



OPTISENS IND 1000 **Technical Datasheet**

Inductive conductivity sensor

- Fully enclosed inductive conductivity sensor for the use in heavily contaminated, aggressive media in water and wastewater applications
- Maintenance-free, cost-effective and rugged sensor design
- Compact design for pipelines with small diameters

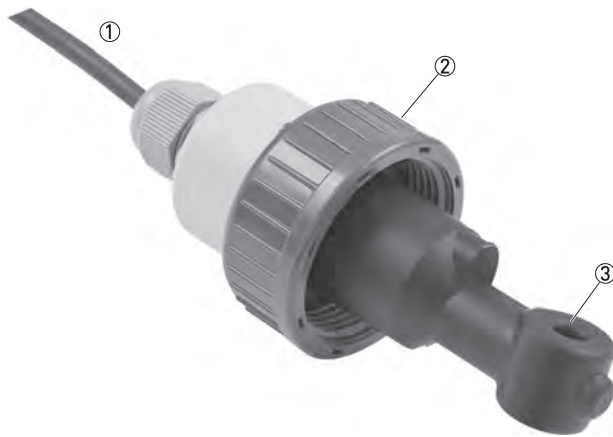
The documentation is only complete when used in combination with the relevant documentation for the signal converter.

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1.1 Inductive conductivity sensor for liquid analysis

The inductive conductivity sensor **OPTISENS IND 1000** features a compact and extremely rugged design as well as a wide measuring range.

In combination with the MAC 100 signal converter, it is possible to create an extremely reliable and low-cost measuring system, which is suitable for a wide range of liquid analysis measurement tasks. This system is very well suited for conductivity measurements in severely contaminated and aggressive media in the water and wastewater industry.



- ① Fixed cable 10 m / 33 ft
- ② Process connection
- ③ Measuring coils (primary and secondary coils)

Highlights

- Compact design for pipelines with small diameters
- Rugged design - electrodes are not in contact with the media
- Corrosion-resistant and dirt-repellent materials like PP or PVDF
- Integrated temperature sensor for automatic temperature compensation
- No polarisation effects at high conductivity values
- Various process connections for pipe and open channel installation
- Suitable for connection to the MAC 100 signal converter

Industries

- Water industry (water and wastewater treatment)
- Chemical industry
- Metal and mining industry
- Pulp and paper industry

Applications

- Quality control in industrial wastewater applications
- Quality control and process monitoring in steam and cooling water circuits
- Quality control in general water applications
- Control of desalination processes
- Measuring water quality of surface and sea water
- Control of acid and base concentrations
- Monitoring and control of water neutralisation processes
- Monitoring of cleaning operations

1.2 Design and options

MAC 100 Multiparameter signal converter for liquid analytical measurements



A complete measuring system consists of:

- MAC 100 Multiparameter signal converter
- 1 or 2 sensors
- Mounting holders

Up to two sensors (for identical or different parameters) can be connected to the converter.

The signal converter MAC 100 can be adapted perfectly for your requirements: you specify the number and type of signal inputs and outputs you define the complexity of the measuring point and the number of parameters. The standardised user interface also speeds up commissioning of the device and opens access to a wide range of diagnostic functions for devices and processes.

OPTISENS IND 1000



The OPTISENS IND 1000 sensor is manufactured using rugged materials like PVDF or PP. The sensor can be installed in pipelines with relatively small diameters.

The temperature sensor Pt1000 can either be exposed in a stainless steel pocket (ultra-fast response) or be located right inside the plastic body.

The measuring cell with two inner, ring-shaped measuring coils is completely enclosed and is therefore not in contact with the media.



The OPTISENS IND 1000 sensor is also available as immersion version for installation in open channels. The sensor is already installed in the holder for a easy installation and reliable measuring.

Made to Fit

Holders for SENSOFIT 1000

As a complete provider for water analysis, we naturally offer a complete range of holders. In addition to immersion holders, there is also a range of flow-through holders and adapters for process connections in a wide range of materials. Special versions for special operating conditions are available on request.

For the OPTISENS IND 1000 sensor type for pipe installation the following individual holders are available:

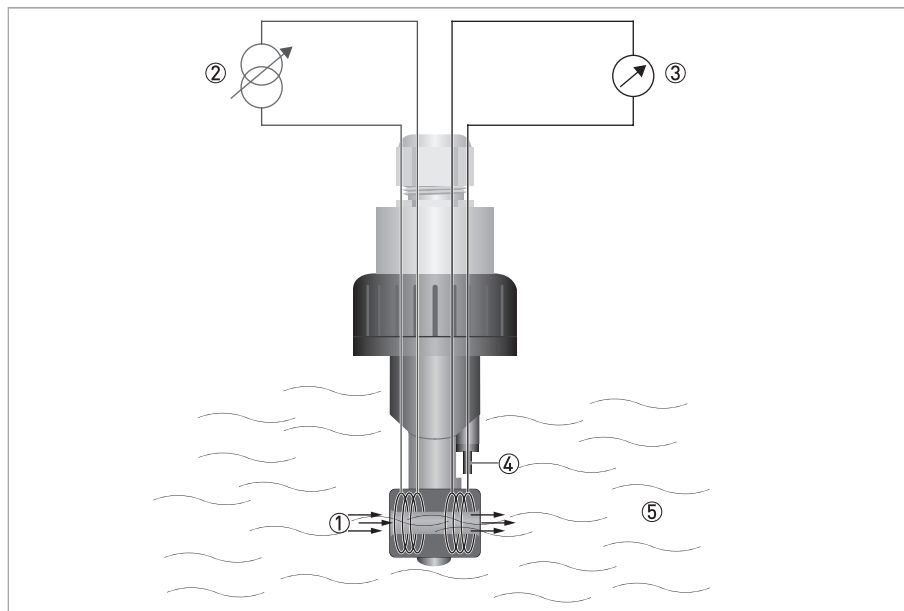
- SENSOFIT FLOW 1000 flow-through holders (T-piece)

For further information please consider the technical datasheets

1.3 Conductivity measurement - inductive

The inductive measurement method enables largely maintenance-free acquisition of specific conductivity, even in the toughest media conditions. In the principle of inductive measurement, the sensor consists of a sender-recipient-coil.

The well-known Faraday Law of magnetic induction is used here to determine conductivity in solutions at higher values, where direct contact measurement is not well suited. When a magnetic field is generated by an electrical coil and a second electrical coil is placed next to it, a certain amount of electric energy will be transferred to it. With an inductive conductivity sensor, the process media flows directly through the middle of both coils. As the voltage in the first coil is constant, the amount of energy transferred to the second coil is directly proportional to the electrical resistance of the solution. Due to said voltage and the cell constant the conductivity can be measured.



- ① Flow direction
- ② Power supply - Polarisation voltage measurement
- ③ Current measurement
- ④ Exposed temperature sensor Pt1000
- ⑤ Measuring medium

2.1 Technical data

- The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local sales office.
- Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website (Downloadcenter).

Measuring system

Measuring principle	Toroidal conductivity - inductive
Measuring range	0.5...2000 mS/cm

Design

Construction	PP or PVDF - body material
Cell constant	c= 6.25 1/cm (PP), c= 4.65 1/cm (PVDF)
Process connection pipe installation	G1½ (PVC or stainless steel)
Process connection open channel installation	Immersion holder (only PP version)
Temperature sensor	Pt1000
	PP version: exposed or sealed Pt1000
	PVDF version: only sealed Pt1000

Measuring accuracy

Conductivity accuracy	≤ 1% (measured value)
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Operating conditions

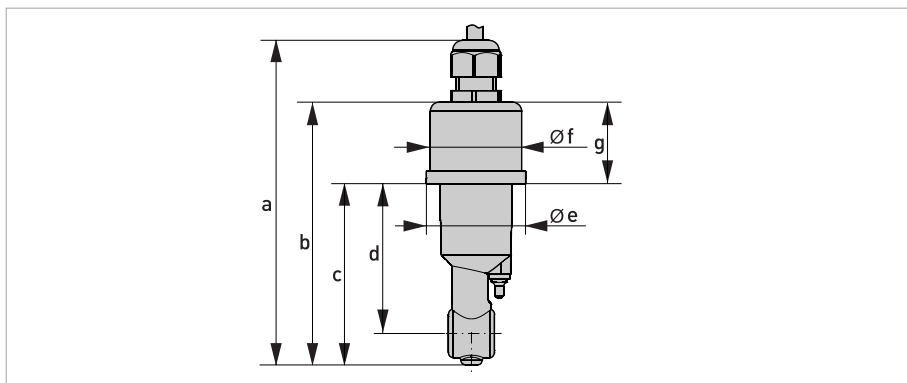
Temperature range	PP version: -10...+60°C / +14...+140°F Max. 15 min. at 100°C
	PVDF version: -10...+100°C / +14...+212°F Max. 15 min. at 110°C
	PVC process connection: -10...+60°C / +14...+140°F
Max. operating pressure	PP version: min. -0.1 bar at -10°C...+80°C / min. -1.45 psi at +14°F...+176°F 10 bar at +20°C / 145 psi at +68°F 6 bar at +50°C / 87 psi at 122°F 0 bar at +60°C / 0 psi at 140°F
	PVDF version: min. -0.1 bar at -10°C...100°C / min. -1.45 psi at 14°F...212°F 10 bar at +20°C / 145 psi at +68°F 6 bar at +60°C / 87 psi at 140°F 4 bar at +80°C / 58 psi at 176°F 0 bar at +100°C / 0 psi at 212°F

Installation conditions

Process connection	Pipe installation with G1½ PVC or stainless steel union nut
	Immersion version

Electrical connection

Cable	Attached cable
Cable length	10 m / 33 ft
Cable options	Core end sleeves

2.2 Dimensions

	Dimensions [mm]	Dimensions [inch]
a	145	5.7
b	118	4.65
c	81	3.2
d	67	2.64
e	44.5	1.75
f	41	1.6
g	36.5	1.44

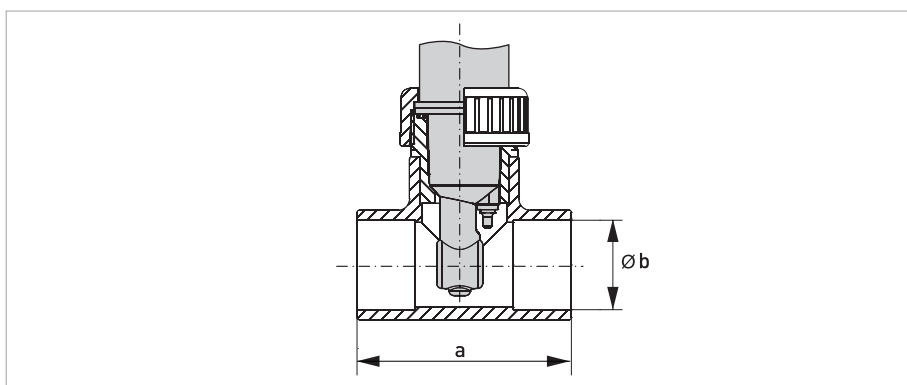
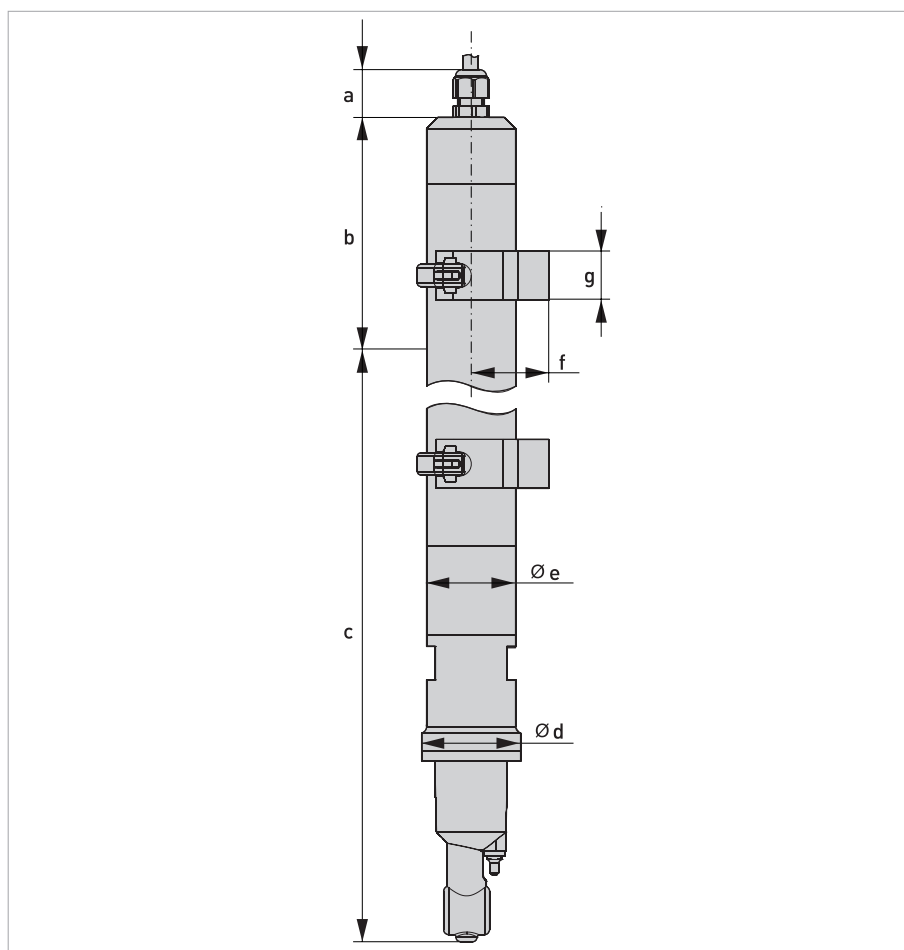


Figure 2-1: Flow-through holder (T-piece)

DN	a [mm / inch]	øb [mm / inch]	Material	Max. Temp.
32	88 / 3.46	40 / 1.57	PP	+80°C / +176°F
40	102 / 4.02	50 / 1.97		
50	124 / 4.88	63 / 2.48		



	Dimensions [mm]	Dimensions [inch]
a	21	0.83
b	120 +/- 10	4.72 +/- 0.4
c	1000 / 2000	39.37 / 78.74
d	44.5	1.75
e	40	1.57
f	40	1.57
g	22	0.87

2.3 Combination sensor/signal converter

Sensor type	Measured parameter	Measuring principle	Signal converter	
			Input A	Input B
pH	pH value	Potentiometric	X	X
ORP	ORP value	Potentiometric	X	X
Cl ₂	Free chlorine	Amperometric	X	-
ClO ₂	Chlorine dioxide	Amperometric	X	-
O ₃	Ozone	Amperometric	X	-
DO	Dissolved oxygen	Amperometric ①	X	-
		Optical ①	X	-
COND	Conductivity/ specified resistance	Conductive	X	X
IND	Toroidal conductivity	Inductive	X	X
TUR	Turbidity	Optical ①	X	-

① only for single channel version

3.1 General notes on installation

Inspect the packaging carefully for damages or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

Do a check of the packing list to make sure that you have all the elements given in the order.

Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

3.2 Intended use

Responsibility for the use of the measuring devices with regard to suitability, intended use and corrosion resistance of the used materials against the measured fluid lies solely with the operator.

The manufacturer is not liable for any damage resulting from improper use or use for other than the intended purpose.

The intended use of OPTISENS IND 1000 conductivity sensor is the measurement of conductive liquids. The sensor is suitable for connection to the MAC 100 signal converter.

3.3 Pre-installation requirements

- *Unpack the sensor carefully!*
- *Make sure that the sensor is clean.*
- *Solids blocking the sensor!*
- *Consider a large enough distance from conductive or isolating pipe walls!*

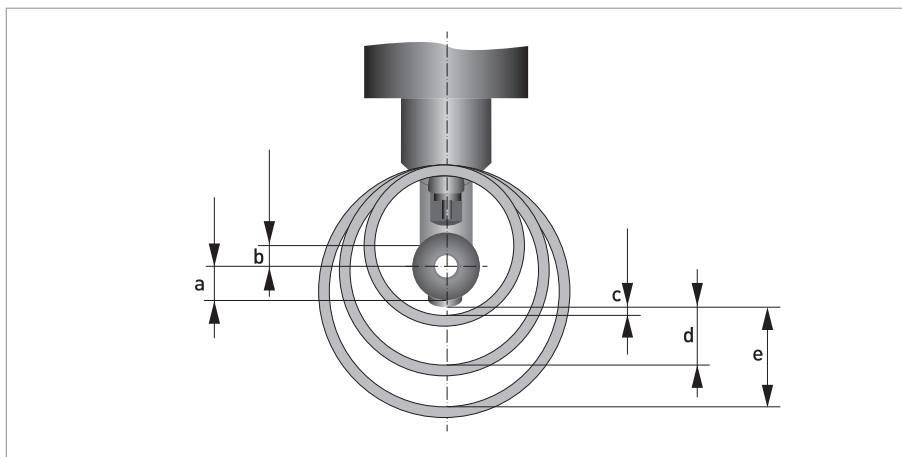


Figure 3-1: Only for pipes with DN 50, DN 65 and DN 80

	Dimensions [mm]	Dimensions [inch]
a	11	0.43
b	6.5	0.26
c	4	0.16
d	22	0.87
e	37.5	1.48

3.4 Installing the sensor

3.4.1 General installation instructions

Ensure that the pipe is without pressure before installing or removing a sensor!

Be sure that the tube is completely filled with water, otherwise the measuring reading is wrong.

During installation you should fix a shut-off valve in front of and behind the instrument so that the sensor can be taken out of the bypass in case of check.

To achieve reliable measuring results, note the following items:

- *Always install the sensor in the designated flow through holder or ensure that the pipe diameter is large enough.*
- *The sensor must always have full contact with the measuring medium.*

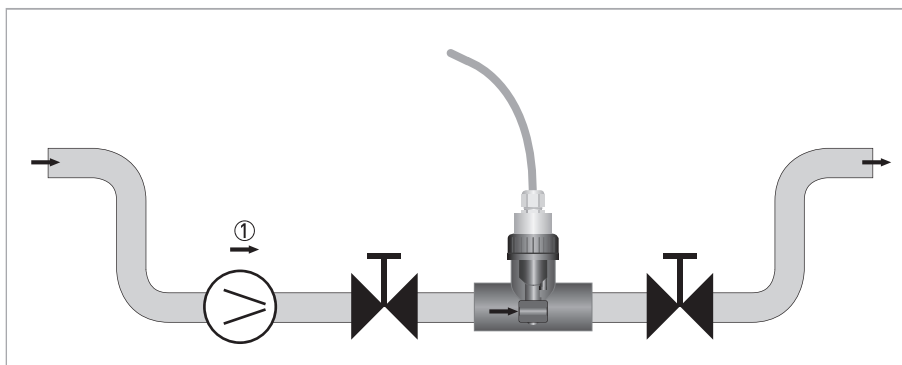


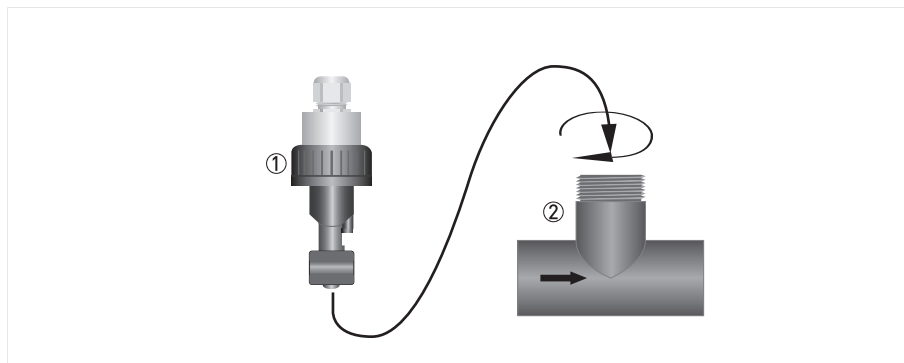
Figure 3-2: Installation requirements

① Flow direction

3.4.2 Mounting to a flow through holder

Ensure that the pipe is without pressure before installing or removing a sensor!

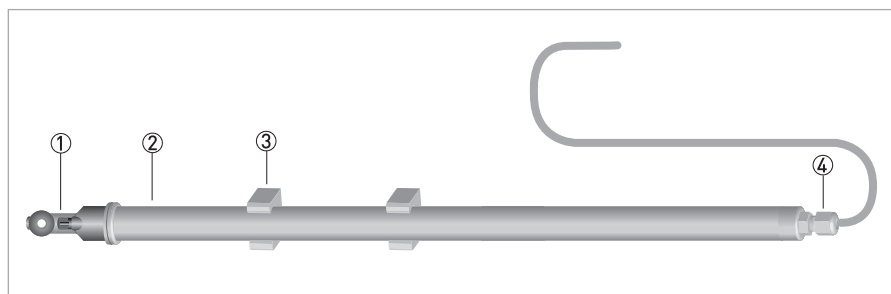
The flow through holder is an optional accessory and not part of the standard scope of delivery. It has to be installed vertically to the flow direction.



- ① Sensor
- ② Flow-through holder (T-piece)

- Screw the sensor ① into the flow through holder ②. Tighten the sensor by hand.

3.4.3 Mounting sensor with immersion holder

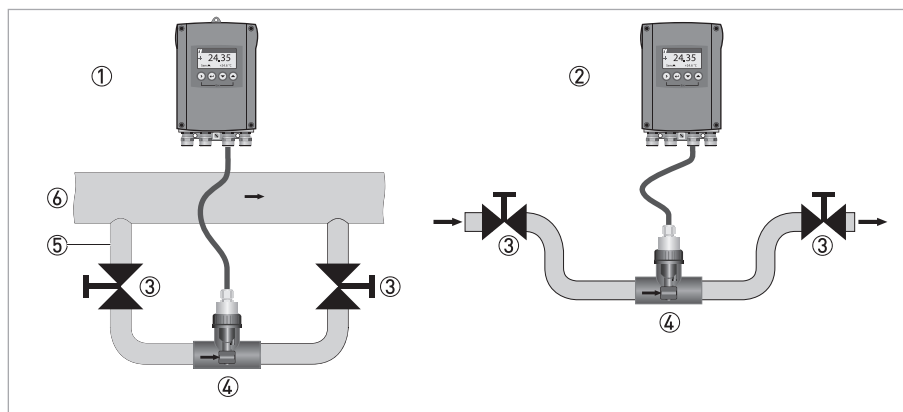


- ① Sensor with attached cable
- ② Immersion holder
- ③ Clamps onto immersion holder
- ④ Cap with cable gland

OPTISENS IND 1000 is also available as immersion version with 1000 or 2000 mm length. The sensor is already installed and sealed inside the holder. The holder is equipped with retaining clamps.

3.5 Examples of a typical measuring point

The following examples each show the signal converter, a sensor with integrated temperature sensor, and the flow-through or immersion holder.



- ① Bypass measurement
- ② Outlet measurement
- ③ Shut-off valve
- ④ Flow-through holder (T-piece) with sensor
- ⑤ Bypass pipe
- ⑥ Main pipe

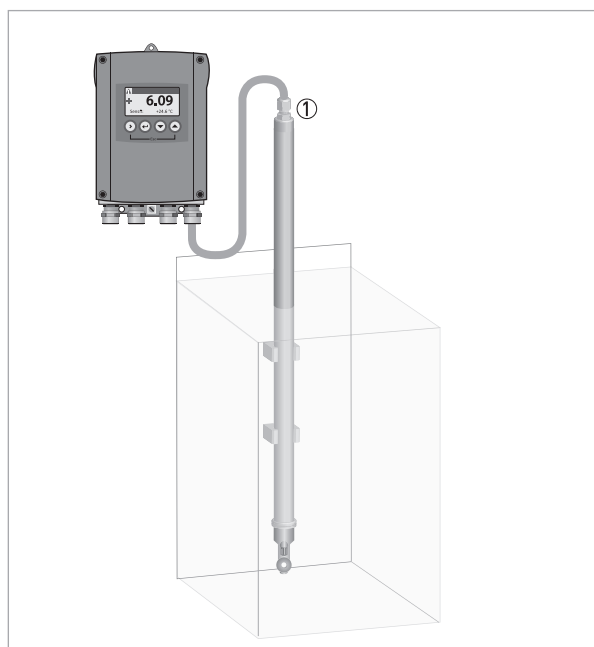


Figure 3-3: Installation with signal converter

- ① Single channel version

4.1 Safety instructions

All work on the electrical connections may only be carried out with the power disconnected. Take note of the voltage data on the nameplate!

Observe the national regulations for electrical installations!

Observe without fail the local occupational health and safety regulations. Any work done on the electrical components of the measuring device may only be carried out by properly trained specialists.

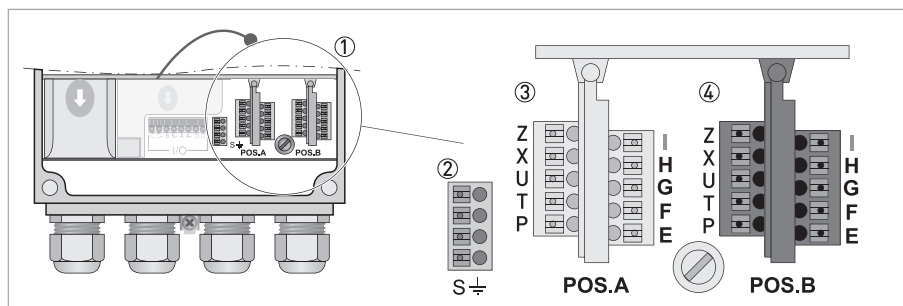
Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

4.2 Connecting the sensor cable to the signal converter

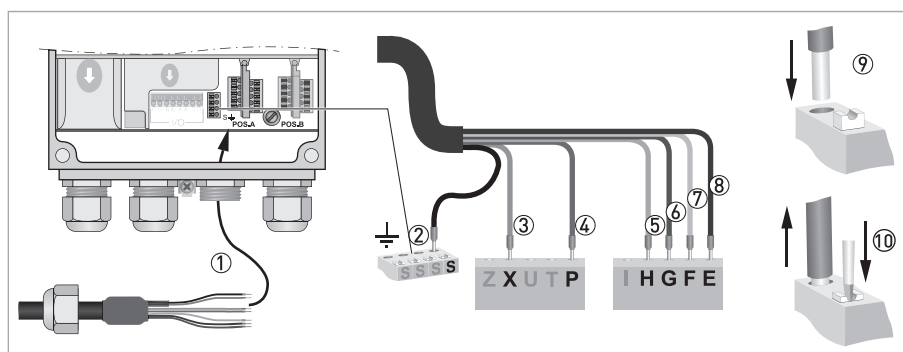
All work on the electrical connections may only be carried out with the power disconnected. Take note of the voltage data on the nameplate!

Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

When ordering the single channel version, only the interface "Pos.A" is populated. In the version with dual channels the interfaces "Pos.A" and "Pos.B" are populated.



- ① Sensor connection terminals
- ② Terminal block S (protective earth)
- ③ Terminal block A : terminal for sensor



The following instructions describe the connection of the sensor cable

Connecting the sensor cable to the signal converter

- Thread the sensor cable through the middle right cable gland (1).
- Push the wire (9) into the terminal block Pos A as described in the chart.
- To remove a cable, press down the white clip (10) on the corresponding terminal and pull the cable out.

Wire	Terminal block A or B
Shield (2)	S
Yellow - Pt1000 (3)	X
Green - Pt1000 (4)	P
Shield from pink (5)	H
Pink (6)	G
White (7)	F
Brown (8)	E

5.1 Order code

The characters of the order code highlighted in light grey describe the standard.

VGA M	4	Sensor type									
		1	OPTISENS IND 1000								
			Measuring range								
		A	0.5...2000 mS/cm								
			Sensor features								
		A	PP for c= 6.25								
		B	PVDF for c= 4.65								
			Process conditions								
		A	PP version: -10...+80°C, 10 bar at +20°C / +14...+176°F, 145 psi at +68°F								
		B	PVDF version: -10...+100°C, 10 bar at +20°C / +14...+212 °F, 145 psi at +68°F								
			Process connection								
		A	Flow-through for T-piece installation, with PVC union nut G1 1/2								
		B	Flow through for T-piece installation, with stainless steel union nut G1 1/2								
		D	immersion version 1000 mm length, only for PP version								
		F	immersion version 2000 mm length, only for PP version								
			Sensor options								
		A	Exposed temperature sensor, only for PP version								
		B	Sealed temperature sensor								
			Sensor - cable connection								
		4	Attached cable								
			Cable								
		1	Cable IND-W-1000								
			Cable features								
		1	Standard								
			Cable length								
		A	10 m / 33 ft								
			Cable options								
		1	Core end sleeve								
			Documentation								
		1	English								
		2	German								
		3	French (available from Q1 2013)								
		4	Spanish (available from Q1 2013)								
VGA M	4										

5.2 Spare parts, consumables and accessories

Spare parts	Order code
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OPTISENS IND 1000 in PP

OPTISENS IND 1000-PP-T/I-10-G11/2PVC	VGA M 4 1AAAAB411A10
OPTISENS IND 1000-PP-T/E-10-G11/2PVC	VGA M 4 1AAAAA411A10
OPTISENS IND 1000-PP-T/I-10-G11/2SS	VGA M 4 1AAABB411A10
OPTISENS IND 1000-PP-T/E-10-G11/2SS	VGA M 4 1AAABA411A10

OPTISENS IND 1000 in PVDF

OPTISENS IND 1000-PF-T/I-10-G11/2PVC	VGA M 4 1ABBAB411A10
OPTISENS IND 1000-PF-T/I-10-G11/2SS	VGA M 4 1ABBBB411A10

OPTISENS IND 1000 immersion version

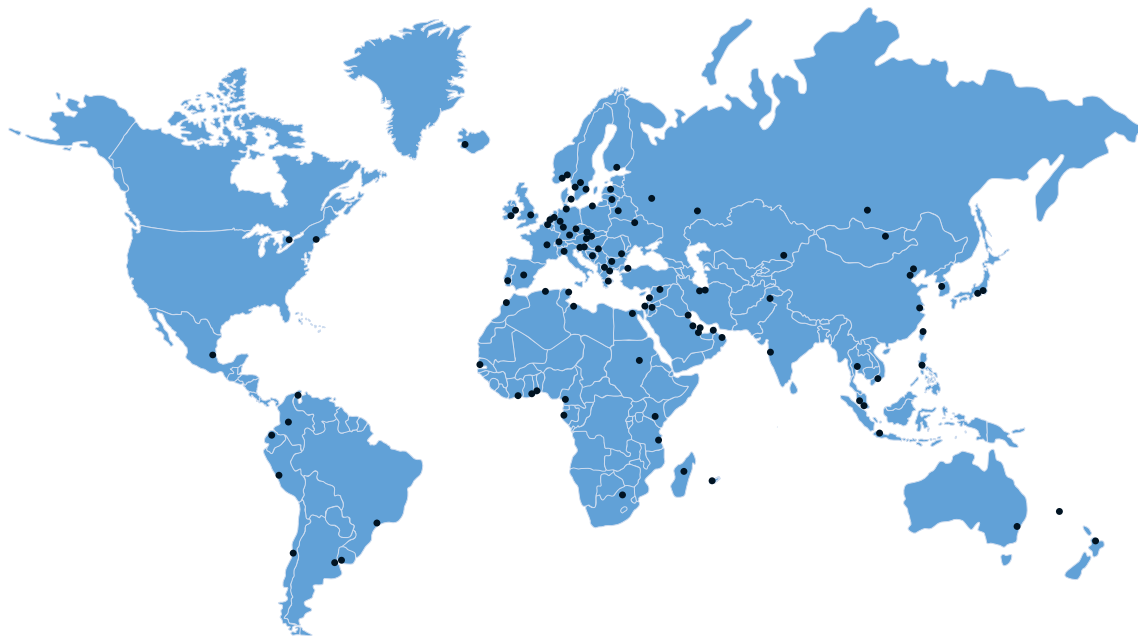
OPTISENS IND 1000-PP-T/I-10-1000	VGA M 4 1AAADB411A10
OPTISENS IND 1000-PP-T/I-10-2000	VGA M 4 1AAAFB411A10
OPTISENS IND 1000-PP-T/E-10-1000	VGA M 4 1AAADA411A10
OPTISENS IND 1000-PP-T/E-10-2000	VGA M 4 1AAAF411A10

Accessories	Order code
SENSOFIT FLOW 1000 (T-piece) installation	Please see technical datasheet SENSOFIT FLOW 1000 (in preparation)









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