

Technical Information

OUSBT66

NIR absorption sensor for the measurement of cell growth and biomass



Application

- Cell growth in bacterial fermentation and applications in mammalian cell cultures
- Biomass in fermentation processes
- Monitoring of algae concentration
- Monitoring of crystallization processes
- Measurement of solids

Your benefits

- Increased product yield thanks to fast and reliable absorption measurement in fermentation and crystallization applications
Highest linearity and wide measuring range with LED lamp
- Suitable for pharmaceutical use:
 - Stainless steel 1.4435 (AISI 316L)
 - Sealless sapphire window without gaps
- High degree of product safety:
 - Sterilizable and autoclavable
 - CIP/SIP-resistant
- Cost-effective, time-efficient calibration with traceable plug-on filters
- For use in a wide range of applications:
 - Variety of optical path lengths for different cell cultures and concentrations
 - Process connection Pg 13.5 for installation in assemblies or head plates
 - Suitable for lab-scale, pilot-scale and production-scale bioreactors
 - Available in different lengths for different immersion depths

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:

$$A = -\log(T) = \varepsilon \cdot c \cdot \text{OPL}$$

$$T = I/I_0$$

T ... Transmission

I ... Intensity of received light at detector

I₀ ... Intensity of transmitted light of light source

A ... Absorption

ε ... Extinction coefficient

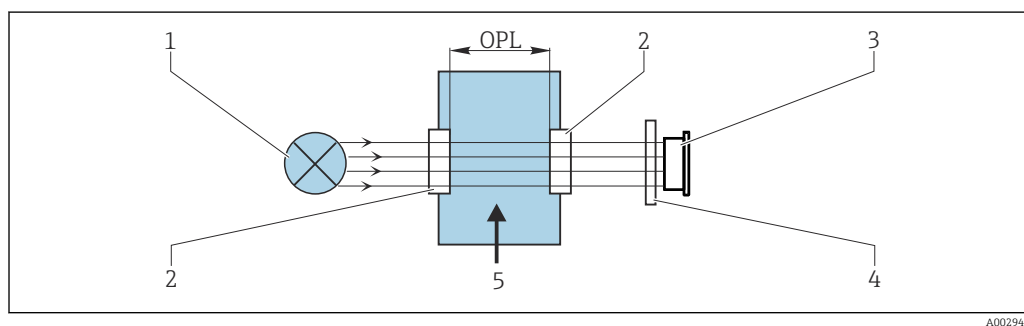
c ... Concentration

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.



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1 Absorption measurement

1 Light source

2 Optical windows of the sensor

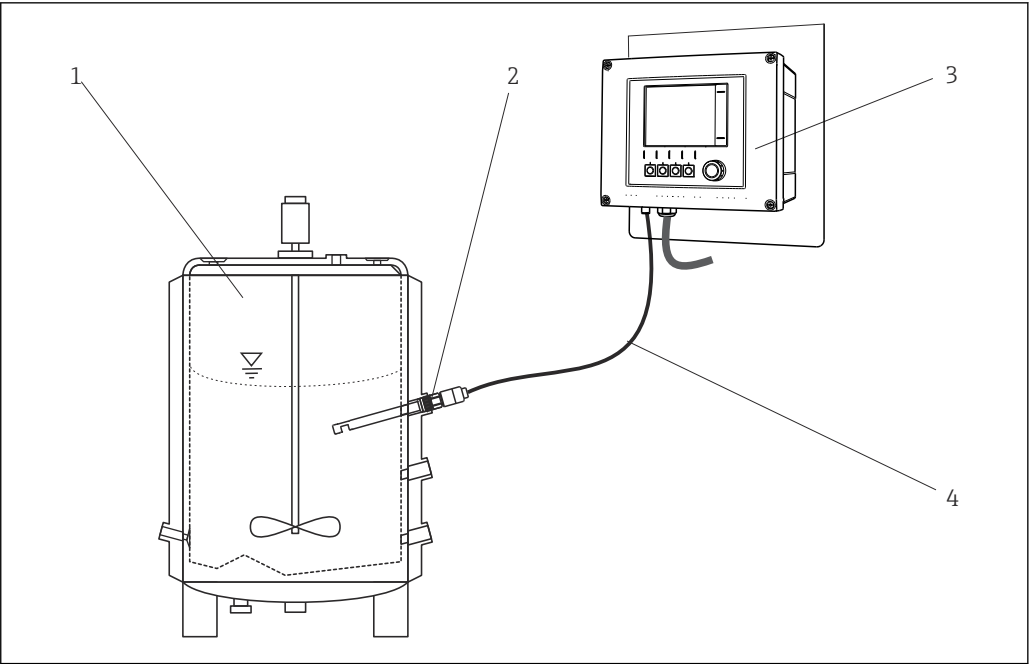
3 Detector

4 Measurement filter (depends on sensor, not provided on all sensors)


5 Medium flow

Measuring system

- An optical measuring system comprises:
- OUSBT66 sensor (photometer)
 - Transmitter, for example Liquiline CM44P
 - Sensor cable, for example CUK80



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 2 Example of a measuring system with a photometer sensor

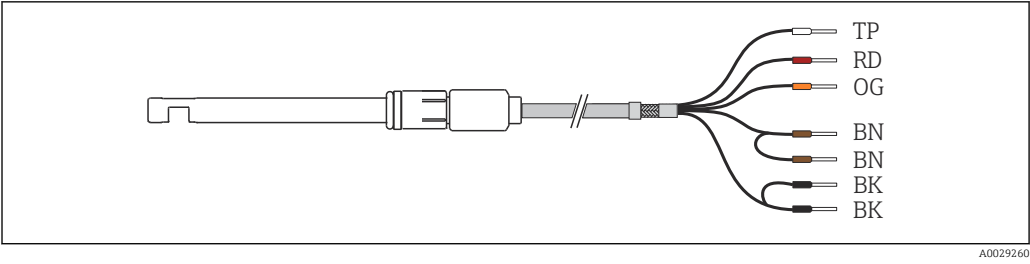
- 1 Bioreactor (example)
- 2 OUSBT66 sensor
- 3 CM44P transmitter
- 4 CUK80 sensor cable

Input

Measured variable	NIR-absorption
Measuring range	<ul style="list-style-type: none">■ 0 to 4 AU■ 0 to 8 OD (depending on the optical path length)
Wavelength	880 nm
Optical path length	5, 10 or 20 mm

Power supply

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

CM44P terminal	Cable color	Assignment
P+	BN	Lamp voltage +
S+	BN	Detection of lamp voltage +
S-	BK	Detection of lamp voltage -
P-	BK	Lamp voltage -
A (1)	RD	Sensor +
C(1)	OG	Sensor -
SH (1)	TP	Shield

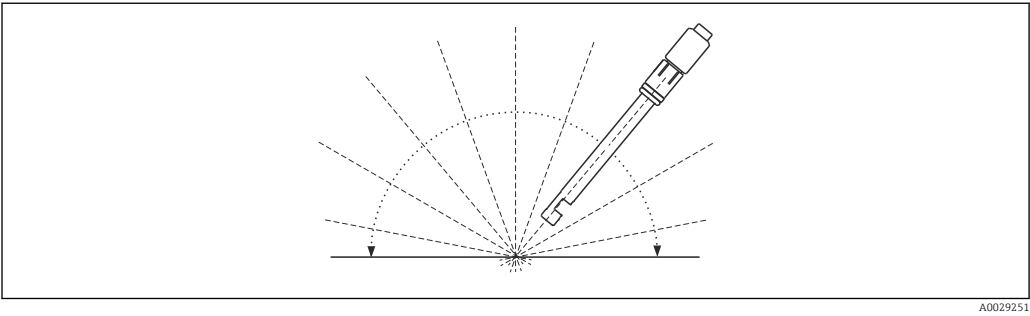
Cable length Maximum 20 m (65 ft)

Lamp voltage	Sensor version	Lamp type	Lamp voltage [V]
	OUSBT66-xxxxx	LED	7.5 ± 0.1

Installation

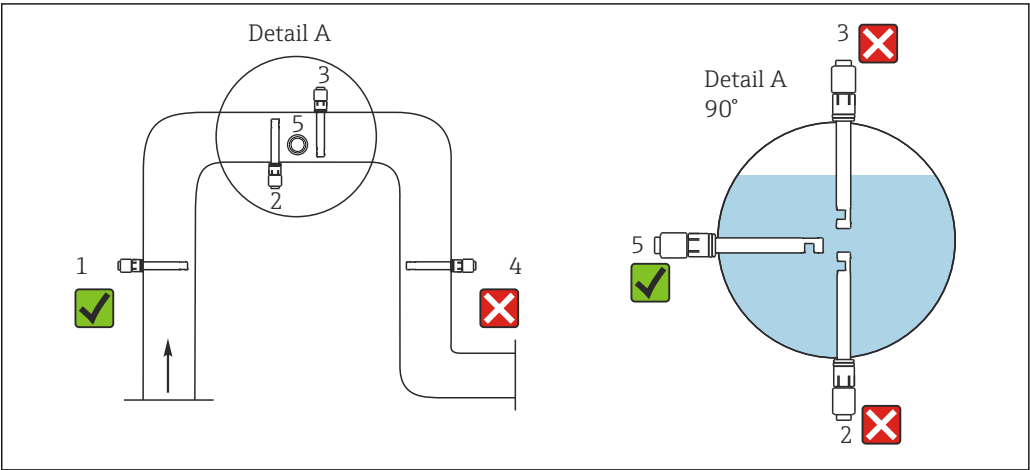
Installation instructions

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



4 Permitted mounting angle

Mounting in pipes



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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 (item 1).
- ▶ Installation in the horizontal pipe (item 5) is also possible.
- ▶ Do not install the sensor in places where air pockets or bubbles occur (→ 5, item 3) or where sedimentation may occur (item 2).
- ▶ Avoid installation in the down pipe (item 4).
- ▶ Align the sensor in such a way that the medium flows through the measuring gap (self-cleaning effect).

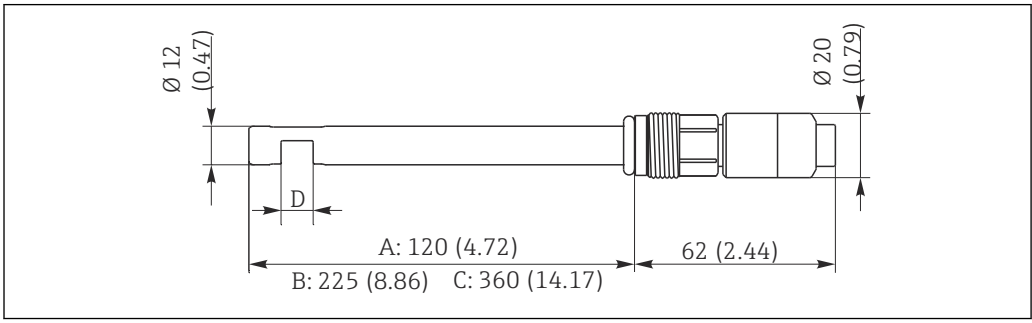
Environment

Atmospheric temperature	0 to 55 °C (32 to 131 °F)
Storage temperature	0 to 70 °C (32 to 160 °F)
Humidity	5 to 95 %
Degree of protection	IP 68, Fischer connector (up to 2 m (6.6 ft) water column for 24 h)

Process

Process temperature	0 to 90 °C (32 to 194 °F) continuous Max. 135 °C (275 °F) for 2 hours maximum
Process pressure	Max. 10 bar (150 psi) absolute, at 90 °C (194 °F)

Mechanical construction

Design, dimensions	 <p>6 Dimensions in mm (inch)</p> <p>A Version with shaft length 120 mm (4.72")</p> <p>B Version with shaft length 225 mm (8.86")</p> <p>C Version with shaft length 360 mm (14.17")</p> <p>D Optical path length: 5, 10 or 20 mm</p>	
Weight	Approx. 0.2 kg (0.44 lbs)	
Materials	Sensor	Stainless steel 1.4435 (316L)
	Window	Sapphire
Process connections	Pg 13.5	
Surface roughness	$R_a < 0.76 \mu\text{m}$ (30 μin)	
Light source	LED	

Certificates and approvals

Current certificates and approvals for the product are available via the Product Configurator at www.endress.com.

1. Select the product using the filters and search field.
2. Open the product page.

The **Configuration** button opens the Product Configurator.

Ordering information

Product page	www.endress.com/ousbt66
Product Configurator	<p>On the product page there is a Configure button to the right of the product image.</p> <ol style="list-style-type: none"> 1. Click this button. <ul style="list-style-type: none"> ↳ The Configurator opens in a separate window. 2. Select all the options to configure the device in line with your requirements. <ul style="list-style-type: none"> ↳ 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. <p>i For many products you also have the option of downloading CAD or 2D drawings of the selected product version. Click the CAD tab for this and select the desired file type using picklists.</p>

Scope of delivery

The scope of delivery comprises the following, :

- Sensor OUSBT66
- Life sciences package certificates
 - Inspection certificate 3.1
 - Pharma CoCCertificate of conformity to pharmaceutical requirements, conformity to bioreactivity test USP Class VI, FDA material conformity, TSE-/BSE-free, surface roughness
- Operating Instructions



Ordering the sensor together with a transmitter:

If you select the calibration option in the **Product Configurator for the transmitter**, the complete measuring system (transmitter, sensor, cable) is factory-calibrated and shipped as one package.

- ▶ If you have any queries:
Please contact your supplier or 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 Center.

Assembly**Unifit CPA842**

- Installation assembly for food, biotechnology and pharmaceuticals
- With EHEDG and 3A certificate
- Product Configurator on the product page: www.endress.com/cpa842



Technical Information TI00306C

Cleanfit CPA875

- Retractable process assembly for sterile and hygienic applications
- For in-line measurement with standard sensors with 12 mm diameter, e.g. for pH, ORP, oxygen
- Product Configurator on the product page: www.endress.com/cpa875



Technical Information TI01168C

Calibration**OUSBT66 calibration kit**

- 2/0.35 AU
- Order no.: 71128340



www.addresses.endress.com
