

## OPTIWAVE 1010 Quick Start

Radar (FMCW) Level Transmitter for bypass chambers  
and magnetic level indicators (BM 26 Advanced)

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### Warnings and symbols used



#### **DANGER!**

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



#### **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.*



#### **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.

### Safety instructions for the operator



#### **CAUTION!**

*Installation, assembly, start-up and maintenance may only be performed by appropriately trained personnel. The regional occupational health and safety directives must always be observed.*



#### **LEGAL NOTICE!**

*The responsibility as to the suitability and intended use of this device rests solely with the user. The supplier assumes no responsibility in the event of improper use by the customer. Improper installation and operation may lead to loss of warranty. In addition, the "Terms and Conditions of Sale" apply which form the basis of the purchase contract.*



#### **INFORMATION!**

- Further information can be found on the supplied CD-ROM in the manual, on the data sheet, in special manuals, certificates and on the manufacturer's website.
- If you need to return the device to the manufacturer or supplier, please fill out the form contained on the CD-ROM and send it with the device. Unfortunately, the manufacturer cannot repair or inspect the device without the completed form.

## 2.1 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.

This radar level transmitter measures distance and level of liquids or the top of a float. It does not touch the measured product.

This radar level transmitter can only be used if it is correctly installed and aligned on a bypass chamber. The bypass chamber must be metallic and electrically conductive.

## 2.2 Scope of delivery



**INFORMATION!**

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

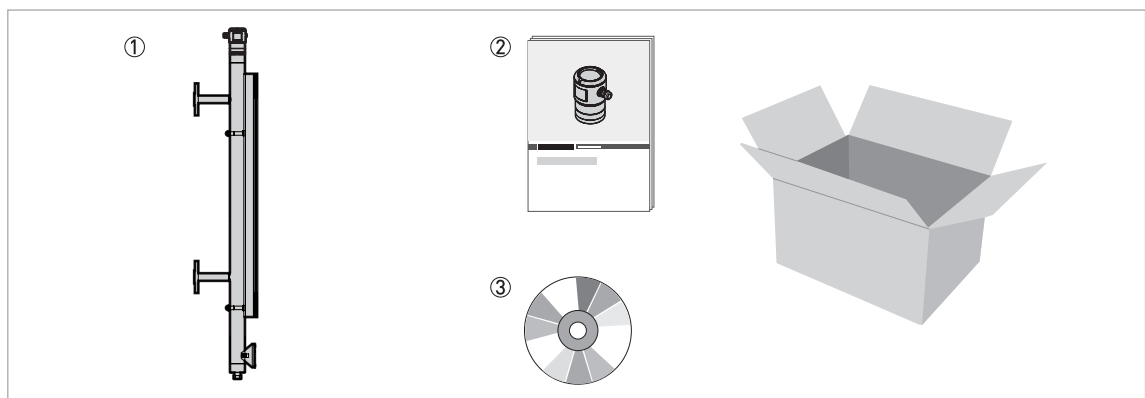


Figure 2-1: Scope of delivery

- ① Device and measuring chamber
- ② Quick Start
- ③ DVD-ROM (including Handbook, Quick Start, Technical Datasheet and related software)

## 2.3 Visual Check



### **INFORMATION!**

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

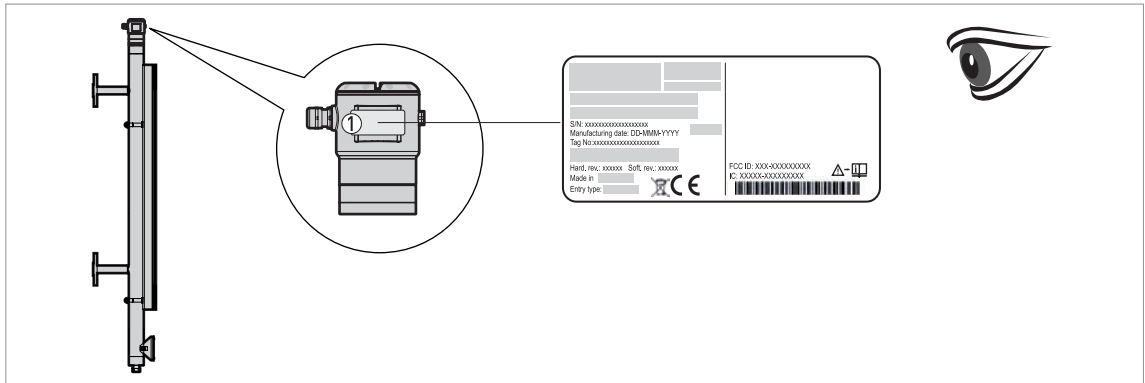


Figure 2-2: Visual check

- ① Device nameplate (for more data, refer to the handbook)



### **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.*

## 2.4 Storage

**INFORMATION!**

For more data about the magnetic level indicator, refer to the handbook for the BM 26 Basic / Advanced.

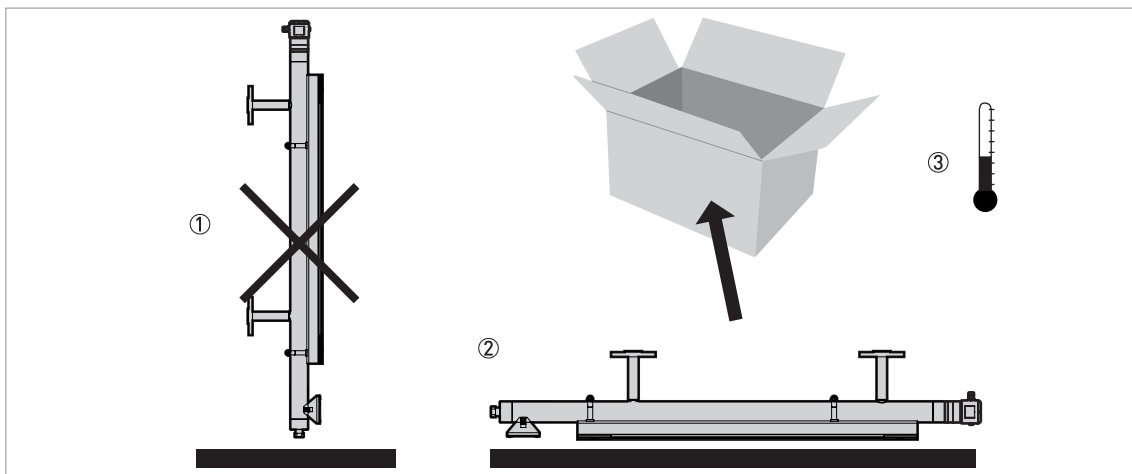


Figure 2-3: Storage conditions

- ① When you put the device into storage, do not keep it in a vertical position
- ② Put the device on its side. We recommend that you use the packaging in which it was delivered.
- ③ Storage temperature range:  $-40\dots+85^{\circ}\text{C}$  /  $-40\dots+185^{\circ}\text{F}$

- Store the device in a dry and dust-free location.
- Store the device in its original packing.

## 2.5 Transport

**WARNING!****OPTIWAVE1010 attached to a magnetic level indicator**

The indicator column is made of Pyrex® glass. If you do not lift the device carefully, you can cause damage to the magnetic level indicator.

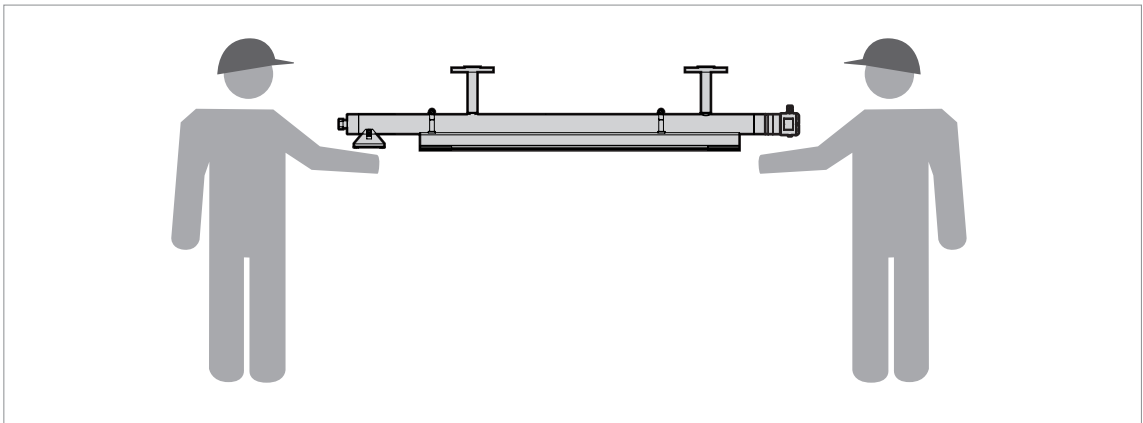


Figure 2-4: Transportation

Depending on the version, the device will weight approx. 6.7...9.8 kg / 14.8...21.6 lb.

**INFORMATION!**

For more data about the magnetic level indicator, refer to the handbook for the BM 26 Basic / Advanced.

## 2.6 Pre-installation requirements

**INFORMATION!**

Obey the precautions that follow to make sure that the device is correctly installed.

- Make sure that there is sufficient space on all sides.
- Protect the signal converter from direct sunlight.
- Do not subject the signal converter to heavy vibrations.

## 2.7 Installation

### 2.7.1 Pressure and temperature ranges



**DANGER!**

If the ambient temperature is more than +70°C / +158°F, there is a risk of injury if you touch the device. Use a protective cover or metallic grid to prevent injury.

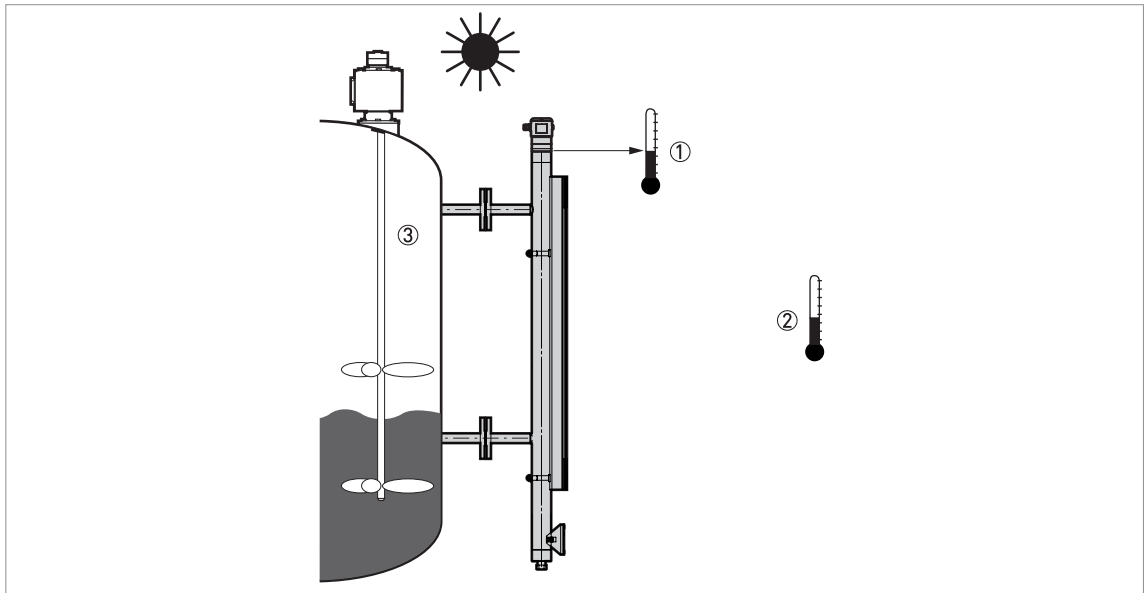


Figure 2-5: Pressure and temperature ranges

- ① Bypass chamber temperature  
Non-Ex devices: Depends on the device versions and the seal material. Refer to the table that follows.  
Ex devices: see supplementary operating instructions
- ② Ambient temperature  
Non-Ex devices: -40...+85°C / -40...+185°F  
Ex devices: see supplementary operating instructions
- ③ Process pressure  
Depends on the type of seal and process connection. Refer to the table that follows.



## Aluminium housing for non-Ex and Ex ia-approved devices

Version	Seal	Distance piece	Bypass chamber temperature		Process pressure	
			[°C]	[°F]	[barg]	[psig]
Metapeek	FKM/FPM with Metapeek	without	-40...+100	-40...+212	-1...16	-14.5...232
	Kalrez® 6375 with Metapeek	without	-20...+100	-4...+212		
	EPDM with Metapeek	without	-40...+100	-40...+212		
Metaglas® and distance piece	FKM/FPM with Metaglas®	with	-40...+150	-40...+302	-1...40	-14.5...580
	Kalrez® 6375 with Metaglas®	with	-20...+150	-4...+302		
	EPDM with Metaglas®	with	-40...+150	-40...+302		

## Stainless steel housing for non-Ex , Ex ia-, Ex db- and Ex tb-approved devices

Version	Seal	Distance piece	Bypass chamber temperature		Process pressure	
			[°C]	[°F]	[barg]	[psig]
Metaglas®	FKM/FPM with Metaglas®	without	-40...+120	-40...+248	-1...40	-14.5...580
	Kalrez® 6375 with Metaglas®	without	-20...+120	-4...+248		
	EPDM with Metaglas®	without	-40...+120	-40...+248		

Ambient temperature / process temperature, in °C

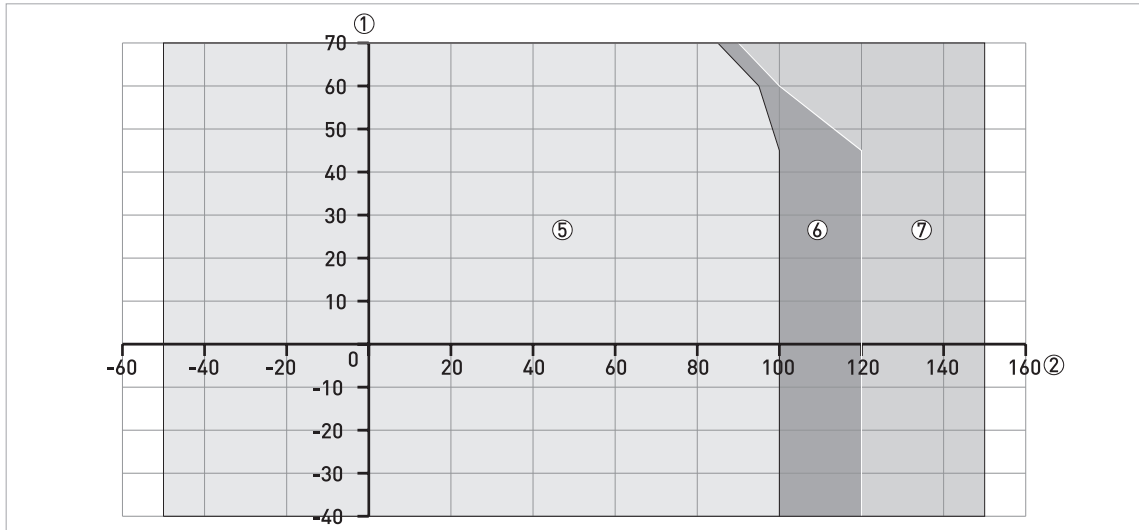


Figure 2-6: Ambient temperature / process temperature, in °C

Ambient temperature / process temperature, in °F

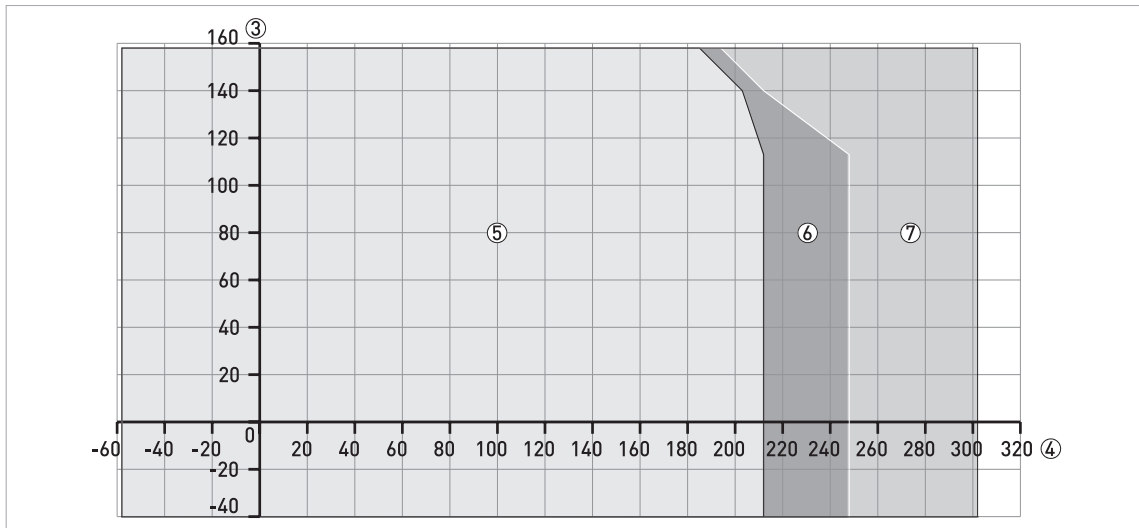


Figure 2-7: Ambient temperature / process temperature, in °F

- ① Maximum ambient temperature, °C
- ② Maximum process temperature, °C
- ③ Maximum ambient temperature, °F
- ④ Maximum process temperature, °F
- ⑤ Device with aluminium housing
- ⑥ Device with stainless steel housing
- ⑦ Device with aluminium housing and distance piece

The maximum ambient temperature for non-Ex devices is +85°C / +185°F. The process connection temperature must agree with the temperature limits of the gasket material.

## 2.7.2 Recommended mounting position



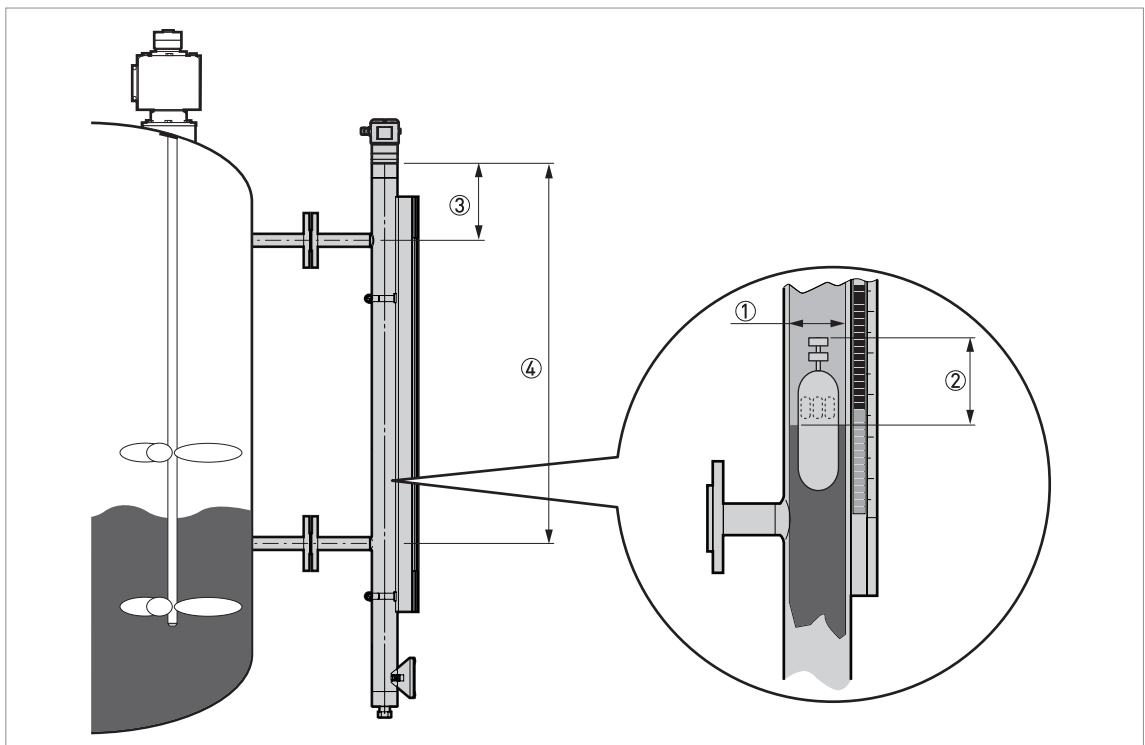
**CAUTION!**

Follow these recommendations to make sure that the device measures correctly. They have an effect on the performance of the device.



**CAUTION!**

Make sure that the cable glands are aligned with the process connections of the bypass chamber.



**Figure 2-8: Recommended mounting position**

- ① Internal tube diameter. Min. ... Max.: 38...56 mm / 1.50...2.20"
- ② Float offset (the distance between the surface of the liquid and the radar target on top of the float).  
Min. ... Max.: 0...200 mm / 0...7.87"
- ③ Distance to top process connection (bypass chamber) = minimum distance (refer to the "basic parameters" menu in the DTM)
- ④ Distance to bottom process connection (bypass chamber) = maximum distance (refer to the "basic parameters" menu in the DTM)

### 2.7.3 Mounting restrictions

Follow these recommendations to make sure that the device measures correctly. They have an effect on the performance of the device.



**WARNING!**

*If the device uses a float to measure the level of the liquid, slowly pressurize the bypass chamber. A float can damage the PEEK cone of the radar level transmitter at the top of the bypass chamber.*



**CAUTION!**

*If there are parasitic signals, the device will not measure correctly. Parasitic signals are caused by sudden changes in bypass chamber diameter in the path of the radar beam.*

### 2.7.4 How to attach the weather protection to the device

The device and the weather protection option are supplied assembled in the same box. If you send an order for the weather protection after delivery of the device, obey the instructions that follow:

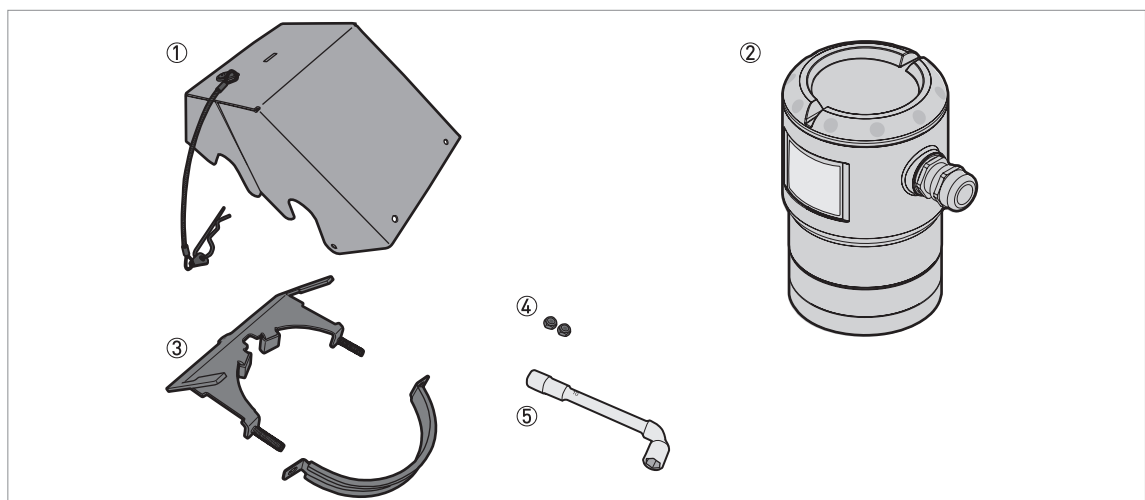


Figure 2-9: Equipment needed

- ① Weather protection cover (with an R-clip to hold the cover on the clamp)
- ② Device
- ③ Weather protection clamp (2 parts)
- ④ 10 mm socket wrench (not supplied)
- ⑤ 2 locking nuts

### Part 1: How to attach the weather protection to the device

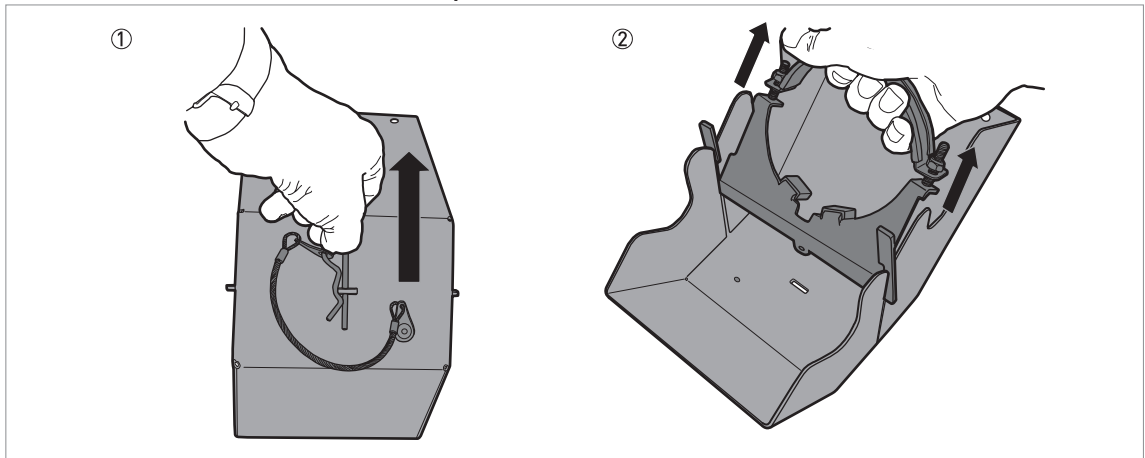


Figure 2-10: Part 1: How to attach the weather protection to the device



- ① Remove the R-clip from the hole at the front of the weather protection cover.
- ② Remove the weather protection clamp from the weather protection cover.

### Part 2: How to attach the weather protection to the device

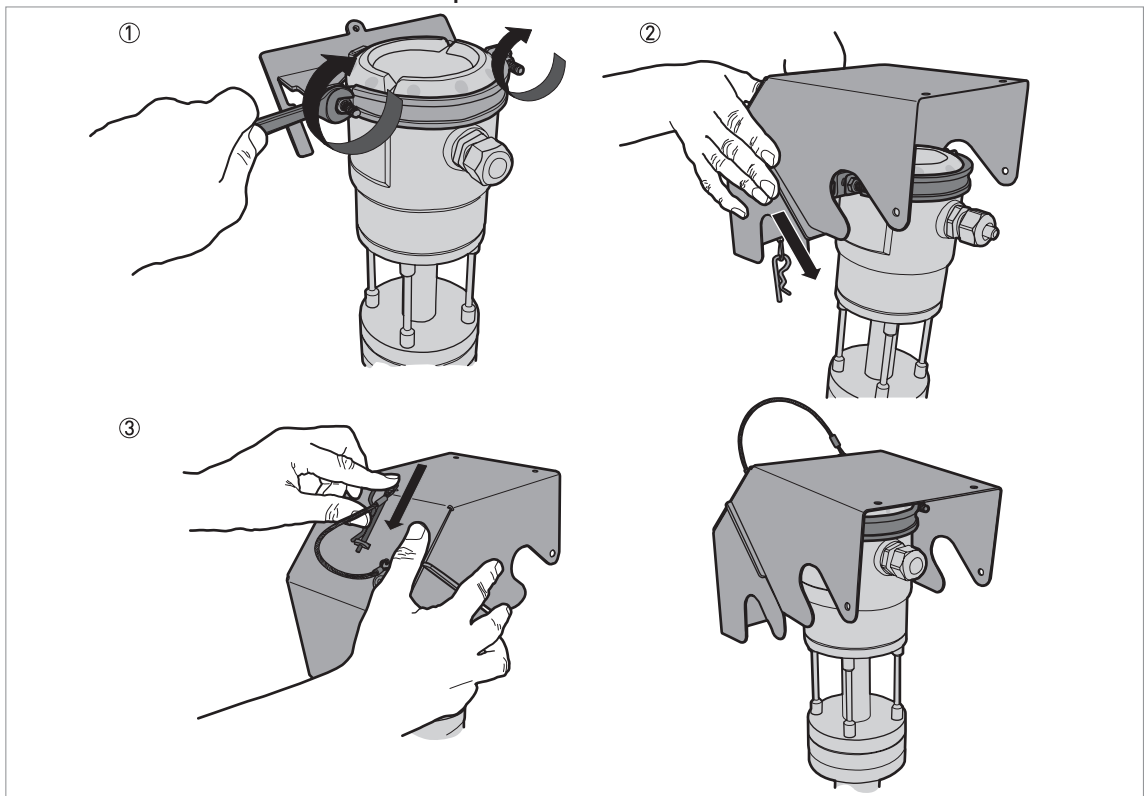


Figure 2-11: Part 2: How to attach the weather protection to the device



**CAUTION!**

*Make sure that the opening at the rear of the weather protection is aligned with the cable entry.*



- ① Put the weather protection clamp around the top of the device. Attach the two locking nuts to the threads on the weather protection clamp. Tighten the locking nuts with a 10 mm socket

- wrench.
- ② Lower the weather protection cover onto weather protection clamp until the hole for the lock is in the slot at the front of the cover.
  - ③ Put the R-clip into the hole at the front of the weather protection cover.
  - ➡ End of the procedure.

For more data about the overall dimensions of the weather protection, refer to "Dimensions and weights" section in the handbook.

### 2.7.5 How to open the weather protection

If your device has the weather protection option, obey the instructions that follow to get access to the housing cover and the terminals compartment.

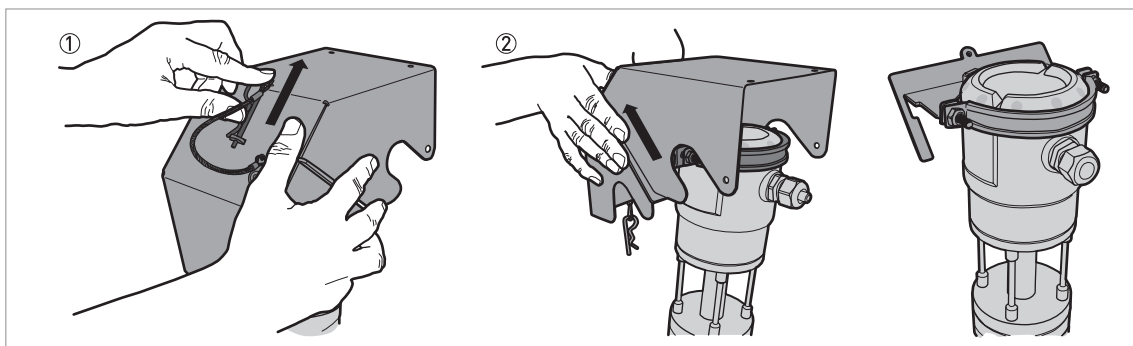


Figure 2-12: How to open the weather protection



**CAUTION!**

*Do not remove the safety cable.*



- ① Remove the R-clip from the hole at the front of the weather protection cover.
- ② Remove the weather protection cover.
- ➡ End of the procedure.

### 3.1 Safety instructions



**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!



**DANGER!**

Observe the national regulations for electrical installations!



**DANGER!**

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



**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. Check for the correct supply voltage printed on the nameplate.

### 3.2 Electrical installation: 2-wire, loop-powered

#### Terminals for electrical installation

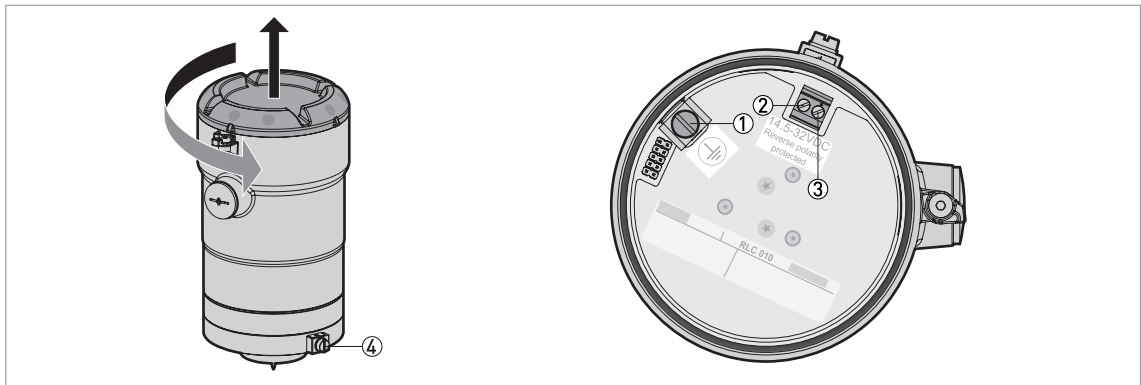


Figure 3-1: Terminals for electrical installation

- ① Grounding terminal in the housing (if the electrical cable is shielded)
- ② Current output terminal – polarity insensitive
- ③ Current output terminal – polarity insensitive
- ④ External ground connection



**INFORMATION!**

Electrical power to the output terminal energizes the device. The output terminal is also used for HART® communication.



**CAUTION!**

Use the applicable electrical cables with the cable glands. Attach the ferrite choke (supplied with the device) to the electrical cable to prevent parasitic signals.

### Procedure: Electrical connection and how to attach the ferrite choke to the electrical cable

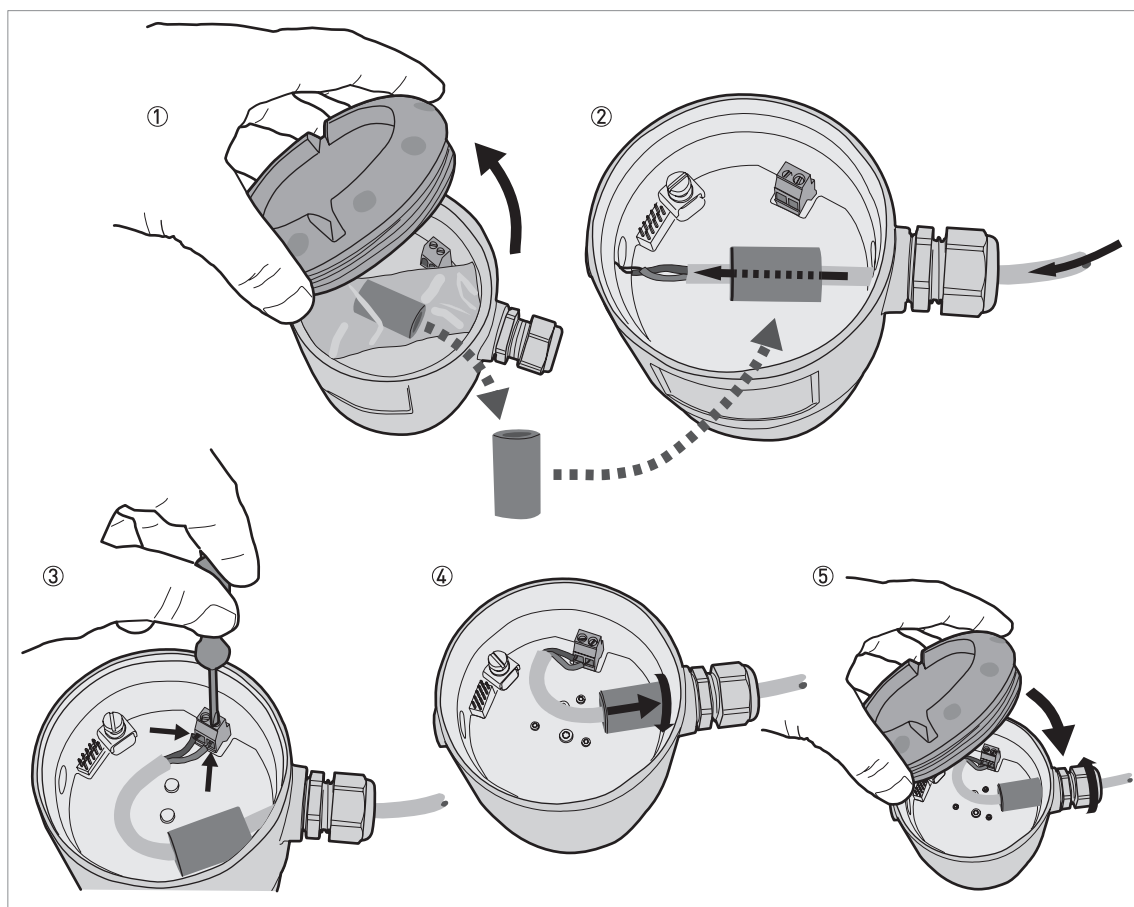


Figure 3-2: Procedure: Electrical connection and how to attach the ferrite choke to the electrical cable

#### Equipment needed:

- Small slotted tip screwdriver (not supplied)
- OPTIWAVE 1010 level transmitter attached to a BM 26 Advanced bypass level indicator
- Ferrite choke. This part is supplied in a transparent plastic bag in the housing.
- Electrical cable (not supplied)



#### Procedure

- ① Remove the housing cover. Remove the transparent plastic bag and open it.
  - ② Put the electrical cable into the opening of the cable gland. Then put the electrical cable into the opening of the ferrite choke.
  - ③ Put the electrical wires in the connector terminals. Tighten the terminal screws with a small slotted-tip screwdriver. Make sure that the electrical wires agree with the terminals.
  - ④ Put the ferrite choke in the opening of the cable entry. Turn the ferrite choke until it is fully engaged.
  - ⑤ Tighten the cable gland. Attach the housing cover.
- ➡ End of the procedure.



### 3.3 Non-Ex devices

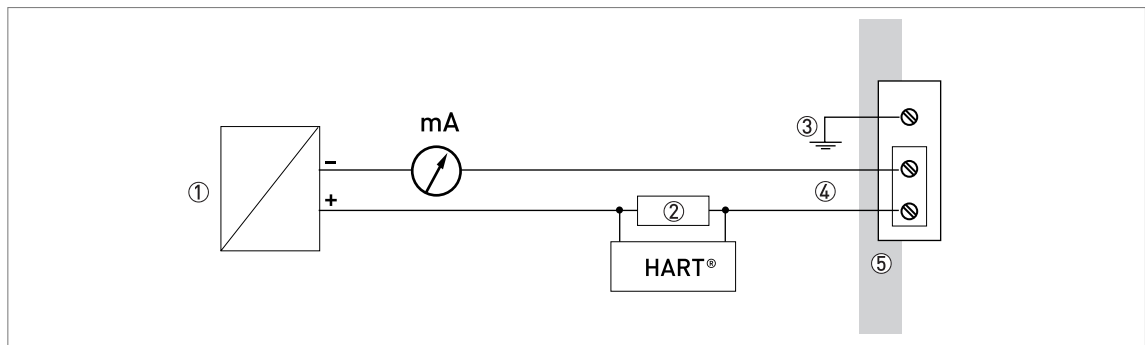


Figure 3-3: Electrical connections for non-Ex devices

- ① Power supply
- ② Resistor for HART® communication
- ③ Optional connection to the grounding terminal
- ④ Output: 14.5...32 VDC for an output of 22 mA at the terminal
- ⑤ Device



**INFORMATION!**

*Electrical polarity has no effect on device operation.*

### 3.4 Devices for hazardous locations



**DANGER!**

*For electrical data for device operation in hazardous locations, refer to the related certificates of compliance and supplementary instructions (ATEX, IECEx etc.). You can find this documentation on the DVD-ROM delivered with the device or it can be downloaded free of charge from the website (Download Center).*

### 3.5 Minimum power supply voltage

Use these graphs to find the minimum power supply voltage for a given current output load.

#### Non-Ex devices or devices with a Hazardous Location approval (Ex db / Ex tb)

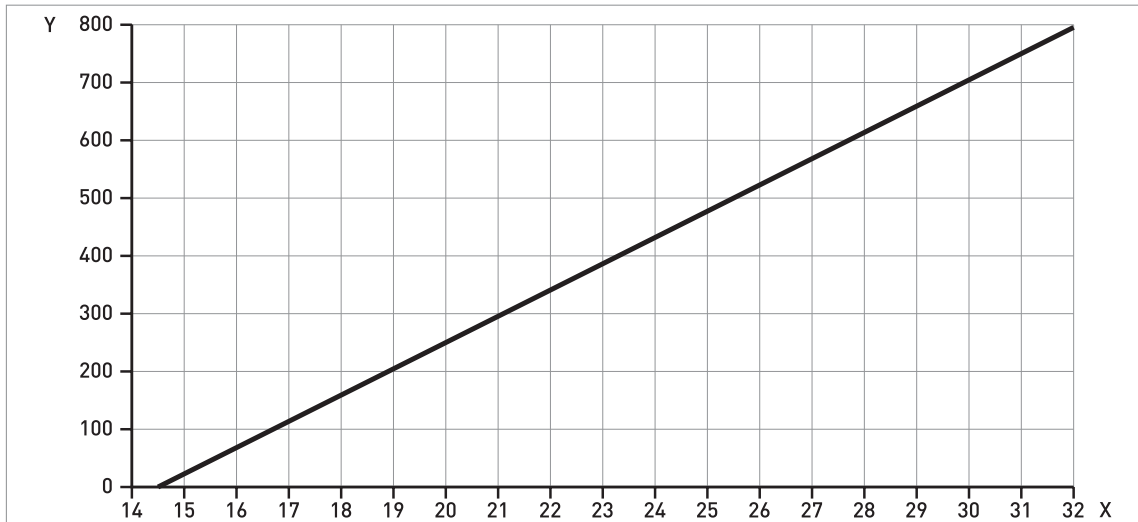


Figure 3-4: Minimum power supply voltage for an output of 22 mA at the terminal (Non-Ex devices or devices with a Hazardous Location approval (Ex db / Ex tb))

X: Power supply U [VDC]  
 Y: Current output load  $R_L$  [ $\Omega$ ]

#### Devices with a Hazardous Location approval (Ex ia)

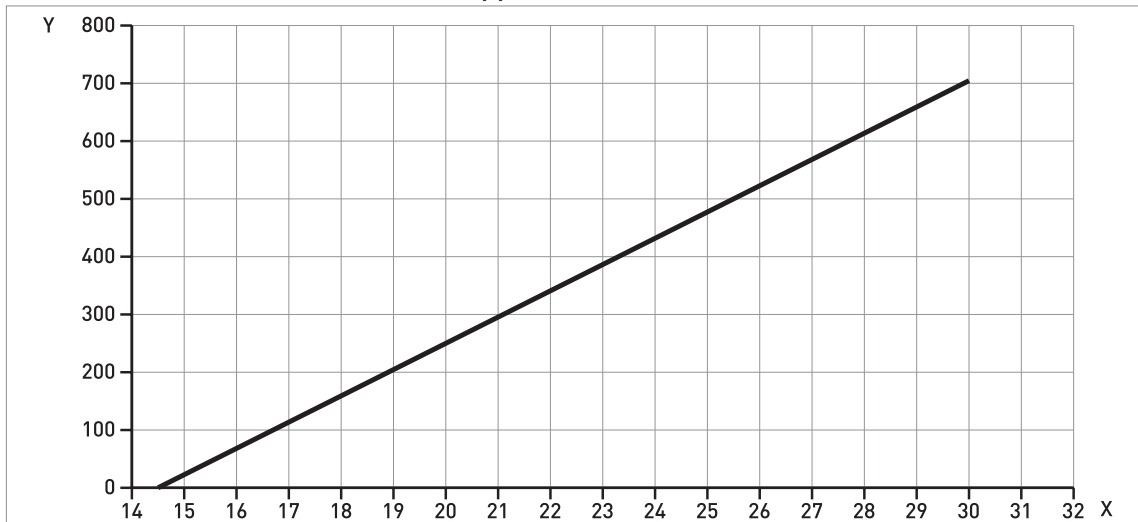


Figure 3-5: Minimum power supply voltage for an output of 22 mA at the terminal (devices with a Hazardous Location approval (Ex ia))

X: Power supply U [VDC]  
 Y: Current output load  $R_L$  [ $\Omega$ ]

### 3.6 Protection category

**INFORMATION!**

The device fulfils all requirements per protection category IP66 / IP67. It also fulfils all requirements per NEMA type 4X (housing) and type 6P (matching element).

**DANGER!**

Make sure that the cable gland is watertight.

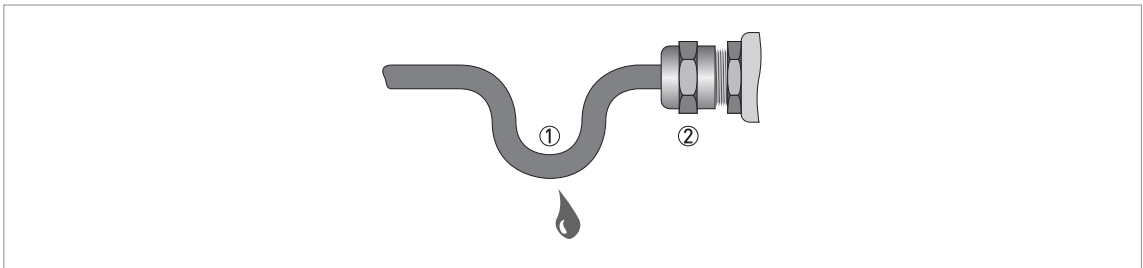


Figure 3-6: How to make the installation agree with protection category IP67



- Make sure that the gaskets are not damaged.
- Make sure that the electrical cable is not damaged.
- Make sure that the electrical cable agrees with the national electrical code.
- Make a loop of cable in front of the device ① to prevent leakage into the housing.
- Tighten the cable feedthrough ②.

## 4.1 How to start the device

### 4.1.1 Start-up checklist

#### Do a check of the device's condition before you energize the device:

- Are all the wetted components (PEEK element, matching element and gaskets) resistant to the product in the tank?
- Does the information on the device nameplate agree with the operating data?
- **If the device is supplied with a magnetic (bypass) level indicator:** Did you correctly install the magnetic level indicator adjacent to the tank?
- **If the device is supplied with a magnetic (bypass) level indicator:** Did you remove the float lock pin from the side process connection at the bottom of the bypass chamber?
- Do the electrical connections agree with the national electrical codes? Use the applicable electrical cables with the cable glands.



#### **DANGER!**

*Before you energize the device, make sure that the supply voltage is correct.*



#### **DANGER!**

#### **Safe operation in hazardous locations**

*Make sure that the installation and the wiring of the device agree with the related Ex standards and regulations. Make sure that the device has the applicable Ex approval for the hazardous location. For more data, refer to the related Ex certificate of conformity and the supplementary instructions.*

### 4.1.2 How to start the device



- Connect the converter to the power supply.
- Energize the converter.



#### **INFORMATION!**

*The manufacturer sets the parameters for your application in the factory. The 0% level (empty) is aligned with the center of the bottom process connection and the 100% level (full) is aligned with the center of the top process connection. You can use the HART communication protocol to change these parameters.*

## 4.2 Operating concept

#### You can read measurements and configure the device with:

- A connection to a system or PC with PACTware™. You can download the Device Type Manager (DTM) file from the website. It is also supplied on the DVD-ROM delivered with the device.
- A connection to a system or PC with AMS™. You can download the Device Description (DD) file from the website. It is also supplied on the DVD-ROM delivered with the device.
- A connection to a HART® Field Communicator. You can download the Device Description (DD) file from the website. It is also supplied on the DVD-ROM delivered with the device.

For more data about how to use the DTM in PACTware, refer to the "Operation" chapter in the handbook. For more data about the menu tree for the Basic-DD, AMS and PDM, refer to the "Description of HART interface" chapter in the handbook.

## 4.3 Remote communication with PACTware™

### 4.3.1 General notes

PACTware™ displays measurement information clearly on a computer (PC) and lets you configure the device from a remote location. It is an Open Source, open configuration software for all field devices. It uses Field Device Tool (FDT) technology. FDT is a communication standard for sending information between the system and the field device. This standard agrees with IEC 62453. Field devices are easily integrated. Installation is supported by a user-friendly Wizard.

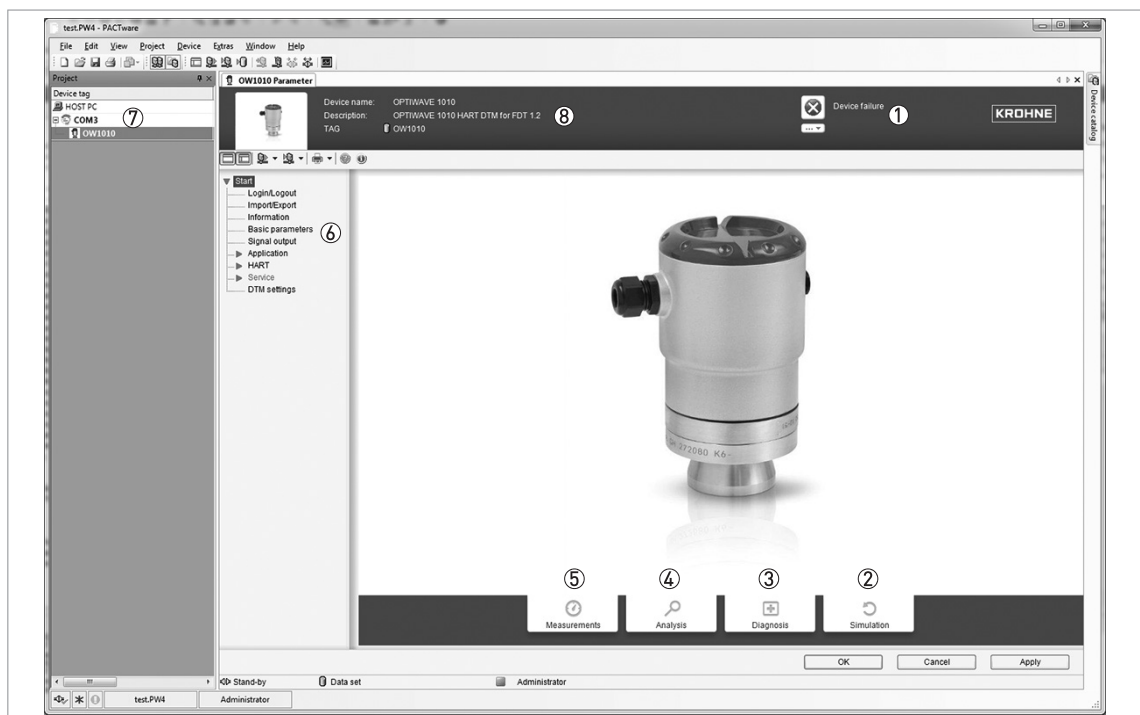


Figure 4-1: Start window for the DTM in PACTware™

- ① Status display
- ② Button for **Simulation** window
- ③ Button for **Diagnosis** window
- ④ Button for **Analysis** window
- ⑤ Button for **Measurements** window
- ⑥ DTM menu list (Login/Logout, Import/Export, Information, Basic parameters, Current output, Application, HART, Service, DTM settings)
- ⑦ **Project** window
- ⑧ Data for device identification

There are 4 buttons at the bottom of the **Start** window: **Measurements**, **Analysis**, **Diagnosis** and **Simulation**. You can use these buttons to do the tasks that follow:

- **Measurements:** Monitor level and distance data. For more data, refer to the "Start-up" chapter of the handbook.
- **Analysis:** Monitor change and rate of change in level, distance, current output, temperature of the electronics and device status. It is also possible to monitor spectrum values. For more data, refer to the "Start-up" chapter of the handbook.
- **Diagnosis:** Do a check of the device's condition (error messages etc.). For more data, refer to the "Start-up" chapter of the handbook.
- **Simulation:** Simulate measured data to make sure that the device operates correctly. For more data, refer to the "Start-up" chapter of the handbook.



**CAUTION!**

*If the device has the float option, the manufacturer uses data supplied in the customer order to enter the device settings. If the data (product density etc.) is correct, the device will measure level correctly. If the data is incorrect, the device will not measure level correctly.*

You can use the free PACTware™ software and the DTM for the OPTIWAVE 1010 to change the device settings. For more data about the procedure, refer to "Application: Float offset calculation" in the "Operation" chapter of the OPTIWAVE 1010 handbook.

You can also change device settings with a HART® Field Communicator or a system or PC with AMS™. For more data, refer to the "Description of the HART interface" chapter in the OPTIWAVE 1010 handbook.

## 5.1 Technical data



### INFORMATION!

- 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	2-wire loop-powered level transmitter; C-band (6 GHz) FMCW radar
Application range	Level indication of liquids in applications up to 40 barg / 580 psig
Primary measured value	Distance to the surface of the liquid (or the top of the float, if the liquid has a low dielectric constant)
Secondary measured value	Level of the liquid in the bypass chamber

### Design

Construction	The measurement system consists of a bypass chamber, a signal converter and an optional float
Measuring range	0.3...5.6 m / 0.98...18.4 ft (max. 8 m / 26.2 ft)
Top dead zone	Minimum value: 300 mm / 11.8" from the matching element
<b>User interface</b>	
User interface	PACTware™

### Measuring accuracy

Repeatability	±2 mm / ±0.08"
Accuracy	Standard: ±10 mm / ±0.4" without calibration or with a 2-point calibration Option: ±5 mm / ±0.2" with a 5-point calibration" ①
Influence of temperature on the bypass chamber	0.01 mm/1 m of distance/°C (relative to +25°C) / 0.000216"/1 ft of distance/°F (relative to +77°F)
<b>Reference conditions acc. to DIN EN 61298-1</b>	
Temperature	+18...+30°C / +64...+86°F
Pressure	860...1060 mbara / 12.5...15.4 psia
Relative air humidity	45...75%
Target	A special float with a target is installed in the bypass chamber and used to calibrate the device

### Operating conditions

<b>Temperature</b>	
Ambient temperature	-40...+85°C / -40...+185°F Ex: see supplementary operating instructions or approval certificates
Storage temperature	-40...+85°C / -40...+185°F

Process temperature	<p><b>Standard aluminium version with Metapeek process seal:</b> with a Kalrez® 6375 gasket: -20...+100°C / -4...+212°F with a FKM/FPM gasket: -40...+100°C / -40...+212°F with a EPDM gasket: -40...+100°C / -40...+212°F ②</p> <p><b>Aluminium version with distance piece and Metaglas® process seal:</b> with a Kalrez® 6375 gasket: -20...+150°C / -4...+302°F with a FKM/FPM gasket: -40...+150°C / -40...+302°F with a EPDM gasket: -40...+150°C / -40...+302°F ③</p> <p><b>Stainless steel version with Metaglas® process seal:</b> with a Kalrez® 6375 gasket: -20...+120°C / -4...+248°F with a FKM/FPM gasket: -40...+120°C / -40...+248°F with a EPDM gasket: -40...+120°C / -40...+248°F ③</p> <p>The process connection temperature must agree with the temperature limits of the gasket material. Ex: see supplementary operating instructions or approval certificates</p>
<b>Pressure</b>	
Process pressure	<p><b>Standard (with Metapeek):</b> -1...16 barg / -14.5...232 psig</p> <p><b>With Metaglas®:</b> -1...40 barg / -14.5...580 psig</p>
<b>Other conditions</b>	
Minimum dielectric constant ( $\epsilon_r$ )	Not applicable. If $\epsilon_r < 3$ , a float with a target is used.
Ingress protection	IEC 60529: IP66/67
Maximum rate of change	10 m/min / 32.8 ft/min
Measurement update rate	Typically 2 measurement cycles/s

### Installation conditions

Dimensions and weights	Refer to "Technical data: Dimensions and weights" in the handbook for the OPTIWAVE 1010 and the handbook for the BM 26 Basic / Advanced.
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### Materials

Housing	<p>Standard: Polyester-coated aluminium</p> <p>Option: Stainless steel (1.4408 / 316)</p>
Wetted materials	Standard: Stainless steel (1.4404 / 316L) bypass chamber / magnetic level indicator with a PEEK cone in the matching element and a FKM/FPM, EPDM or Kalrez® 6375 O-ring
Process seal	<p>Standard Aluminium: Metapeek process seal with O-ring</p> <p>Aluminium version with distance piece: Metaglas® process seal with O-ring</p> <p>Stainless steel version: Metaglas® process seal with O-ring</p>
Cable gland	<p>Standard: none</p> <p>Options: Plastic (Non-Ex: black, Ex ia-approved: blue); nickel-plated brass; stainless steel</p>
Weather protection (option)	Stainless steel (1.4404 / 316L)



## Process connections

The device is welded to the top of the bypass chamber of the magnetic level indicator. For more data about the process connections of the magnetic level indicator, refer to the handbook for the BM 26 Basic / Advanced.

## Electrical connections

Power supply	<b>Non-Ex, Ex db- and Ex tb-approved devices</b> 14.5...32 VDC; min./max. value for an output of 22 mA at the terminals <b>Ex ia-approved devices</b> 14.5...30 VDC; min./max. value for an output of 22 mA at the terminals
Maximum current	22 mA
Current output load	$R_L [\Omega] \leq ((U_{\text{ext}} - 14.5 \text{ V}) / 22 \text{ mA})$ . For more data, refer to <i>Minimum power supply voltage</i> on page 18.
Cable entry	Standard: M20×1.5; Option: ½ NPT
Cable gland	Standard: none Options: M20×1.5 (cable diameter: 6...10 mm / 0.2...0.39"); others are available on request
Cable entry capacity (terminal)	0.5...2.5 mm <sup>2</sup>

## Input and output

<b>Current output / HART®</b>	
Output signal	4...20 mA HART® or 3.8...20.5 mA acc. to NAMUR NE 43 ④
Resolution	±3 µA
Analog temperature drift	Typically 50 ppm/K (150 ppm/K maximum)
Digital temperature drift	Typically ±5 mm / 0.2" – max. 15 mm / 0.59" for the full temperature range
Error signal	High: 22 mA; Low: 3.6 mA acc. to NAMUR NE 43

## Approvals and certification

CE	<p>The device meets the essential requirements of the EU Directives. The manufacturer certifies successful testing of the product by applying the CE marking.</p> <p>For more data about the EU Directives and European Standards related to this device, refer to the EU Declaration of Conformity. You can find this documentation on the DVD-ROM supplied with the device or it can be downloaded free of charge from the website (Download Center).</p>
Vibration resistance	EN 60068-2-6 / IEC 61298-3 10-82.2 Hz: 0.15 mm; 82.2-1000 Hz: 20 m/s <sup>2</sup>
<b>Explosion protection</b>	
ATEX (Ex ia or Ex db or Ex tb) KIWA 15ATEX0022 X	II 1/2 G Ex ia IIC Tx Ga/Gb; ⑤
	II 2 D Ex ia IIIC T120°C Db (stainless steel housing only);
	II 1/2 G Ex db IIC T6...T4 Ga/Gb (stainless steel housing only);
	II 2 D Ex tb IIIC T120°C Db (stainless steel housing only)
IECEX (Ex ia or Ex db or Ex tb) IECEX KIW 15.0012 X	Ex ia IIC Tx Ga/Gb; ⑤
	Ex ia IIIC T120°C Db (stainless steel housing only);
	Ex db IIC T6...T4 Ga/Gb (stainless steel housing only);
	Ex tb IIIC T120°C Db (stainless steel housing only)

Other standards and approvals	
EMC	Electromagnetic Compatibility (EMC) directive
Radio approvals	<b>EU</b> Radio Equipment directive
	<b>FCC Rules</b> Part 15
	<b>Industry Canada</b> License-exempt RSS-210
LVD	Essential requirements of Low-Voltage (LVD) directive
NAMUR	NAMUR NE 43 Standardization of the Signal Level for the Failure Information of Digital Transmitters
	NAMUR NE 53 Software and Hardware of Field Devices and Signal Processing Devices with Digital Electronics
	NAMUR NE 107 Self-Monitoring and Diagnosis of Field Devices
Construction code	Option: NACE MR0175 / ISO 15156; NACE MR0103

- ① For more data, refer to the "Measuring accuracy" section in this chapter
- ② Kalrez® is a registered trademark of DuPont Performance Elastomers L.L.C. The process connection temperature must agree with the temperature limits of the gasket material.
- ③ Metaglas® is a registered trademark of Herberts Industrieglas, GMBH & Co., KG. The process connection temperature must agree with the temperature limits of the gasket material.
- ④ HART® is a registered trademark of the HART Communication Foundation
- ⑤ Tx = T6...T4 (without a distance piece) or T6...T3 (with a distance piece)

## 5.2 Measuring accuracy

Use these graphs to find the measuring accuracy for a given distance from the transmitter.

### Measuring accuracy without calibration or after 2-point calibration (with a 2-point calibration certificate)

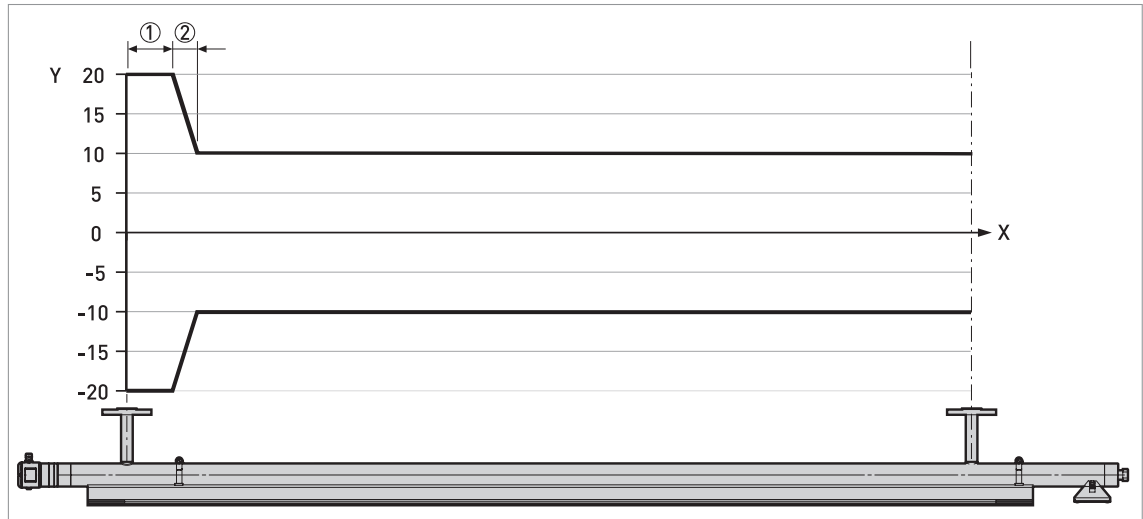


Figure 5-1: Measuring accuracy / distance from the process connections of the bypass chamber, in mm

X: Distance from the top process connection [mm]

Y: Accuracy [+yy mm / -yy mm]

①: 200 mm

②: Float offset. Refer to the "Basic parameters" menu in the DTM for the float offset value.



Figure 5-2: Measuring accuracy / distance from the process connections of the bypass chamber, in inches

X: Distance from the top process connection [inches]

Y: Accuracy [+yy" / -yy"]

①: 7.9"

②: Float offset. Refer to the "Basic parameters" menu in the DTM for the float offset value.

Measuring accuracy after 5-point calibration (with a 5-point calibration certificate)

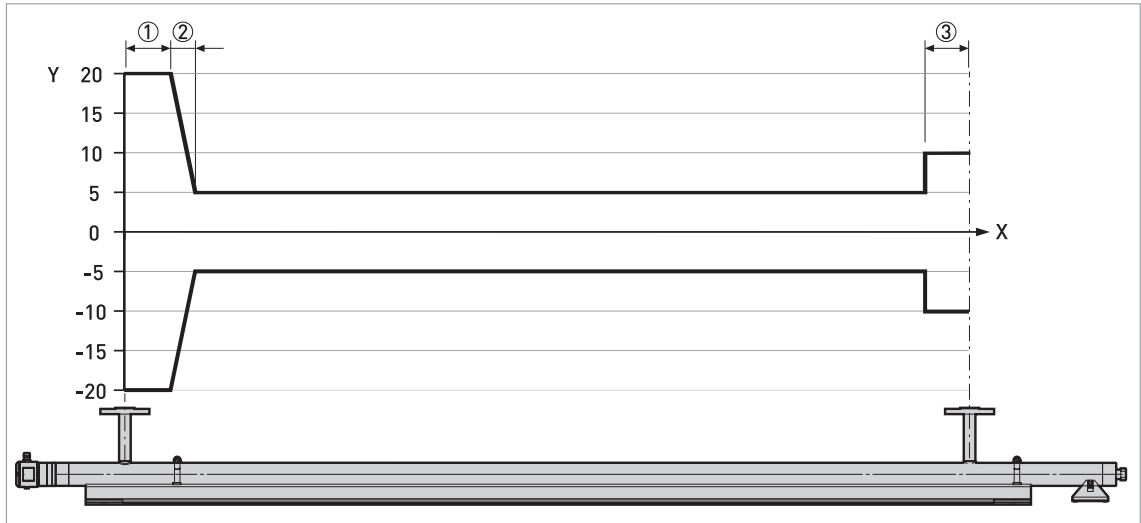


Figure 5-3: Measuring accuracy / distance from the process connections of the bypass chamber, in mm

X: Distance from the top process connection [mm]

Y: Accuracy [+yy mm / -yy mm]

①: 200 mm

②: Float offset. Refer to the "Basic parameters" menu in the DTM for the float offset value.

③: 200 mm

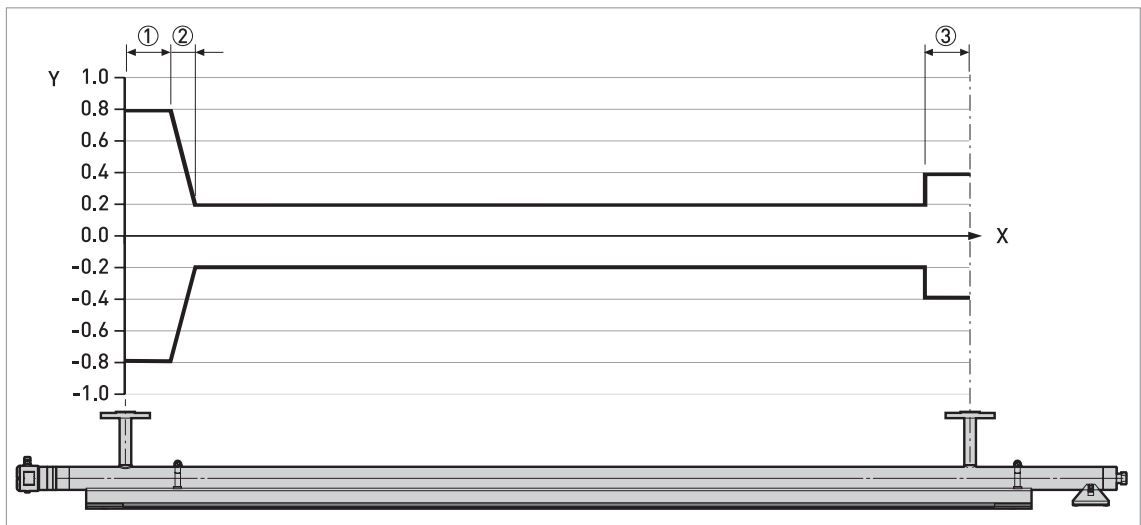


Figure 5-4: Measuring accuracy / distance from the process connections of the bypass chamber, in inches

X: Distance from the top process connection [inches]

Y: Accuracy [+yy" / -yy"]

①: 7.9"

②: Float offset. Refer to the "Basic parameters" menu in the DTM for the float offset value.

③: 7.9"









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Head Office KROHNE Messtechnik GmbH  
Ludwig-Krohne-Str. 5  
47058 Duisburg (Germany)  
Tel.: +49 203 301 0  
Fax: +49 203 301 10389  
info@krohne.com

The current list of all KROHNE contacts and addresses can be found at:  
[www.krohne.com](http://www.krohne.com)

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