



Level



Pressure



Flow



Temperature

Liquid
Analysis

Registration

Systems
Components

Services



Solutions

Technical Information

OUSAF44

Optical sensor combined with flow assembly OUA260 for measurement of UV absorption



Application

The OUSAF44 sensor is used for measuring the spectral absorbance of process liquids 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

Your benefits

- Accurate measurement
 - Measuring range up to 50 OD (depending on optical path length)
 - Configurable to measure UV absorption at discrete wavelengths between 254 nm and 365 nm
 - Outstanding filter performance for highest linearity
 - Direct consistence with lab results
 - Built-in reference detector for lamp compensation
- Gas discharge light source for long service life and stable operation
- Patented Easycal™ system option for easy, liquid-free online calibration traceable to NIST
- FM and ATEX approved lamps for hazardous area applications

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

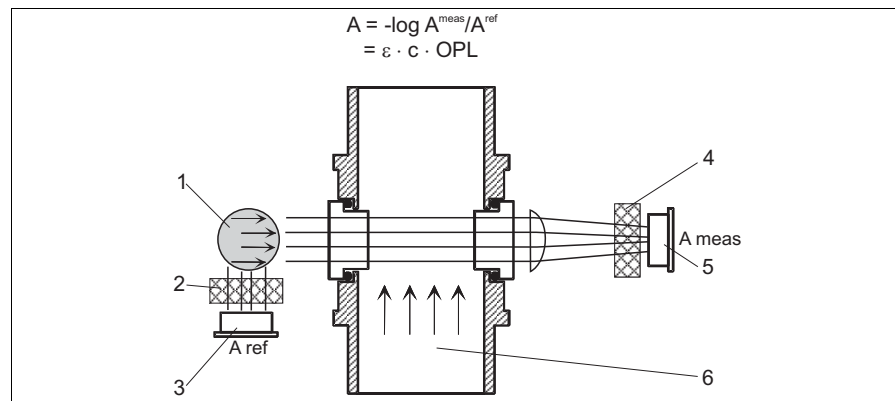
- Hygienic design
 - FDA and USP accepted seal materials available
 - SIP/CIP-resistant flow assembly with minimum retention
- Broad variety of wetted materials and process connections
- Air purge ports available for preventing condensate formation on the optical windows
- Unique precision optical pathlength adjuster available enabling exact adjustment of short pathlengths

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 absorption of light 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 intensity of light 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.



E.g. Single-wavelength absorption sensor with reference

<i>A</i>	Absorbance	<i>1</i>	Light source
<i>ε</i>	Extinction coefficient	<i>2</i>	Reference filter
<i>c</i>	Concentration	<i>3</i>	Reference detector
<i>OPL</i>	Optical pathlength	<i>4</i>	Measurement filter
		<i>5</i>	Measurement detector
		<i>6</i>	Medium

Options

Easycal™

Easycal™ is the most accurate and convenient method for inline verification and calibration without dismantling the sensor from the process.

The Easycal™ unit comprises an optical detector system with two NIST traceable filters that provide an accurate and reproducible three-point calibration method. Calibration is fast and easy by simply rotating the filters into the light path.

The mechanically sealed and compact design results in the longest lifetime and stability of the traceable filters even under harshest conditions.

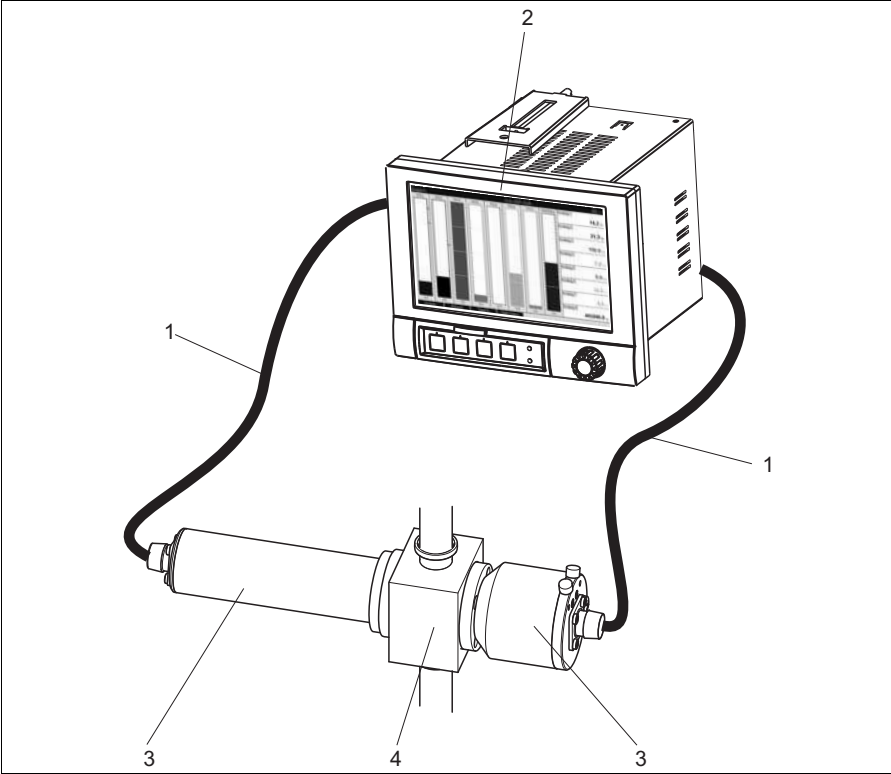
Installation in hazardous areas

The explosion-proofed lamp housing allows the installation in hazardous areas. This sensor version is rated for FM Class 1, Division 1, Groups B, C, D and ATEX II 2G EExd IIC T5.

Measuring system

A complete measuring system comprises:

- Memograph M CVM40
- An optical sensor, e.g. OUSAF44
- Flow assembly, e.g. OUA260
- Cable set, e.g. OUK40



Example of a measuring system

- 1 Cable set OUK40
- 2 Memograph M CVM40 photometer
- 3 OUSAF44 sensor
- 4 OUA260 flow assembly

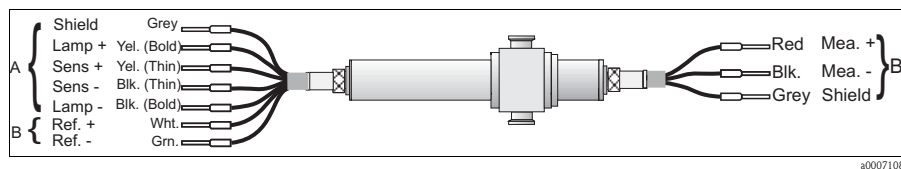
Input

Measured variable	UV absorbance in absorbance units (AU) or optical density (OD)
Measuring range	0 to 2.5 AU, 0 to 50 OD (depending on optical path length)
Wavelengths	Discrete wavelength at 254, 280, 295, 302, 313 or 365 nm; further versions available on request

Wiring

Electrical connection

The OUSAF44 sensor is connected to the UV transmitter via the pre-terminated and labeled cable set OUK40 (to be ordered separately).
Terminals and labeling might vary with the transmitter in use.



Connecting cable for OUSAF44

A Power supply for lamp and reference detector

B Signal transmission of measurement detector

Cable length

max. 100 m (328 ft)

Cable connectors

Nickel-plated brass

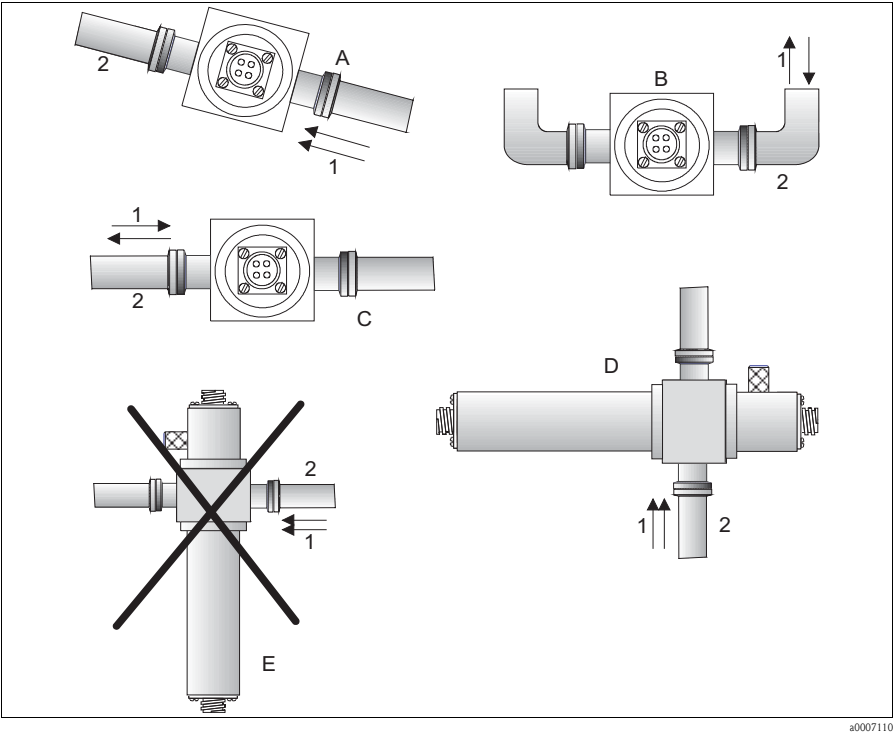
Installation

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 OUSAF44 sensor cannot be used without the OUA260.

Note!

- 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 evolution.



Sensor installation

- A Preferred
- B Acceptable
- C Avoid
- D Best

- E Never
- 1 Process flow
- 2 Process piping

Environment

Ambient temperature	0 ... 55 °C (32 ... 131 °F)
Storage temperature	-20 ... 70 °C (-4 ... 158 °F)
Relative humidity	5 ... 95 %
Ingress protection	IP 65 (NEMA 4) for all optical parts

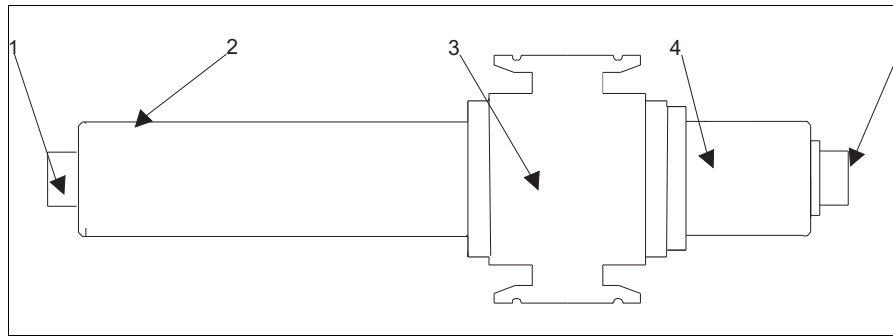
Process

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

Mechanical construction

Design

General design:



Design of OUSAF44 with OUA260 flow assembly

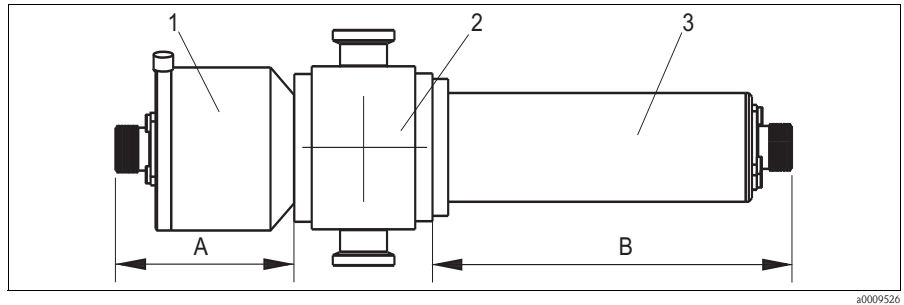
- 1 Environmental connector
- 2 Lamp housing
- 3 OUA260 flow assembly (to be ordered separately)
- 4 Detector housing

Flow assembly OUA260

Process connections:	Tri-clamp, weld stubs, tube compression fittings, Swagelok, ANSI flange, DIN flange (further connections available on request)
Materials:	SS316, 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 (further materials available on request)

Dimensions

The sensor dimensions depend on the flow assembly.



General dimensions

1 Detector assembly

2 Flow assembly

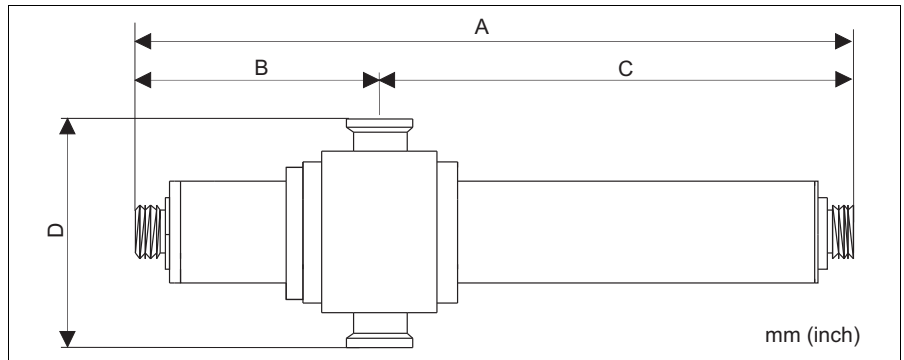
3 Lamp assembly

Detector assembly type	A	Lamp assembly type	B
Standard OUSAF44 w/ ref rod	60.2 mm (2.37")	Standard lamp	142 mm (5.60")
Easycal™	69 mm (2.70")		

Note!

Make sure to leave an additional clearance of approx. 5 cm (2") for installation of the sensor cable.

Example: OUSAF44 for non-Ex area with triclamp flow assembly



Dimensions of OUSAF44-xxAx sensor; dimensions A, B, C, D depend on the process connection size (see table below)

Connection size	A	B		C	D
		Standard	Easycal™		
1/4" - 3/4"	258.6 mm (10.18")	88.3 mm (3.48")	96.6 mm (3.81")	170.3 mm (6.71")	82.6 mm (3.25")
1" - 1 1/2"	268.5 mm (10.57")	93.2 mm (3.67")	101.6 mm (4.0")	175.3 mm (6.9")	82.6 mm (3.25")
2"	288.5 mm (11.36")	103.3 mm (4.07")	111.6 mm (4.4")	185.3 mm (7.3")	82.6 mm (3.25")
2 1/2"	301.2 mm (11.86")	109.6 mm (4.32")	118.0 mm (4.65")	191.6 mm (7.55")	88.9 mm (3.5")
3"	310.1 mm (12.21")	114.0 mm (4.49")	122.4 mm (4.82")	196.1 mm (7.72")	114.3 mm (4.5")
4"	334.3 mm (13.16")	126.1 mm (4.97")	134.5 mm (5.3")	208.2 mm (8.2")	123.8 mm (4.88")

Weight	Sensor	
	Lamp housings	
	UV lamp:	0.58 kg (1.28 lbs)
	UV lamp with SS-braided cable (1.2 m (4ft)) and junction box (Ex-proofed sensor):	3.2 kg (6.66 lbs)
	Detector housings	
	Easycal™ detector:	0.65 kg (1.43 lbs)
	Standard detector:	0.36 kg (0.794 lbs)
	Flow assembly OUA260 (assembled with windows and window rings, no sensor)	
	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)
Materials	Sensor housing:	stainless steel 316
Light source	Pre-focused low pressure mercury lamp	
	Lamp life:	minimum 1000 hours (3000 hours typical)
Detectors	UV enhanced silicon detectors, hermetically sealed	
Filters	Multilayer narrow passband interference filter designed for extreme UV conditions	

Certificates and approvals

Ex approval	<ul style="list-style-type: none"> ■ ATEX II 2G EEx d IIC T5 ■ FM Cl.1, Div. 1, Group B, C, D
FDA	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.

Ordering information

Product structure

Sensor OUSAF44

Wavelength			
A	254 nm		
B	280 nm		
C	295 nm		
D	302 nm		
E	313 nm		
F	365 nm		
Calibration / Validation			
0	Standard		
1	Easycal™		
Lamp approval			
A	Standard		
B	FM Class 1 Div 1 groups B, C, D		
C	ATEX II 2G EEx d IIC T5		
Assembly			
0	Isolated order / spare part		
1	Assembled to flow cell order position		
OUSAF44-			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

Scope of delivery	<p>The scope of delivery depends on the ordered version.</p> <p>Isolated order</p> <ul style="list-style-type: none"> ■ 1 detector and lamp arm without flow assembly <p>Assembled to flow assembly</p> <ul style="list-style-type: none"> ■ Detector and lamp arm mounted on ■ OUA260 flow assembly ■ Operating Instructions depending on the used transmitter <p>When the sensor is ordered together with a transmitter, the complete measuring system is factory-calibrated and shipped as one package.</p>
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Accessories

Flow assembly	<p>OUA260 flow assembly for hygienic sensors</p> <ul style="list-style-type: none"> ■ For sensor installation in pipe lines ■ Materials: stainless steel 316, 316L or Kynar (further materials available on request) ■ Many process connections and pathlength versions available ■ Ordering acc. to product structure, see Technical Information TI418C/07/EN
Transmitters	<p>CVM40 Memograph M</p> <ul style="list-style-type: none"> ■ Graphic inline photometer and data manager ■ Ordering acc. to product structure, see Technical Information TI457C/07/EN <p>OUM960 transmitter</p> <ul style="list-style-type: none"> ■ Transmitter for measurement of UV absorption ■ Ordering acc. to product structure, see Technical Information TI417C/07/EN
Cables	<p>OUK40 cable set</p> <ul style="list-style-type: none"> ■ Pre-terminated and labeled cables for connection of OUSAF4x sensors ■ Ordering according to product structure
Calibration	<p>EasycalTM retrofit</p> <ul style="list-style-type: none"> ■ Patented, NIST traceable system for online calibration of UV and solids flow through sensors ■ Ordered acc. to product structure, see price list

Instruments International

Endress+Hauser
Instruments International AG
Kaegenstrasse 2
4153 Reinach
Switzerland

Tel.+41 61 715 81 00
Fax+41 61 715 25 00
www.endress.com
info@ii.endress.com

Endress+Hauser 
People for Process Automation