# OPTISENS COND 1200 Handbook

Conductive conductivity sensor

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



KROHNE

# IMPRINT

## 1.1 Intended use

*CAUTION!*
*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.*

*INFORMATION!*
*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 COND 1200 conductivity sensor is the measurement of conductive liquids. The sensor is suitable for connection to the MAC 100 signal converter.

## 1.2 Safety instructions from the manufacturer

### 1.2.1 Copyright and data protection

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The manufacturer reserves the right to alter the content of its documents, including this disclaimer in any way, at any time, for any reason, without prior notification, and will not be liable in any way for possible consequences of such changes.

### 1.2.3 Product liability and warranty

The operator shall bear responsibility for the suitability of the device for the specific purpose. The manufacturer accepts no liability for the consequences of misuse by the operator. Improper installation and operation of the devices (systems) will cause the warranty to be void. The respective "Standard Terms and Conditions" which form the basis for the sales contract shall also apply.

### 1.2.4 Information concerning the documentation

To prevent any injury to the user or damage to the device it is essential that you read the information in this document and observe applicable national standards, safety requirements and accident prevention regulations.

If this document is not in your native language and if you have any problems understanding the text, we advise you to contact your local office for assistance. The manufacturer can not accept responsibility for any damage or injury caused by misunderstanding of the information in this document.

This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device. Special considerations and precautions are also described in the document, which appear in the form of underneath icons.

### 1.2.5 Warnings and symbols used

Safety warnings are indicated by the following symbols.

*DANGER!*
*This information refers to the immediate danger when working with electricity.*

*DANGER!*
*This warning refers to the immediate danger of burns caused by heat or hot surfaces.*


*DANGER!*
*This warning refers to the immediate danger when using this device in a hazardous atmosphere.*

*DANGER!*
*These warnings must be observed without fail. Even partial disregard of this warning can lead to serious health problems and even death. There is also the risk of seriously damaging the device or parts of the operator's plant.*

*WARNING!*
*Disregarding this safety warning, even if only in part, poses the risk of serious health problems. There is also the risk of damaging the device or parts of the operator's plant.*

*CAUTION!*
*Disregarding these instructions can result in damage to the device or to parts of the operator's plant.*

*INFORMATION!*
*These instructions contain important information for the handling of the device.*


*LEGAL NOTICE!*
*This note contains information on statutory directives and standards.*

- HANDLING
  This symbol designates all instructions for actions to be carried out by the operator in the specified sequence.

➲ RESULT
This symbol refers to all important consequences of the previous actions.

## 1.3 Safety instructions for the operator

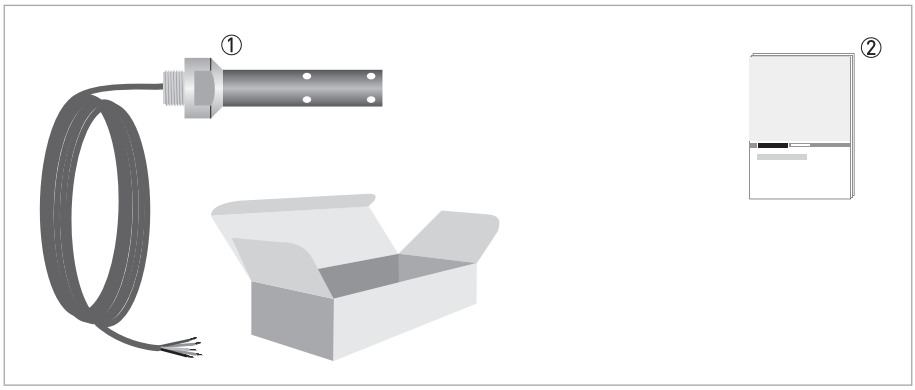
*WARNING!*
*In general, devices from the manufacturer may only be installed, commissioned, operated and maintained by properly trained and authorized personnel.*
*This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device.*

## 2.1 Scope of delivery

*INFORMATION!*
*Inspect the cartons carefully for damages or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.*

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

*INFORMATION!*
*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.*




① Ordered sensor
② Documentation

### Optional accessories

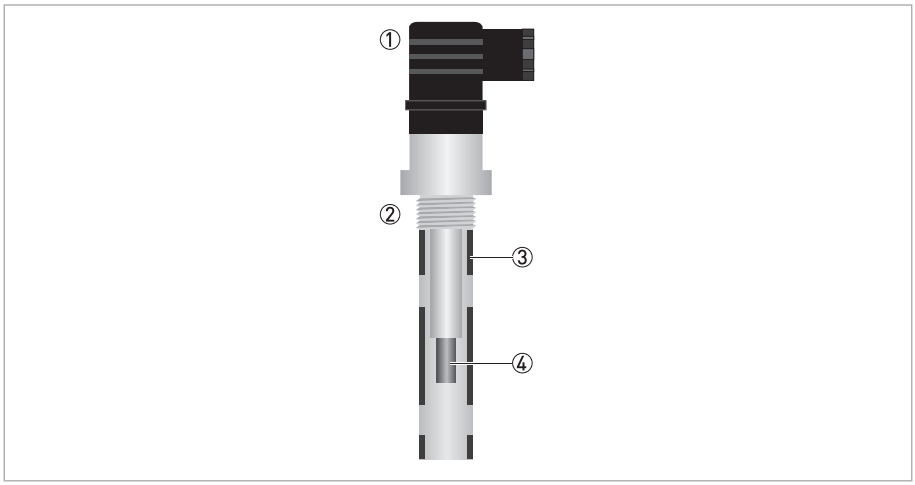
- SENSOFIT FLOW 1000 Flow-through assembly
- SENSOFIT IMM 1000 Immersion assembly
- SENSOFIT INS 1000 Screw-in adapter

### Consumables/Spare parts available

- OPTISENS 1200 (W)
- OPTISENS 1200 (PW)
- OPTISENS 1200 (GF)
- Standard solution for sensor calibration

## 2.2 Device description

### 2.2.1 Conductivity sensor

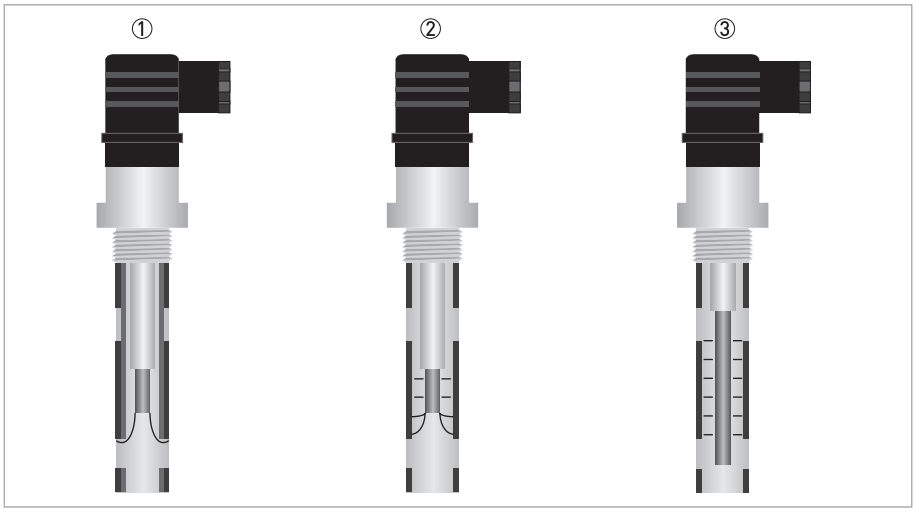



① 4-pin-right-angle plug
② Process connection thread
③ Outside electrode
④ Inside electrode

The OPTISENS COND 1200 sensor is a conductive cellular measurement medium with an integrated temperature sensor (Pt1000). It contains two stainless steel electrodes with PVDF insulation that prevent proneness to soiling. It is available in various cell constants (c = 0.01, 0.05, 0.1, 0.2, 1.0) and thus covers a wide area of use. The conductivity sensor have a standardised robust design and a long lifespan. In combination with a signal converter, it is possible to create extremely reliable low-cost measurement systems, which is suitable for a wide range of water analysis measurement tasks.
The conductive measurement principle is characterised by high sensitivity, especially at low conductivity values. For this reason, the sensor is perfect for low-contamined, non-corrosive media such as pure water, steam and cooling water as well as service water.

If the values exceed 20 mS/cm and in case of heavy soiling or danger of corrosion by the medium, it is highly recommended to make use of the inductive measurement with the IND 1000 (see handbook IND 1000).

Sensor types




① External sensor with high conductivity
② External sensor with medium conductivity
③ External sensor with low conductivity

## 2.3 Nameplate

*INFORMATION!*
*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.*

The sensor type is specified on the labelling of the sensor package and on the sensor itself.

## 3.1 General notes on installation

*INFORMATION!*
*Inspect the cartons carefully for damages or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.*

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

*INFORMATION!*
*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 Storage and Transport

- Store the sensor in its original packaging in a dry and dust-free location. Keep it away from dirt.
- The original packaging serves the protection of the equipment. Therefore always use it for transport or return to the manufacturer.
- Avoid solar radiation.

## 3.3 Installation procedure

As a new inductivity sensor needs to be calibrated before it is installed into its final measuring location, it is important to follow the installation order:

1. Unpack the sensor.
2. Connect the sensor to the signal converter.
3. Calibrate the sensor.
4. Install the sensor into its final measuring location.

The required steps are explained in the following sections.

## 3.4 Pre-installation requirements

*CAUTION!*
*Never touch or scratch the sensor shaft or the inner electrode.*

*INFORMATION!*
- *Install the sensor against the flow to ensure direct exposure of the electrodes.*
- *Install the sensor only in T-pieces or flow through assembly of the manufacturer.*
- *Avoid air getting trapped around the sensor.*
- *Avoid solids collection around the electrodes.*

## 3.5 Electrical connection


*DANGER!*
*For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation.*

*DANGER!*
*All work on the electrical connections may only be carried out with the power disconnected.*

*DANGER!*
*Observe the national regulations for electrical installations!*

*WARNING!*
*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.*

*INFORMATION!*
*Look at the device nameplate to ensure that the device is delivered according to your order.*

### 3.5.1 Connecting the cable to the sensor

*CAUTION!*
*Moisture inside the sensor connector must be avoided! Moisture may cause a shortcut and deliver erratic readings!*
*If moisture has entered the connector, dry it with air (e.g. hair blower).*

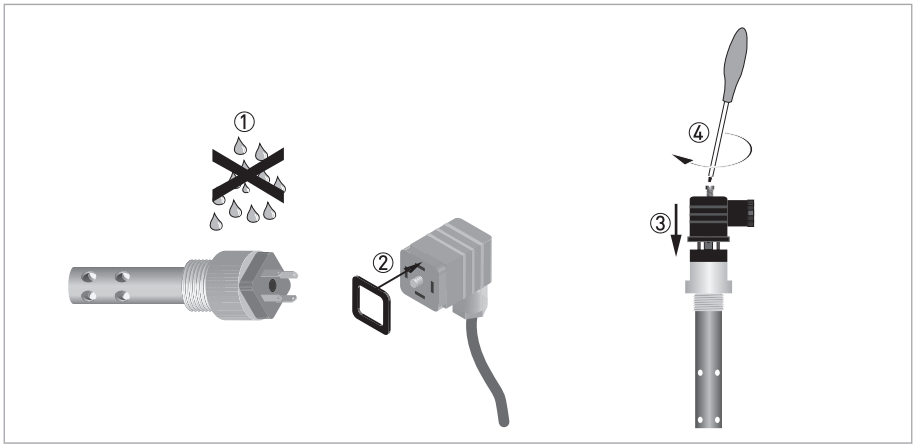



**Figure 3-1: Connecting the Hirschmann plug to the sensor**

Ensure that both cable and sensor connector are absolutely dry ①.
Make sure that the seal is positioned on the sensor connector ②.
Push the cable connector ③ on the sensor.
Screw the cable connector to the sensor and tighten it with a screw driver ④.

### 3.5.2 Cable assign of a Hirschmann plug

*CAUTION!*
*Do not shorten the cable length. This can influence the measuring accuracy.*

*INFORMATION!*
*The given colours only refer to the delivered cables! When using cables of a different provider, take into account the manufacturer's notes concerning the cable colour and designation.*

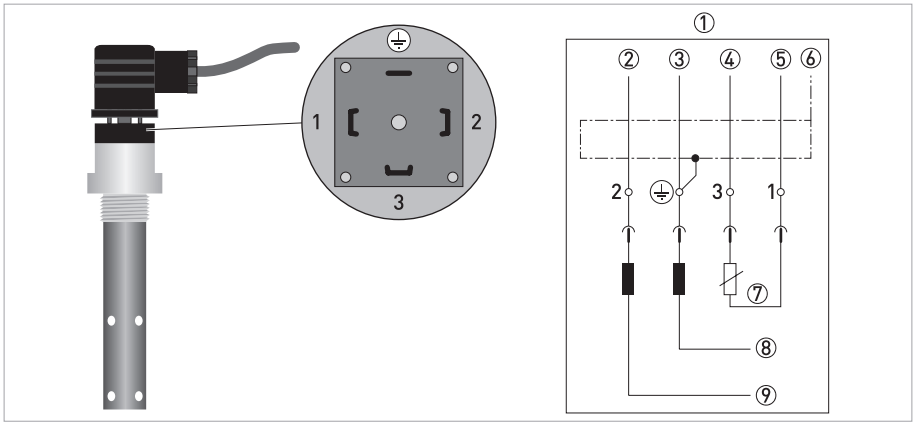



Figure 3-2: Cable assign of a Hirschmann plug

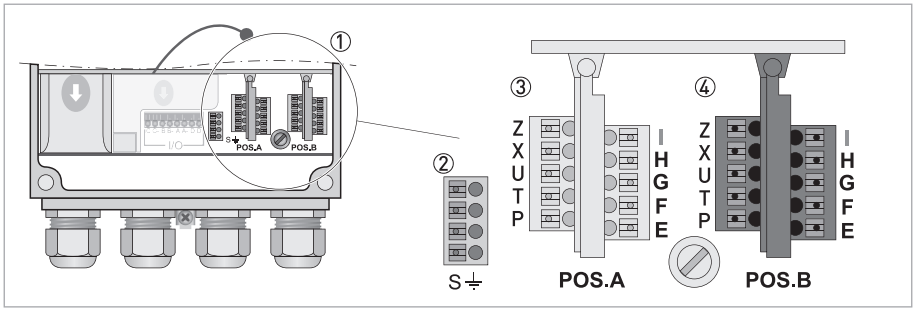
① Cable LIYCY 4x0.5 mm
② White
③ Brown
④ Yellow
⑤ Green
⑥ Shield
⑦ Pt100 sensor
⑧ Outer electrode
⑨ Inner electrode

### 3.5.3 Connecting the sensor cable to the signal converter

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

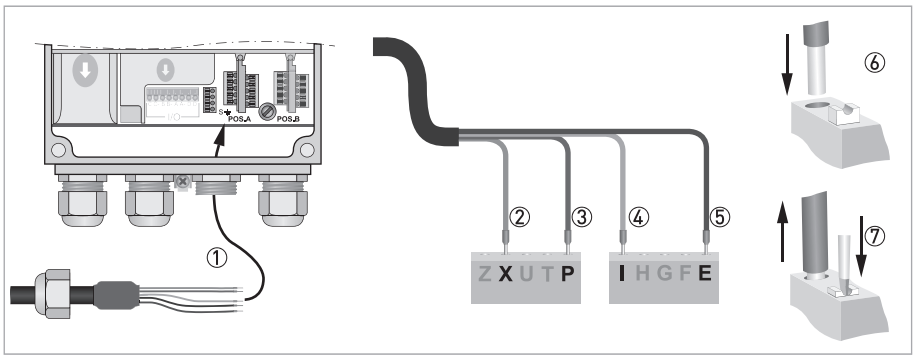
*CAUTION!*
*Don't connect the shielding to the signal converter if the sensor has got a Hirschmann GDM 3011 plug!*

*INFORMATION!*
*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.*




① Sensor connection terminals
② Terminal block S (protective earth)
③ Terminal block A: terminals for sensor
④ Terminal block B: terminals for sensor

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.




## Connecting the sensor cable to the signal converter

- Thread the sensor cable through the middle right cable gland ①.
- Push the wire ⑦ into the terminal block Pos. A or Pos. B as described in the chart.
- To remove a cable, press down the white clip ⑧ on the corresponding terminal and pull the cable out.

| Wire | Terminal block Pos. A / B |
|---|---|
| Green ② | X |
| Yellow ③ | P |
| White ④ | I |
| Brown ⑤ | E |

## 3.6 Calibrating the sensor

Before the sensor is installed, it has to be calibrated. Proceed as described on page 27. Then continue with the installation procedure.

## 3.7 Installing the sensor

### 3.7.1 General installation instructions

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

*INFORMATION!*
*This installation procedure is only recommended for very clean water without any particles in the water. Otherwise turn the flow-through assembly and be sure that the tube is completely filled with water, otherwise the measuring reading is wrong.*

*INFORMATION!*
*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.*

*INFORMATION!*
*To achieve reliable measuring results, note the following items:*

- *Always install the sensor in the designated flow through assembly.*
- *The sensor must always have full contact with the measuring medium.*

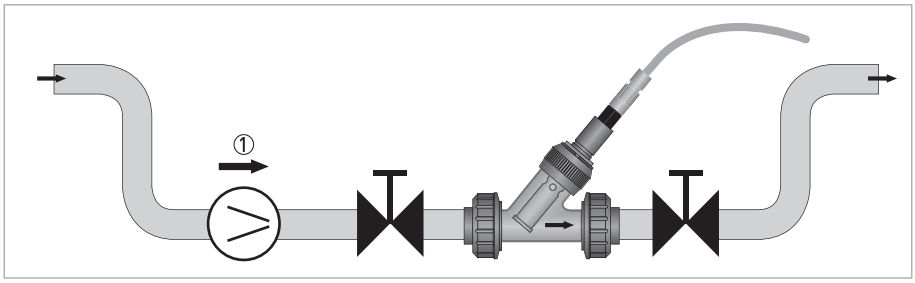



Figure 3-3: Installation requirements for the sensor

① $Flow_{min}$ = 30 l/h / 7.93 gal/h

### Installation recommendation

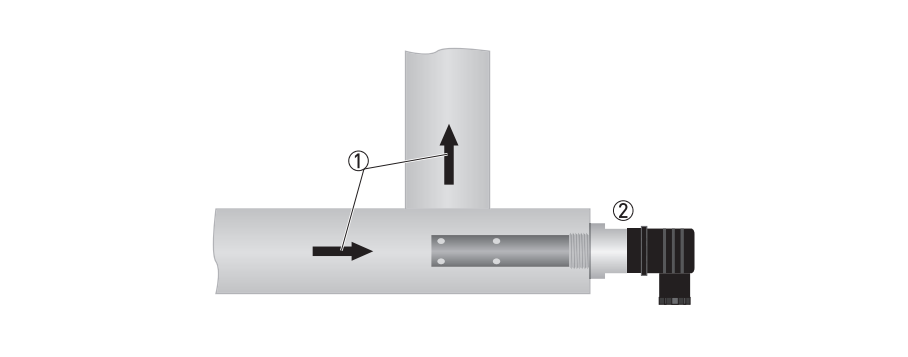



Figure 3-4: Typical installation

① Flow direction
② Ordered sensor

- Installation against the flow to ensure direct exposure of the electrodes.

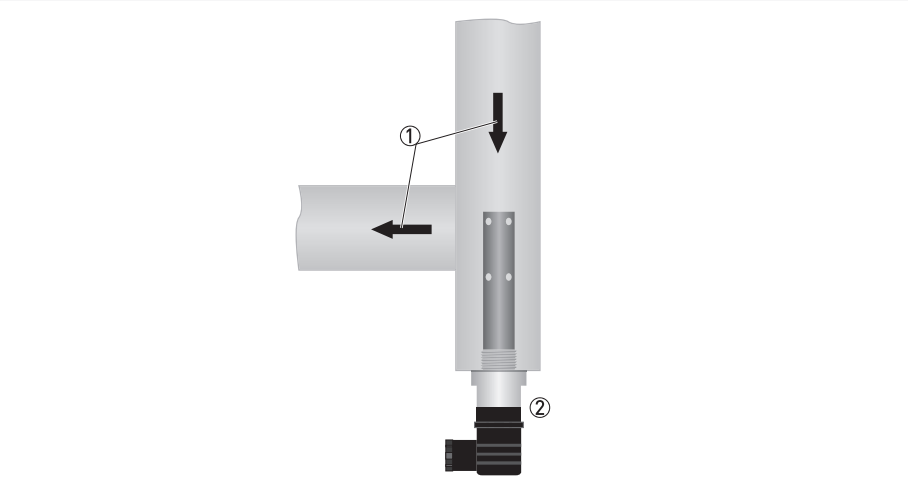



Figure 3-5: Installation for clean water

① Flow direction
② Ordered sensor

- This installation is only recommended if there are no particles or air bubbles in the pipe.

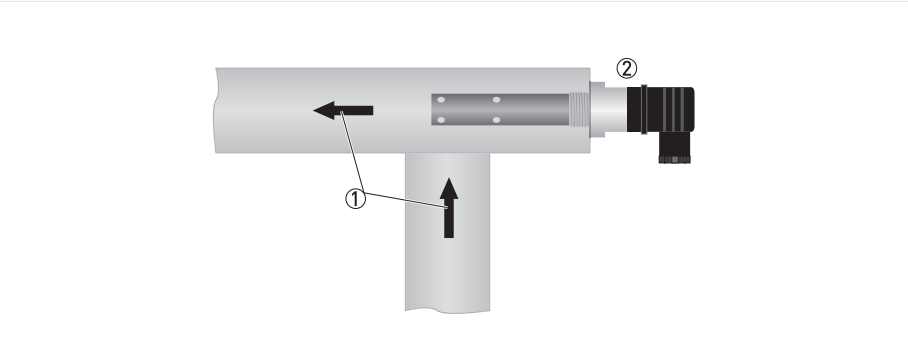



Figure 3-6: Installation for clean water

① Flow direction
② Ordered sensor

- This installation is only recommended if the pipe is completely filled.

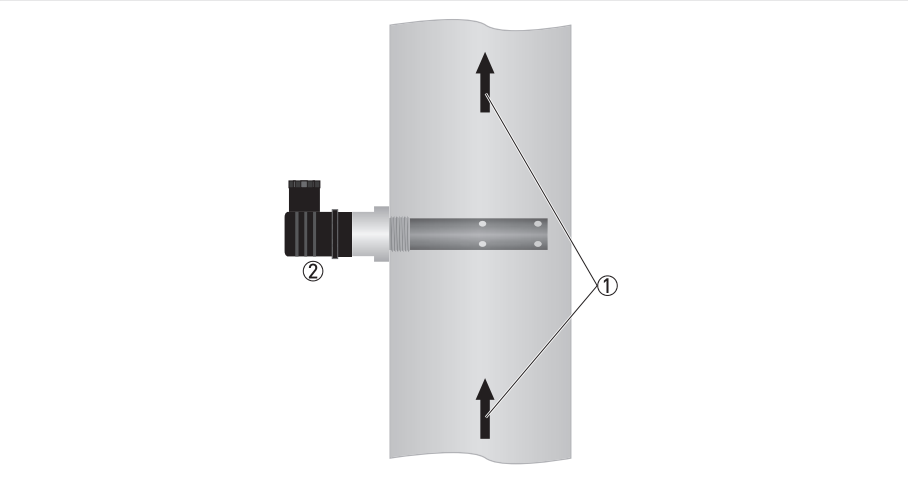



Figure 3-7: Possible installation

① Flow direction
② Ordered sensor

- This installation is only recommended if the pipe is completely filled.
- Consider the diameter of the pipe, i.e. compare pipe DN with insertion length of the sensor shaft.

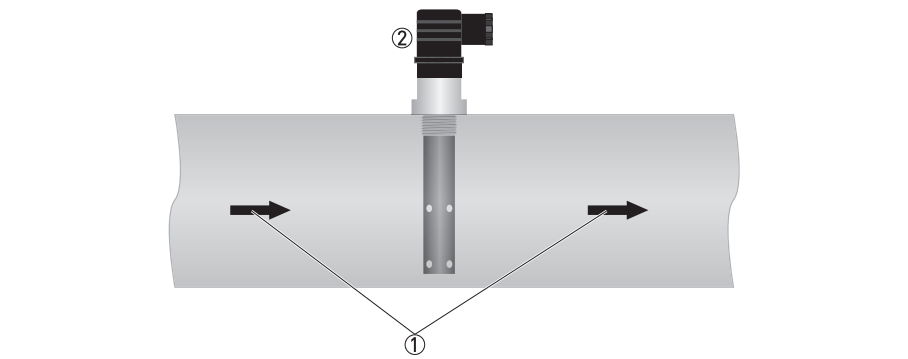



Figure 3-8: Possible installation

① Flow direction
② Ordered sensor

- This installation is only recommended if the pipe is completely filled and if there are no particles or air bubbles in the pipe.

## 3.7.2 Mounting to a flow through assembly

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

*INFORMATION!*
*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.*

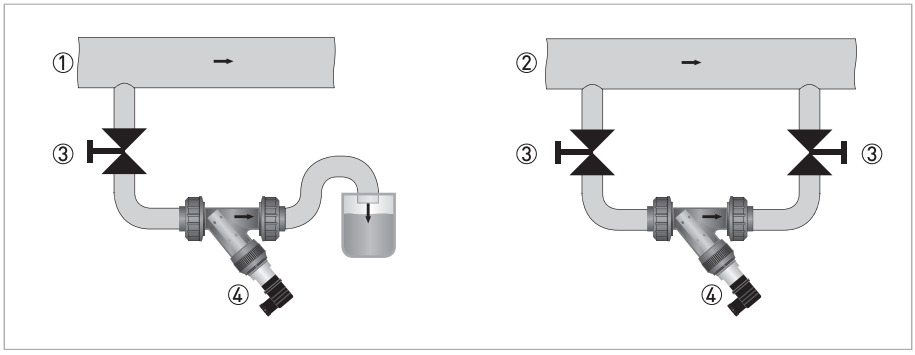



Figure 3-9: Possible mounting positions of the flow-through assembly

① Mounting in an outlet pipe
② Mounting in a bypass pipe
③ Shut-off valve
④ Sensor installed in flow through assembly

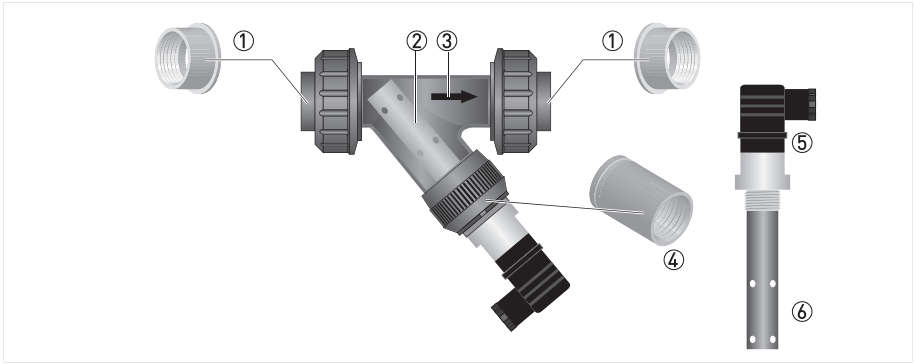
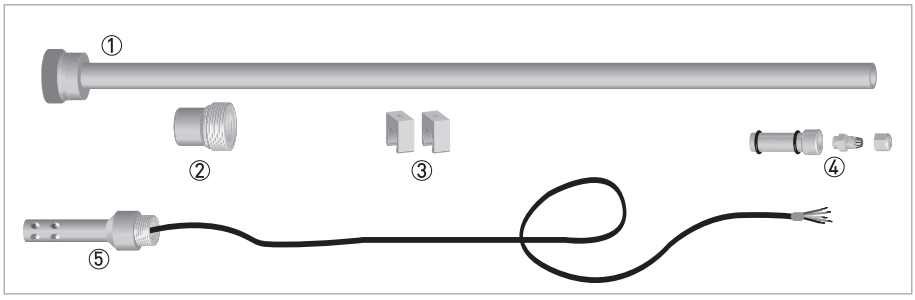



Figure 3-10: Installing the sensor into the flow-through assembly

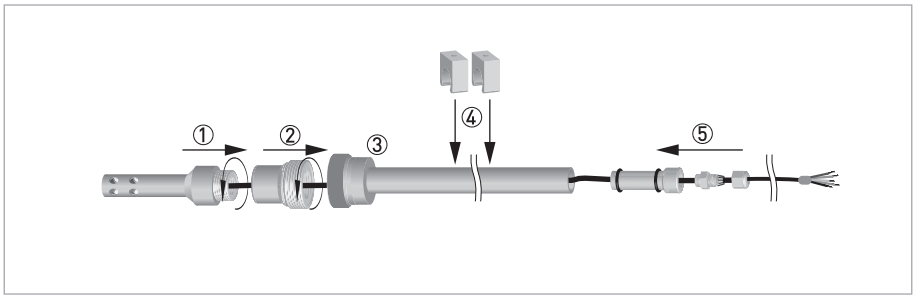
① Process connection
② Protective cage
③ Flow direction
④ Female thread
⑤ 4-pin-right-angle plug
⑥ Sensor

- Make sure that the plug ⑤ is connected to the sensor ⑥.
- Screw the sensor into the female thread ④ of the flow through assembly. Tighten the sensor by hand.

### 3.7.3 Mounting sensor into immersion assembly




① Immersion assembly
② Sensor-assembly connector
③ Clamps
④ Caps with cable gland
⑤ Sensor (only for immersion version with attached cable)

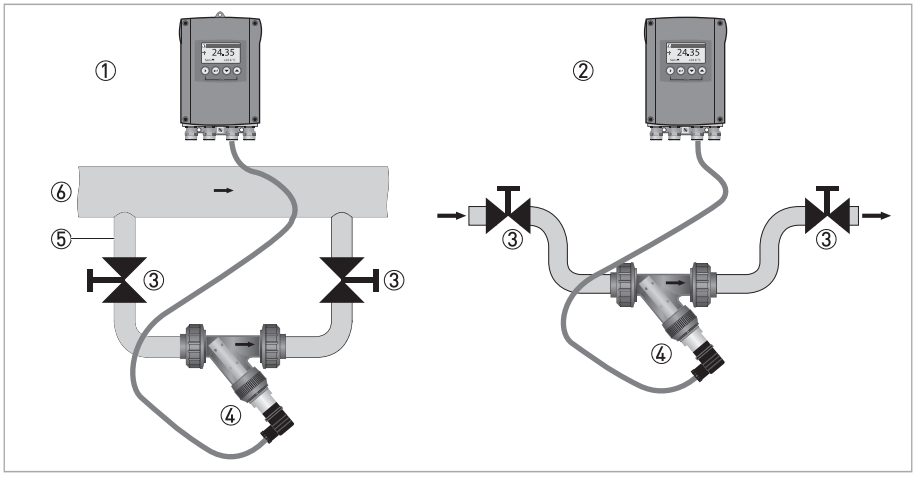



① Sensor with attached cable
② Sensor-assembly connector
③ Immersion assembly
④ Clamps onto immersion assembly
⑤ Cap with cable gland

- Pull the cap with cable gland ⑤ off the immersion assembly
- Push the sensor cable through the sensor-assembly connector ②, the immersion assembly ③ and the cap with cable gland ⑤.
- Screw the sensor-assembly connector ② into the immersion assembly ③. Then screw the sensor ① into the sensor-assembly connector.
- Push the cap with cable gland onto the immersion assembly again ④.

## 3.8 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 assembly.




① Bypass measurement
② Inlet measurement
③ Shut-off valve
④ Flow-through assembly with sensor
⑤ Bypass pipe
⑥ Main pipe

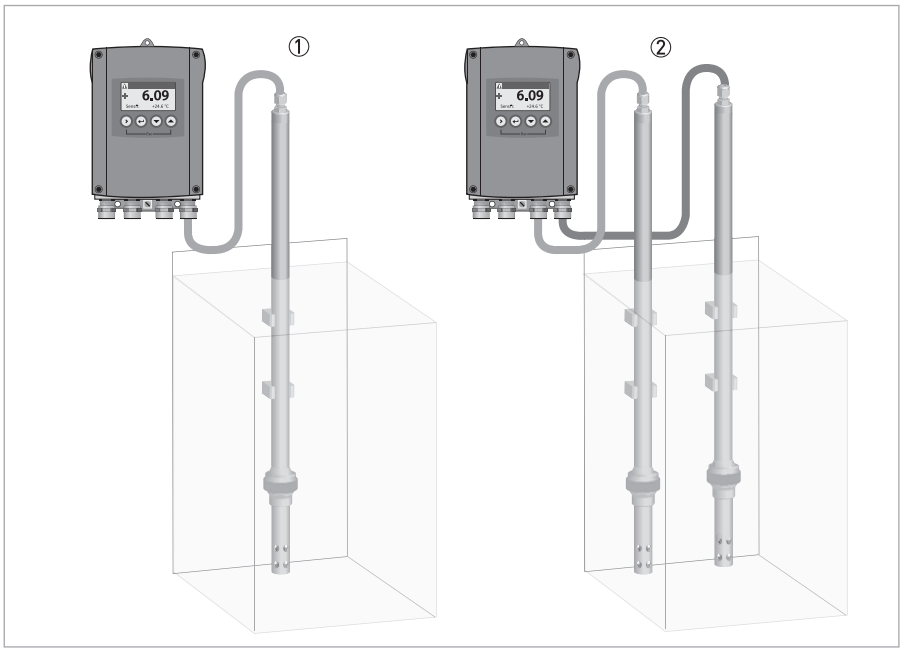



Figure 3-11: Installation with signal converter

① Single channel version
② Dual channel version

## 4.1 Menu mode structure

*INFORMATION!*
*The following table just presents an overview. When programming the device, always consult the function tables additionally as they contain further information!*
*Only the sensor relevant menus are shown in the following tables. For detailed information about the general setting refer to the signal converter manual.*

| Main menu | | Submenu | Parameter |
|---|---|---|---|
| **A quick setup** | A6 analog outputs | A6.1 measurement | For further information see function tables. |
| | | A6.2 spec. conductivity | |
| **B test** | B1 sim. process input A | B1.1 temperature | For further information see function tables. |
| | | B1.2 spec. conductivity | |
| | | B1.3 spec. resistance | |
| | B4 actual values | B4.2 process input A | |
| | | B4.2.1 temperature | |
| | | B4.2.2 spec. conductivity | |
| | | B4.2.3 Meg. Ohm | |
| | | B4.2.5 pH | |
| | | B4.2.8 generator volt. | |
| | | B4.2.9 CPU temp. | |
| | | B4.2.10 range | |
| | | B4.2.11 electrode volt. | |
| | B6 information | B6.2 process input A | |
| **C setup** | C1 process input A | C1.1 parameter | For further information see function tables. |
| | | C1.2 cell constant | |
| | | C1.3 cable resistance | |
| | | C1.4 concentration | |
| | | C1.14 time constant | |
| | | C1.15 temperature | |
| | | C1.23 cell calibration | |

## 4.2 Function tables

### 4.2.1 Menu A, quick setup

*INFORMATION!*
*Note that the appearance of some sub-menus depends on the hardware setting and the used sensor(s). Also only the sensor relevant menus and submenus are shown here in detail. For all other menu functions refer to the MAC 100 signal converter manual.*

**A 6.1 measurement:**

Value used for driving the current output C. Choose between:

- spec. conductivity
- temperature
- spec. resistance
- spec. conductivity

**A 6.2 spec. conductivity**

Unit for the current output range. Choose between:

- µS/cm
- mS/cm
- free unit

### 4.2.2 Menu B, test

*INFORMATION!*
*Note that the appearance of some sub-menus depends on the hardware setting and the used sensor(s). Also only the sensor relevant menus and sub-menus are shown here in detail. For all other menu functions refer to the MAC 100 signal converter manual.*

The procedure to start the simulation process is the same for all functions:

- Choose the function with the help of ↓ or ↑ and press ↵.

➲ You see the two options "set value" (opens the editor to enter the simulation value) and "break" (exits the menu without simulation).

- Choose the desired option with the help of ↑ or ↓ and press ↵.

➲ If you chose "set value", the device asks "start simulation" and offers the options "no" (exits the menu without simulation) or "yes" (starts the simulation finally).

- Choose the desired option with the help of ↑ or ↓ and press ↵.

➲ If you chose "yes", the simulation starts.

### B1,sim.process inp.A
### B2,sim.process inp.B

| Level | Designation / function | Settings / descriptions |
|---|---|---|
| **B1.1** | temperature | In this menu the temperature can be simulated. |
| **B1.2** | spec. conductivitiy | In this menu the conductivity can be simulated. |
| **B1.3** | spec. resistance | In this menu the resistance can be simulated. |

### B4, actual values

| Level | Designation / function | Settings / descriptions |
|---|---|---|
| This menu groups several functions which allow to display the corresponding actual reading. The shown measurements are depending on the device configuration. | | |
| **B4.2** | process input A | In this menu the measurements from process input A can be read. |
| **B4.3** | process input B | In this menu the measurements from process input B can be read. (for 2 channel version only) |

### B6, information

| Level | Designation / function | Settings / descriptions |
|---|---|---|
| This menu groups several other menus which contain device specific information. The build-up of the display is the same for all menus:<br>• 1st line: ID No. of the circuit board<br>• 2nd line: software version<br>• 3rd line: production date | | |
| **B6.2** | process input A | Gives information about the electronical part of process input A. |
| **B6.3** | process input B | In this menu the measurements from process input B can be read. (for 2 channel version only) |

## 4.2.3 Menu C, setup

*INFORMATION!*
*The signal converter has a dual process input, A and B. Each process input has an own submenu in this main menu. Process input A is always present, i.e. there is always a board in the interface "Pos.A" in the connection area. The interface of process input B only has a board with the dual channel signal converter. Be aware that the definition which kind of measurement a process input can do is defined when ordering the device. The configuration cannot be changed later.*

*INFORMATION!*
*Note that the appearance of some submenus depends on the hardware setting and the used sensor(s).*

## C1, process input A
## C2, process input B

| Level | Designation / function | Settings / descriptions |
|---|---|---|
| Process input A and B can be either a sensor 1 or a sensor 2. Further information about the type of sensor 1 or 2 please refer to MAC 100 manual "Sensor input combinations". Process input A is always present, process Input B can be present.<br>Note: The exchange of a sensor 1 with a sensor 2, or vice versa, can only be done by the manufacturer!<br>Depending on the sensor which is connected to a slot A or B the menu changes. | | |
| **C1.1** | parameter (conductivity) | This menu item is for selecting the probe which is connected to process input A/B. The entries of this selection depends on the chosen device configuration. The device configuration is customer specific and set during production. |
| **C1.2** | cell constant | Enter cell constant. |
| **C1.3** | cable resistance | Enter cable resistance in Ohm |
| **C1.14** | time constant | Enter time constant. |
| **C1.15** | temperature | Menu for temperature measurement. Available for sensor 1 and sensor 2. |
| C1.15.1 | probe | Options:<br>• manual: used if no internal or external temperature sensor is connected to the signal converter<br>• Pt1000: used if an external Pt1000 temperature sensor is connected to the signal converter |
| C1.15.2 | manual | Only available if C1.15.1 is set to "manual". If you have chosen "manual" enter temperature. |
| C1.15.3 | correction | Offset correction for temperature measurement. Not available if C1.15.1 is set to "manual". If you have chosen “Pt 1000” enter the temperature correction. |
| C1.15.4 | limitation | Measuring ranges for temperature measurement. Enter limitation |
| C1.15.5 | temp. comp. | Menu for editing the temperature compensation parameters for the measurement. |
| | | Options:<br>• off<br>• table<br>• ultra pure water NACl<br>• ultra pure water Nao3<br>• upw morpholin<br>• ultra pure water NH3<br>• ultra pure water HCL<br>• ultra pure water<br>• linear |
| C1.15.6 | temp. coefficient | If you have chosen “linear” enter the temperature coefficient. |
| C1.15.7 | ref. temperature | If you have chosen “linear” enter the reference temperature. |
| C1.15.8 | Reference points | Only available if C1.15.5 is set to “table”. Choose:<br>• 2 till 10 |
| C1.15.9 | tbl. temperature | Only available if C1.15.5 is set to “table”. Choose:<br>• temperature for each row |
| C1.15.10 | tbl. conductivity | Only available if C1.15.5 is set to “table”. Choose:<br>• conductivity for each row |
| **C1.23** | cell calibration | For detailed information refer to calibration on page 30 |
| C1.23.1 | temp. comp. | Menu for temperature measurement. |
| | | Options:<br>• off: temperature measurement is disabled.<br>• manual: temperature value has to be entered manually.<br>• automatic: temperature measurement is performed as configured |

| Level | Designation / function | Settings / descriptions |
|---|---|---|
| C1.23.2 | temperature | Menu for setup of manual temperature (manual temperature measurement). |
| C1.23.3 | temp. coefficient | Menu for setup of temperature coefficient (manual temperature measurement). |
| C1.23.4 | spec. conductivity | Enter the conductivity of the calibration fluid. |
| | | Menu for preparation of measurement:<br>• Put probe into calibration fluid<br>• Wait until measurement is stable.<br>• Press enter to proceed.<br>Wait until concentration is measured. |
| C1.23.5 | cell constant | Enter cell constant. |
| | | Check slope, press enter, decide whether to store or to discard calibration parameter. |

*CAUTION!*
*If you choose for measurement the temperature compensation "linear" than choose between "automatic" or "manual" for the temperature compensation during calibration. If you choose for measurement the temperature compensation "off" than choose also "off" for the temperature compensation during calibration.*

## 4.3 Calibration

### 4.3.1 Temperature compensation

There are three basic options for temperature compensation:

- **automatic:** the signal converter will automatically compensate temperature influences using the information of a Pt1000 temperature sensor.
- **manual:** the signal converter will compensate temperature influences using a manually entered value; this option only makes sense if the temperature of the measured medium is quite constant.
- **off:** temperature compensation is disabled.

*INFORMATION!*
*If you choose no compensation, the measured conductivity will most probably deviate considerably from the actual conductivity. The reason is that the conductivity of a specific medium varies depending on the temperature of the medium.*

The menu for the type of temperature compensation offers the following options:

- **Pt1000**: choose this option if there is an external Pt1000 temperature sensor connected to the signal converter.
- **manual**: choose this option if there is no internal or external temperature sensor connected to the signal converter.

After starting-up the signal converter, the measuring screen appears. This is the standard screen which is displayed automatically in the normal operating mode. If you are in this mode and you want to adjust the temperature compensation, you have to perform the following steps:

### Step 1: activating the temperature compensation for measurement

- Press **>** for more than 2.5 seconds, then release the button. You are on the main menu level. In the upper line of the display "A" appears, beneath the main menu **quick setup** is highlighted.
- Press ▼ or ▲ until the main menu **setup** is highlighted.

| |
|---|
| MAIN MENU |
| A quick setup<br>B test<br>**> C setup**<br>D service |
| • Press **>** to enter the chosen menu. |
| You are on the first submenu level. In the upper line of the display "setup" and "c1" appears, beneath the submenu **process input A** is highlighted. |
| • Press ▼ or ▲ to select **process input A**. |
| • Press **>** to enter the chosen menu. |
| You are on the second submenu level. In the upper line of the display "process input A" and "c1.1"appears beneath the submenu **parameter** is highlighted. |
| • Press ▼ or ▲to select **temperature** |
| • Press **>** to enter the chosen menu. |
| You are on the third submenu level. In the upper line of the display "temperature" and "C1.15.1" appears, beneath the submenu **probe** is highlighted |
| • Press ▼ or ▲to select **temp. comp.** |
| • Press **>** to enter the chosen menu. |

- Now you can set up the temperature compensation. Press ▼ or ▲to select **off** or **linear**. Press ↵ to confirm the entered value.

## Step 2: choosing the type of temperature compensation

| Step 2a: **probe Pt100/1000** |
|---|
| Read the currently measured temperature of the Pt1000 temperature sensor from the measurement screen and write it down.<br>Measure the temperature with a reference thermometer and check if it deviates from the temperature measured by the Pt1000.<br>• Press **>** for more than 2.5 seconds, then release the button. You are on the main menu level. In the upper line of the display "A" appears, beneath the main menu **setup** is highlighted.<br>• Press ▼ or ▲ until the main menu **setup** is highlighted. |
| MAIN MENU |
| A quick setup<br>B test<br>**> C setup**<br>D service |
| • Press **>** to enter the chosen menu. |
| You are on the first submenu level. In the upper line of the display "setup" and "c1" appears, beneath the submenu **process input A** is highlighted. Choose process input A or B where ever pH is configurated. |
| • Press ▼ or ▲ to select **process input A**. |
| • Press **>** to enter the chosen menu . |
| You are on the second submenu level. Press ▼ or ▲ until the submenu **temperature** is highlighted. |
| • Press **>** to enter the chosen menu. |
| You are on the third submenu level. Press ▲ or ▼ until the submenu **correction** is highlighted. |
| • Press ↵ to enter the chosen menu |

- If necessary, enter the temperature correction in Kelvin so that the signal converter shows the same temperature as the reference thermometer. Press ↵ to confirm the entered value. The temperature sensor has been adjusted.

| Step 2b: **probe manual** |
|---|
| Measure the temperature of the measuring medium.<br>• Press **>** for more than 2.5 seconds, then release the button. You are on the main menu level. In the upper line of the display "A" appears, beneath the main menu **setup** is highlighted.<br>• Press ▼ or ▲ until the main menu **setup** is highlighted. |
| MAIN MENU |
| A quick setup<br>B test<br>**> C setup**<br>D service |
| • Press **>** to enter the chosen menu. |
| You are on the first submenu level. In the upper line of the display "setup" and "c1" appears, beneath the submenu **process input A** is highlighted. |
| • Press ▼ or ▲ to select **process input A**. |
| • Press **>** to enter the chosen menu **process input A**. |
| You are on the second submenu level. Press ▲ or ▼ until the submenu **temperature** is highlighted. |
| • Press **>** to enter the chosen menu. The submenu **probe** is highlighted. |
| • Press ▼ or ▲ until the submenu **manual** is highlighted.<br>• Press ↵ to enter the chosen menu |

- Enter the measured temperature. Press ↵ to confirm the entered value. The manually measured temperature will now be used for temperature compensation.

### 4.3.2 Calibrating measurement

Calibration is necessary in regular intervals or when installing a new sensor.

When calibrating a conductivity measurement, keep in mind that the measuring system as a whole is calibrated, and not only the sensor. Therefore the measuring system has to be recalibrated if, for example, the measuring medium changes.

In an intact sensor, the optimal slope is 59 mV and the optimal zero point is 0 mV. The slope should at least have a value between 50...65 mV.
Re-calibrate the sensor if the slope does not approximate those limits.
As the sensor ages, the slope gets flatter and the zero error increases. When one or both of these values exceed certain limits, the signal converter displays a message indicating that the sensor has to be exchanged.

To avoid alarms on the distrubted control system (DLC) when temporarily removing the sensor (i.e. for maintenance), the signal converter has a hold function. This function "freezes" all outputs (i.e. the display and the current outputs) of the last measured value.

*INFORMATION!*
*As an indication that the hold function is active, the "warning sign" in the upper left corner of the display appears. Meanwhile the status messages show "checks in progress". For more details about how to select the manual hold function refer to the signal converter documentation.*

After starting-up the signal converter, the measuring screen appears. This is the standard screen which is displayed automatically in the normal operating mode. If you are in this mode and you want to initiate a calibration, you have to activate the manual hold function performing the following steps.

## Step 1: activating the hold function

- Press **>** for more than 2.5 seconds, then release the button. You are on the main menu level. In the upper line of the display "A" appears, beneath the main menu **quick setup** is highlighted.
- Press ▼ or ▲ until the main menu **quick setup** is highlighted.

| | | | |
|---|---|---|---|
| | MAIN MENU | | |
| | **> A quick setup**<br>B test<br>C setup<br>D service | | |
| | • Press **>** to enter the chosen menu. | | |
| | | You are on the first submenu level. In the upper line of the display "quick setup" and A1" appears, beneath the submenu **language** is highlighted. | |
| | | • Press ▼ or ▲ until the submenu **hold function** is highlighted.<br>• Press **>** to enter the chosen menu. | |
| | | | You are on the second submenu level. In the upper line of the display "manual hold" appears, beneath the option **off** is highlighted |
| | | | • Press ▼ or ▲ to choose the option on |
| | | | • Press ↵ to confirm the entered value. |

- You have activated the hold function. To go to the next step and prepare the calibration procedure. You have to return to the measuring mode.
- Press ↵ until you reach the measuring mode again

## Step 2: preparing the calibration procedure

- If you calibrate a new sensor, make sure that the sensor is correctly connected to the signal converter.
- Check the sensor for damages or dirt deposits.
- Provide a suitable standard solution. Further information on page 8

After activating the hold function and the preparative measures, you can get access to the calibration procedure from the measuring mode via the main menu **setup** (step 3a).

### Step 3a: accessing the calibration menu via the main menu **setup**

- Press **>** for more than 2.5 seconds, then release the button. You are on the main menu level. In the upper line of the display "A" appears, beneath the main menu **quick setup** is highlighted.
- Press ▼ or ▲ until the main menu **setup** is highlighted.

| | | | |
|---|---|---|---|
| | MAIN MENU | | |
| | A quick setup<br>B test<br>**> C setup**<br>D service | | |
| | • Press **>** to enter the chosen menu. | | |
| | | You are on the first submenu level. In the upper line of the display "setup" and "c1" appears, beneath the submenu **process input A** is highlighted. | |
| | | • Press ▼ or ▲ to select **process input A** is highlighted. | |
| | | • Press **>** to enter the chosen menu. | |
| | | | You are on the second submenu level. In the upper line of the display "process input A" and "C1.1" appears, beneath the submenu **parameter** is highlighted. |
| | | | • Press ▼ or ▲ until the submenu **cell calibration** is highlighted. |
| | | | • Press **>** to enter the chosen menu. |

- You can start the calibration procedure now as described in "Step 4".

### Step 4: calibration procedure

- After choosing the submenu **cell calibration** (step 3a) in the previous steps, continue by pressing **>**.

➲ The signal converter demands to choose the kind of temperature compensation. You have the options "off", "automatic" and "manual" ( refer to *Temperature compensation* on page 27). Please select the same kind of temperature compensation for the calibration as for the measurement.

- If you chose "automatic", just press ↵. If you chose "manual", first enter the temperature and the temperature coefficient of the measured medium using ▼ or ▲ and then press ↵.

➲ On the screen the message **spec.conductivity** appears.

- Enter the specific conductivity in µS/cm
- The signal converter now performs a measurement which takes 20 seconds.

➲ On the screen the message cell constant appears

- Enter the cell constant in 1/cm.

➲ The signal converter now asks store cal. value?

- Choose **yes** to store the calibration values. Choose **no** to discard the results.
- Press ↵ to confirm.

➲ Prior returning to the measuring display, you are asked if the configuration should be stored.

- Choose **yes** using ▼ or ▲ to store the new calibration values.

➲ You have completed the calibration.

- If you want to return to the measuring mode, press ↵ several times until you reach this mode.

*INFORMATION!*
*The "stored value" is a calculated value based on the actual measurement. The signal converter calculates this value depending on the compensation methods (temperature compensation) chosen for the calibration. Do not change the compensation method in the time between the measurement of the "stored value" and the input of the reference value. Otherwise this could result in a wrong calibration.*

### Step 5: re-installing the sensor

- After the calibration procedure, rinse the sensor with tap water.
- Reinstall the sensor into its assembly, refer to *Installing the sensor* on page 16.

### Step 6: switching back to measurement

- Deactivate the function "hold function " again.

## 4.3.3 Calibration log

*INFORMATION!*
*In order to show the history of the calibrations, the converter has a calibration logbook function. Up to 64 entries of the calibration history are stored including date and time.*

### Accessing the calibtration log

- Press **>** for more than 2.5 seconds, then release the button. You are on the main menu level. In the upper line of the display "A" appears, beneath the main menu **quick setup** is highlighted.
- Press ▼ or ▲ until the main menu **test** is highlighted.

MAIN MENU
A quick setup
**> B test**
C setup
D service

Press **>** to enter the chosen menu.

You are on the first submenu level. In the upper line of the display "test" and "B1" appears, beneath the submenu **sim.process input A** is highlighted.

Press ▲ or ▼ until the submenu **logbooks** is highlighted.

Press **>** to enter the chosen menu.

You are on the second submenu level. In the upper line of the display "logbooks" and "B5.1" appears, beneath the submenu **status log** is highlighted.

Press ▼ or ▲ until the submenu **calibration log** is highlighted.

Press **>** to enter the chosen menu.

- You are on the data level and you see the calibration history. With the help of ▼ or ▲ you can scroll through the different entries.
- If you want to return to the measuring mode press ↵ several times until you reach this mode.

# 5.1 Maintenance

## 5.1.1 Cleaning

- Clean the sensor surface with pure water.
- Slight dirt residues or dust: Rinse the sensor with tap water and clean it with a soft tissue.
- Oily and greasy coatings: Remove with a warm soap solution and rinse with water.
- Hardness deposits or metal hydroxide deposits: Remove with 10% citric acid or hypochloric acid and rinse with water.

## 5.1.2 Aging and re-calibration

When the sensor becomes too old to provide reliable measurements, the signal converter displays an error message after the calibration procedure. In this case, the sensor has to be exchanged.

# 5.2 Spare parts availability

The manufacturer adheres to the basic principle that functionally adequate spare parts for each device or each important accessory part will be kept available for a period of 3 years after delivery of the last production run for the device.

This regulation only applies to spare parts which are subject to wear and tear under normal operating conditions.

# 5.3 Availability of services

The manufacturer offers a range of services to support the customer after expiration of the warranty. These include repair, maintenance, technical support and training.

*INFORMATION!*
*For more precise information, please contact your local sales office.*

# 5.4 Returning the device to the manufacturer

# 5.5 Disposal

*CAUTION!*
*Disposal must be carried out in accordance with legislation applicable in your country.*

## 6.1 Measuring principle

### 6.1.1 Conductive measurement

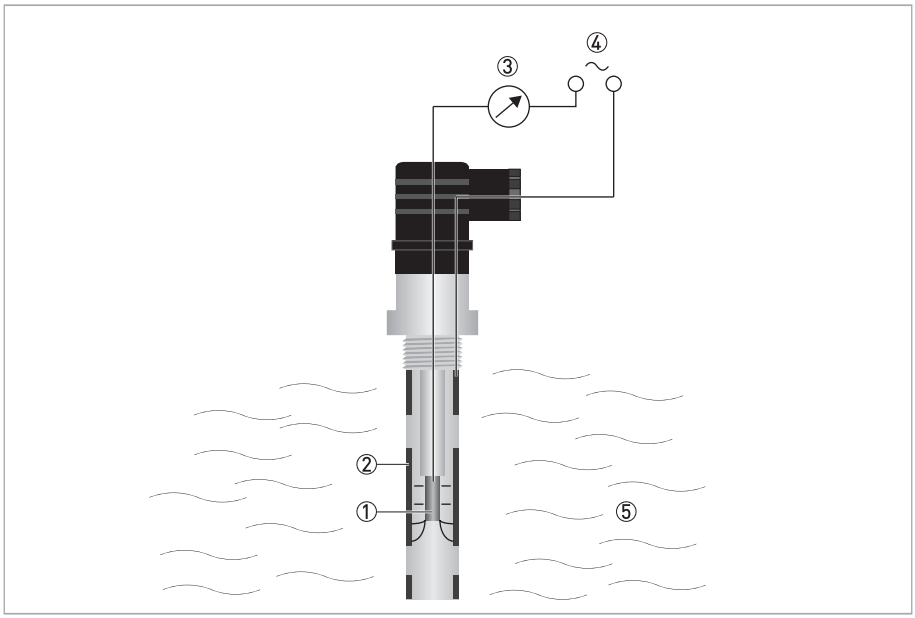



Figure 6-1: Measuring principle for conductivity measurement

① Inner electrode
② Outer electrode
③ Current measurement
④ Power supply
⑤ Measuring medium

The principle of conductivity measurement is defined as the capacity of a solution to conduct an electrical current between two electrodes. For determining the electrolytic conductivity it is necessary to record the number of dissolved ions summarily. The parameter serves as a scale for water purity and is given in Siemens. As there are two open cells, mutual voltage is being produced. This one on its part generates electricity depending on the resistance of the medium. As the medium is in direct contact with the electrode, the medium reacts faster to differences in measuring values. The integrated temperature sensor compensates the conductivity.
Using Ohm's law: Ohm = Voltage/Current, the resistance of a liquid can be determined by measuring the current while keeping voltage constant. Specific conductivity is defined by 1/resistance. The unit of measurement is Siemens and is normally expressed in µS/cm or mS/cm. An important criterion for the measuring range of conductivity cells is the geometry of the electrodes. There are two rules which are characteristic for conductivity measurement:

1. The larger the distance between the two electrodes, the larger the resistance.
2. The larger the electrode surface, the lower the resistance.

The surface area (A) and the distance (L) must be correctly matched to the desired measuring range. This is called the "cell constant" defined as c=L/A.

## 6.2 Technical data

### Measuring system

| | |
|---|---|
| Measuring principle | Conductive conductivity |
| Measuring range | OPTISENS COND 1200 (W)<br>0.1...200 µS/cm (c=0.05)<br>1...2000 µS/cm (c=0.2)<br>1...20 mS/cm (c=1) |
| | OPTISENS COND 1200 (PW)<br>0.05...10 µS/cm (c=0.01)<br>0.001...1 mS/cm (c=0.1) |
| | OPTISENS COND 1200 (GF)<br>10 µS/cm...15 mS/cm (c=1) |

### Materials

| | |
|---|---|
| Construction | OPTISENS COND 1200 (W):<br>Body: PVDF<br>Cell: Stainless steel (1.4571) |
| | OPTISENS COND 1200 (PW):<br>Body: PVDF<br>Cell: Stainless steel (1.4571) or titanium |
| | OPTISENS COND 1200 (GF):<br>Body: PVDF<br>Cell: Graphite (GF) |
| Sensor options | With integrated Pt100 temperature sensor |
| Process connection | OPTISENS COND 1200 (W):<br>G3/4 A male thread<br>G1/2 A male thread for immersion assembly |
| | OPTISENS COND 1200 (PW/GF):<br>G3/4 A male thread<br>G1/2 A male thread<br>G1 A male thread<br>3/4-14 NPT male thread |

### Measuring accuracy

| | |
|---|---|
| Conductivity accuracy | OPTISENS COND 1200 (W): +/- 2% full scale ① |
| | OPTISENS COND 1200 (PW): +/-10% from the nominal value ① |
| | OPTISENS COND 1200 (GF): +/-10% from the nominal value ① |

### Operating conditions

| | |
|---|---|
| Temperature range | OPTISENS COND 1200 (W/PW):<br>0...+135°C / +32...+275°F |
| | OPTISENS COND 1200 (GF):<br>0...+130°C / +32...+266°F |
| Max. operating pressure | OPTISENS COND 1200 (W/PW):<br>16 bar at +25°C, 9 bar at +60°C / 232 psi at +77°F, 130.5 psi at +140°F |
| | OPTISENS COND 1200 (GF):<br>16 bar at +25°C, 9 bar at +60°C / 232 psi at +77°F, 130.5 psi at +140°F |

① Depending on the production conditions, the cell constant can deviate from the nominal value. This deviation can be compensated at the signal converter.

## Electrical connection

| | |
|---|---|
| Cable | Cable COND-W 1200 |
| Sensor cable connection | OPTISENS COND 1200 (W/PW/GF):<br>4-pin connector (Hirschmann) |
| | OPTISENS COND 1200 (W):<br>Immersion version with attached cable 10 m / 33 ft |
| Cable length | 5 m / 16.5 ft |
| | 10 m / 33 ft |
| | 15 m / 49 ft |
| | 20 m / 65 ft |
| Cable options | Core end sleeve |

## 6.3 Dimensions

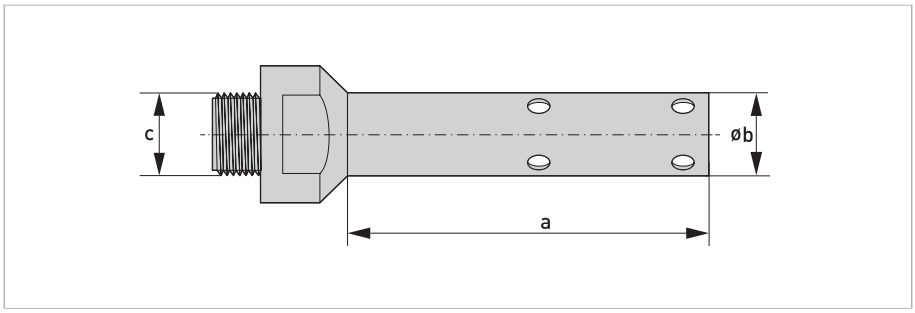



Figure 6-2: OPTISENS COND 1200 (W) immersion version

| | Dimensions [mm] | Dimensions [inch] |
|---|---|---|
| a | 100 | 3.94 |
| b | Ø 20 | Ø 0.79 |
| c | G1/2 A | |

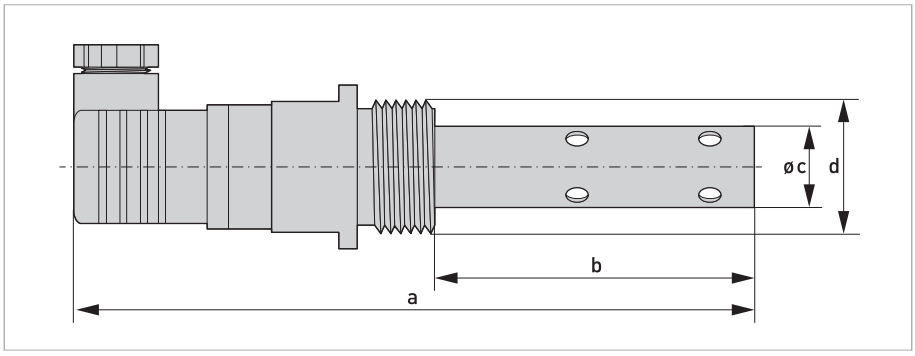



Figure 6-3: OPTISENS COND 1200 (W)

| | Dimensions [mm] | Dimensions [inch] |
|---|---|---|
| a | 186 | 7.32 |
| b | 100 | 3.94 |
| c | Ø 20 mm | Ø 0.79 |
| d | G3/4 A | |

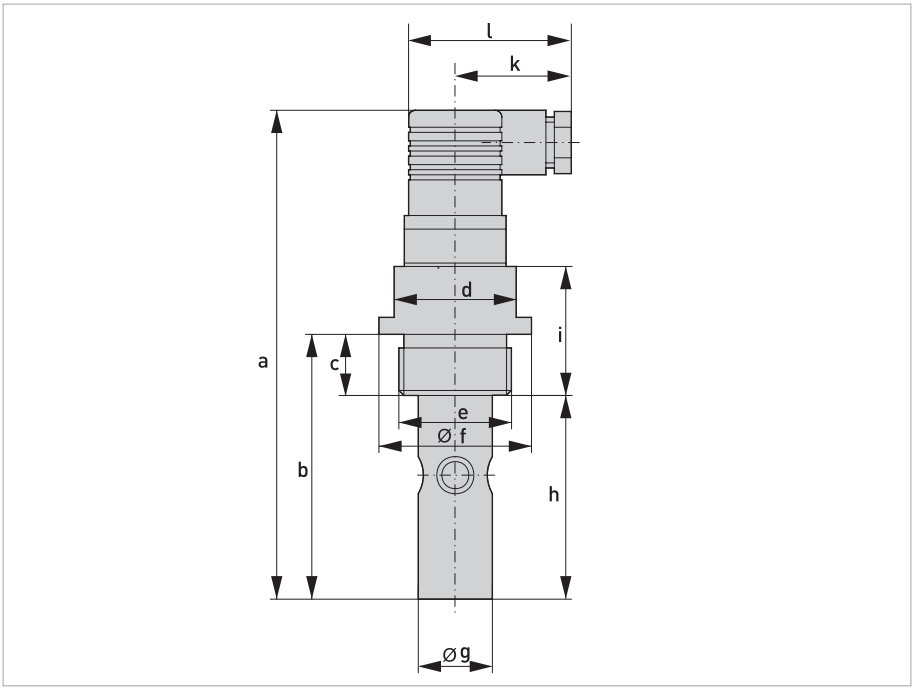



Figure 6-4: OPTISENS COND 1200 (PW)

| Dimension in mm | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| a | b | c | d | e | f | g | h | i | k | l |
| 145 | 80 | 20 | 36 | 3/4-14NPT | 45 | 23.8 | 60 | 38 | 37 | 50 |
| | 78 | 18 | | G1 A | | 22 | | | | |
| | 76 | 16 | | G3/4 A | | 22 | | | | |
| | 74 | 14 | | G1/2 A | | 16 | | | | |

| Dimension in inch | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| a | b | c | d | e | f | g | h | i | k | l |
| 5.71 | 3.15 | 0.79 | 1.42 | 3/4-14NPT | 1.77 | 0.94 | 2.36 | 1.5 | 1.46 | 1.97 |
| | 3.07 | 0.71 | | G1 A | | 0.87 | | | | |
| | 3 | 0.63 | | G3/4 A | | 0.87 | | | | |
| | 2.91 | 0.55 | | G1/2 A | | 0.63 | | | | |

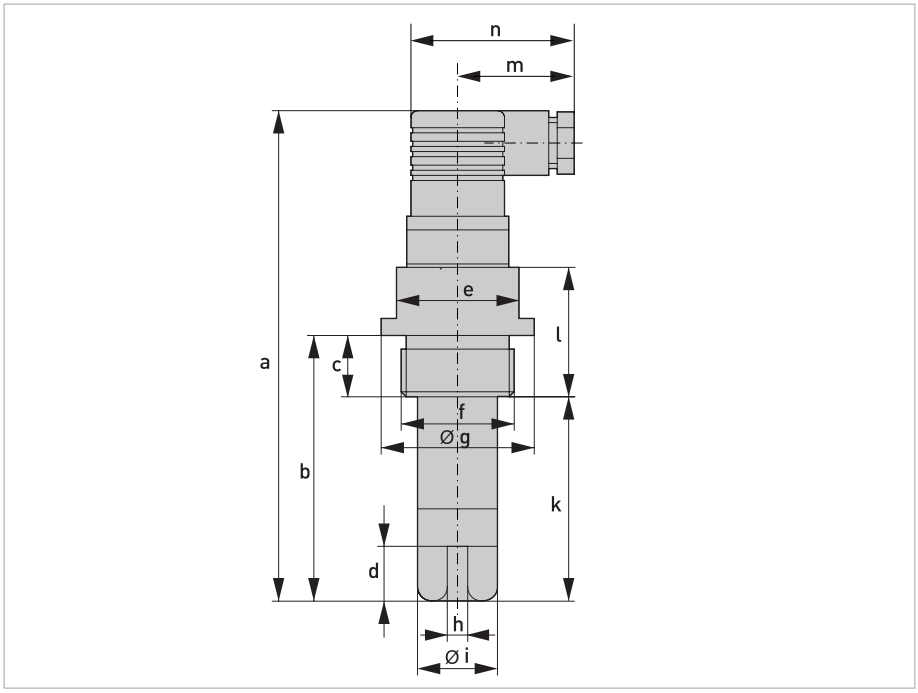
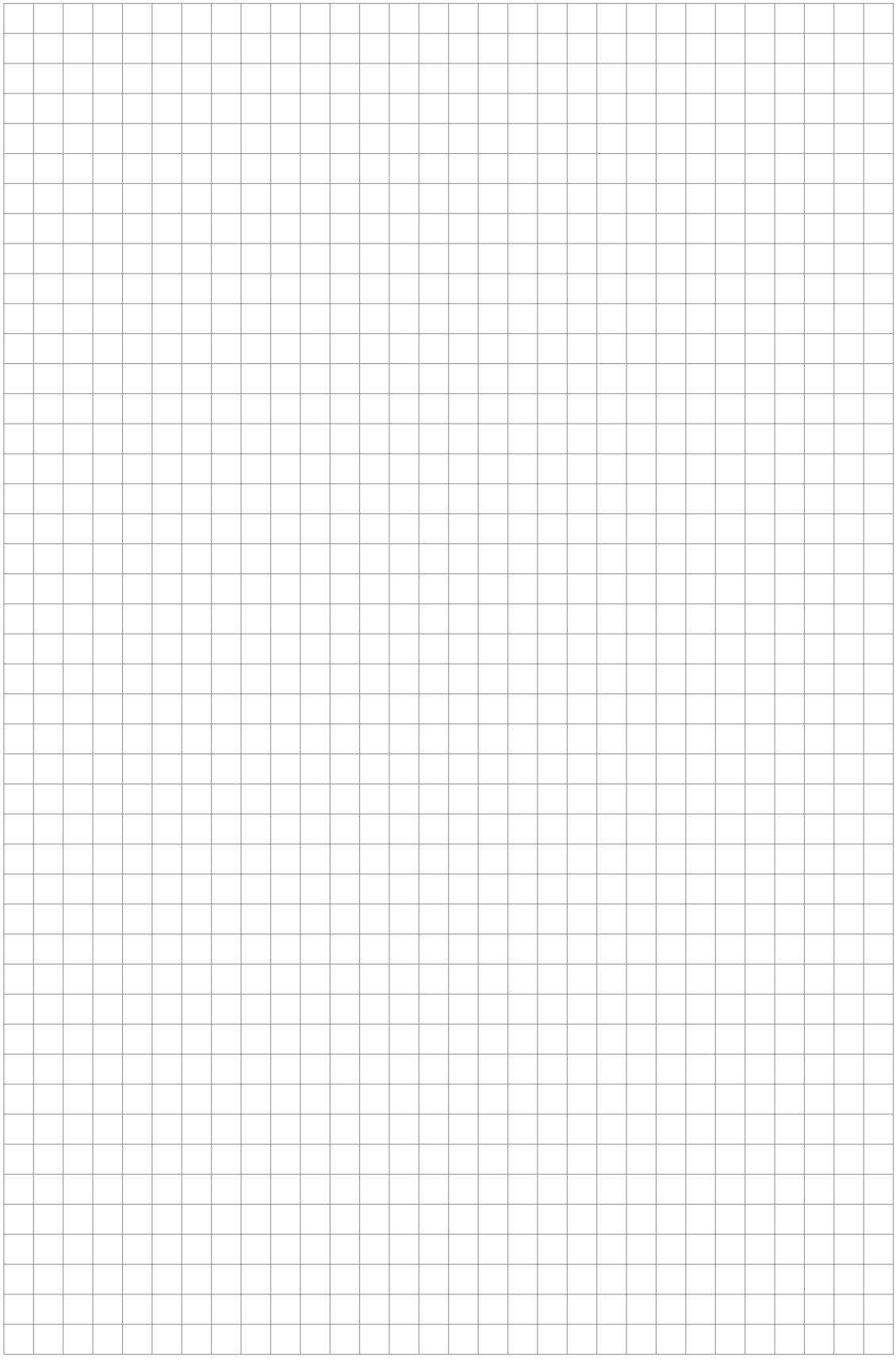



Figure 6-5: OPTISENS COND 1200 (GF)

| Dimension in mm | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| a | b | c | d | e | f | g | h | i | k | l | m | n |
| 145 | 80 | 20 | 16 | 36 | 3/4-14NPT | 45 | 6 | 23.5 | 60 | 38 | 37 | 50 |
| | 78 | 18 | | | G1 A | | | | | | | |
| | 76 | 16 | | | G3/4 A | | | | | | | |

| Dimension in inch | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| a | b | c | d | e | f | g | h | i | k | l | m | n |
| 5.71 | 3.15 | 0.79 | 1.42 | 1.42 | 3/4-14NPT | 1.77 | 0.24 | 0.93 | 2.36 | 1.5 | 1.46 | 1.97 |
| | 3.07 | 0.71 | | | G1 A | | | | | | | |
| | 3 | 0.63 | | | G3/4 A | | | | | | | |



## KROHNE product overview

- Electromagnetic flowmeters
- Variable area flowmeters
- Ultrasonic flowmeters
- Mass flowmeters
- Vortex flowmeters
- Flow controllers
- Level meters
- Temperature meters
- Pressure meters
- Analysis products
- Products and systems for the oil & gas industry
- Measuring systems for the marine industry

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KROHNE