

## 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:

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

### Your benefits

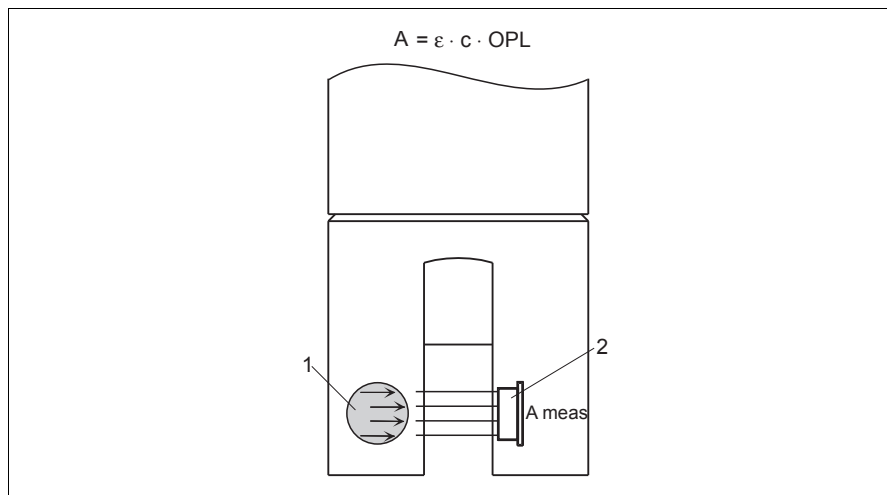
- Flexible:
  - Submersible sensor for applications in open tanks and basins
  - Insertion sensor with Triclamp or Varivent connection for sanitary applications in pipes and vessels
- Two pathlengths available: 5 and 10 mm
- Measuring range: 0 to 3 AU (absorption units)
- Low voltage incandescent lamp 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

## 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

$\epsilon$  Extinction coefficient

$c$  Concentration

$OPL$  Optical pathlength

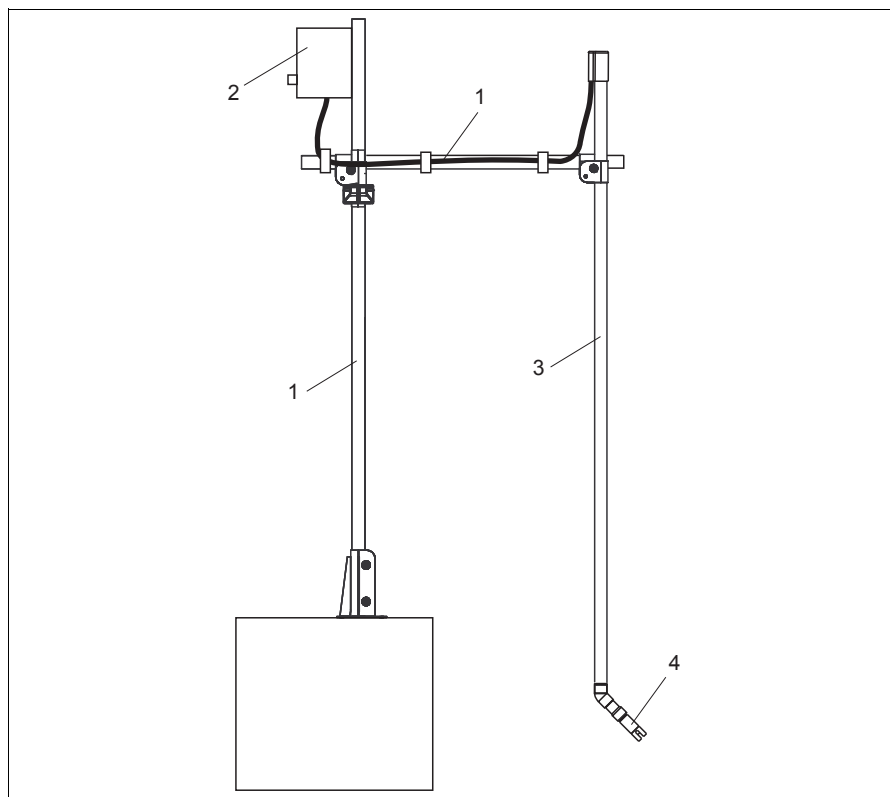
1 Light source

2 Measurement detector

**Measuring system**

A complete measuring system is typically comprised of:

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



Example of a measuring system with immersion assembly

a0014609

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

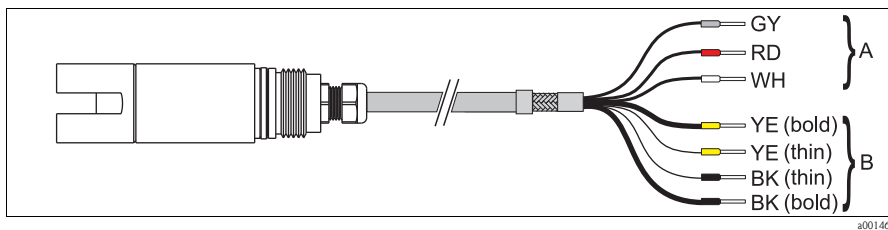
## Input

<b>Measured variable</b>	VIS/NIR absorption
<b>Measuring range</b>	0 to 3 AU, 0 to 6 OD (depending on optical pathlength)
<b>Wavelengths</b>	NIR, broadband (VIS and NIR)
<b>Optical pathlengths</b>	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 -

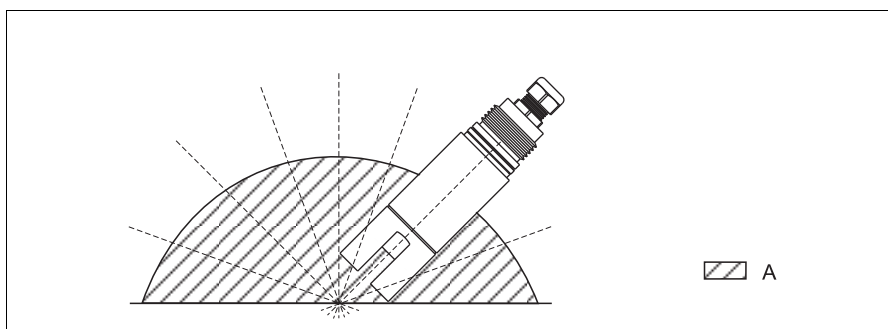
### Cable length

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 overhead. 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.

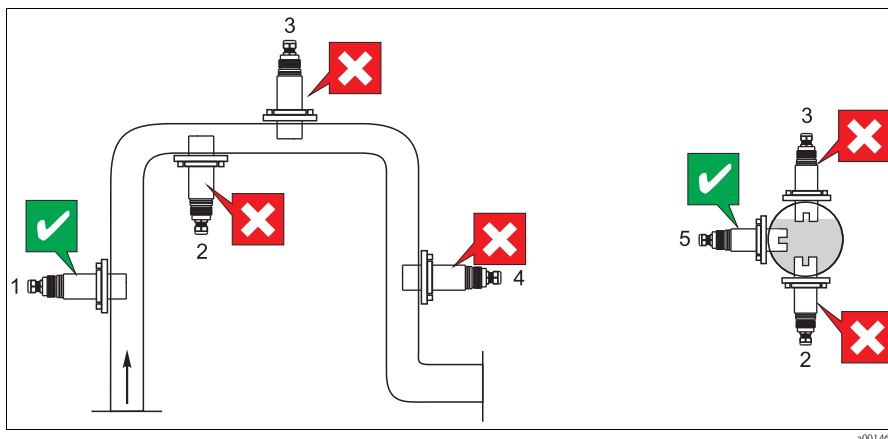


Angle of installation

A Permissible installation positions: 0 to 180 °

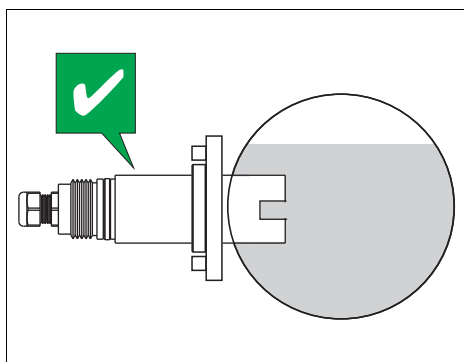
**Pipe installation**

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**

<b>Ambient temperature</b>	0 to 55 °C (32 to 131 °F)
<b>Storage temperature</b>	-20 to 70 °C (-4 to 158 °F)
<b>Relative humidity</b>	5 to 95 %
<b>Ingress protection</b>	IP 67 (NEMA 4) IP 68 when mounted with CYH112

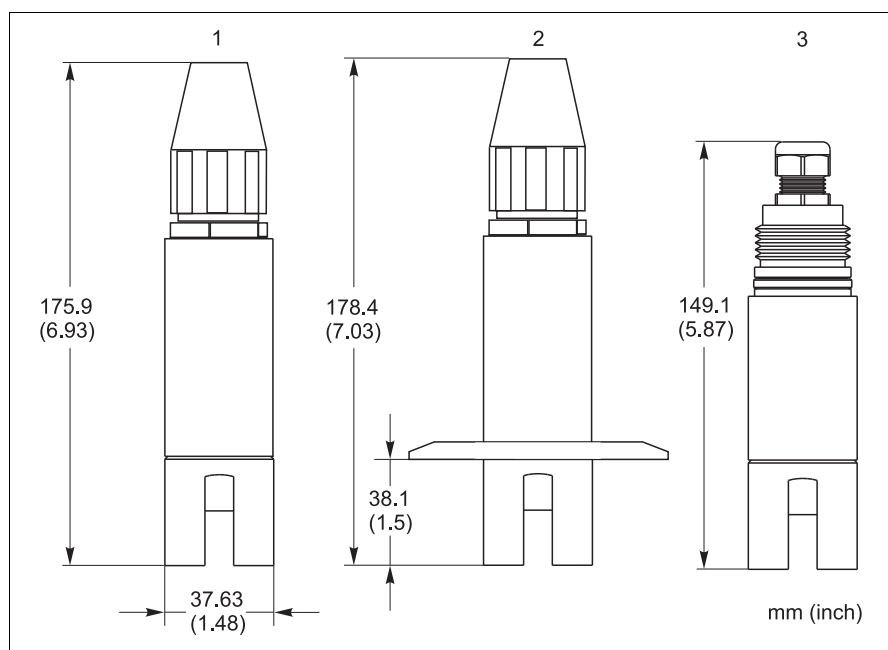
## Process

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

**Process pressure (for version with triclamp flange)** 15 bar (150 psi)

## Mechanical construction

### Design, dimensions



*Design and dimensions of OUSAF11*  
 1 Immersion sensor OUSAF11  
 2 OUSAF11 with triclamp 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 structure

Approval				
	AA	Non-hazardous area		
Wavelength				
	1	NIR, 725 - 1100 nm		
	2	Broadband (VIS and NIR), 390 - 1100 nm		
Optical pathlength (OPL)				
	05	5 mm		
	10	10 mm		
Process connection				
	A1	Immersion sensor		
	A2	Immersion sensor, thread G1		
	A3	Immersion sensor, thread NPT 1"		
	B1	Triclamp 2"		
	B2	Triclamp 2.5"		
	B3	Triclamp 3"		
	C1	Varivent N DN40-125		
Sealing material				
	A	EPDM (FDA, USP Class VI)		
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				
	A	Transmitter OUM910		
	D	Memograph CVM40		
OUSAF11-				complete order code

## Scope of delivery

### 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 for water and wastewater 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

OUM910 transmitter

- Transmitter for measurement of absorption
- Ordering according to product structure