



OPTISENS ORP 8500 **Technical Datasheet**

ORP sensor

- High quality and precise platinum electrode for usage in water analysis
- Ceramic diaphragm for all-purpose applications
- Sensor for oxidizing solutions containing chloride as well as natural waters

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

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1.1 ORP sensor for water applications

The OPTISENS ORP 8500 sensor is characterised by standardised design, easy handling and a long life cycle. In combination with the MAC 100 signal converter it is possible to create an extremely reliable and low-cost measurement system, which is suitable for a wide range of water analysis measurement tasks.

Designed as combined electrode with built-in reference electrode the OPTISENS ORP 8500 is equipped with a ceramic diaphragm. The sensor can be used in various applications and it is extremely service friendly as well as durable.



- ① Process connection PG 13.5
- ② Glass shaft with built-in reference electrode and KCl gel filling
- ③ Ceramic diaphragm
- ④ Platinum ring electrode

Highlights

- Pure platinum electrode and small ceramic diaphragm for long time and reliable ORP measurement.
- Special reference system for extended lifetime and a wide application range.
- Various mounting assemblies for easy installation and reliable handling.
- Suitable for connection to the MAC 100 signal converter.

Industries

- Water industry

Applications

- Drinking Water / Beverages
- Process Water

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 assemblies

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



The OPTISENS ORP 8500 sensor is manufactured using a very pure and large platinum electrode which can be used in almost all standard water applications due to its robust sensor design.

This sensor type is equipped with ceramic diaphragm.

Made to Fit

Mounting assemblies SENSOFIT series

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

For the OPTISENS ORP 8500 sensor type the following individual assemblies are available:

- SENSOFIT FLOW 1000 series - Flow-through assemblies
- SENSOFIT IMM 1000 series - Immersion assemblies
- SENSOFIT INS 1000 / 7000 series - Insertion assemblies
- SENSOFIT RET / RAM 5000 series - Manual and pneumatic retractable assemblies

For further information please consider the technical datasheets.

1.3 Measuring principle

1.3.1 ORP measurement

The oxidation reduction potential, ORP in short, is the measurement for the concentration of oxidising and reducing agents in water. Its value is influenced both by pH and temperature. ORP is a sum parameter that gives no information on the concentration of a single substance in a mixture.

ORP measurements are used to monitor chemical reactions involving electron transfer. In drinking water treatment it can be found in ozone treatment and the removal of iron, manganese and nitrate as well as in disinfection steps. In swimming pools the German DIN 19643 requires ORP measurements as a hygiene parameter and decrees maximum and minimum values for fresh water, pool water, and salt water. In wastewater treatment ORP is measured in the denitrification process and in detoxication of industrial wastewater.

The ORP sensor consists of a measuring electrode of platinum or gold and a reference of e.g. Ag/AgCl. The potential of the measuring electrode changes with the concentration of reducing and oxidising agents and is measured against the reference. The measured values can be recalculated to fit literature values based on NHE (normal hydrogen electrode) as reference.

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	Potentiometric
Measuring range	-1500...+1500 mV

Design

Construction	Glass sensor
Shaft diameter	12 mm / 0.47"
Length	120 mm / 4.72"
Process connection	PG 13.5
Sensor cap	S8
Type of diaphragm	Ceramic

Measuring accuracy

Reference conditions	Medium: water
	Temperature: 20°C / 68°F
	Pressure: max. 1 bar / 14.5 psi (absolute)
Measuring error	0.3% full scale
Repeatability	<0.2% full scale
Resolution	0.1 (or 0.01 in extended mode)

Operating conditions

Temperature range	-5...+70°C / +23...+158°F
Max. operating pressure	<2 bar / 29 psi
Minimum conductivity	>150 µS/cm

Installation conditions

Process connection	PG 13.5
Immersion assemblies	SENSOFIT IMM 1000
Flow-through assemblies	SENSOFIT FLOW 1000
Insertion assemblies	SENSOFIT INS 1000 series

Materials

Sensor shaft	Glass
Measuring electrode	Platinum
Reference	Ag/AgCl/Tepox gel
Diaphragm	Ceramic
Gasket	EPDM

Electrical connection

Connector	S8
Cable	Cable pH/ORP-W-Coax
Cable length	5 m / 16.4 ft; 10 m / 33 ft; 15 m / 49 ft

2.2 Dimensions

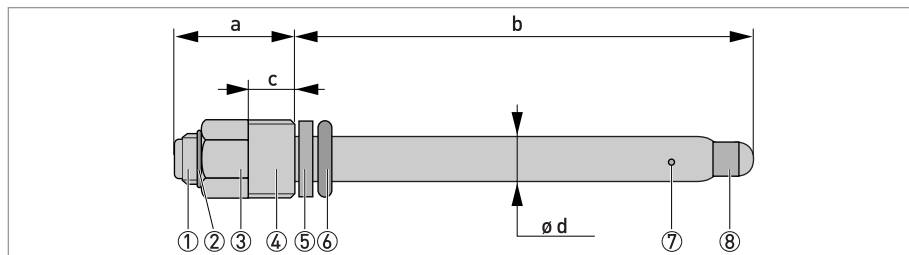


Figure 2-1: Dimensions of OPTISENS ORP 8500

- ① Thread for sensor cable connector
- ② O-ring
- ③ Hexagonal nut
- ④ Thread
- ⑤ Washer
- ⑥ O-ring
- ⑦ Diaphragm
- ⑧ Pt-Ring

	Dimensions [mm]	Dimensions [inch]
a	31	1.2
b	120	4.7
c	12	0.5
d	Ø12	Ø0.5
e	6	0.2
f	Ø8	Ø0.3

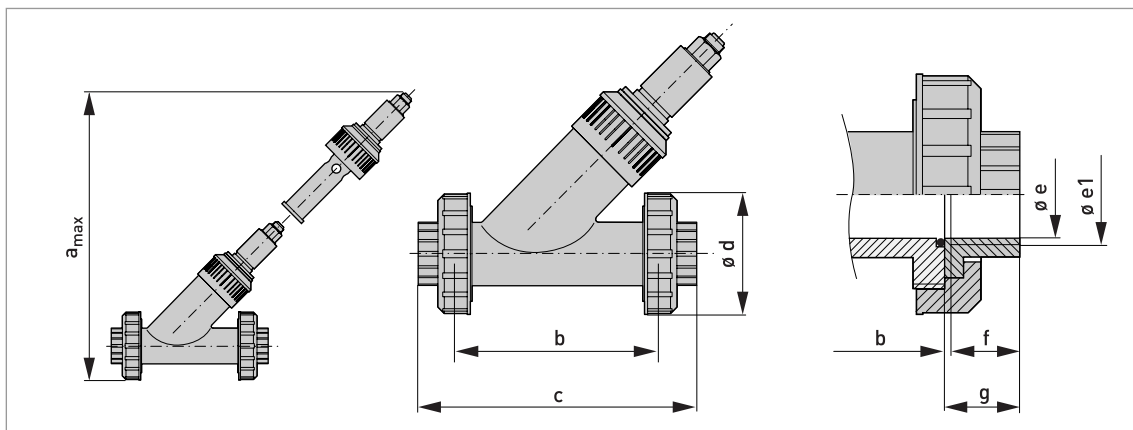


Figure 2-2: Dimensions SENSOFIT FLOW 1000

	Dimensions [mm]	Dimensions [inch]
$a_{\max}$	165	6.5
b	142.5	5.61
c	178.5	7.03
d	Ø 75	Ø 2.95
e	Ø 21	Ø 1.26
e1	G1	G1
f	19.1	0.75
g	22	0.87

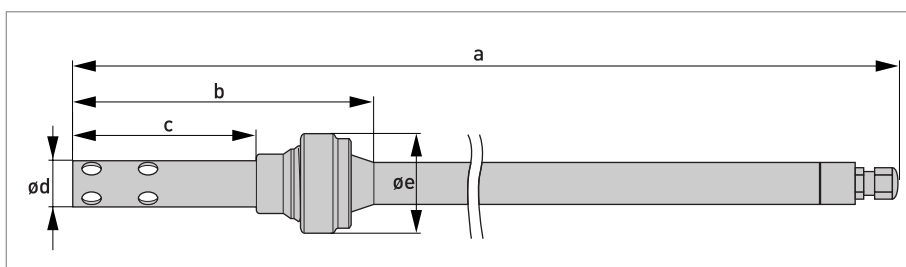


Figure 2-3: Dimensions SENSOFIT IMM 1000

	Dimensions [mm]	Dimensions [inch]
a	1030 (may be shortened)	40.55 (may be shortened)
b	160	6.3
c	100	3.94
d	Ø 25	Ø 0.98
e	Ø 59	Ø 2.32

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 sensor is the measurement of ORP in water. The sensor is suitable for connection to the MAC 100 signal converter.

3.3 Pre-installation requirements

- *Do not drop the device! Handle the device with care!*
- *Never touch or scratch the platinum electrode of the sensor.*
- *Store the sensor in its original packaging in a dry, dust-free location. Keep it away from dirt. If necessary, clean it as described in the manual of the sensor.*
- *Do not make any mechanical modifications to the sensor (electrodes shortened, drilled, bent or scratched). This can result in the loss of proper functionality, as well as the rights under the device warranty.*
- *The sensor must be suitable for the temperature, pressure and medium conditions which are specified (including chemical resistance).*

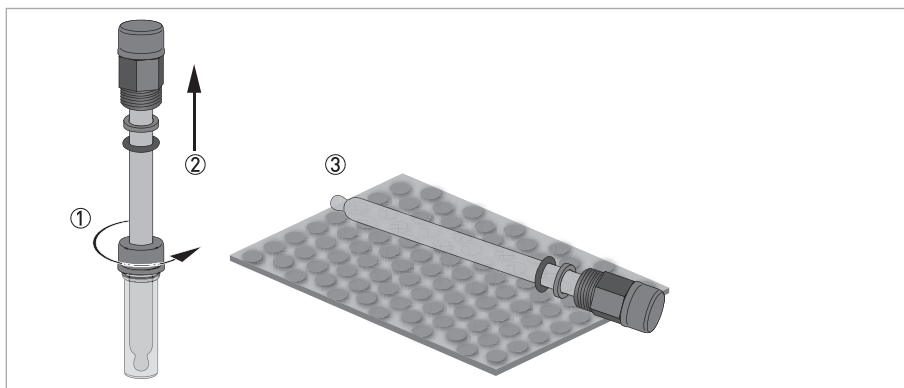


Figure 3-1: Handling the sensor

Unpacking the sensor

- Loosen the storage cap which is screwed or/and pushed on to the plastic tube ①.
- Gently pull the sensor out of the plastic tube ②.
- Lay the sensor on a soft mat/tissue ③.

3.4 Installing the sensor

3.4.1 Installation instructions

The platinum electrode must always have full contact with the measuring medium.

The mounting position of the sensor should not deviate more than 75° from vertical position (sensor tip pointing downwards). Doing otherwise might cause internal air bubbles to float into the platinum electrode. This would interrupt the electrical contact between the inner buffer solution and the platinum surface.

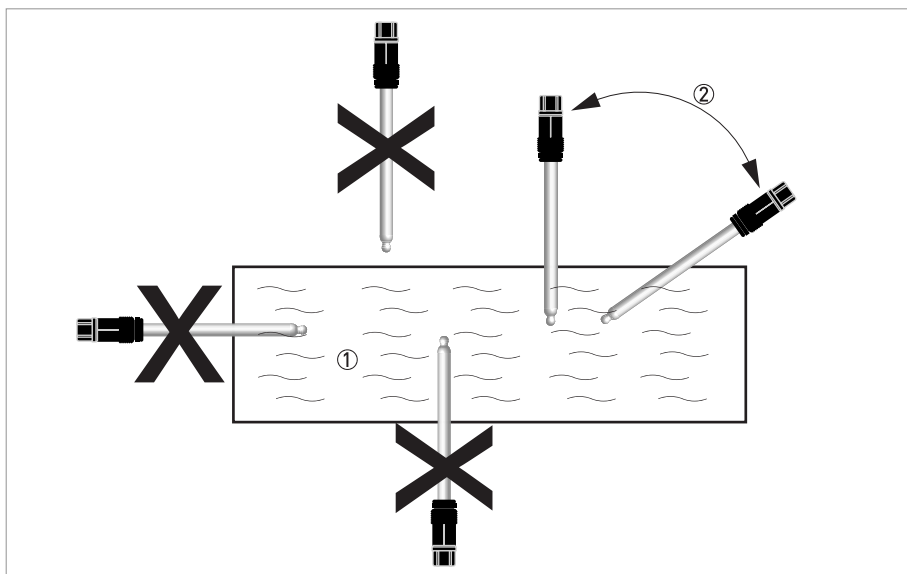


Figure 3-2: Installation requirements

- ① Measuring medium
- ② Maximum deviation of 75° from vertical position

3.4.2 Mounting to a flow-through assembly

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

The flow-through assembly is an optional accessory and not part of the standard scope of delivery. It has to be installed horizontally in pump or sample lines or directly in the process.

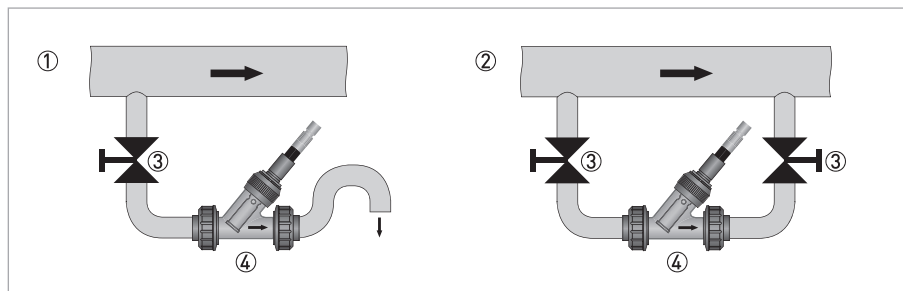


Figure 3-3: Possible mounting positions of the flow-through assembly

- ① Mounting in an outlet pipe
- ② Mounting in a bypass pipe
- ③ Valve
- ④ Flow-through assembly

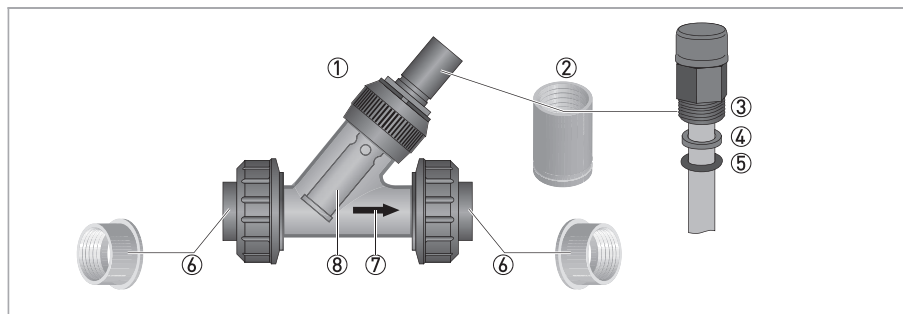


Figure 3-4: Installing the sensor into the flow-through assembly

- ① Flow-through assembly
- ② Female thread
- ③ Sensor thread
- ④ Washer
- ⑤ O-ring
- ⑥ Process connection
- ⑦ Flow direction
- ⑧ Protective cage

Installing a new sensor

- Make sure that the O-ring ⑤ and the washer ④ on the sensor are assembled in the sequence indicated in the drawing.
- Screw the sensor into the female thread ② of the flow-through assembly ①. Tighten the sensor by hand.
- If you have not yet established the electrical connection to the signal converter, leave the protective cap on the sensor until you establish the electrical connection.

3.5 Examples of a typical measuring point

The following examples each show the signal converter, a sensor with or without integrated temperature measurement, and the flow-through or immersion assembly.

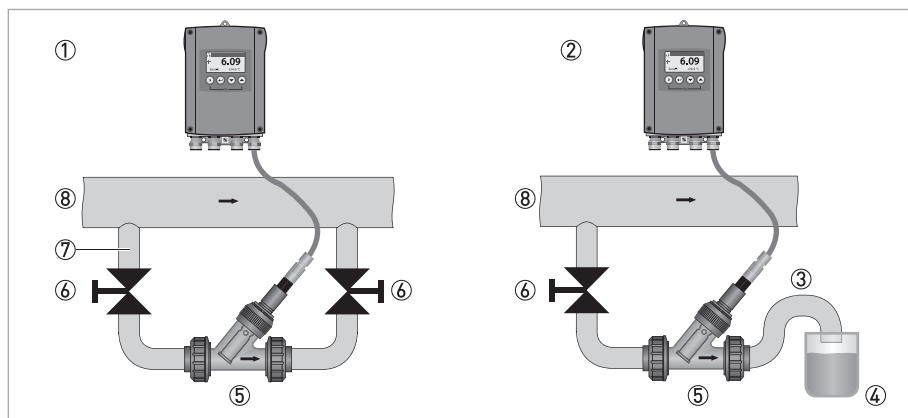


Figure 3-5: Measuring point using the flow-through assembly

- ① Bypass measurement
- ② Outlet measurement
- ③ Elbow pipe
- ④ Sample vial
- ⑤ Flow-through assembly with sensor
- ⑥ Shut-off valve
- ⑦ Bypass pipe
- ⑧ Main pipe

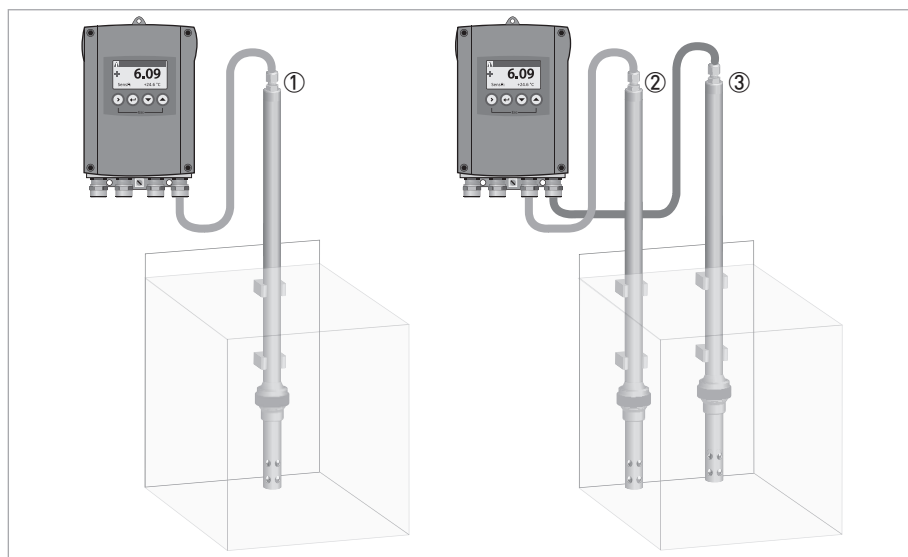


Figure 3-6: Measuring point using the immersion assembly

- ① ORP on single channel instrument
- ② ORP or ORP (optimal with temperature)
- ③ ORP (optimal with temperature)

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.

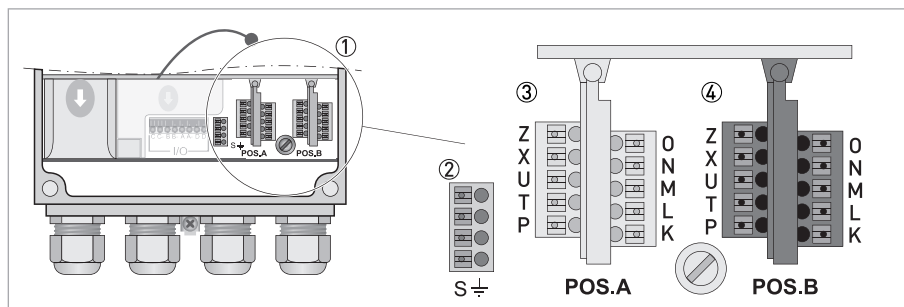


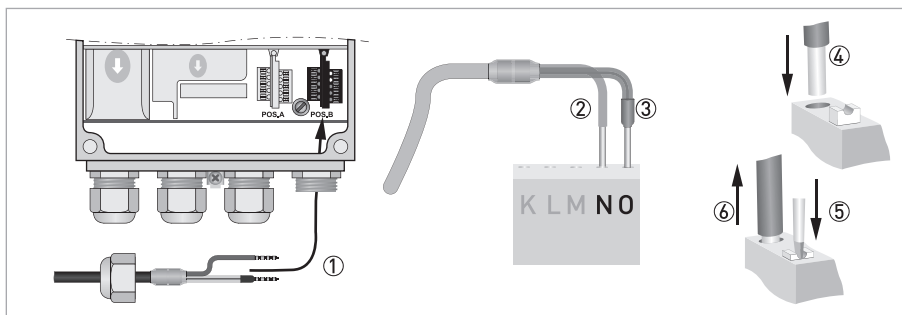
Figure 4-1: Sensor connection terminals on the MAC 100 dual channel version

- ① Sensor connection terminals
- ② Terminal block S (protective earth)
- ③ Terminal block Pos.A: terminal for sensor and temperature
- ④ Terminal block Pos.B: terminal for sensor and temperature

The ORP sensor is connected to the signal converter using a coax cable.

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

Wire	Terminal block Pos.A/B
OPTISENS ORP 8500 with coax cable (without integrated Pt100/1000)	
Coax shield (red)	N (ref.)
Coax core (transparent)	O (pH/ORP)



The following instructions describe the connection of the different sensor cables.

Connecting the sensor cable to the signal converter

- Thread the sensor cable through the outer right cable gland ①.
- Push the coax shield ④ into terminal N ② and the coax core into terminal O ③.
- To remove a cable, press down the white clip ⑤ on the corresponding terminal and pull the cable out ⑥.

4.3 Connecting the external temperature sensor

Connect an external Pt100 or Pt1000 sensor to terminal block Pos.A/B of the signal converter according to the following drawings:

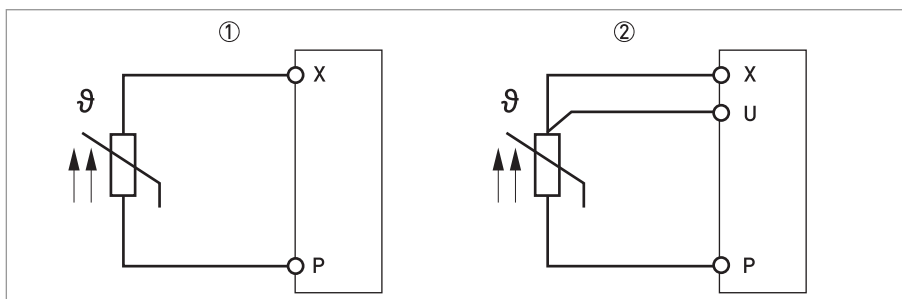


Figure 4-2: Connection of an external Pt100/1000 temperature sensor to the signal converter (2-wire connection)

- ① 2-wire connection
- ② 3-wire connection

4.4 Connecting the cable to the sensor

Moisture on the sensor connector must be avoided! Moisture may cause a short-circuit and a malfunction of the sensor!

If moisture has entered the connector dry it with air (e.g. hot air gun).

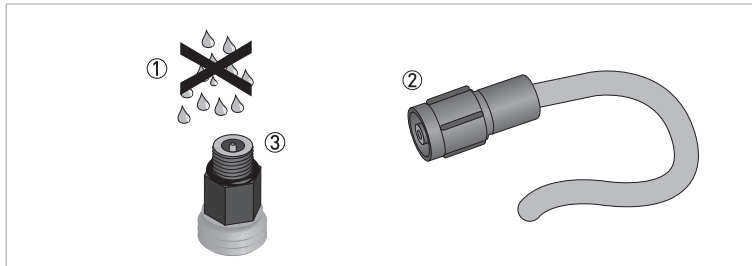


Figure 4-3: Connecting the cable to the sensor

Connecting the cable to the sensor

- Ensure that the cable and the sensor connector are absolutely dry ①.
- Screw the cable connector ② on to the sensor connector ③ and tighten it by hand.

5.1 Order code

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

VGA P	4	Sensor type									
		R	OPTISENS ORP 8500								
			Measuring range								
		B	-1500...1500mV								
			Diaphragm								
		5	Ceramic								
			Reference								
		1	Ag/AgCl/Gel								
			Body material								
		1	Glass								
			Glass								
		B	Platinum								
			Process conditions								
		5	-5...+70°C/+23...+158°F, 2 bar / 29 psi								
			Process connection								
		1	PG 13.5								
			Insertion length								
		3	120 mm / 4.7"								
			Sensor features								
		5	1x Ceramic diaphragm (1 mm / 0.04")								
			Sensor option								
		0	Standard (without Pt100)								
			Connector type								
		1	S8 connector								
			Documentation								
		0	none								
		1	English								
		2	German								
		3	French								
		4	Spanish								
VGA P	4										

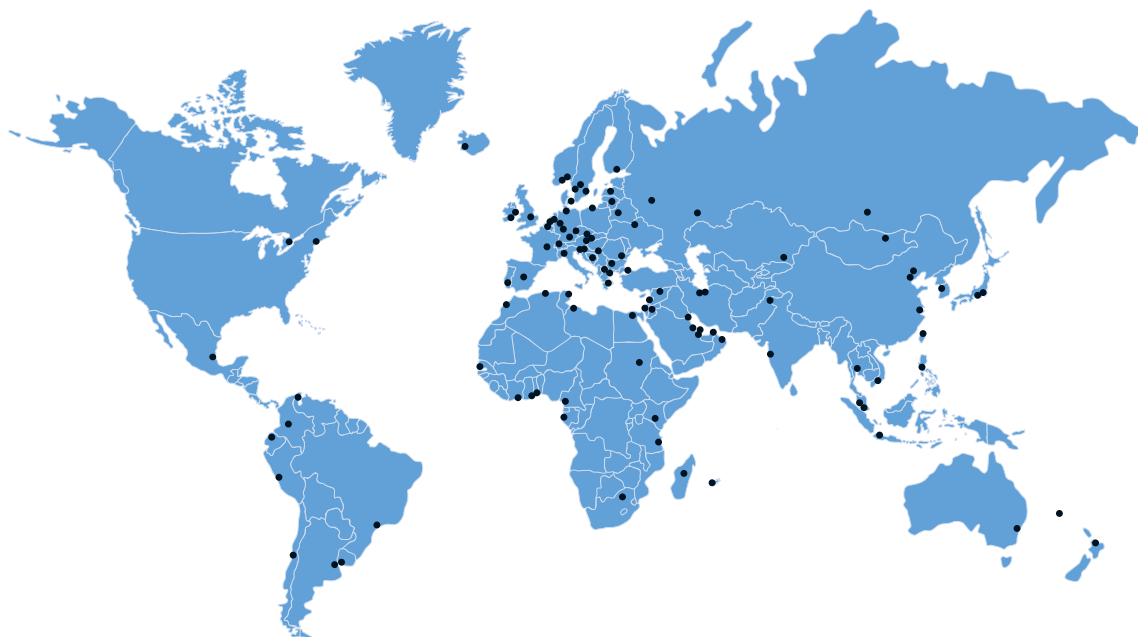
5.2 Spare parts, consumables and accessories

Consumables	Order code
250 ml redox solution 468 mV	XGA S 010060
250 ml redox solution 220 mV	XGA S 010065

Accessories	Order code
SENSOFIT FLOW 1000 series - Flow-through assemblies	Please see technical datasheet SENSOFIT FLOW 1000
SENSOFIT IMM 1000 series - Immersion assemblies	Please see technical datasheet SENSOFIT IMM 1000
SENSOFIT INS 1000 / 7000 series - Insertion assemblies	Please see technical datasheet SENSOFIT INS 1000 / 7000
SENSOFIT RET / RAM 5000 series - Manual and pneumatic retractable assemblies	Please see technical datasheet SENSOFIT RET / RAM 5000
Cable pH/ORP-W Sensor Coax 5 m / 16.4 ft	XGA W 0 11151
Cable pH/ORP-W Sensor Coax 10 m / 33 ft	XGA W 0 11161
Cable pH/ORP-W Sensor Coax 15 m / 49 ft	XGA W 0 11171







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