Technical
Information
TI 182e02
No. 51502162

# Conductivity Sensor
# *ACS-X0I*
# *EXPERT-LINE*

## Highly resistant Inductive Conductivity Sensor for Standard and High-Temperature Applications

Mit Qualitätszertifikat

The conductivity sensor ACS-X0I is specially suitable for use in the chemical industry and in process engineering. The six-decade measuring range and high chemical resistance of the material in contact with the medium (PEEK) permit this sensor to be used in virtually any application conceivable. The wide temperature range of –20 to +125 °C leaves nothing to be desired.

**Areas of application**

- Chemical industry
  - Concentration measurement of acids and alkalis
  - Product quality monitoring of chemical products in tanks and pipelines
- Phase separation of product/product mixtures in pipe systems in food and pharma industry

**Benefits at a glance**

- Measuring range from 5 µS/cm to 2000 mS/cm
- Chemical resistance due to PEEK coating
- Temperature resistance up to 125 °C
- Total cable length of up to 55 m
- Integrated, coated Pt 100 temperature sensor, error class A
- Large sensor opening, therefore low risk of soiling
- Can be installed in ≥ DN 80 tees with the outgoing diameter reduced to ≥ DN 50

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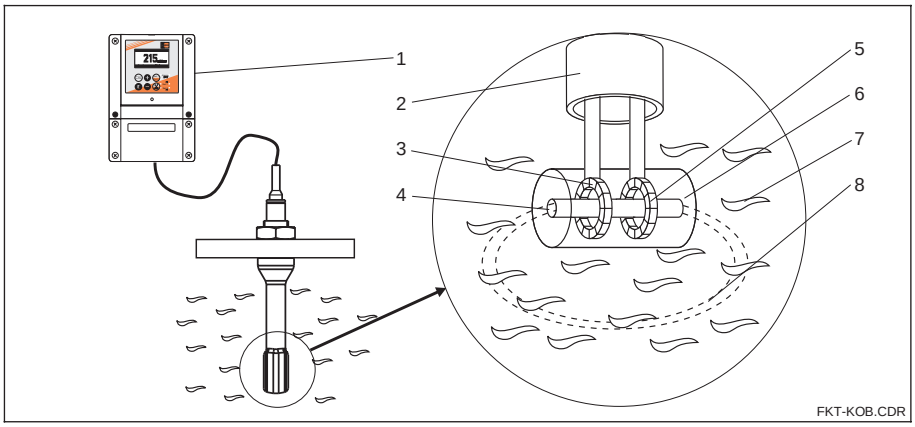
# Operating principle




Measuring and operating principle

1 Measuring instrument
2 Cable
3 Transmitting coil
4 Sensor opening
5 Receiving coil
6 Sensor housing
7 Medium
8 Induced electric current

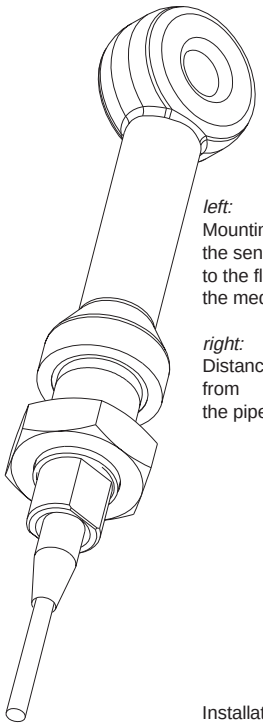
**Conductivity measurement**
In inductive conductivity measurement, a transmitting coil (3) generates a magnetic alternating field that induces an electric voltage in a liquid. The ions present in the liquid enable a current flow which increases with increasing ion concentrations. The ion concentration serves as a measure of conductivity. The current (8) in the liquid generates a magnetic alternating field in the receiving coil (5). The resulting current induced in the receiving coil is measured and used to determine the conductivity value.

**This measuring principle has the following advantages:**
- No electrodes, therefore no polarisation
- Error-free measurement in strongly soiled media with a tendency to sediment
- Complete galvanic separation of measurement from medium.

# Cell constant and installation factor

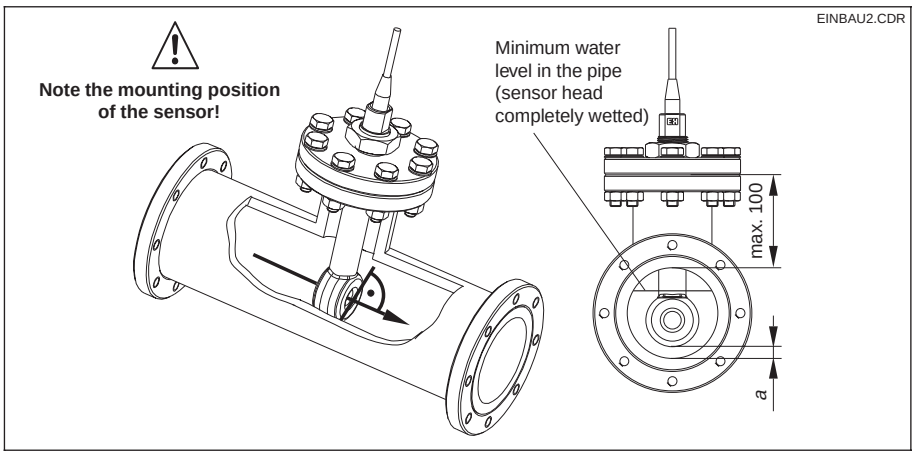
The electric conductivity of the liquid primarily depends on the ion concentration. However, installation and sensor geometry are factors that need to be taken into acount. The sensor constant describes the geometry of the sensor completely.
If the distance from the wall is sufficient ($a$ > 30 mm), then it is not necessary to consider the installation factor ($f$ = 1.00). If the distance from the wall is smaller, then the installation factor increases in the case of electrically insulating pipes ($f$ > 1) and decreases in the case of electrically conductive pipes ($f$ < 1).

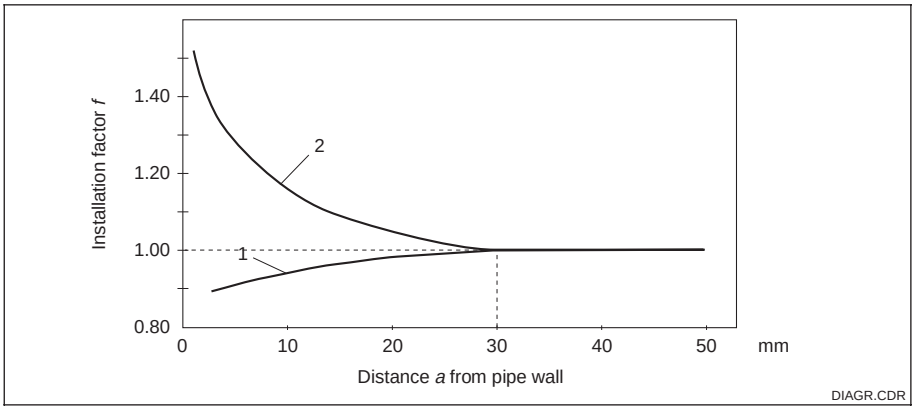
# Installation



*left:*
Mounting position of the sensor with respect to the flow direction of the medium

*right:*
Distance *a* of the sensor from the pipe wall

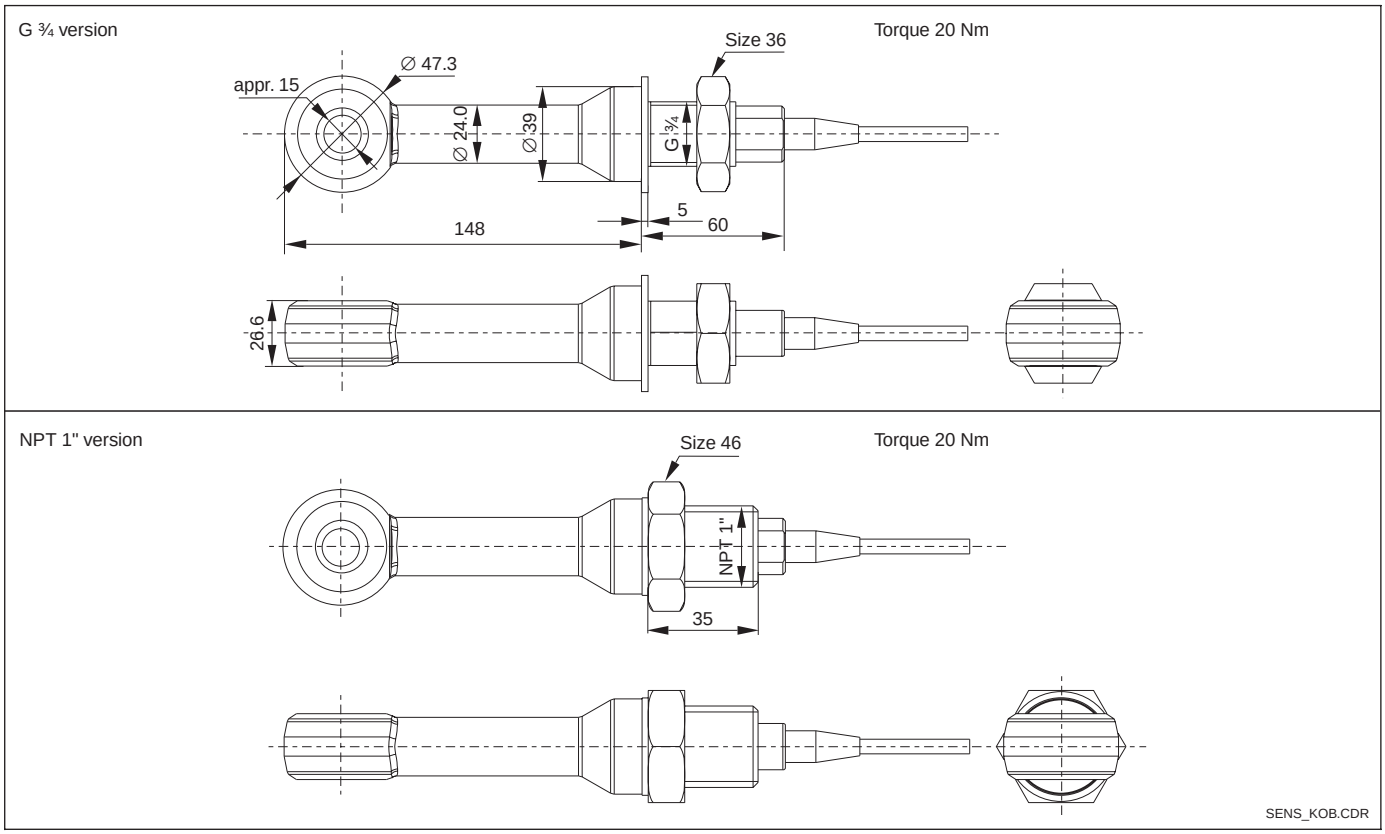



Installation factor *f* in dependence on distance *a* from pipe wall

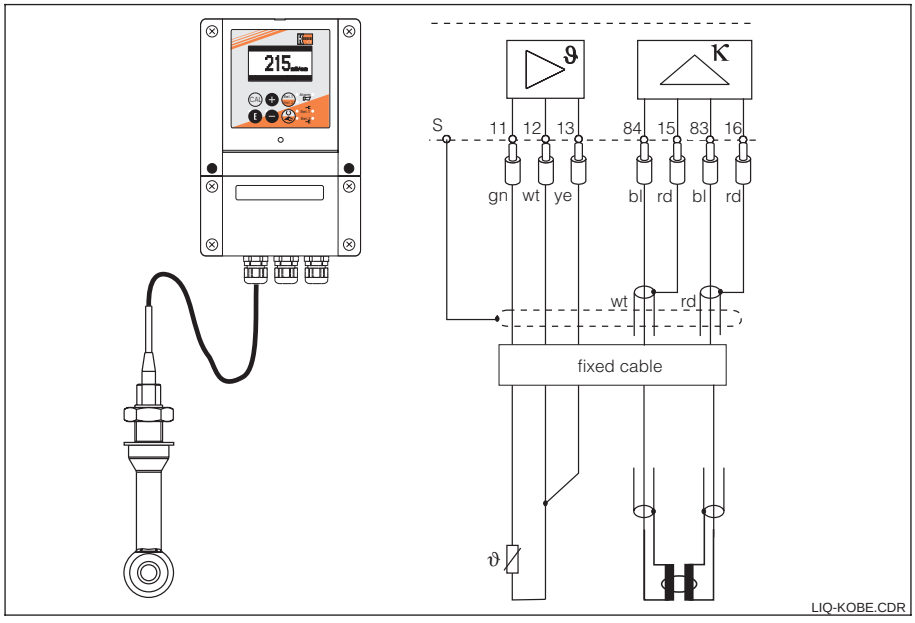
1 Conductive pipe
2 Insulating pipe

# Dimensions




Dimensions: Versions with G ¾ thread (top) and NPT 1" thread (bottom)

# Cable connection



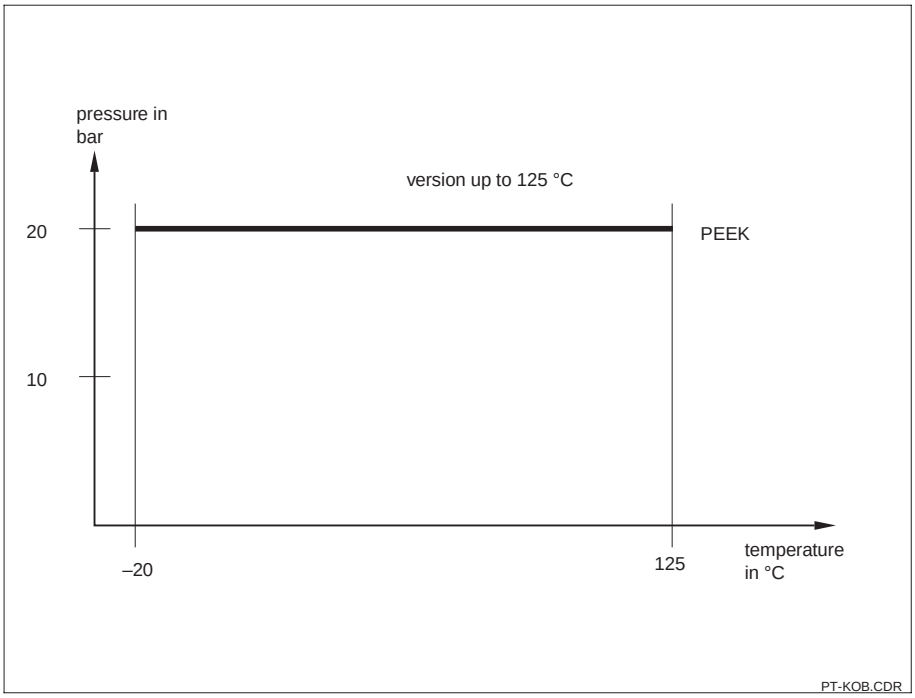

Cable connection at transmitter

# Resistance table

| Chemical attack | | | Resistance |
|---|---|---|---|
| **Medium** | **Concentration [%]** | **Temperature [°C]** | **PEEK** |
| Nitric acid $HNO_3$ | up to 5 | 20 | + |
| | | 60 | + |
| | up to 40 | 20 | + |
| | | 60 | – |
| Phosphoric acid $H_3PO_4$ | up to 10 | 20 | + |
| | | 60 | + |
| Sodium hydroxide solution NaOH | up to 3 | 20 | + |
| | | 50 | + |
| | | 80 | + |

resistance for PEEK:
+ resistant
- non resistant

# Pressure-temperature curves




Pressure-temperature curve

# Technical data

| | |
|---|---|
| Measuring range | 5 µS/cm ... 2000 mS/cm |
| Cell constant | appr. 2 $cm^{-1}$ |
| Storage temperature | –20 ... +80 °C |
| Protection class (DIN 40050) | IP 67 (sensor in mounted state combined with original sealing) |
| Meas. value deviation for –20 ... 100 °C | ±(5 µS/cm + 0.5 % of measured value) |
| Meas. value deviation for > 100 °C | ±(10 µS/cm + 0.5 % of measured value) |

**Temperature measurement**

| | |
|---|---|
| Temperature sensor | Pt 100, class A acc. to IEC 751 |
| Temperature response $t_{90}$<br><br>– PEEK version | 90 % of upper temperature display limit (acc. to DIN 746-1):<br>approx. 7 min |

**Installation**

| | |
|---|---|
| Required pipe diameter | ≥ DN 80 (consider installation factor if pipe diameter < DN 110) |
| Installation in reduced outgoing line | ≥ DN 50 |

Subject to modifications.

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