Technical
Information
TI 229C/07/en
51504291

# Turbidity and Solids Content Sensor *TurbiMax P CUS 62*

## Turbidity and Solids Content Sensor for High Concentrations in Hazardous Areas Using the Light Absorption Method

The TurbiMax P CUS 62 sensor is used for optical solid matter content measurement in turbid water for up to 50g solid matter/l for applications in hazardous areas.

**Applications**

- Solid matter content measurement of suspended matter in sewage treatment plants:
  Primary sludge, digested sludge, thickened sludge,
  Inflow to centrifuge / press
- Industrial quality control

**Features and benefits**

- Reliable concentration measurement using optical measuring process
- Four-beam pulsed light method for compensation of sensor soiling and ageing of optical components
- Stainless steel sensor body
- No mechanically moving parts
- Measured value preprocessing in sensor resulting in low signal transmission sensitivity

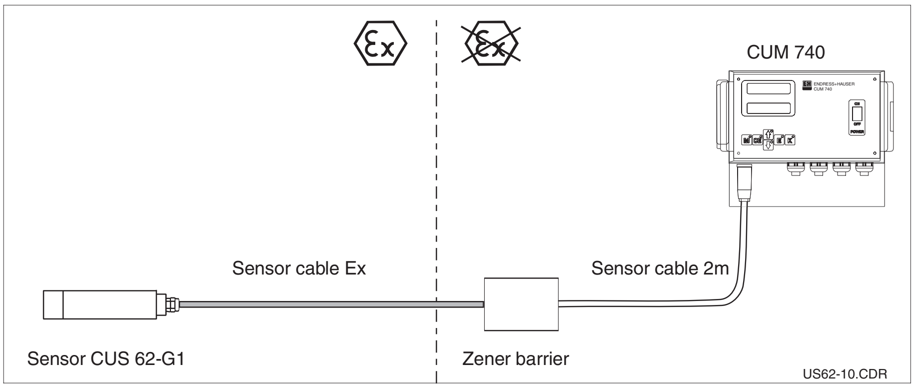
## Measuring system

The complete measuring system for hazardous areas comprises:

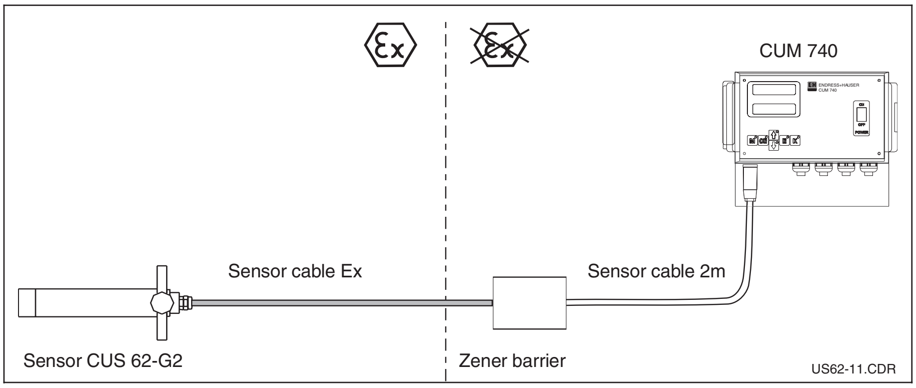
- Turbidity measurement transmitter CUM 740
- Turbidity sensor TurbiMax P CUS 62
- Zener barrier 7900 ZB
- Assembly for installation or immersion

Example of a measuring system

CUM 740 with CUS 62-G1




Measuring sytem CUM 740 with CUS 62-G2



# Measuring principle

**Turbidity measurement**
By turbidity we mean the scattered component of a light beam which is diverted away from its original course by optically denser particles in the medium e.g. solid matter particles.

**Four-beam pulsed light method**
This method is based on two light sources and two photoreceivers. Long-life LEDs (at least 20,000 operating hours) are used as monochromatic light sources.

To eliminate interference from extraneous light sources, the LEDs are pulsed at a rate of several kHz.

Two measuring signals are detected at the two photoreceivers with every light pulse. The four measuring signals are compared with each other logarithmically and converted to a ratio. This compensates for detector soiling and the ageing of optical modules.

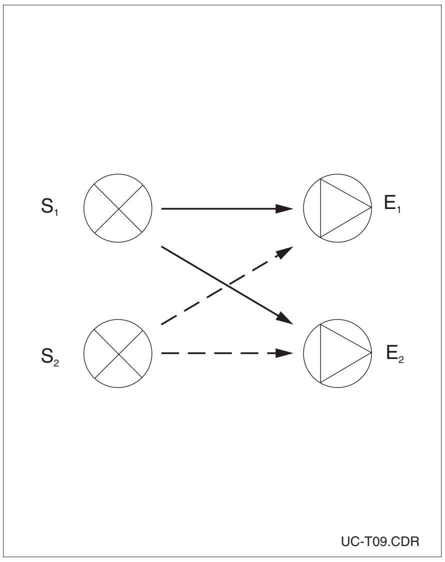
**Light absorption method**
This measuring method is based on the Lambert-Beer law. Turbidity is measured by light attenuation.

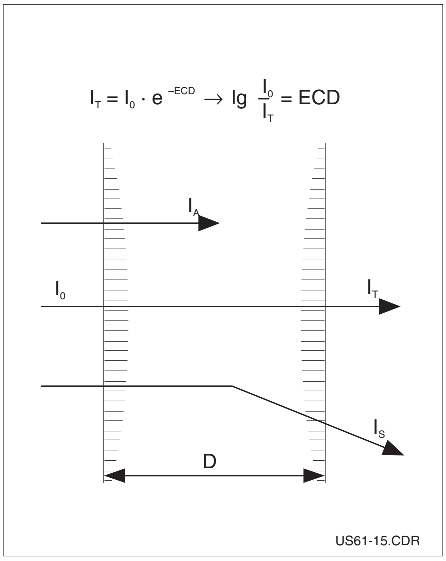
The LEDs on the sensor send a directed light beam to the photoreceivers.
The intensity of the beam is attenuated by solid matter particles in the medium. The photoreceivers measure the absorption signal and convert it into a frequency signal. The frequency signals are assigned to corresponding turbidity units and solid matter concentrations, and appear in the display.

*left:*
Principle of measured light radiation
S = Transmitter
E = Receiver

*right:*
Principle of measured light attenuation analogue to Lambert-Beer's law

$I_0$ = Intensity of transmitted light
$I_A$ = Intensity of absorbed light
$I_T$ = Intensity of light transmitted
$I_S$ = Intensity of scattered light
E = Extinction coefficient
C = Concentration
D = Optical path length



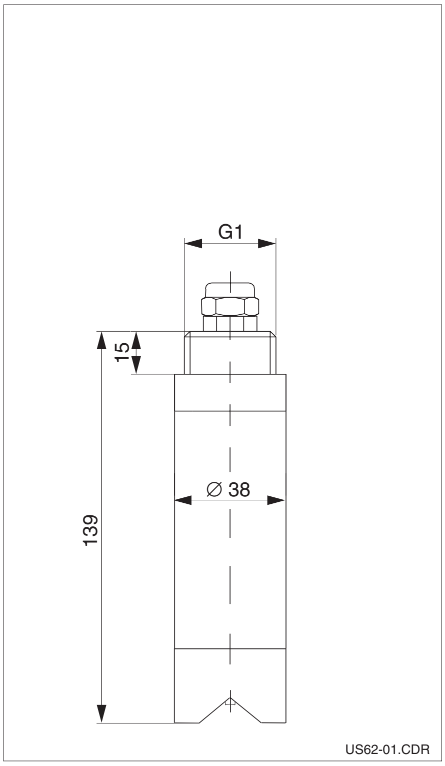



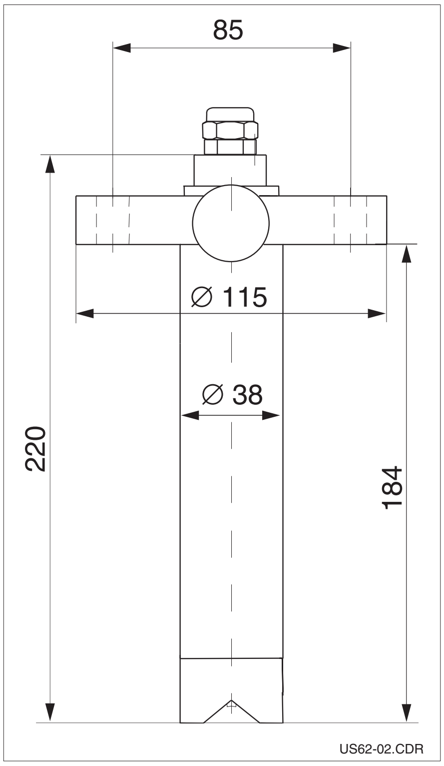

# Calibration

Each sensor is subjected to a careful calibration at the factory. One customer-defined calibration can also be saved.

For the calibration of solids content measurement, such as sludge, refer to the concentration determined by a reference method (dry substance).

# Dimensions

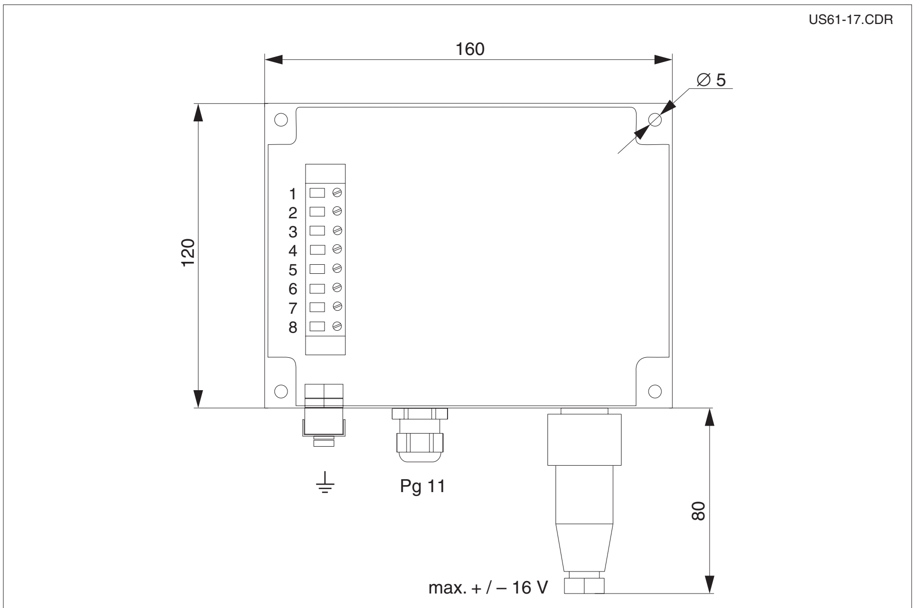



Dimensions CUS 62

*left:*
CUS 62 Immersion type

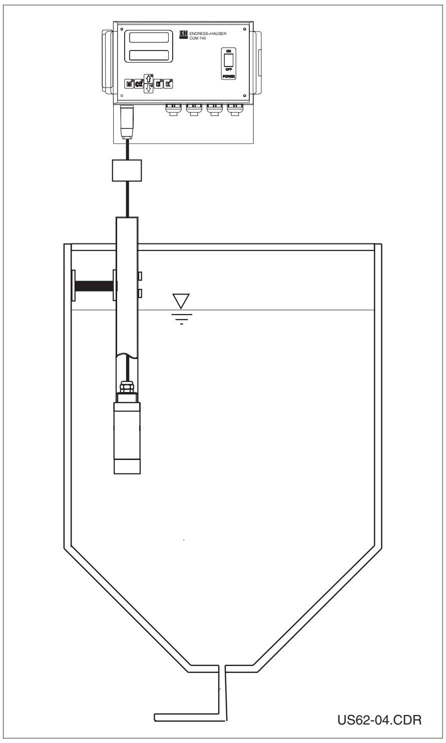
*right:*
CUS 62 Installation type




| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| bl | pk | wt | bn | gn | ye | gn | bk |
| +dig | 0Vdig | +at | 0V at | Status | AV | screen | PAL |

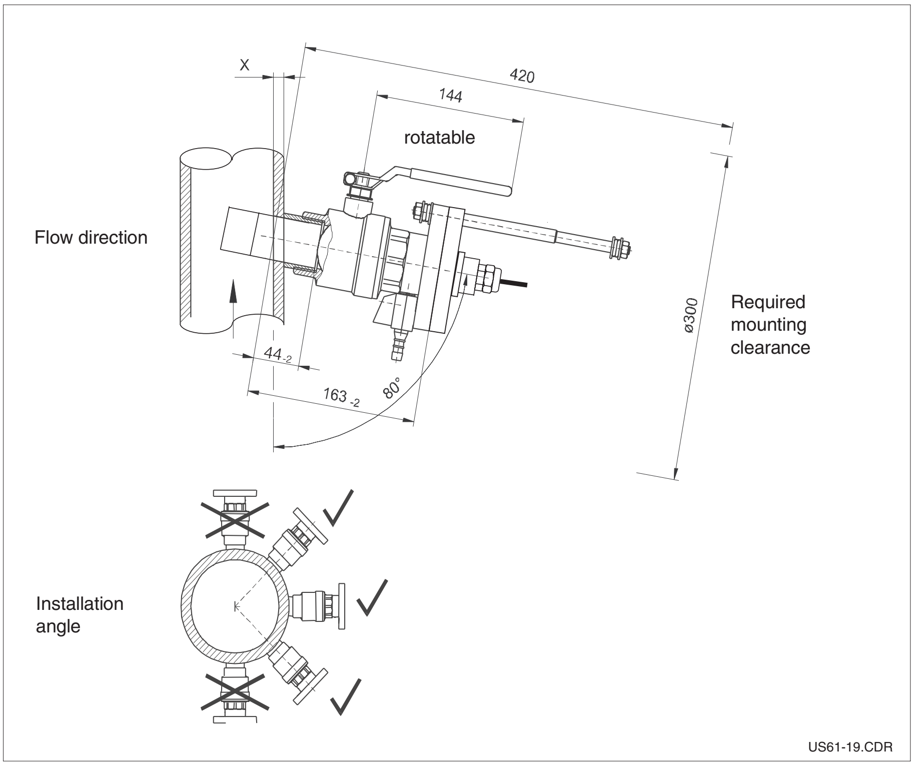
Dimensions
Zener barrier
7900 ZB

# Installation




Installation example of
CUS 62
Immersion type

Tank installation




Installation example of
CUS 62
Installation type

Tube installation with ball valve built-in assembly (accessories)

**Note:**

- We recommend the use of an immersion tube for the CUS 62 immersion type.
- Installing the sensor in pipelines or close to a wall can lead to back-scattering and therefore to signal increase.

# Accessories

- Ball valve built-in assembly
  for sensor extension under process conditions, DN 40 with safety lock
  Material: stainless steel SS 316 Ti,
  O-rings made of Viton®
  Order No.: 51503588

- Sensor fixing bracket for basin mounting
  Material: stainless steel SS 316 Ti,
  Order No.: 51503626

- Immersion tube 1m
  Material: stainless steel SS 316 Ti
  Order No. 51506000

- Immersion tube 2m
  Material: stainless steel SS 316 Ti
  Order No. 51505994

# Technical data

**General data**

| | |
|---|---|
| Manufacturer | Endress+Hauser |
| Product designation | TurbiMax P CUS 62 |

**Mechanical data**

| | | |
|---|---|---|
| Dimensions (L x ∅) | Immersion type<br>Installation type | 139 × 38 ∅ mm<br>220 × 38 ∅ mm |
| Weight | Immersion type<br>Installation type | approx. 1kg<br>approx. 3kg |

**Material**

| | |
|---|---|
| Sensor body | Stainless steel SS 316 Ti |
| Sight glass | Epoxy resin |
| O-rings | Viton® |

**Turbidity measurement**

| | |
|---|---|
| Measuring principle | Light absorption method |
| Optical components | Light source: 2 LEDs, Detector: 2 photodiodes |
| Measuring light | Infrared light at 880nm (absorption maximum) |
| Measuring range | 0 ... 50g solid matter/l, dependent on sludge type |
| Accuracy | < 1% of measuring range end value |
| Reference | Using four-beam pulsed light method |
| Factory calibration | $SiO_2$ |
| Cable lengths | 13m, 25m, 25 ... 100m |
| Connecting cable length of Zener barrier to transmitter | 2m |

**Operating conditions**

| | |
|---|---|
| Operating temperature | 0 ... +50°C |
| Operating pressure | max. 6 bar |
| Ingress protection | IP 68 |
| Explosion protection | EEx ib IIC T4 |

**Supplementary documentation**

| | |
|---|---|
| Technical Information CUM 740 | Order No.: 51504296 |

Subject to modifications.

# Product structure

**Turbidity sensor TurbiMax P CUS 62**

**Certificate**
G ATEX II 2G EEx ib IIC T4
Y Special version

**Version**
1 Immersion type
2 Installation type
9 Special version

**Cable length**
D Connecting cable 13m
F Connecting cable 25m
H Connecting cable 25 ... 100m (price per metre)
Y Special version

**Additional equipment**
A Standard version
Y Special version

| CUS 62- | | | | | **Complete order code** |
|---|---|---|---|---|---|

Endress+Hauser
GmbH+Co.
Instruments International
P.O. Box 22 22
D-79574 Weil am Rhein
Germany

Tel. (0 76 21) 975-02
Fax (0 76 21) 975-3 45
http://www.endress.com
info@ii.endress.com

Endress+Hauser
The Power of Know How

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