Sensor housing:	stainless steel 316L
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<b>Light source</b>	Pre-focused low pressure mercury lamp Lamp life: minimum 1000 hours (3000 hours typical)
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<b>Detectors</b>	UV enhanced silicon detectors, hermetically sealed
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<b>Filters</b>	Multilayer narrow passband interference filter designed for extreme UV conditions
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## Certificates and approvals

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<b>FDA conformity</b>	All non metallic wetted parts as in rubber and plastics comply with FDA Regulations 21 CFR 177.2600. The plastic and elastomeric wetted parts of the sensor have passed the bio-reactivity tests according to USP <87> and <88> class VI.
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## Ordering information

### Product page

You can create a complete and valid order code by using the configurator on the internet product page.

Enter the following address to access the product page:

[www.products.endress.com/OUSAF46](http://www.products.endress.com/OUSAF46)

### Online configurator

1. You can choose from the following options on the product page located on the right:

Product page function	
::	Add to product list
::	Price & order information
::	Compare this product
::	Configure this product

2. Click "Configure this product".

3. The configurator opens in a separate window. You can now configure your device and receive the complete order code that applies for the device.

4. Afterwards, export the order code as a PDF or Excel file. To do so, click the appropriate button at the top of the page.

### Product structure

 The following product structure represents the status of printing. You can create a complete and valid order code on the Internet using the configurator tool.

#### Sensor OUSAF46

Wavelengths combination			
A	254 nm / 280nm		
C	280 nm / 295nm		
D	280 nm / 313 nm		
Y	Special version, TSP no. to be spec.		
Calibration/Validation			
0	Standard		
Lamp			
C	High luminescence lamp		
D	Gas filled hight output lamp		
Lamp Approval			
A	Standard		
B	FM Div 1		
C	ATEX II 2G Eex d IIC T5		
Assembly			
0	Isolated order/spare part		
1	Assembled to flow cell, order position		
9	Special version, TSP no. to be spec.		
OUSAF46-			Complete order code

**Cable set OUK40**

Sensor	
1	OUSAF44
2	OUSAF46
Transmitter	
A	900 series
B	600 series
C	700 series
D	CVM40
Cable length	
10	10 ft / 3 m
15	15 ft / 4.5 m
25	25 ft / 7.5 m
50	50 ft / 15 m
88	..... ft
89	..... m
Barrier	
A	No hazardous area
B	FM, Busbar
C	ATEX, Busbar
D	FM, DIN rail
E	ATEX, DIN rail

OUK40- | | | complete order code

**Scope of delivery**

The scope of delivery depends on the ordered version.

Isolated order

- 1 detector and lamp assembly without flow assembly
- Operating Instructions

Assembled to flow assembly

- Detector and lamp assembly installed
- OUA260 flow assembly
- Operating Instructions

When the sensor is ordered together with a transmitter, the complete measuring system is factory-calibrated and shipped as one package.

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## Accessories

-  The most important accessories that could be delivered at the time this document went to print are listed below.  
For information on accessories that are not listed here, please contact your local service or sales representation.
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### Flow assembly

OUA260 flow assembly

- For sensor installation in pipe lines
  - Materials: stainless steel 316L or Kynar (further materials available on request)
  - Many process connections and pathlength versions available
  - Order according to product structure, see Technical Information TI418C/07/EN
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### Transmitter

CVM40 Memograph

- Graphic transmitter for inline photometers and data manager
- Order according to product structure, see Technical Information TI457C/07/EN

OUM960 transmitter

- Transmitter for measurement of UV absorption
  - Ordering according to product structure, see Technical Information TI417C/07/EN
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### Cable

OUK40 cable set

- Pre-terminated or labeled cable set for connection of OUSAF4x sensors
- Order according to product structure

[www.addresses.endress.com](http://www.addresses.endress.com)

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