

Technical Information

OUSAF12

Optical sensor combined with flow assembly
OUA260 for absorbance measurement



Application

The OUSAF12 sensor is used for determining the VIS/NIR absorption of a liquid medium. It is suitable for a variety of applications in different industries.

Suspended solids measurement in

- Pharmaceutical and Biotech
- Chemical
- Pulp and Paper

Product interface detection in

- Food and Beverage
- Chemical
- Oil and Gas

Your benefits

- VIS/NIR absorbance at a discrete wavelength between 400 nm and 1200 nm
 - Measuring range up to 2.5 AU or 50 OD (depending on optical path length)
 - Configurable to measure absorbance at discrete wavelengths in the visible and NIR region
 - Color independent measurement with optional long pass filter
- Incandescent light provides long service life and stable operation
- Easy, liquid-free verification
- FM and ATEX approved lamps for hazardous area applications

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

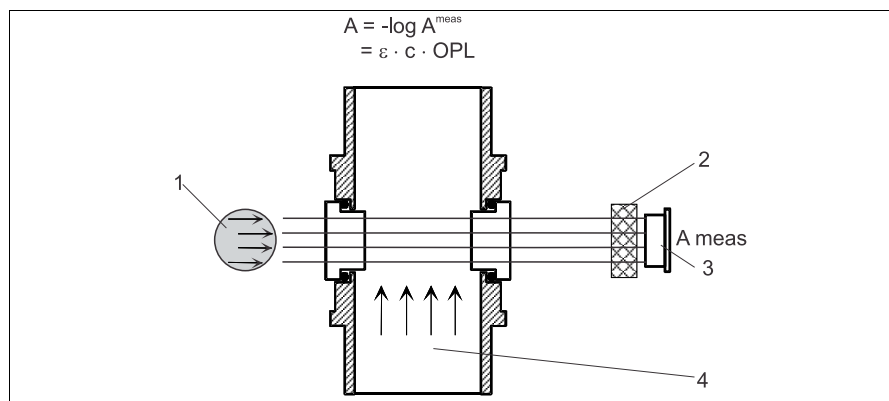
- Broad variety of wetted materials provides resistance against any process medium
- Flexible process adaptation with various process connections
- Hygienic versions with certified materials and SIP/CIP-resistance
- Air purge ports available for preventing condensate formation on the optical windows
- 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 light waves through the medium and the transmitted light is measured on the detector side. The light intensity is determined by a photodiode and converted into a photo current. The final conversion into absorption units (AU, OD) is done by the related transmitter.



Absorption sensor with no reference

- 1 Light source
- 2 Measurement filter
- 3 Measurement detector
- 4 Medium

Options

Installation in hazardous areas

The explosion-proof lamp housing allows for 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.

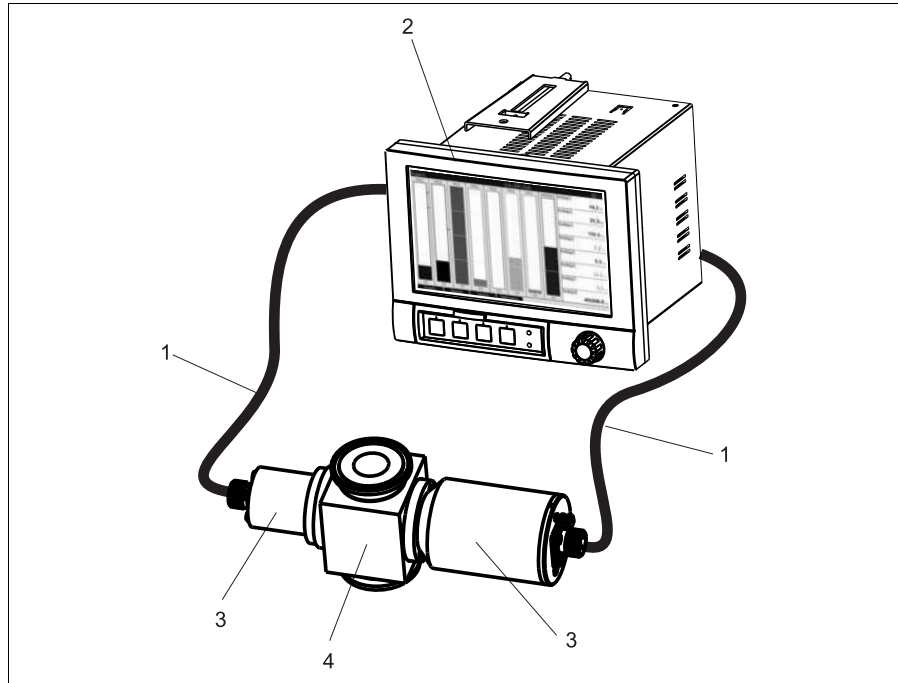
Easycal (1 filter)

Easycal is the most accurate and convenient method for in-line verification without dismantling the sensor from the process. The Easycal unit comprises an optical detector with one traceable filter. The mechanically sealed and compact design results in the longest lifetime and stability of the traceable filter even under harshest conditions.

Measuring system

A complete measuring system comprises:

- Transmitter Memograph CVM40
- Optical sensor OUSAF12
- Flow assembly OUA260
- Cable set OUK10



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Example of a measuring system

- 1 Cable set OUK10
- 2 Transmitter Memograph CVM40
- 3 Optical sensor OUSAF12
- 4 Flow assembly OUA260

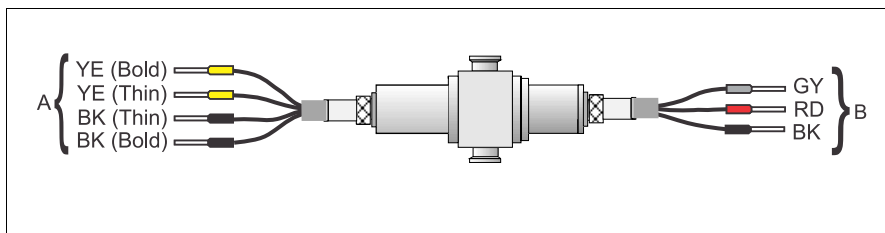
Input

Measured variable	VIS/NIR absorption in absorbance units (AU)
Measuring range	Measuring range up to 2.5 AU or 50 OD (depending on optical path length)
Wavelengths	400 nm, 420 nm, 430 nm, 540 nm, 950 nm, 1134 nm, and long pass NIR (780 nm and up)

Wiring

Electrical connection

The OUSAF12 sensor is connected to the transmitter via the pre-terminated and labeled cable set OUK10 (to be ordered separately). Terminals and labeling might vary with the transmitter in use.



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Connecting cable for OUSAF12

A Power supply for lamp

B Signal transmission of measurement detector

Terminal CVM40	Cable OUK10 for sensor OUSAF12	
	Color	Assignment
S1.5	GY	Shield
S1.1	RD	Sensor Mea +
S1.2	BK	Sensor Mea -
V1.1	YE (Bold)	Lamp voltage +
V1.3	YE (Thin)	Lamp sense +
V1.4	BK (Thin)	Lamp sense -
V1.2	BK (Bold)	Lamp voltage -

Cable length max. 100 m (328 ft)

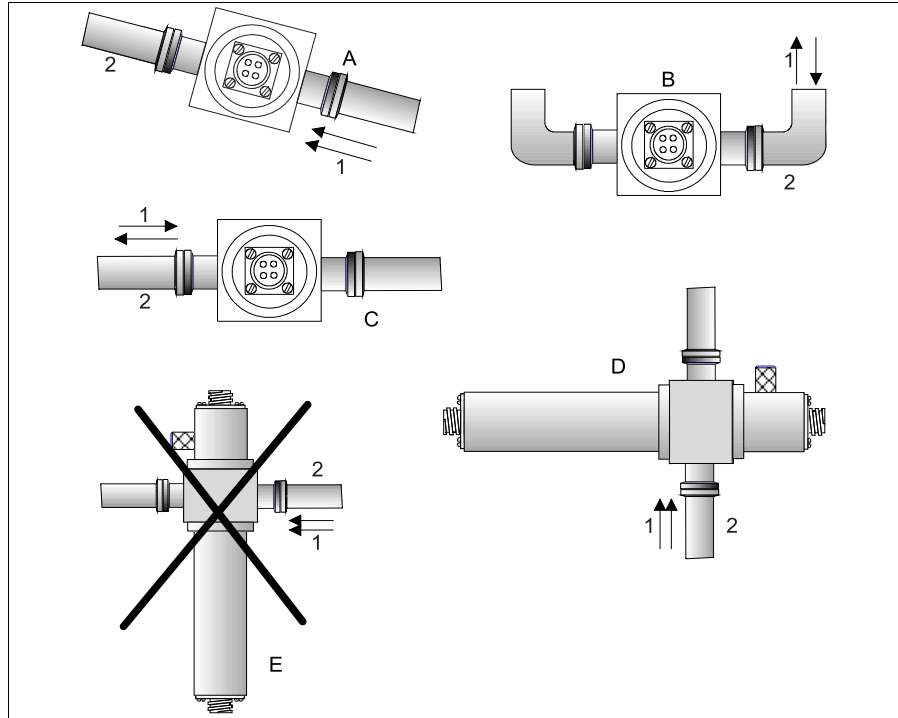
Cable connectors Nickel-plated brass

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 OUSAF12 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)

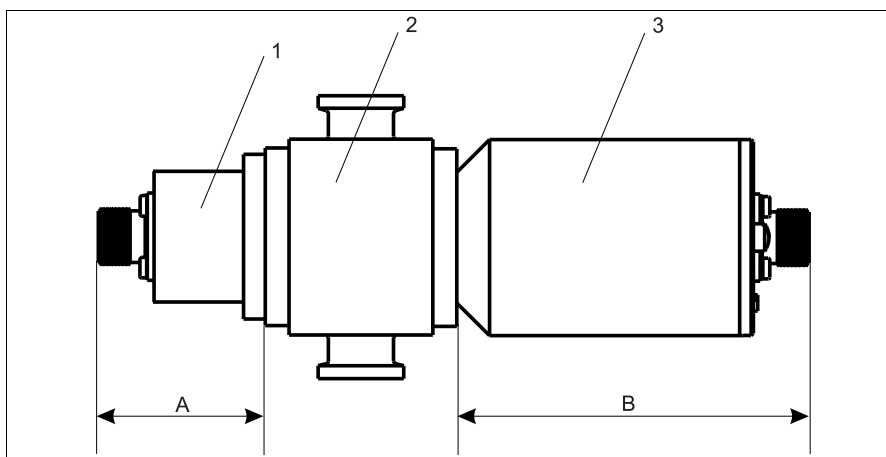
Process

Process temperature 0 to 90 °C (32 to 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, dimensions The sensor dimensions depend on the flow assembly.



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Design of OUSAF12 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 incandescent lamp	33.78 mm (1.33")	Standard	33.78 mm (1.33")
High luminescence lamp	33.78 mm (1.33")	Easycal	102.8 mm (4.05")
Gas filled lamp	33.78 mm (1.33")		
Collimated lamp	151.3 mm (5.96")		

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.

Weight	Sensor
	Lamp housings
	Lamp: 0.36 kg (0.794 lbs)
	Hazardous lamp with SS-braided cable (1.2 m (4ft)) and junction box (FM Ex-sensor only): 3.2 kg (6.66 lbs)
	ATEX lamp: 1.34 kg (2.95 lbs)
	Detector housings
	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)

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

Materials	Sensor housing:	Stainless Steel 316L
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Light source	<ul style="list-style-type: none"> ■ Standard incandescent lamp: Optical filter option W, X Lamp life: Typically 10,000 hours ■ Collimated incandescent lamp: Extended resolution < 200 ppm or FTU, with Optical filter option W, X Lamp life: Typically 10,000 hours ■ High luminescence gas lamp: Optical filter option A, B, C Lamp life: Typically 10,000 hours ■ Gas filled high output lamp: Optical filter option D, F, G Lamp life: Typically 10,000 hours
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Detectors	Visible/IR enhanced silicon detectors, hermetically sealed
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Filters	Multilayer narrow bandpass interference filter Multilayer longpass NIR filter > 780 nm optional
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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
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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.
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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/OUSAF12

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 OUSAF12

Wavelengths / Optical filter option			
	A	400 nm	
	B	420 nm	
	C	430 nm	
	D	540 nm	
	F	950 nm	
	G	1134 nm	
	W	Without Filter (visible range and NIR)	
	X	Long Pass NIR	
	Y	Special version, TSP-no. to be spec.	

Calibration/Validation			
	0	Standard	
	1	EasyCal (1 filter)	
	9	Special version, TSP-no. to be spec.	

Lamp			
	A	Standard Incandescent	
	B	Collimated Incandescent (ext. resolution)	
	C	High Luminescence lamp	
	D	Gas filled high output lamp	

Lamp Approval			
	0	Standard	
	1	FM Div 1	
	2	ATEX II 2G Eex d IIC T5	

Assembly			
	A	Isolated order/spare part	
	B	Assembled to flow cell, order position	
	Y	Special version, TSP-no. to be spec.	

OUSAF12-																				Complete order code
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Cable set OUK10

Sensor			
	1		OUSAF12
	2		OUSAF13
Transmitter			
	A		OUM900 Series
	B		OUM600 Series
	C		OUM700 Series
	D		Memograph 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
	80	 ft; cable
	90	 m; cable
Barrier			
	A		Standard (non-hazardous area)
	B		FM Busbar
	C		ATEX Busbar
	D		FM DIN rail
	E		ATEX DIN rail
OUK10-			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.

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.

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
 - Ordering acc. to product structure, see Technical Information TI418C/07/EN

Transmitters

- CVM40 Memograph
- Graphic transmitter for inline photometers and data manager
 - Ordering acc. to product structure, see Technical Information TI457C/07/EN

Cables

- OUK10 cable set
- Pre-terminated or labeled cable set for connection of OUSAF1x sensors
 - Ordering according to product structure

www.addresses.endress.com
