Technical Information
OUSAF11

Optical sensor for measurement of VIS/NIR absorption

Application
The OUSAF11 sensor is used for determining the VIS/NIR absorption of a liquid medium. It is suitable for a variety of applications:

- Product interphase detection
- Dairy applications:
  - Milk detection in CIP solutions
  - Phase separation milk/water
  - Product loss detection in effluent
- Suspended solids measurement in:
  - Primaries
  - Mining

Your benefits

- Flexible:
  - Submersible sensor for applications in open tanks and basins
  - Insertion sensor with Tri-Clamp or Varivent connection for sanitary applications in pipes and vessels
- Glass-free and certified according to **3-A** Standard 46-03
- Two pathlengths available: 5 and 10 mm
- Measuring range: 0 to 3 AU (absorption units)
- Low voltage incandescent lamp provides long service life and stable operation
- Robust design with stainless steel body and fouling resistant sensor head made of FEP
- Operating temperature range: 0 to 90°C (32 to 194°F)
- Color independent measurement with optional NIR detector
- Easy to maintain

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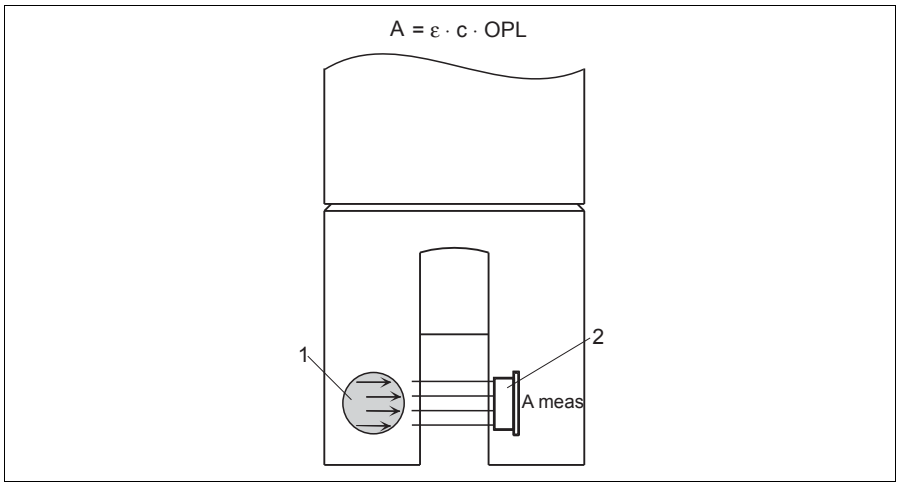
Function and system design

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. 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.



Single-wavelength absorption sensor

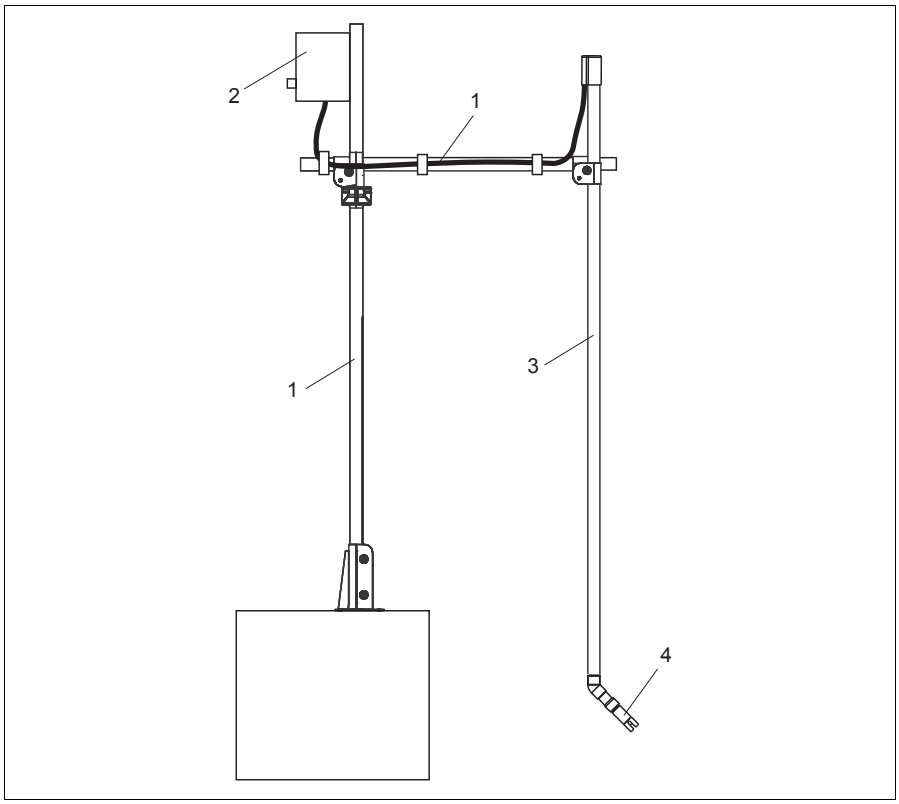
A	*Absorption*	*1*	*Light source*
ε	*Extinction coefficient*	*2*	*Measurement detector*
c	*Concentration*		
OPL	*Optical pathlength*		

Measuring system

A complete measuring system is typically comprised of:
- Transmitter Memograph CVM40
- Optical sensor OUSAF11

For applications in open tanks and basins a typical measuring system is comprised of:

- Transmitter Memograph CVM40
- Optical sensor OUSAF11
- Assembly Flexdip CYA112 and holder system Flexdip CYH112



Example of a measuring system with immersion assembly

1 Holder system Flexdip CYH112
2 Transmitter Memograph CVM40
3 Assembly Flexdip CYA112
4 Optical sensor OUSAF11

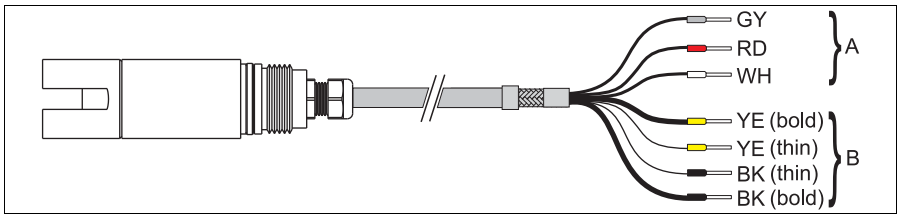
Input

Measured variable	VIS/NIR absorption
Measuring range	0 to 3 AU, 0 to 6 OD (depending on optical pathlength)
Wavelengths	NIR, broadband (VIS and NIR)
Optical pathlengths	5 or 10 mm

Wiring

Electrical connection

Terminals and labeling might vary with the transmitter in use.
Up to two sensors can be connected to the transmitter Memograph CVM40.



Connection to transmitter Memograph CVM40
A Signal transmission of detector
B Power supply for lamp and lamp voltage signal

Terminal CVM40	Sensor OUSAF11	
	Core	Assignment
S1.S	GY	Shield
S1.1	RD	Sensor +
S1.2	WH	Sensor -
V1.1	YE (bold)	Lamp voltage +
V1.3	YE (thin)	Lamp sense +
V1.4	BK (thin)	Lamp sense -
V1.2	BK (bold)	Lamp voltage -

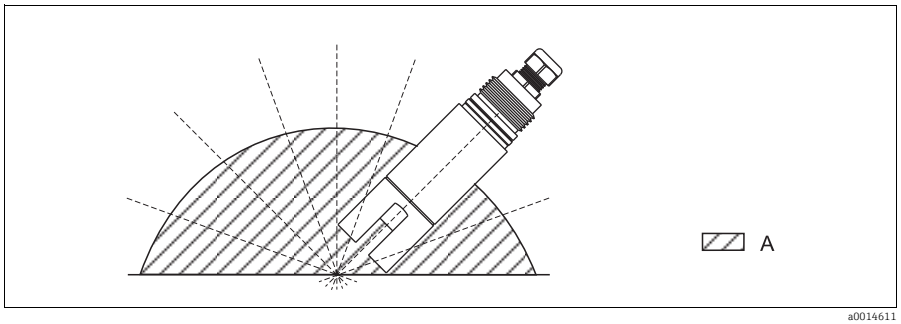
Cable length

max. 100 m (328 ft)

Installation

Installation instructions

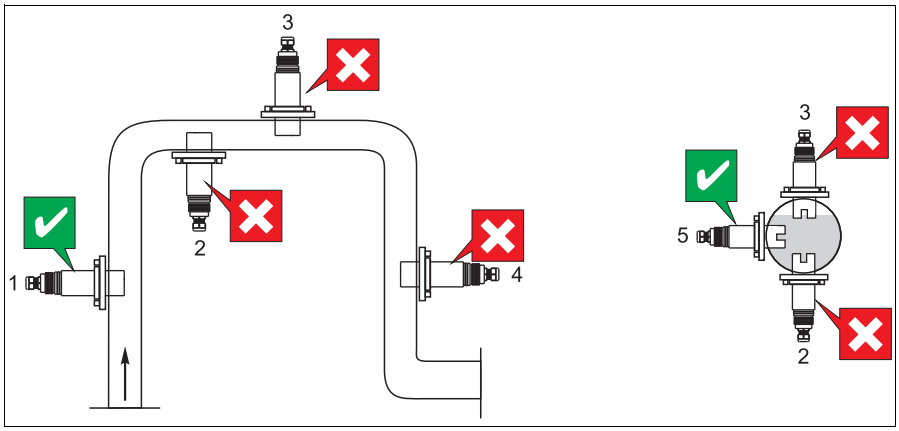
The sensor can be installed up to the horizontal in an assembly, holder or a suitable process connection. Other installation positions are not recommended. Do **not** install the sensor vertically through the bottom of a pipe. This avoids possible sediment formation and guarantees steady flow through the measuring section. It ensures correct measured values and proper drainage required in sanitary applications.



Angle of installation
A Permissible installation positions: 0 to 180 °

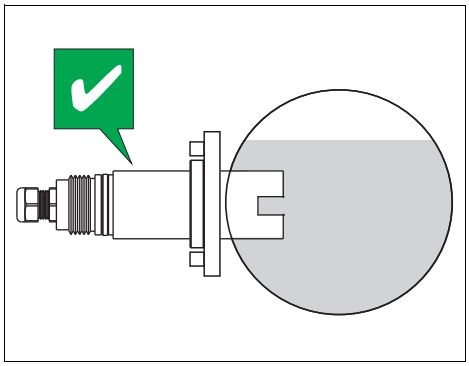
Pipe installation

The following figure illustrates various installation positions in pipes and indicates whether they are permitted or not.



Orientation and installation positions

- The pipeline diameter must be at least 50 mm (2").
- Install the sensor in places with uniform flow conditions.
- The best installation location is in the ascending pipe (item 1). Installation is also possible in the horizontal pipe (item 5).
- Do not install the sensor in places where air may collect or foam bubbles form (item 3) or where suspended particles may settle (item 2).
- Avoid installation in the down pipe (item 4).



Orientation of OUSAF11

Orientate the sensor in such a way that the medium flows through the measurement section (self-cleaning effect).

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 67 (NEMA 4) IP 68 when mounted with CYH112

Process

Process temperature

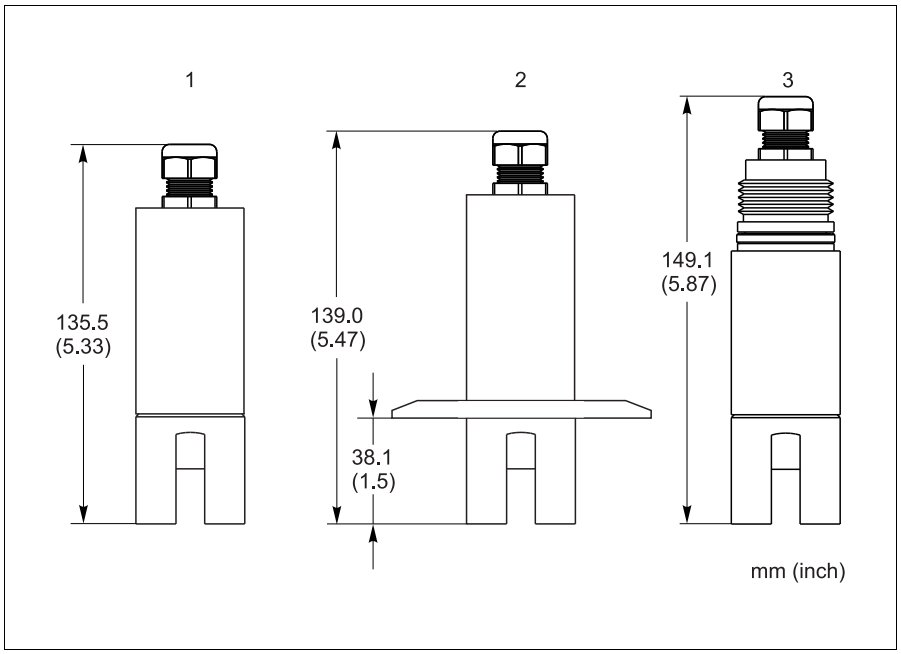
0 to 90 °C (32 to 194 °F) continuous,
max. 130 °C (266 °F) for 2 hours

Process pressure (for version with Tri-Clamp and Varivent process connection)

10 bar (150 psi),
at 20 °C (70 °F)

Mechanical construction

Design, dimensions



Design and dimensions of OUSAF11
1 Immersion sensor OUSAF11
2 OUSAF11 with Tri-Clamp or Varivent flange
3 Immersion sensor OUSAF11 with external thread

Weight

appr. 0.82 kg (1.81 lbs)

Materials

Sensor head:	FEP (Fluorinated Ethylene Propylene)
Sensor body:	Stainless steel 316
O-ring:	EPDM

Light source

Incandescent lamp

Lamp life: 10,000 hours typical

Detectors

VIS/NIR enhanced silicon detectors, hermetically sealed

Filters

NIR or broadband filter integrated in detector

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/OUSAF11

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.

	Approval
AA	Non-hazardous area
YY	Special version, TSP-no. to be spec.

		Wavelength
1		NIR, 725 - 1100 nm
2		Broadband (VIS and NIR), 390 - 1100 nm
9		Special version, TSP-no. to be spec.

			Optical pathlength (OPL)
05			5 mm
10			10 mm
99			Special version, TSP-no. to be spec.

				Process connection
A1				Immersion sensor
A2				Immersion sensor, thread G1
A3				Immersion sensor, thread NPT 1"
B1				Tri-Clamp 2"
B2				Tri-Clamp 2.5"
B3				Tri-Clamp 3"
C1				Varivent N DN40-125
Y9				Special version, TSP-no. to be spec.

					Sealing material
A					EPDM (FDA, USP Class VI)
Y					Special version, TSP-no. to be spec.

						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; cable
89						... m; cable

						Cable labelling
D						Memograph CVM40

						Additional Approval
L2						Hygiene 3-A

						Marking	
						Z1	Tagging (TAG), see additional spec.
OUSAF11-							complete order code

Scope of delivery

The scope of delivery includes:
- Optical sensor OUSAF11
- Operating Instructions, English

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

Accessories

Assembly, holder

Holder system Flexdip CYH112 and assembly Flexdip CYA112:
- Modular holder system for sensors and assemblies in open basins, channels and tanks
- The holder system CYH112 works for nearly any type of mounting - mounting on the floor, wall or directly on a rail.
- Material: stainless steel
- Ordering according to product structure (Technical Information TI430C/07/EN)

Transmitters

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

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