

OPTIWAVE 6300 C Quick Start

Non-contact Radar (FMCW) Level Meter for solids

for distance, level, volume and mass measurement of solids



CONTENTS OPTIWAVE 6300 C

1	Safety instructions	3
2	Installation	4
	2.1 Intended use	4
	2.2 Scope of delivery	
	2.3 Visual Check	
	2.4 Storage	
	2.5 Transport	
	2.6 Pre-installation requirements	
	2.7 How to prepare the silo before you install the device	
	2.7.1 Pressure and temperature ranges	
	2.7.2 Theoretical data for nozzle position	
	2.9 How to install the device on the silo	
	2.9.1 How to install a device with a flange connection	
	2.9.2 How to install a device with a threaded connection	
	2.9.3 How to attach antenna extensions	
	2.9.4 How to turn or remove the signal converter	
	2.9.5 How to attach the weather protection to the device	
	2.9.6 How to open the weather protection	18
3	Electrical connections	19
	3.1 Safety instructions	10
	3.2 Electrical installation: outputs 1 and 2	
	3.2.1 Non-Ex devices	
	3.2.2 Devices for hazardous locations	
	3.2.3 PROFIBUS PA	
	3.2.4 FOUNDATION Fieldbus	21
	3.3 Protection category	21
4	Technical data	22
	4.1 Technical data	22

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

This radar level transmitter measures distance, level, mass, volume and reflectivity of granulates and powders.

It can be installed on silos and bunkers.

2.2 Scope of delivery



INFORMATION!

Check the packing list to check if you received completely all that you ordered.

Scope of delivery - horn antenna

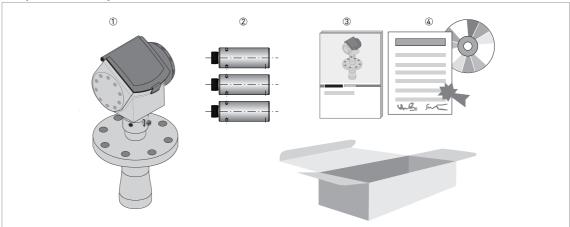


Figure 2-1: Scope of delivery - horn antenna

- ① Signal converter and antenna in compact version
- ② Antenna extensions (option)
- 3 Quick Start
- © CD-ROM (including Handbook, Quick Start, Technical Datasheet and related software)

Scope of delivery - Drop antenna

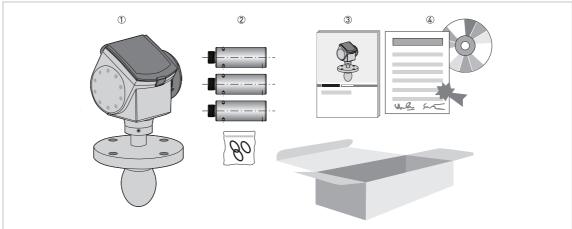


Figure 2-2: Scope of delivery - Drop antenna

- ① Signal converter and antenna in compact version
- ② Antenna extensions (option) and o-ring for each antenna extension
- 3 Quick Start
- 4 CD-ROM (including Handbook, Quick Start, Technical Datasheet, and related software)



INFORMATION!

No special tools or training required!

2.3 Visual Check



WARNING!

If the display screen glass is broken, do not touch.



INFORMATION!

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

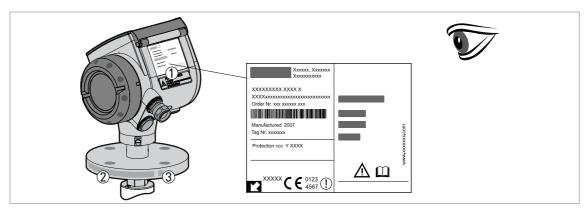


Figure 2-3: Visual check

- ① Device nameplate (for more data, refer to the handbook)
- 2 Process connection data (size and pressure rating, material reference and heat number)
- 3 Gasket material data refer to the illustration that follows



Figure 2-4: Symbols for the supplied gasket material (on the side of the process connection)

- ① EPDM
- ② Kalrez® 6375

If the device is supplied with an FKM/FPM gasket, there is no symbol on the side of the process connection.



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.



INFORMATION!

Compare the material references on the side of the process connection with the order.

2.4 Storage



WARNING!

Do not keep the device in a vertical position. This will damage the antenna and the device will not measure correctly.

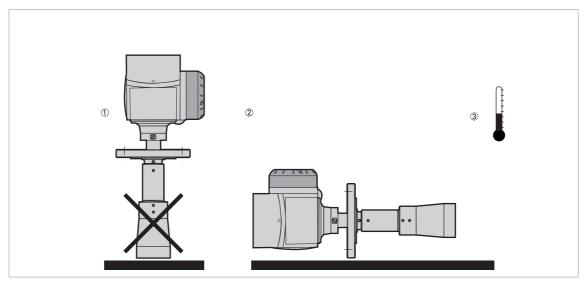


Figure 2-5: Storage conditions

- 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...+85°C / -40...+185°F
- Store the device in a dry and dust-free location.
- Keep the converter out of the sunlight.
- Store the device in its original packing.

2.5 Transport

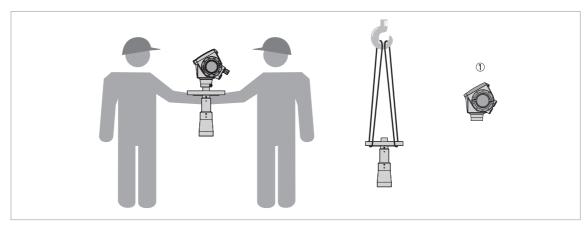


Figure 2-6: How to lift the device

① Remove the converter before you lift the device with a hoist.



WARNING!

Lift the device carefully to prevent damage to the antenna.

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 sufficent space on all sides.
- Protect the signal converter from direct sunlight. If necessary, install the weather protection accessory.
- Do not subject the signal converter to heavy vibrations. The devices are tested for vibration and agree with EN 50178 and IEC 60068-2-6.

2.7 How to prepare the silo before you install the device



CAUTION!

To avoid measuring errors and device malfunction, obey these precautions.

2.7.1 Pressure and temperature ranges

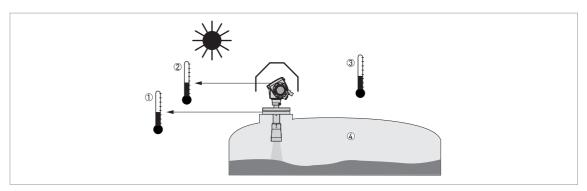


Figure 2-7: Pressure and temperature ranges

Flange temperature

FKM/FPM gasket: -40...+200°C / -40...+390°F; Kalrez® 6375 gasket: -20...+200°C / -4...+390°F;

EPDM gasket: -50...+150°C / -58...+300°F

Depends on the antenna type. Refer to the table that follows.

Ex devices: see supplementary operating instructions

2 Ambient temperature for operation of the display

-20...+60°C / -4...+140°F

If the ambient temperature is not between these limits, the display screen switches off automatically

3 Ambient temperature

Non-Ex devices: -40...+80°C / -40...+175°F

Ex devices: see supplementary operating instructions

4 Process pressure

Depends on the antenna type. Refer to the table that follows.



WARNING!

The process connection temperature range must agree with the temperature limits of the gasket material. The operating pressure range is subject to the process connection used and the flange temperature.

Antenna type	Maximum process connection temperature		Maximum ope	rating pressure
	[°C]	[°F]	[barg]	[psig]
PP Drop	+100	+210	16	232
PTFE Drop	+150	+300	40	580
Horn / Sheet metal horn	+200	+390	40	580

2.7.2 Theoretical data for nozzle position



CAUTION!

Follow these recommendations to make sure that the device measures correctly.

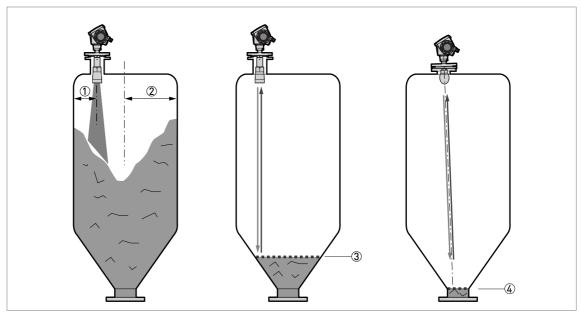


Figure 2-8: Recommended nozzle position for solids

- ① Position of the process fitting from the silo wall, r/2 (for DN80, DN100 or DN150 horn antennas, and DN80 or DN150 Drop antennas)
- ② Radius of the silo, r
- 3 The minimum measured level for a device without a 2° slanted PP flange option
- 4 The minimum measured level for a device with a 2° slanted PP flange option



INFORMATION!

If possible, do not install a nozzle on the silo centerline.



INFORMATION!

If it is necessary to measure to the bottom of the silo, a 2° slanted flange option is available for all antennas. For more data, refer to Installation recommendations for solids on page 12.



CAUTION!

Do not put the device near to the product inlet. If the product that enters the silo touches the antenna, the device will measure incorrectly. If the product fills the silo directly below the antenna, the device will also measure incorrectly.

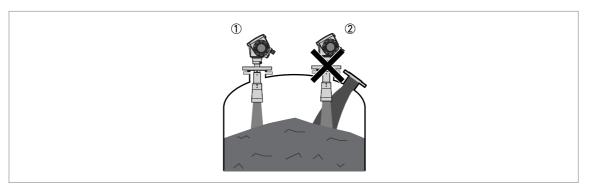


Figure 2-9: Product inlets

- The device is too near to the product inlet.

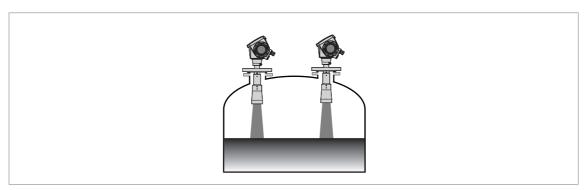


Figure 2-10: More than 1 FMCW radar level meter can be operated in a silo

More than 1 FMCW radar level meter can be operated in a silo.

2.8 Installation recommendations for solids



CAUTION

Do not install the device above objects in the silo (ladder, supports etc.). Objects in the silo can cause parasite radar signals. If there are parasite radar signals, the device will not measure correctly.

If it is not possible to install the device on another part of the silo, do an empty spectrum scan.



INFORMATION!

We recommend that you configure the device when the silo is empty.



INFORMATION!

For the best device performance, the antenna should be silo-intrusive. Refer to the illustration that follows.

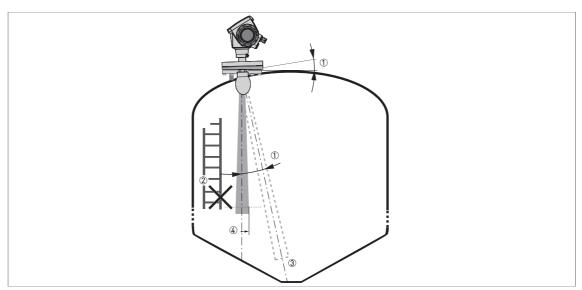


Figure 2-11: General installation recommendations

- ① The level transmitter can continue to measure to the bottom of the silo if you tilt the device as shown in the illustration (a 2° slanted flange option is available for all antennas)
- ② If there are too many objects in the radar footprint, do an empty spectrum scan. Refer to the handbook for the procedure.
- 3 Conical silo bottoms. Refer to the handbook for fine adjustment of the device.
- Radius of radar footprint (DN80 horn antenna): increments of 90 mm/m or 1.1"/ft (5°)
 Radius of radar footprint (DN100 horn antenna, DN150 horn antenna, DN200 horn antenna and DN80 Drop antenna): increments of 70 mm/m or 0.83"/ft (4°)

Radius of radar footprint (DN150 Drop antenna): increments of 35 mm/m or 0.42"/ft (2°)

2.9 How to install the device on the silo

2.9.1 How to install a device with a flange connection

Equipment needed:

- Device
- Gasket (not supplied)
- Nuts and bolts (not supplied)
- Wrench (not supplied)

Requirements for flange connections

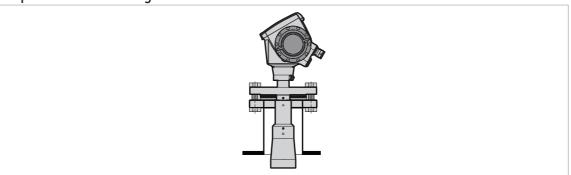


Figure 2-12: Flange connection



- Make sure the flange on the nozzle is level.
- Make sure that you use the applicable gasket for the flange dimensions and the process.
- Align the gasket correctly on the flange facing of the nozzle.
- Lower the antenna carefully into the silo.
- Tighten the flange bolts.
- Refer to local rules and regulations for the correct torque to apply to the bolts.

For more data, refer to the handbook.

2.9.2 How to install a device with a threaded connection

Equipment needed:

- Device
- Gasket for G 1½ connection (not supplied)
- 50 mm / 2" wrench (not supplied)

Requirements for threaded connections

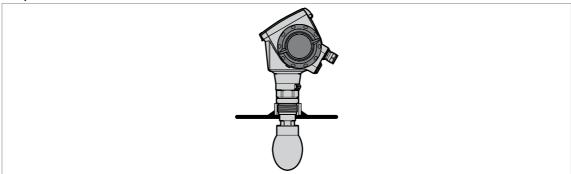


Figure 2-13: Threaded connection



- Make sure the silo connection is level.
- Make sure that you use the applicable gasket for the connection dimensions and the process.
- Align the gasket correctly.
- Lower the antenna carefully into the silo.
- Turn the threaded connection on the housing to attach the device to the process connection.
- Tighten the connection.
- Refer to local rules and regulations for the correct torque to apply to the connection.

For more data, refer to the handbook.

2.9.3 How to attach antenna extensions

Horn antenna - antenna extensions

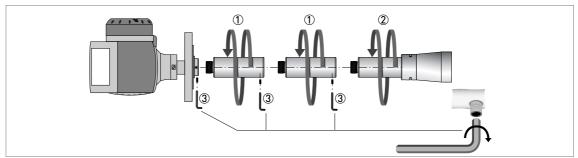


Figure 2-14: Horn antenna - how to attach antenna extensions

Equipment needed:

• 3 mm Allen wrench (not supplied)

For more data, refer to the handbook.

Drop antenna - antenna extensions

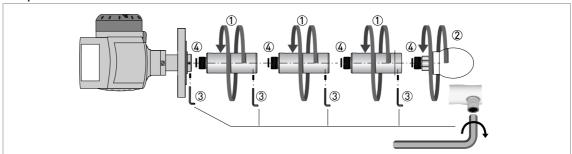


Figure 2-15: Drop antenna - how to attach antenna extensions



INFORMATION!

Drop antenna: Antenna extensions can only be attached below flanges without the PP/PTFE flange plate option



CAUTION!

Drop antenna: Make sure that there are not more than 5 antenna extensions attached to a device with a Drop antenna. If there are more than 5 antenna extensions, the device will not measure correctly.

Make sure that you put an o-ring @ into the groove at the top of each antenna extension.

Equipment needed (not supplied):

- Torque wrench 200 Nm (for the H30 head of the Drop antenna sub-assembly)
- 3 mm Allen wrench

For more data, refer to the handbook.

2.9.4 How to turn or remove the signal converter



INFORMATION!

The converter turns 360°.

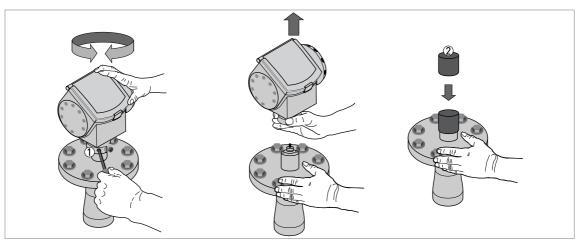


Figure 2-16: How to turn or remove the signal converter

- ① Tool: 5 mm Allen wrench (not supplied)
- ② Cover for the wave guide hole on top of the process connection assembly (not supplied)



CAUTION!

If you remove the housing, put a cover on the wave guide hole on top of the process connection assembly.

When the housing is attached to the process connection assembly, tighten the lock screw.

2.9.5 How to attach the weather protection to the device

Equipment needed:

- Device.
- Weather protection (option).
- 10 mm wrench (not supplied).

The overall dimensions of the weather protection are in "Dimensions and weight" in the handbook.

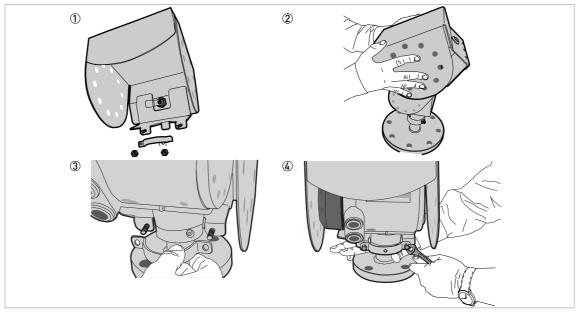


Figure 2-17: Installation of the weather protection



- Loosen the bracket nuts on the weather protection.
- Remove the bracket.
- Lower the weather protection onto the device.
- Turn the weather protection so that the keyhole points forward.
- Attach the bracket.
- Lift the weather protection to the top of the housing support pillar.
- Hold the weather protection in the correct position and tighten the bracket nuts.

2.9.6 How to open the weather protection

Equipment needed:

- Weather protection attached to the device.
- Large slotted tip screwdriver (not supplied).

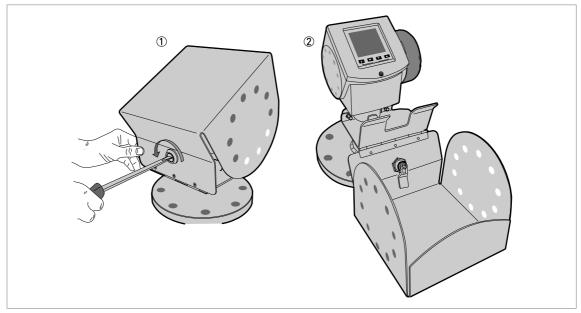


Figure 2-18: How to open the weather protection

- $\textcircled{1} \ \ \textbf{Weather protection in its closed position}$
- $\ensuremath{\textcircled{2}} \ensuremath{\texttt{Weather}} \ensuremath{\texttt{protection}} \ensuremath{\texttt{in}} \ensuremath{\texttt{its}} \ensuremath{\texttt{open}} \ensuremath{\texttt{position}}. \ensuremath{\texttt{Minimum}} \ensuremath{\texttt{clearance}} \ensuremath{\texttt{in}} \ensuremath{\texttt{front}} \ensuremath{\texttt{of}} \ensuremath{\texttt{the}} \ensuremath{\texttt{device}} \ensuremath{\texttt{300}} \ensuremath{\texttt{mm}} \ensuremath{\texttt{/}} \ensuremath{\texttt{12}}^{\circ}.$



- Put a large slotted tip screwdriver into the keyhole at the front of the weather protection. Turn the screwdriver counterclockwise.
- Pull the top of weather protection up and forward.
- This will open the weather protection.

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



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: outputs 1 and 2

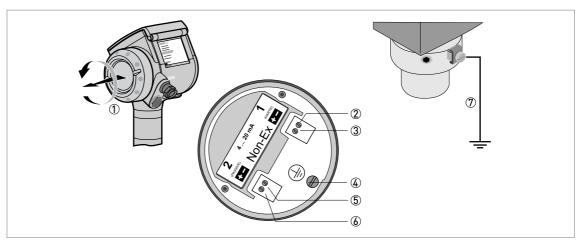


Figure 3-1: Electrical installation

- Terminal compartment cover
- 2 Output 1: current output -
- 3 Output 1: current output +
- 4 Grounding terminal in the housing
- ⑤ Output 2: current output (option)
- Output 2: current output + (option)
- $\ensuremath{\mathfrak{D}}$ Grounding terminal between the process connection and the converter

Output 1 energizes the device and is used for HART[®] communication. If the device has the second current output option, use a separate power supply to energize output 2.



Procedure:

- Remove the housing terminal compartment cover ①.
- Connect the wires to the device. Obey the national electrical codes.
- Make sure that the polarity of the wires is correct.
- Attach the ground to 4 or 7. Both terminals are technically equivalent.

3.2.1 Non-Ex devices

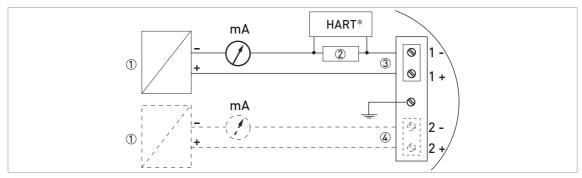


Figure 3-2: Electrical connections for non-Ex devices

- Power supply
- ② Resistor for HART® communication
- 3 Output 1: 14...30 VDC for an output of 22 mA at the terminal
- 4 Output 2: 10...30 VDC for an output of 22 mA at the terminal

3.2.2 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, FM, CSA, ...). You can find this documentation on the CD-ROM delivered with the device or it can be downloaded free of charge from the website (Download Center).

3.2.3 PROFIBUS PA

For electrical data for PROFIBUS PA networks, refer to the PROFIBUS PA supplement. You can find this documentation on the CD-ROM delivered with the device or it can be downloaded free of charge from the website (Downloadcenter).

3.2.4 FOUNDATION Fieldbus

For electrical data for FOUNDATION Fieldbus networks, refer to the FOUNDATION Fieldbus supplement. You can find this documentation on the CD-ROM delivered with the device or it can be downloaded free of charge from the website (Downloadcenter).

3.3 Protection category



INFORMATION!

The device fulfills all requirements per protection category IP 66/67 (equivalent to NEMA type 4X (housing) and type 6P (antenna)).



DANGER!

Make sure that the cable gland is watertight.

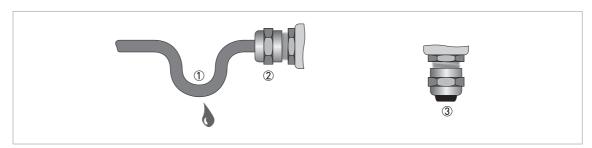


Figure 3-3: How to make the installation agree with protection category $\,$ IP 67



- Make sure that the gaskets are not damaged.
- Make sure that the electrical cables are not damaged.
- Make sure that the electrical cables agree with the national electrical code.
- The cables are in a loop in front of the device ① so water does not go into the housing.
- Tighten the cable feedthroughs 2.
- Close unused cable feedthroughs with dummy plugs ③.

4.1 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 representative.
- Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website (Download Center).

Measuring system

Measuring principle	2-wire loop-powered level transmitter; K-band (2426 GHz) FMCW radar
Application range	Level measurement of powders and granulates
Primary measured value	Δ f (change in frequency) between the emitted and received signal
Secondary measured value	Distance, level, volume, mass and reflectivity

Design

Construction	The measurement system consists of a measuring sensor (antenna) and a signal converter which is only available in a compact version
Standard	Antenna purging system for horn antenna (supplied with a ¼ NPTF connection - for horn antenna only)
Options	Integrated LCD display with sun cover (-20+60°C / -4+140°F); if the ambient temperature is not in these limits, the display switches off
	2nd current output
	FOUNDATION Fieldbus output (4-wire device with local HART communication)
	PROFIBUS PA output (4-wire device with local HART communication)
	PTFE/PP flange plate protection (for Drop antenna without antenna extensions only)
	Distance piece (for process temperature: +150+200°C / +300+390°F)
Accessories	Weather protection
	Antenna extensions of 105 mm / 4.1" length (max. length for Drop antenna versions: 525 mm / 20.7")
	2° PP slanted flange (for all antennas)
Max. measuring range	80 m / 260 ft
	Depends on the antenna option, dielectric constant of the product and installation type. Refer also to "Antenna selection".
Min. tank height	0.2 m / 8"
Dead zone	Antenna extension length + antenna length + 0.3 m / 12"
Beam angle of antenna	Horn / Sheet metal horn DN80 / 3": 10°
	Horn / Sheet metal horn DN100 / 4": 8°
	Sheet metal horn DN150 / 6": 8°
	Sheet metal horn DN200 / 8": 8°
	Drop DN80 / 3": 8°
	Drop DN150 / 6": 4°
Display and user interface	
Display	LCD display
	9 lines, 160 × 160 pixels in 8-step grayscale with 4-button keypad
Interface languages	English, German, French, Italian, Spanish, Portuguese, Japanese, Chinese (Mandarin) and Russian

Measurement accuracy

Resolution	1 mm / 0.04"	
Repeatability	±5 mm / ±0.2"	
Accuracy	±10 mm / ±0.4", when distance < 10 m / 33 ft; ±0.1% of measured distance, when distance > 10 m / 33 ft	
Reference conditions acc. to EN 60770		
Temperature	+20°C ±5°C / +70°F ±10°F	
Pressure	1013 mbara ±20 mbar / 14.69 psia ±0.29 psi	
Relative air humidity	60% ±15%	
Target	Metal plate in an anechoic chamber	

Operating conditions

Temperature	
Ambient temperature	-40+80°C / -40+175°F (according to the temperature limits of the gasket material. Refer to "Materials" in this table.) Ex: see supplementary operating instructions or approval certificates
Storage temperature	-40+85°C / -40+185°F
Flange temperature	Horn / Sheet metal horn antenna: Standard: -50+150°C / -58+300°F Option: -50+200°C / -58+390°F (the process connection temperature must agree with the temperature limits of the gasket material. Refer to "Materials" in this table.) Ex: see supplementary operating instructions or approval certificates
	Drop antenna (PTFE): -50+150°C / -58+300°F (the process connection temperature must agree with the temperature limits of the gasket material. Refer to "Materials" in this table.) Ex: see supplementary operating instructions or approval certificates
	Drop antenna (PP): -40+100°C / -40+210°F (the process connection temperature must agree with the temperature limits of the gasket material. Refer to "Materials" in this table.) Ex: see supplementary operating instructions or approval certificates
Pressure	
Operating pressure	Drop antenna (PP): -116 barg / -14.5232 psig; subject to process connection used and flange temperature
	Drop antenna (PTFE): -140 barg / -14.5580 psig; subject to process connection used and flange temperature
	Horn / Sheet metal horn antenna: Standard: -140 barg / -14.5580 psig; subject to process connection used and flange temperature
Other conditions	
Dielectric constant (εr)	≥1.5
Vibration resistance	IEC 60068-2-6 and EN 50178 (1057 Hz: 0.075 mm / 57150 Hz:1g)
Protection category	IP 66/67 equivalent to NEMA type 4X (housing) and type 6P (antenna)
Maximum rate of change	10 m/min / 33 ft/min

Installation conditions

Process connection size	The nominal diameter (DN) should be equal to or larger than the antenna diameter.
	If the nominal diameter (DN) is smaller than the antenna, either: - provide the means to adapt the device to a larger process connection on the silo (for example, a plate with a slot), or - use the same process connection, but remove the antenna from the device before installation and fit it from inside the silo
Process connection position	Make sure that there are not any obstructions directly below the process connection for the device.
Dimensions and weights	Refer to "Technical data: Dimensions and weights" in the Handbook.

Materials

Drop antenna: PTFE; PP - a PP or PTFE flange plate protection option is also available Process connection Stainless steel (1.4404 / 316L) - a PP or PTFE flange plate protection option is also available for the Drop antenna Gaskets (and o-rings for the sealed antenna extension option) PTFE Drop antenna: FKM/FPM (-40+150°C / -40+300°F); Kalrez® 6375 (-20+150°C / -4+300°F); EPDM (-50°C+150°C / -58+300°F) ① PP Drop antenna: FKM/FPM (-40+100°C / -40+210°F); Kalrez® 6375 (-20+100°C / -4+210°F); EPDM (-40°C+100°C / -40+210°F) ① Horn / Sheet metal horn antenna: FKM/FPM (-40+200°C / -40+390°F); Kalrez® 6375 (-20+200°C / -4+390°F); EPDM (-50°C+150°C / -58+300°F) ① Feedthrough Standard: PEI (-50+200°C / -58+390°F - max. range. The feedthrough temperature limits must agree with the temperature limits of the gasket material and antenna type. If the distance piece option is not attached, the maximum temperature limits must agree with the temperature limits of the gasket material and antenna type. If the distance piece option is not attached, the maximum temperature limits must agree with the temperature limits of the gasket material and antenna type. If the distance piece option is not attached, the maximum temperature is 150°C / 300°F.] ②		
Horn / Sheet metal horn antenna: Stainless steel (1.4404 / 316L)	ousing	Standard: Aluminium with a polyester topcoat
Drop antenna: PTFE; PP - a PP or PTFE flange plate protection option is also available Process connection Stainless steel (1.4404 / 316L) - a PP or PTFE flange plate protection option is also available for the Drop antenna Gaskets (and o-rings for the sealed antenna extension option) PTFE Drop antenna: FKM/FPM (-40+150°C / -40+300°F); Kalrez® 6375 (-20+150°C / -4+300°F); EPDM (-50°C+150°C / -58+300°F) ① PP Drop antenna: FKM/FPM (-40+100°C / -40+210°F); Kalrez® 6375 (-20+100°C / -4+210°F); EPDM (-40°C+100°C / -40+210°F) ① Horn / Sheet metal horn antenna: FKM/FPM (-40+200°C / -58+300°F) ① Standard: PEI (-50+200°C / -58+300°F) ① Standard: PEI (-50+200°C / -58+390°F - max. range. The feedthrough temperature limits must agree with the temperature limits of the gasket material and antenna type. If the distance piece option is not attached, the maximum temperature limits must agree with the temperature limits of the gasket material and antenna type. If the distance piece option is not attached, the maximum temperature limits must agree with the temperature limits of the gasket material and antenna type. If the distance piece option is not attached, the maximum temperature limits must agree with the temperature limits of the gasket material and antenna type. If the distance piece option is not attached, the maximum temperature is 150°C / 300°F.] ②		Option: Stainless steel (1.4404 / 316L)
available Process connection Stainless steel (1.4404 / 316L) - a PP or PTFE flange plate protection option is also available for the Drop antenna Gaskets (and o-rings for the sealed antenna extension option) PTFE Drop antenna: FKM/FPM (-40+150°C / -40+300°F); Kalrez® 6375 (-20+150°C / -4+300°F); EPDM (-50°C+150°C / -58+300°F) ① PP Drop antenna: FKM/FPM (-40+100°C / -40+210°F); Kalrez® 6375 (-20+100°C / -4+210°F); EPDM (-40°C+100°C / -40+390°F); Malrez® 6375 (-20+200°C / -4+390°F); EPDM (-50°C+150°C / -58+300°F) ① Feedthrough Feedthrough Standard: PEI (-50+200°C / -58+390°F - max. range. The feedthrough temperature limits must agree with the temperature limits of the gasket material and antenna type. If the distance piece option is not attached, the maximum temperature limits must agree with the temperature limits of the gasket material and antenna type. If the distance piece option is not attached, the maximum temperature is 150°C / 300°F.] Option: Metaglas® (-30+200°C / -22+390°F - max. range. The feedthrough temperature limits must agree with the temperature limits of the gasket material and antenna type. If the distance piece option is not attached, the maximum temperature is 150°C / 300°F.] Query Company Co	Wetted parts, including antenna	Horn / Sheet metal horn antenna: Stainless steel (1.4404 / 316L)
available for the Drop antenna PTFE Drop antenna: FKM/FPM (-40+150°C / -40+300°F); Kalrez® 6375 (-20+150°C / -4+300°F); EPDM (-50°C+150°C / -58+300°F) ① PP Drop antenna: FKM/FPM (-40+100°C / -40+210°F); Kalrez® 6375 (-20+100°C / -4+210°F); EPDM (-40°C+100°C / -40+210°F) ① Horn / Sheet metal horn antenna: FKM/FPM (-40+200°C / -40+390°F); Kalrez® 6375 (-20+200°C / -4+390°F); EPDM (-50°C+150°C / -58+390°F) ① Feedthrough Standard: PEI (-50+200°C / -58+390°F - max. range. The feedthrough temperature limits must agree with the temperature limits of the gasket material and antenna type. If the distance piece option is not attached, the maximum temperature limits must agree with the temperature limits of the gasket material and antenna type. If the distance piece option is not attached, the maximum temperature limits must agree with the temperature limits of the gasket material and antenna type. If the distance piece option is not attached, the maximum temperature limits must agree with the temperature limits of the gasket material and antenna type. If the distance piece option is not attached, the maximum temperature is 150°C / 300°F.) ②		
FKM/FPM (-40+150°C / -40+300°F); Kalrez® 6375 (-20+150°C / -4+300°F); EPDM (-50°C+150°C / -58+300°F) ① PP Drop antenna: FKM/FPM (-40+100°C / -40+210°F); Kalrez® 6375 (-20+100°C / -4+210°F); EPDM (-40°C+100°C / -40+210°F) ① Horn / Sheet metal horn antenna: FKM/FPM (-40+200°C / -40+390°F); Kalrez® 6375 (-20+200°C / -4+390°F); EPDM (-50°C+150°C / -58+300°F) ① Standard: PEI (-50+200°C / -58+390°F - max. range. The feedthrough temperature limits must agree with the temperature limits of the gasket material and antenna type. If the distance piece option is not attached, the maximum temperature limits must agree with the temperature limits of the gasket material and antenna type. If the distance piece option is not attached, the maximum temperature is 150°C / 300°F.) Option: Metaglas® (-30+200°C / -22+390°F - max. range. The feedthrough temperature limits must agree with the temperature limits of the gasket material and antenna type. If the distance piece option is not attached, the maximum temperature is 150°C / 300°F.) ②	Process connection	
FKM/FPM (-40+100°C / -40+210°F); Kalrez® 6375 (-20+100°C / -4+210°F); EPDM (-40°C+100°C / -40+210°F) ① Horn / Sheet metal horn antenna: FKM/FPM (-40+200°C / -40+390°F); Kalrez® 6375 (-20+200°C / -4+390°F); EPDM (-50°C+150°C / -58+390°F) ① Standard: PEI (-50+200°C / -58+390°F - max. range. The feedthrough temperature limits must agree with the temperature limits of the gasket material and antenna type. If the distance piece option is not attached, the maximum temperature limits must agree with the temperature limits of the gasket material and antenna type. If the distance piece option is not attached, the maximum temperature is 150°C / 300°F.)	Gaskets (and o-rings for the sealed antenna extension option)	FKM/FPM (-40+150°C / -40+300°F); Kalrez® 6375 (-20+150°C / -4+300°F);
FKM/FPM (-40+200°C / -40+390°F); Kalrez® 6375 (-20+200°C / -4+390°F); EPDM (-50°C+150°C / -58+390°F) ① Standard: PEI (-50+200°C / -58+390°F - max. range. The feedthrough temperature limits must agree with the temperature limits of the gasket material and antenna type. If the distance piece option is not attached, the maximum temperature is 150°C / 300°F.) Option: Metaglas® (-30+200°C / -22+390°F - max. range. The feedthrough temperature limits must agree with the temperature limits of the gasket material and antenna type. If the distance piece option is not attached, the maximum temperature is 150°C / 300°F.) ②		FKM/FPM (-40+100°C / -40+210°F); Kalrez® 6375 (-20+100°C / -4+210°F);
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temperature limits must agree with the temperature limits of the gasket material and antenna type. If the distance piece option is not attached, the maximum temperature is 150°C / 300°F.) ②	Feedthrough	temperature limits must agree with the temperature limits of the gasket material and antenna type. If the distance piece option is not attached, the maximum
Weather protection (Option) Stainless steel (1.4301 / 304)		temperature limits must agree with the temperature limits of the gasket material and antenna type. If the distance piece option is not attached, the maximum
	Weather protection (Option)	Stainless steel (1.4301 / 304)

Process connections

Thread	G 1½; 1½ NPT
Flange version	
EN	DN80150 in PN16 or PN40; others on request
ASME	3"8" in 150 lb, 3"4" in 300 lb; others on request
JIS	80100A in 10K; others on request
Other	Others on request

Electrical connections

Power supply	Terminals output 1 - Non-Ex / Ex i: 1430 VDC; min./max. value for an output of 22 mA at the terminal
	Terminals output 1 - Ex d: 2036 VDC; min./max. value for an output of 22 mA at the terminal
	Terminals output 2 - Non-Ex / Ex i / Ex d: 1030 VDC; min./max. value for an output of 22 mA at the terminal (additional power supply needed - output only)
Cable entry	M20×1.5; ½ NPT
	G ½ (not for FM- and CSA-approved devices. Not for stainless steel housings.)
	M25×1.5 (for stainless steel housings only)
Cable gland	Standard: none
	Options: M20×1.5 (for non-Ex and Ex -approved devices with M20×1.5 and M25×1.5 cable entries); others are available on request
Cable entry capacity (terminal)	0.51.5 mm²

Input and output

Current output	
Output signal (Output 1)	420 mA HART® or 3.820.5 mA acc. to NAMUR NE 43 ③
Output signal (Output 2 - optional)	420 mA (no HART® signal) or 3.820.5 mA acc. to NAMUR NE 43
Resolution	±3 μΑ
Temperature drift	Typically 25 ppm/K
Error signal	High: 22 mA; Low: 3.6 mA acc. to NAMUR NE 43
PROFIBUS PA	
Туре	4-wire (+ local HART) level transmitter; K-band FMCW radar
Function blocks	7 (level, distance, level conversion, level mass, reflection, ullage conversion and distance mass)
Protocol / Communication standard	PROFIBUS PA protocol that agrees with IEC 61158-2, galvanically isolated
Physical layer types	Standard power signaling, bus powered, non I.S.
Other features	Bus interface with integrated reverse polarity protection
Device power supply (24 V input)	1830 VDC
Current consumption on PROFIBUS network	20 mA
Output data	Level, distance, level conversion, level mass, reflection, ullage conversion or distance mass
Input data	None
Error current FDE	Typically 0 mA (FDE =Fault Disconnection Electronic)
Address range	0125. Default address: 126.
FOUNDATION Fieldbus	
Туре	4-wire (+ local HART) level transmitter; K-band FMCW radar
Function blocks	1 × Resource Block (RB), 4 × Analog Input Blocks (AI), 1 × Transducer Block (TB)
	Analog Input Block: 50 ms
Protocol / Communication standard	Foundation Fieldbus protocol that agrees with IEC 61158-2, galvanically isolated
ITK version	5.1

Physical layer types	Standard power signaling, bus powered, non I.S.
Other features	Bus interface with integrated reverse polarity protection
Device power supply (24 V input)	1830 VDC
Bus power supply	932 VDC (non-Ex); 917.5 VDC (intrinsically-safe)
Basic current	20 mA
Maximum error current	20 mA
Start current after 10 ms	20 mA
Polarity sensitivity	Yes
Minimum cycle time	100 ms
Output data	Level, distance, level conversion, level mass, reflection, ullage conversion or distance mass
Input data	None
Error current FDE	Typically 0 mA (FDE =Fault Disconnection Electronic)
Link Master function	Not supported

Approvals and certification

This device fulfils the statutory requirements of the EC directives. The
manufacturer certifies successful testing of the product by applying the CE mark.
II 1 G, 1/2 G, 2 G Ex ia IIC T6T3;
II 1 D, 1/2 D, 2 D Ex iaD 20 or Ex iaD 20/21 or Ex iaD 21 IP6X T70°CT95°C;
II 1/2 G, 2 G Ex d[ia] IIC T6T3;
II 1/2 D, 2 D Ex tD[iaD] A21/20 or Ex tD[iaD] A21 IP6X T70°CT95°C
Ga Ex ia IIC T6T3; Ex iaD 20 IP6X T70°CT95°C;
Ga/Gb Ex d[ia] IIC T6T3; Ex tD[iaD] A21/20 IP6X T70°CT95°C
NEC 500
XP-IS / Cl. I, Div. 1 / Gr. ABCD / T6;
DIP / Cl. II/III / Div. 1 / Gr. EFG / T6;
IS / Cl. I/II/III / Div. 1 / Gr. ABCDEFG / T6;
NI / Cl. I / Div. 2 / Gr. ABCD / T6
NEC 505
Cl. I / Zone 0 / AEx d[ia] IIC T6;
Cl. I / Zone 0 / AEx ia IIC T6;
Cl. I / Zone 2 / AEx nA[ia] IIC T6
Hazardous (Classified) Locations, indoor/outdoor Type 4X and 6P, IP66, Dual Seal
CEC Section 18 (Zone ratings)
Cl. I, Zone 1, Ex d, IIC (Antenna: Zone 0) T6;
Cl. I, Zone 0, Ex ia, IIC T6;
Cl. I, Zone 2, Ex nA, IIC T6
CEC Section 18 and Annex J (Division ratings)
XP-IS, Cl. I, Div. 2, Gr. ABCD; Cl. II, Div. 2, Gr. FG; Cl. III, Div. 2 T6;
IS, Cl. I, Div. 1, Gr. ABCD; Cl. II, Gr. FG; Cl. III T6

NEPSI GYJ091178/79	Ex dia IIC T3~T6 DIP A21/A20 T _A T70°C~T95°C IP6X;
	Ex ia IIC T3~T6 DIP A21/A20 T _A T70°C~T95°C IP6X
CEPEL / INMETRO CEPEL-EX-1996/11X	BR-Ex ia IIC T6T3 Ga
	Ex ia IIIC T95°C Da IP67
	BR-Ex d[ia] IIC T6T3 Gb
	Ex t[ia Da] IIIC T95°C Db IP67
Other standards and approva	als
EMC	Electromagnetic Compatibility Directive 2004/108/EC in conjunction with EN 61326-1 (2006)
R & TTE	Radio Equipment and Telecommunications Terminal Equipment Directive 1999/5/EC in conjunction with ESTI EN 302 372 (2006)
FCC Rules	Part 15
Industry Canada	RSS-210
LVD	Low-Voltage Directive 2006/95/EC in conjunction with EN 61010-1 (2001)
CRN	This certification is for all Canadian provinces and territories. For more data, refer to the website.
NAMUR	NAMUR NE 21 Electromagnetic Compatibility (EMC) of Industrial Process and Laboratory Control Equipment
	NAMUR NE 43 Standardization of the Signal Level for the Failure Information of Digital Transmitters

 $[\]textcircled{1} \ \, \mathsf{Kalrez} \\ \textcircled{8} \ \, \mathsf{is a registered trademark of DuPont Performance Elastomers L.L.C.}$

 $[\]textcircled{2}$ Metaglas® is a registered trademark of Herberts Industrieglas, GMBH & Co., KG

 $[\]ensuremath{\mathfrak{J}}$ HART® is a registered trademark of the HART Communication Foundation



KROHNE product overview

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

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

The current list of all KROHNE contacts and addresses can be found at: www.krohne.com $\,$

