Technical
Information
TI 231C/07/en
51504295

Turbidity and Solids Content Sensor *TurbiMax P CUS 64*

Turbidity and Solids Content Sensor for the High Concentrations in Hazardous Areas Using the Backscatter-Light Method

The TurbiMax P CUS 64 sensor is used for optical solid matter content measurement in turbid water for up to 150g 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

Quality made by
Endress+Hauser

ISO 9001

Endress+Hauser

The Power of Know How

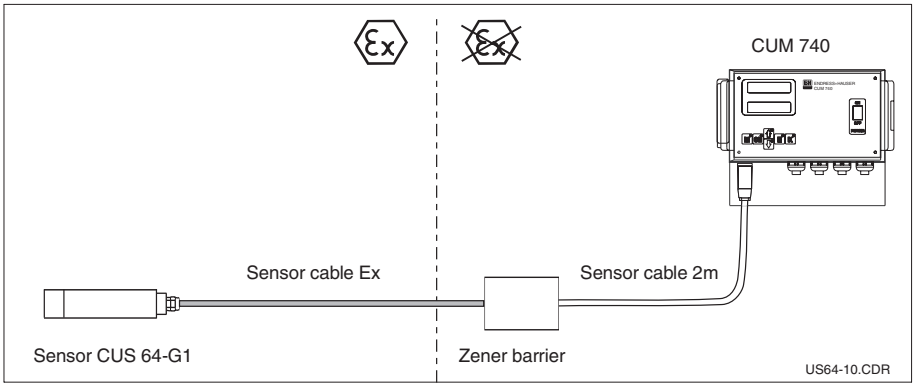
Measuring system

The complete measuring system for hazardous areas comprises:

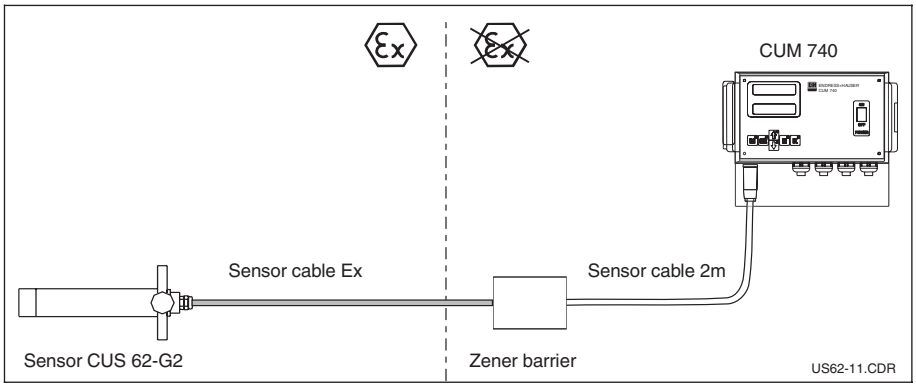
- Turbidity measuring transmitter CUM 740
- Turbidity sensor TurbiMax P CUS 64
- Zener barrier 7900 ZB
- Assembly for immersion or installation

Example of a measuring system

CUM 740 with CUS 64-G1



Measuring sytem CUM 740 with CUS 64-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 logarithmically with each other and converted into a ratio. This can compensate for detector soiling and the ageing of optical modules.

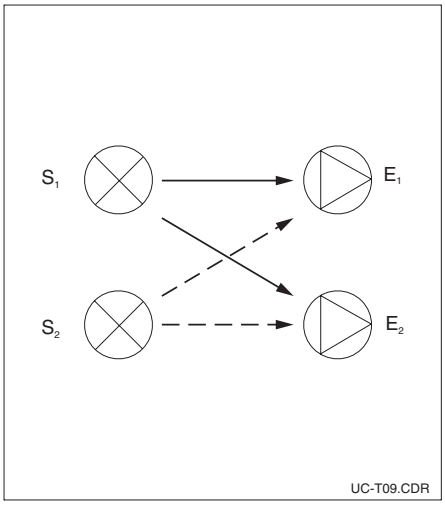
Backscattered light method
The particles contained in the measuring medium reduce the intensity of the transmitted light exponentially to the path length and concentration.

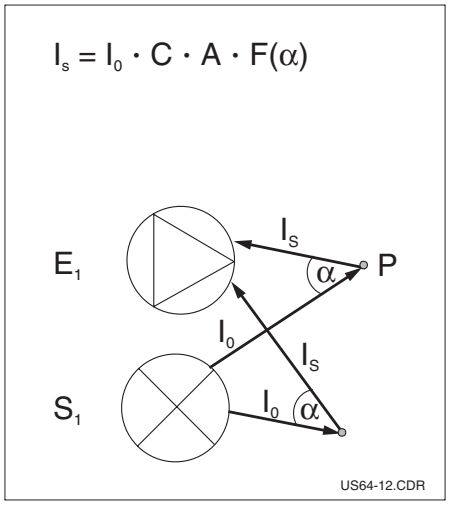
The turbidity of the medium is determined with the amount of backscattered light. The transmitted infra-red light beam is scattered by the particles in the medium. The backscatter created is measured by the scattered light receivers which are arranged next to the light sources. The measured scattered light signals are converted to frequency signals. The frequency signals are assigned to corresponding turbidity units and solid matter concentrations, and appear in the display.

left:
Principle of measured light transmission
S = Transmitter
E = Receiver

right:
Principle of the back-scattered-light method

I_0 = Intensity of transmitted light
I_S = Intensity of scattered light
A = Geometrical factor
C = Concentration
$f(\alpha)$= Angle correlation
P = Particle



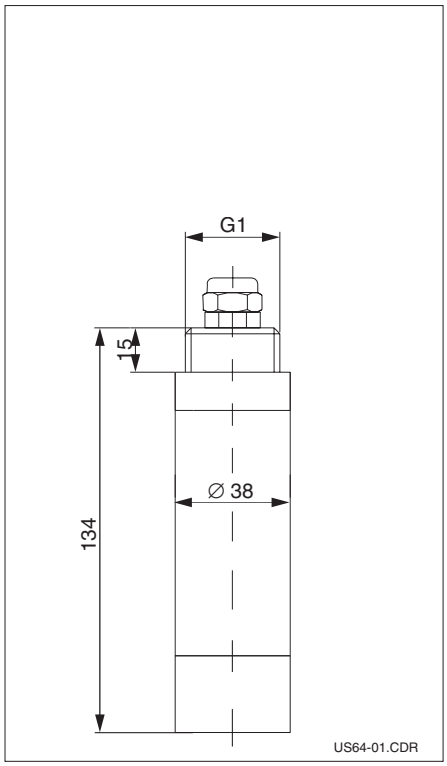


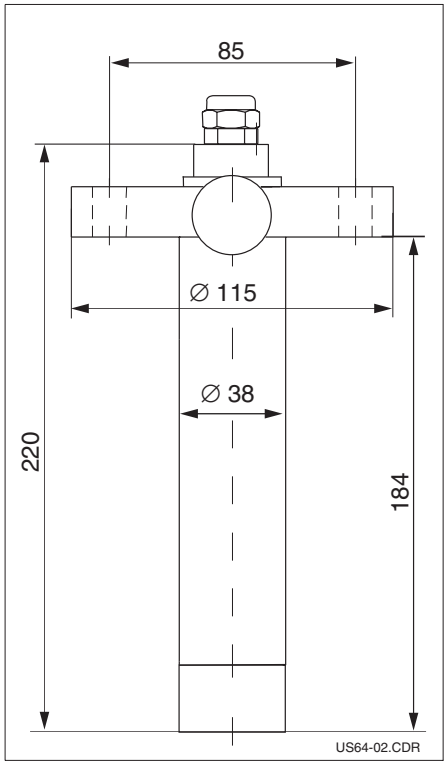
Calibration

Each sensor is subjected to careful calibration at the factory. One customer 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

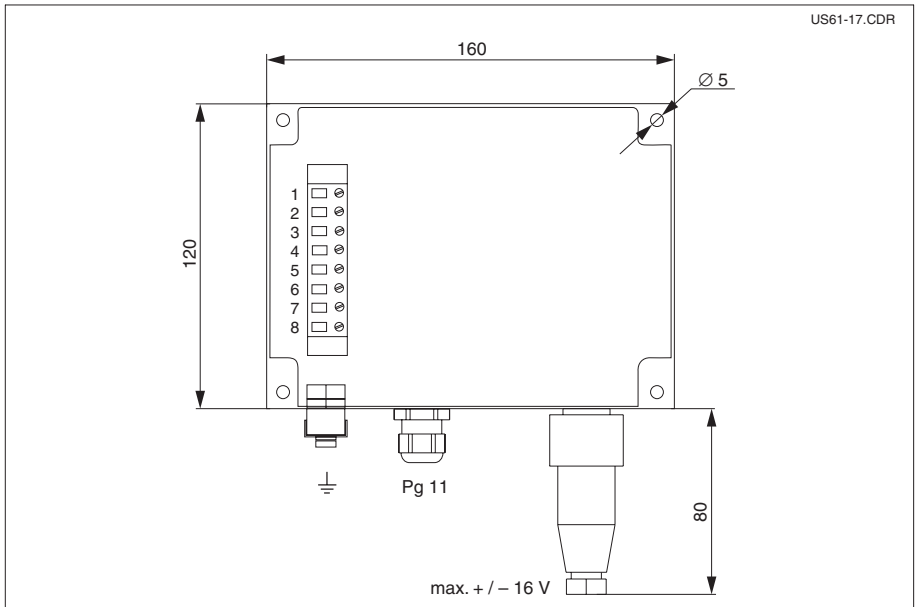




Dimensions CUS 64

left:
CUS 64 Immersion type

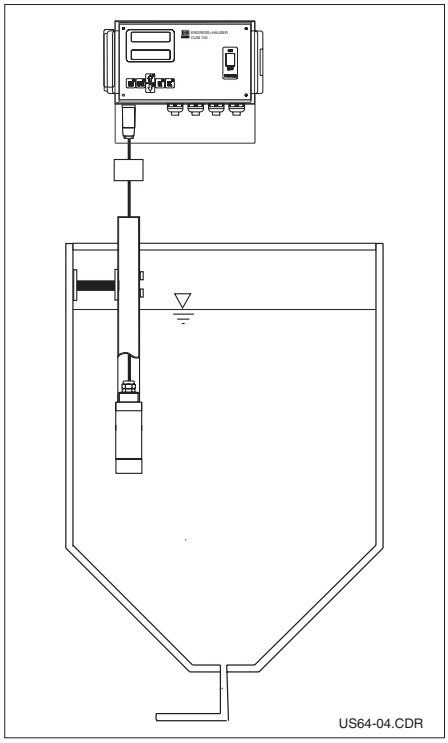
right:
CUS 64 Installation type



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

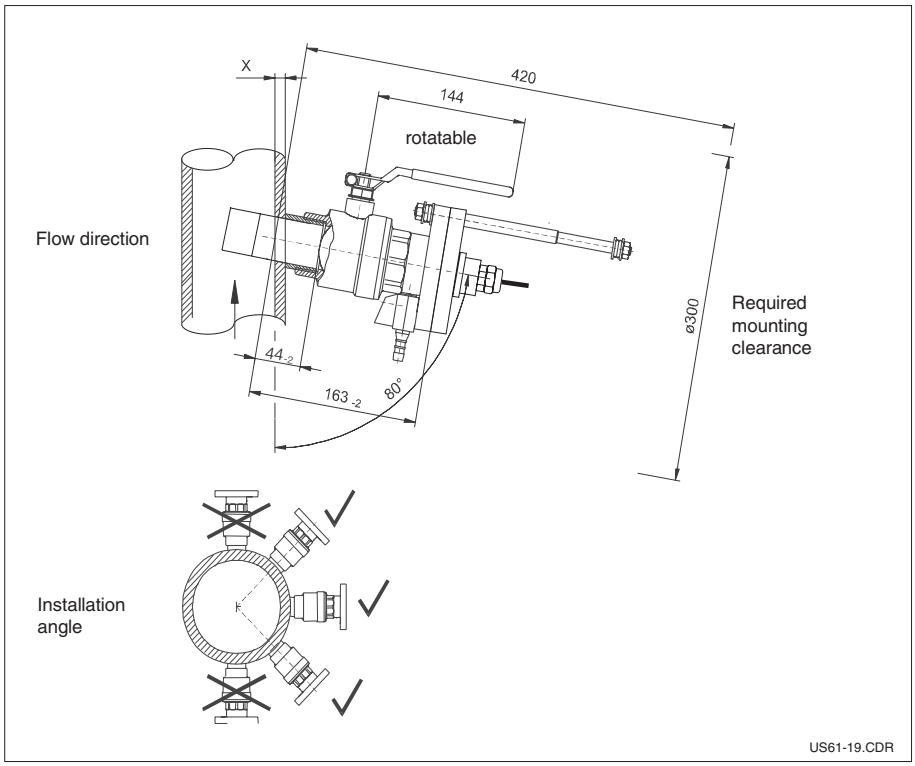
Dimensions
Zener barrier
7900 ZB

Installation



Installation examples
CUS 64
immersion type

Tank installation of
with immersion tube



Installation example of
CUS 64
Installation type

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

Note:

- We recommend the use of an immersion tube for the CUS 64 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 specifications

Manufacturer	Endress+Hauser
Instrument designation	TurbiMax P CUS 64

Mechanical data

Dimensions (L x ∅)		134 × 38 ∅ mm 220 × 38 ∅ mm
Weight	Immersion type Installation type	approx. 1kg approx. 3kg

Materials

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

Turbidity measurement

Measuring principle	Backscatter light method
Optical components	Light source: 2 LEDs, detectors: 2 photodiodes
Measuring light	Infrared light at 880nm (absorption maximum)
Measuring range	10 ... 150g 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 proetection	EEx ib IIC T4

Supplementary documentation

Technical Information CUM 740	Order No.: 51504297

Subject to modifications.

Product structure

Turbidity sensor TurbiMax P CUS 64

Certificate

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

Version

1 Immersed version
2 Mounting version
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 64-					**Complete order code**

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The Power of Know How

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