Technical Information
OUSAF11

Optical sensor for the measurement of VIS/NIR absorption

Application

The OUSAF11 sensor measures the VIS/NIR absorption of liquids.
- Interphase detection
- Applications in the food and beverage industry
  - Milk detection in CIP solutions
  - Phase separation, e.g. milk/water
  - Product loss detection in outlet
- Measurement of solids in:
  - Primaries industry
  - Mining

Your benefits

- Cost savings and less product loss thanks to fast interphase detection:
  - Measuring range 0 to 3 AU (absorbance units)
  - Two path lengths available: 5 and 10 mm
  - Low-voltage incandescent lamp
- High degree of product safety owing to non-glass, robust and hygienic design:
  - Stainless steel housing and sensor head made from dirt-repellent FEP
  - FDA-compliant materials and 3-A certification
  - CIP/SIP-resistant
- Easy maintenance saves time and costs
- Flexible
  - Submersible sensor for applications in open tanks and basins
  - Insertion sensor with Triclamp or Varivent connection for hygienic applications in pipes and vessels
  - Color-independent measurement with optional NIR detector
  - Operating temperature range 0 to 90 °C (32 to 190 °F)

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Function and system design

Measuring principle

Light absorption

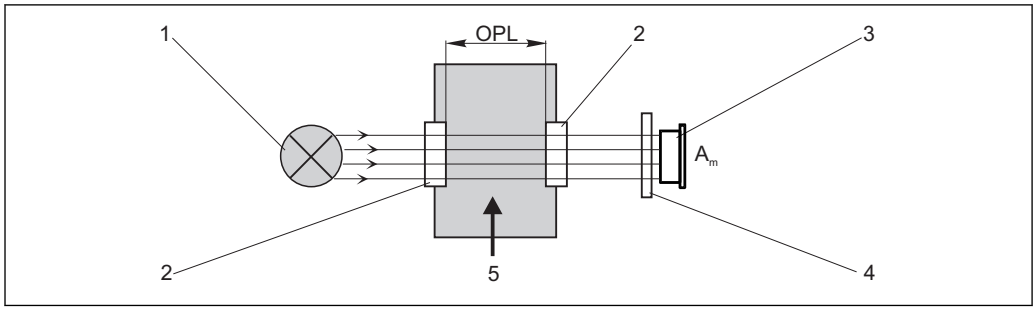
The measuring principle is based on the Lambert-Beer law.

There is a linear dependency between the absorption of light and the concentration of the absorbing substance:

$A = -\log A_m = \varepsilon \cdot c \cdot OPL$

A ... absorption, A_m ... absorption measured by detector
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.
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.

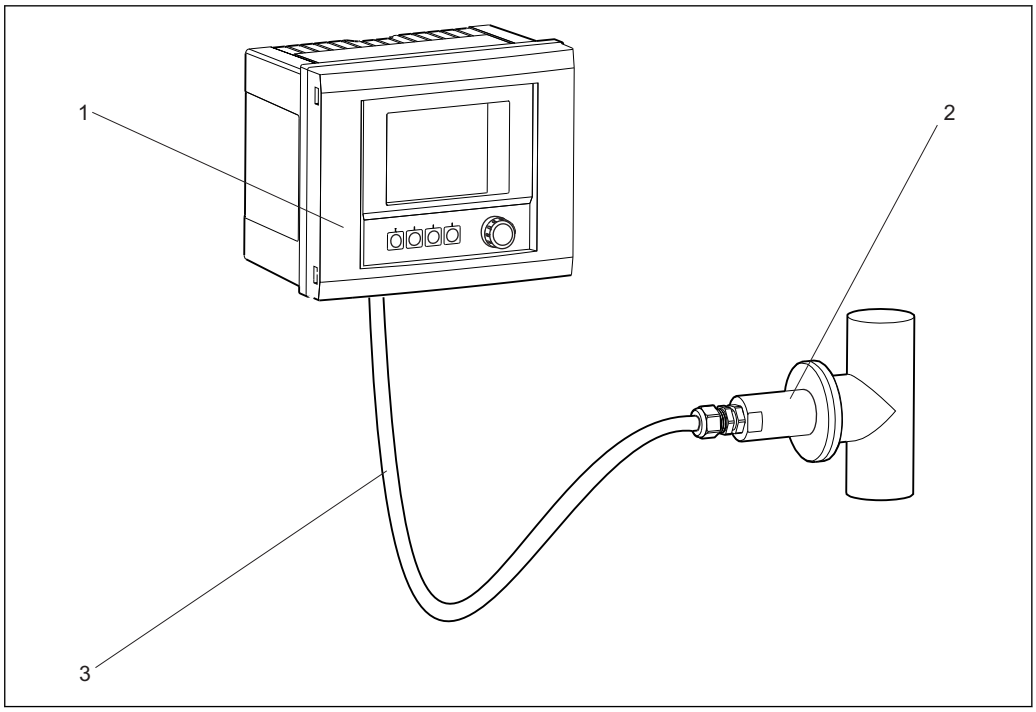


1 Absorption measurement

1 Light source
2 Optical windows of the sensor
3 Detector
4 Measurement filter (depends on sensor, not provided on all sensors)
5 Medium flow

Measuring system

An optical measuring system comprises:
- OUSAF11 sensor (photometer)
- Liquiline CM44P transmitter
- Sensor cable



2 Example of a measuring system with a photometer sensor

1 CM44P transmitter
2 OUSAF11 sensor
3 Sensor fixed cable

Input

Measured variable

VIS/NIR absorption

Measuring range

- 0 to 3 AU
- 0 to 6 OD (depending on the optical path length)

Wavelength

NIR, broadband (VIS and NIR)

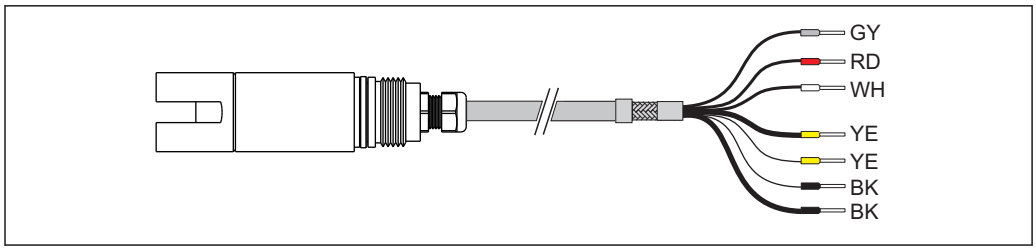
Optical path length

5 or 10 mm

Power supply

Electrical connection

The sensor is connected to the transmitter using the pre-terminated or labeled sensor fixed cable.



3 OUSAF11 fixed cable

CM44P terminal	CVM40 terminal	Cable color	Assignment
P+	V1.1	YE (thick)	Lamp voltage +
S+	V1.3	YE (thin)	Detection of lamp voltage +
P-	V1.2	BK (thick)	Lamp voltage -
S-	V1.4	BK (thin)	Detection of lamp voltage -
A (1)	S1.1	RD	Sensor +
C(1)	S1.2	WH	Sensor -
SH (1)	S1.S	GY	Shield

Cable length

Maximum 100 m (330 ft)

Lamp voltage

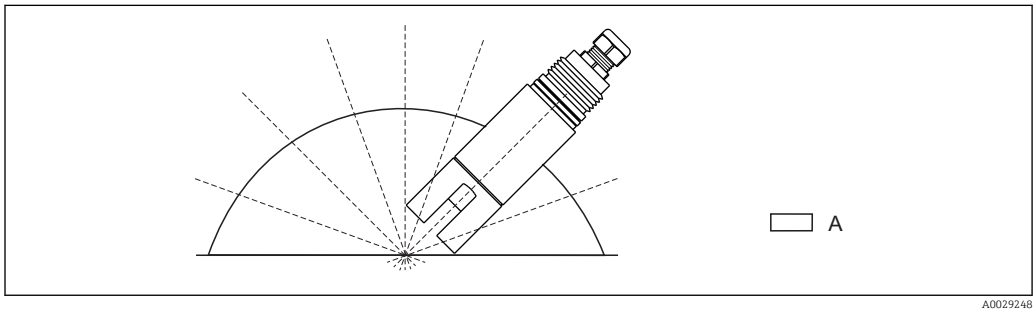
Sensor version	Lamp type	Lamp voltage [V]
OUSAF11-xxxxx	Single beam, incandescent lamp	4.9 ± 0.1

Installation

Installation instructions

The sensor can be installed up to the horizontal in an assembly, support or suitable process connection. Other angles of inclination are not recommended.

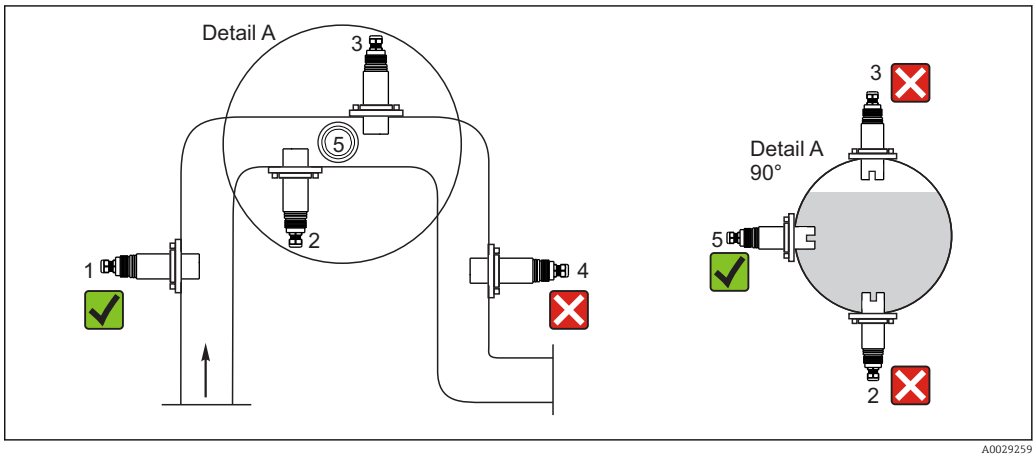
Do not install the sensor vertically through the floor of a pipe. In this way, you avoid any sedimentation and ensure a constant flow through the measuring gap. This guarantees correct measured values and complete drainage in hygienic applications.



4 Mounting angles

A Permitted mounting angle: 0 to 180°

Mounting in pipes



5 Permitted and unacceptable installation positions in pipes

Comply with the following conditions. Otherwise you run the risk of damaging the measuring point or obtaining incorrect measured values.

- The diameter of the pipe must be at least 50 mm (2").
- Install the sensor in places with consistent flow conditions.
- The best installation location is in the ascending pipe (pos. 1). Installation is also possible in the horizontal pipe (pos. 5).
- Do not install the sensor in places where air pockets or foam bubbles can form (pos. 3) or where suspended particles can settle (pos. 2).
- Avoid installation in the down pipe (pos. 4).
- Align the sensor in such a way that the medium flows through the measuring gap (self-cleaning effect).

Environment

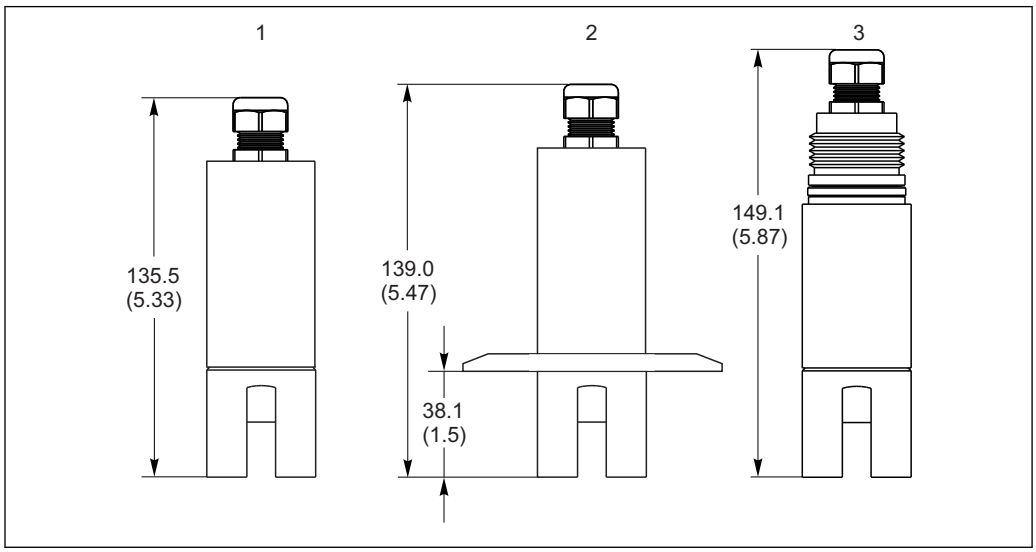
Ambient temperature range	0 to 55 °C (32 to 130 °F)
Storage temperature	-20 to +70 °C (0 to 160 °F)
Humidity	5 to 95 %
Degree of protection	IP 67 (NEMA 4) for all optical parts IP 68 when mounting with CYH112

Process

Process temperature	0 to 90 °C (32 to 194 °F) continuous Max. 130 °C (266 °F) for 2 hours
Process pressure	Max. 10 bar (150 psi) absolute, at 20 °C (68 °F) (For version with Tri-Clamp or VARIVENT process connection)

Mechanical construction

Design, dimensions



6 *Design and dimensions in mm (inch)*

1 *Submersible sensor*
2 *Tri-Clamp or Varivent process connection*
3 *Sensor with external thread*

Weight

Approx. 0.8 kg (1.8 lbs)

Materials

Sensor head	FEP (Fluorinated ethylene propylene)
Sensor shaft	Stainless steel 316L
O-ring	EPDM
Cable connection ends	Nickel-plated brass

Process connections

Depends on version:
- Thread G1
- NPT 1" thread
- Tri-Clamp
  - 2"
  - 2.5"
  - 3"
- VARIVENT N DN40-125

Light source

Incandescent lamp

Lamp operating life: typically 10 000 h

Detector

VIS/NIR silicon detectors, hermetically sealed

Filter

NIR or broadband filter, integrated in detector

Certificates and approvals

CE 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 CE mark.

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.

3-A

Certified according to the 3-A standard 46-xx for versions with Tri-Clamp and Varivent process connections

3-A hygiene standard for sensors whose spare parts and process connections are designed for use in milk and dairy product plants

Ordering information

Product page

www.endress.com/ousaf11

Product Configurator

On the product page there is a "Configuration" button to the right of the product image.

1. Click this button.
   ↳ The Configurator opens in a separate window.
2. Select all the options to configure the device in line with your requirements.
   ↳ In this way, you receive a valid and complete order code for the device.
3. Export the order code as a PDF or Excel file. To do so, click the appropriate button on the right above the selection window.

For many products you also have the option of downloading CAD or 2D drawings of the selected product version. To do so, click the "CAD" tab and select the desired file type using drop-down lists.

Scope of delivery

The scope of delivery consists of the following :
- OUSAF11 sensor
- Operating Instructions

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

If you have any questions, please contact your supplier or your local sales center.

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.

Assembly

Flexdip CYH112
- Modular holder system for sensors and assemblies in open basins, channels and tanks
- For Flexdip CYA112 water and wastewater assemblies
- Can be affixed anywhere: on the ground, on the capstone, on the wall or directly onto railings.
- Stainless steel version
- Product Configurator on the product page: www.endress.com/cyh112

Technical Information TI00430C

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