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Quick setup guide

**Radar sensor for continuous level
measurement of bulk solids**

VEGAPULS 67

4 ... 20 mA/HART - four-wire



Document ID: 47155



VEGA

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Information:

This quick setup guide enables quick setup and commissioning of your instrument.

You can find supplementary information in the corresponding, more detailed Operating Instructions Manual as well as the Safety Manual that comes with instruments with SIL qualification. These manuals are available on the supplied DVD or in the download area of "www.vega.com".

Operating instructions VEGAPULS 67 - 4 ... 20 mA/HART - four-wire: Document-ID 36532

Editing status of the quick setup guide: 2016-02-04

1 For your safety

1.1 Authorised personnel

All operations described in this operating instructions manual must be carried out only by trained specialist personnel authorised by the plant operator.

During work on and with the device the required personal protective equipment must always be worn.

1.2 Appropriate use

VEGAPULS 67 is a sensor for continuous level measurement.

You can find detailed information about the area of application in chapter "*Product description*".

Operational reliability is ensured only if the instrument is properly used according to the specifications in the operating instructions manual as well as possible supplementary instructions.

1.3 Warning about incorrect use

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel overfill or damage to system components through incorrect mounting or adjustment. Also the protective characteristics of the instrument can be influenced.

1.4 General safety instructions

This is a state-of-the-art instrument complying with all prevailing regulations and guidelines. The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for the trouble-free operation of the instrument.

During the entire duration of use, the user is obliged to determine the compliance of the necessary occupational safety measures with the current valid rules and regulations and also take note of new regulations.

The safety instructions in this operating instructions manual, the national installation standards as well as the valid safety regulations and accident prevention rules must be observed by the user.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden.

The safety approval markings and safety tips on the device must also be observed.

Depending on the instrument version, the emitting frequencies are in the C, K or W band range. The low emitting frequencies are far below the internationally approved limit values. When used correctly, the device poses no danger to health.

1.5 CE conformity

The device fulfills the legal requirements of the applicable EC guidelines. By affixing the CE marking, we confirm successful testing of the product.

You can find the CE Certificate of Conformity in the download section of our homepage.

Electromagnetic compatibility

Instruments in four-wire or Ex-d-ia version are designed for use in an industrial environment. Nevertheless, electromagnetic interference from electrical conductors and radiated emissions must be taken into account, as is usual with class A instruments according to EN 61326-1. If the instrument is used in a different environment, the electromagnetic compatibility to other instruments must be ensured by suitable measures.

1.6 NAMUR recommendations

NAMUR is the automation technology user association in the process industry in Germany. The published NAMUR recommendations are accepted as the standard in field instrumentation.

The device fulfills the requirements of the following NAMUR recommendations:

- NE 21 – Electromagnetic compatibility of equipment
- NE 43 – Signal level for malfunction information from measuring transducers
- NE 53 – Compatibility of field devices and display/adjustment components
- NE 107 – Self-monitoring and diagnosis of field devices

For further information see www.namur.de.

1.7 Radio license for Europe

The instrument is approved according to EN 302372-1/2 V1.2.1 (2011-02) for use in closed vessels.

For operation inside of closed vessels, the following conditions must be fulfilled:

- The instrument must be permanently mounted on a closed vessel made of metal, reinforced concrete, or comparable attenuating materials.
- Flanges, process fittings and mounting accessories must ensure the microwave impermeability of the vessel and not let the radar signal escape to the outside
- If necessary, existing viewing windows in the vessel must be coated with a microwave impermeable material (e.g. electrically conductive coating)
- Manholes and flanges on the vessel must be closed and sealed to avoid penetration of the radar signal
- The instrument should be preferably mounted on top of the vessel with antenna orientation downward

- The instrument must only be installed and maintained by appropriately qualified staff

1.8 Radio license for USA/Canada

The instrument is in conformity with part 15 of the FCC regulations. Take note of the following two regulations:

- This device may not cause interference, and
- The device must be resistant to interference signals, including such that may cause undesired operating states of the device

Modifications not expressly approved by the manufacturer will lead to expiry of the operating licence according to FCC/IC.

The instrument is in conformity with RSS-210 of the IC regulations.

The instrument may only be used in closed vessels made of metal, concrete, or fibre-reinforced plastic.

1.9 Environmental instructions

Protection of the environment is one of our most important duties. That is why we have introduced an environment management system with the goal of continuously improving company environmental protection. The environment management system is certified according to DIN EN ISO 14001.

Please help us fulfill this obligation by observing the environmental instructions in this manual:

- Chapter "*Packaging, transport and storage*"
- Chapter "*Disposal*"

2 Product description

2.1 Configuration

Type label

The type label contains the most important data for identification and use of the instrument:

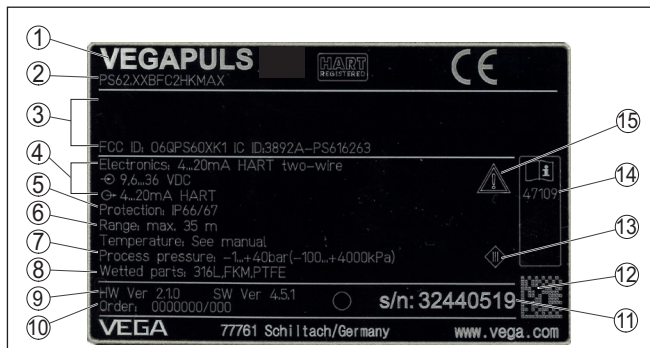


Fig. 1: Layout of the type label (example)

- 1 Instrument type
- 2 Product code
- 3 Approvals
- 4 Power supply and signal output, electronics
- 5 Protection rating
- 6 Measuring range
- 7 Process and ambient temperature, process pressure
- 8 Material, wetted parts
- 9 Hardware and software version
- 10 Order number
- 11 Serial number of the instrument
- 12 Data-Matrix-Code for smartphone app
- 13 Symbol of the device protection class
- 14 ID number, instrument documentation
- 15 Reminder to observe the instrument documentation

Serial number - Instrument search

The type label contains the serial number of the instrument. With it you can find the following instrument data on our homepage:

- Product code (HTML)
- Delivery date (HTML)
- Order-specific instrument features (HTML)
- Operating instructions and quick setup guide at the time of shipment (PDF)
- Order-specific sensor data for an electronics exchange (XML)
- Test certificate (PDF) - optional

Go to www.vega.com "VEGA Tools" and "Instrument search". Enter the serial number.

Alternatively, you can access the data via your smartphone:

- Download the smartphone app "VEGA Tools" from the "Apple App Store" or the "Google Play Store"
- Scan the Data Matrix code on the type label of the instrument or
- Enter the serial number manually in the app

3 Mounting

3.1 Collar or adapter flange

For mounting the instrument on a socket, a combi compression flange for DN 80 (ASME 3" or JIS 80) is also available for retro fitting. Optionally, the instrument can be also equipped with an adapter flange from DN 100 (ASME 4" or JIS 100).

With the housing versions plastic, aluminium single chamber and stainless steel, the collar flange can be placed directly over the housing. With the aluminium double chamber housing, retroactive mounting in this way is not possible - the mounting type must be specified with the order.

You can find drawings of these mounting options in chapter "*Dimensions*".

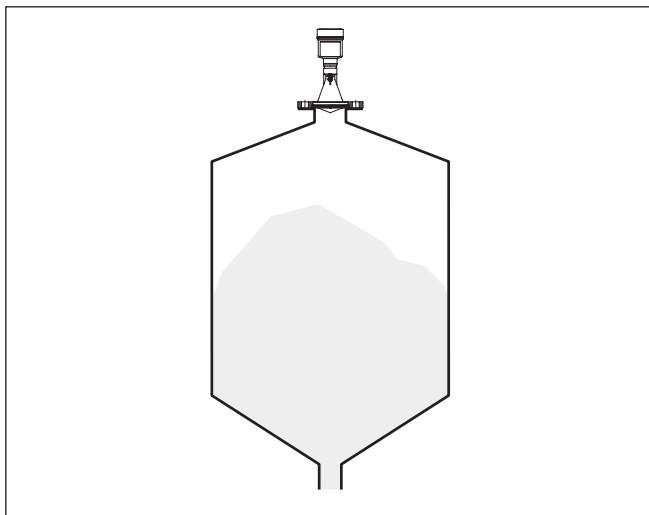


Fig. 2: Flange mounting of the radar sensor

3.2 Mounting strap

Mounting strap

The mounting strap enables simple mounting on the vessel wall or silo top. It is suitable for wall, ceiling or boom mounting. Especially in open vessels this is a very easy and effective way to align the sensor to the bulk solid surface.

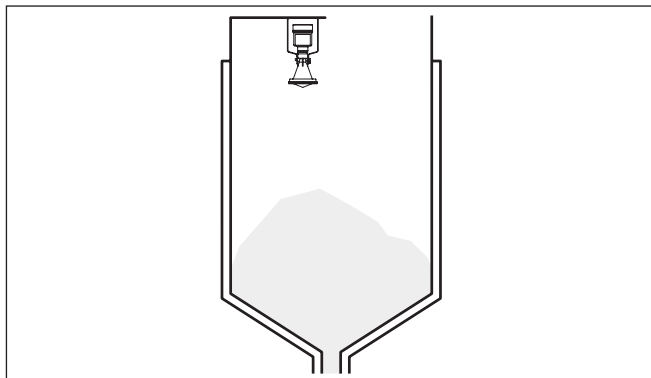


Fig. 3: Radar sensor with mounting strap

The strap is supplied unassembled and must be screwed to the sensor before setup with three hexagon socket screws M5 x 10 and spring washers. Max. torque, see chapter "Technical data". Required tools: Allen wrench size 4.

There are two ways to screw the strap onto the sensor. Depending on the selected version, the sensors can be swivelled in the strap as follows:

- Single chamber housing
 - Angle of inclination 180°, infinitely variable
 - Angle of inclination in three steps 0°, 90° and 180°
- Double chamber housing
 - Angle of inclination 90°, infinitely variable
 - Angle of inclination in two steps 0° and 90°

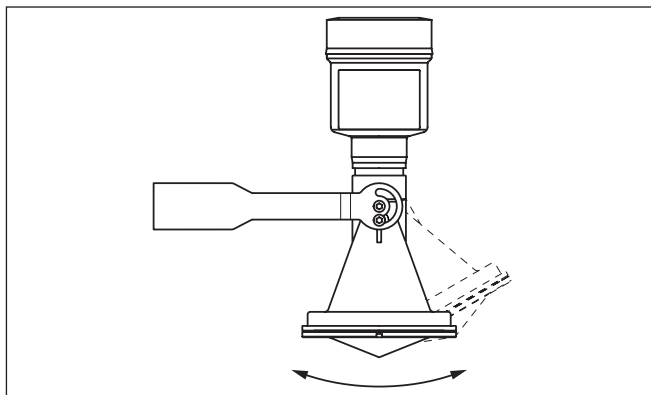


Fig. 4: Adjustment of the angle of inclination

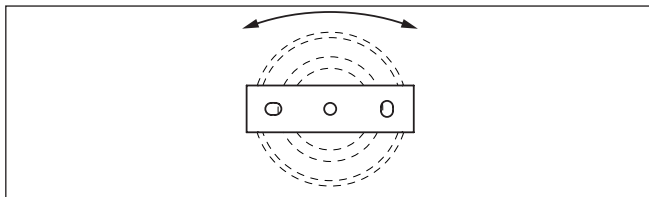


Fig. 5: Turning by fastening in the centre

3.3 Mounting instructions

Mounting

1. Distance from the vessel wall > 200 mm

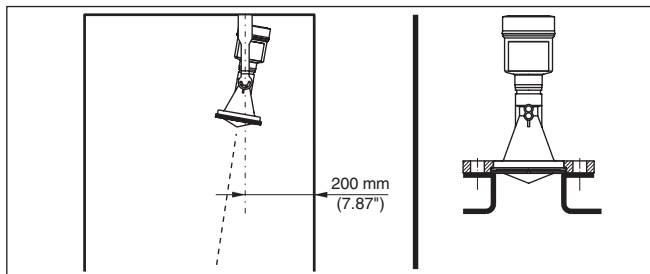


Fig. 6: Distance of the antenna to the vessel wall/socket configuration

2. Keep the socket short, round off the socket end

For further information see chapter "Mounting".

4 Connecting to power supply

4.1 Connection

Connection technology

The voltage supply and signal output are connected via the spring-loaded terminals in the housing.

Connection to the display and adjustment module or to the interface adapter is carried out via contact pins in the housing.



Information:

The terminal block is pluggable and can be removed from the electronics. To do this, lift the terminal block with a small screwdriver and pull it out. When reinserting the terminal block, you should hear it snap in.

Connection procedure

Proceed as follows:

1. Unscrew the housing lid
2. Loosen compression nut of the cable gland and remove blind plug
3. Remove approx. 10 cm (4 in) of the cable mantle (signal output), strip approx. 1 cm (0.4 in) insulation from the ends of the individual wires
4. Insert the cable into the sensor through the cable entry



Fig. 7: Connection steps 5 and 6

5. Insert the wire ends into the terminals according to the wiring plan



Information:

Solid cores as well as flexible cores with wire end sleeves are inserted directly into the terminal openings. In case of flexible cores without end sleeves, press the terminal from above with a small screwdriver, the terminal opening is then free. When the screwdriver is released, the terminal closes again.

6. Check the hold of the wires in the terminals by lightly pulling on them
7. Connect the screen to the internal ground terminal, connect the outer ground terminal to potential equalisation in case of power supply via low voltage
8. Connect the lead cable for power supply in the same way according to the wiring plan, in addition connect the ground conductor to the inner ground terminal when powered with mains voltage.
9. Tighten the compression nut of the cable glands. The seal ring must completely encircle the cables
10. Screw the housing lid back on

The electrical connection is finished.



Information:

The terminal blocks are pluggable and can be removed from the housing insert. To do this, lift the terminal block with a small screwdriver and pull it out. When inserting the terminal block again, you should hear it snap in.

4.2 Wiring plan, double chamber housing



The following illustrations apply to the non-Ex as well as to the Ex-d-ia version.

Connection compartment with mains voltage

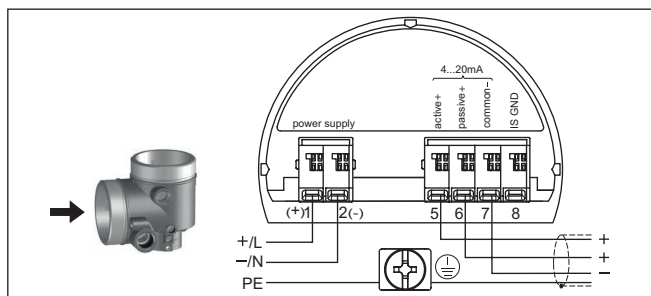


Fig. 8: Connection compartment with double chamber housing with mains voltage

Terminal	Function	Polarity
1	Voltage supply	+ / L
2	Voltage supply	- / N
5	4 ... 20 mA output (active)	+
6	4 ... 20 mA output (passive)	+
7	Mass - output	-
8	Function ground when installing according to CSA (Canadian Standards Association)	

Connection compartment with low voltage

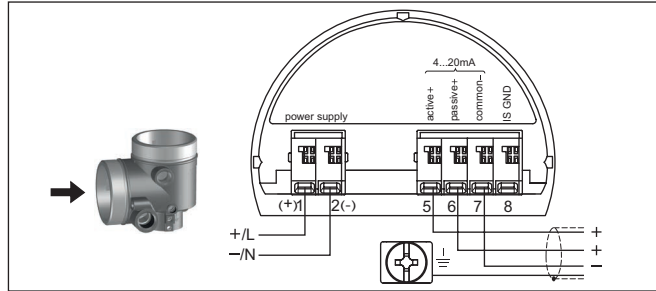


Fig. 9: Connection compartment with double chamber housing with low voltage

Terminal	Function	Polarity
1	Voltage supply	+ / L
2	Voltage supply	- / N
5	4 ... 20 mA output (active)	+
6	4 ... 20 mA output (passive)	+
7	Mass - output	-
8	Function ground when installing according to CSA (Canadian Standards Association)	

5 Set up with the display and adjustment module

5.1 Insert display and adjustment module

The display and adjustment module can be inserted into the sensor and removed again at any time. You can choose any one of four different positions - each displaced by 90°. It is not necessary to interrupt the power supply.

Proceed as follows:

1. Unscrew the housing lid
2. Place the display and adjustment module on the electronics in the desired position and turn it to the right until it snaps in.
3. Screw housing lid with inspection window tightly back on

Disassembly is carried out in reverse order.

The display and adjustment module is powered by the sensor, an additional connection is not necessary.



Fig. 10: Installing the display and adjustment module in the double chamber housing



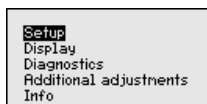
Note:

If you intend to retrofit the instrument with a display and adjustment module for continuous measured value indication, a higher lid with an inspection glass is required.

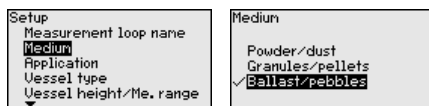
5.2 Parameter adjustment

Set parameters

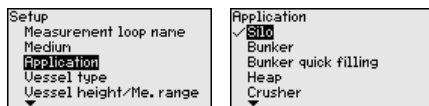
1. Go to the menu "Setup" via the display and adjustment module.



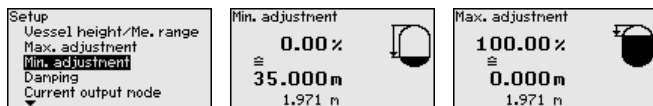
2. Select in the menu item "Medium" the medium of your application, for example "Gravel/Pebble".



3. Select in the menu item "Application" the vessel, the application and the vessel form, for example, silo.



4. Carry out the adjustment in the menu items "Min. adjustment" and "Max. adjustment".



Parameterization example The radar sensor measures the distance from the sensor to the product surface. For indication of the real level, an allocation of the measured distance to the percentage height must be carried out.

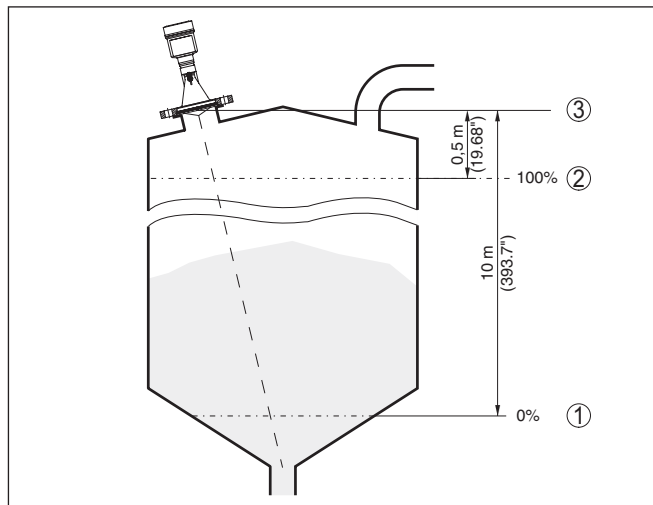


Fig. 11: Parameterization example

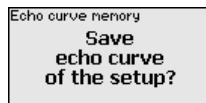
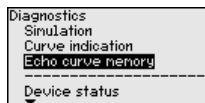
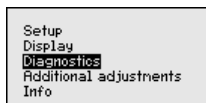
- 1 Min. level $\hat{=}$ max. meas. distance
- 2 Max. level $\hat{=}$ min. meas. distance

For this adjustment, the distance is entered when the vessel is full and nearly empty. If these values are not known, an adjustment with other distances, for example, 10 % and 90 % is also possible. Starting point for these distance specifications is always the seal surface of the thread or flange.

Diagnostics - Echo curve memory

The function "Echo curve memory" makes it possible to save the echo curve at the time of setup. This is generally recommended, and it is absolutely necessary to do this if you want to use the Asset Management functions. If possible, the curve should be saved with a low level in the vessel.

With the adjustment software PACTware and the PC, the high resolution echo curve can be displayed and used to recognize signal changes during operation. In addition, the echo curve of setup can be displayed in the echo curve window and compared with the current echo curve.



Additional adjustments - False signal suppression

The following circumstances cause interfering reflections and can influence the measurement:

- High sockets
- Vessel internals such as struts
- Agitators
- Buildup or welded joints on vessel walls



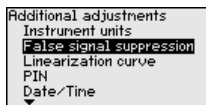
Note:

A false signal suppression detects, marks and saves these false signals so that they are no longer taken into account in the level measurement.

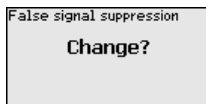
This should be done with a low level so that all potential interfering reflections can be detected.

Proceed as follows:

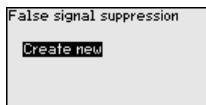
1. Select with **[F->]** the menu item "False signal suppression" and confirm with **[OK]**.



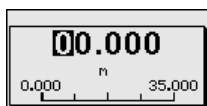
2. Confirm again with **[OK]**.



3. Confirm again with **[OK]**.



4. Confirm again with **[OK]** and enter the actual distance from the sensor to the product surface.



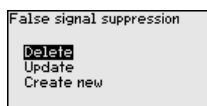
5. All interfering signals in this section are detected by the sensor and stored after confirming with **[OK]**.



Note:

Check the distance to the product surface, because if an incorrect (too large) value is entered, the existing level will be saved as a false signal. The level would then no longer be detectable in this area.

If a false signal suppression has already been saved in the sensor, the following menu window appears when selecting "*False signal suppression*":



Delete: An already created false signal suppression will be completely deleted. This is useful if the saved false signal suppression no longer matches the metrological conditions in the vessel.

Extend: is used to extend an already created false signal suppression. This is useful if a false signal suppression was carried out with too high a level and not all false signals could be detected. When selecting "*Extend*", the distance to the product surface of the created false signal suppression is displayed. This value can now be changed and the false signal suppression can be extended to this range.

Menu and parameter overview

Menu - Setup

Menu item	Parameter	Default setting
Measurement loop name		Sensor
Medium		Liquid Water based
Application		Storage tank
Vessel form	Vessel top	Dished form
	Vessel bottom	Dished form
Vessel height/ Measuring range		35 m
Max. adjustment		0,000 m(d)
		100.00 %
Min. adjustment		35 m
		0.00 %
Damping	Integration time	0.0 s

Menu item	Parameter	Default setting
Current output mode	Output characteristics	4 ... 20 mA
	Failure mode	≤ 3.6 mA
Current output - Min./Max.	Min. current	3.8 mA
	Max. current	20.5 mA
Lock adjustment		Released

Menu - Display

Menu item	Default setting
Language	Order-specific
Displayed value	Filling height in %
Backlight	Switched on

Menu - Diagnosis

Menu item	Parameter	Default setting
Sensor status		-
Peak value	Distance	-
Electronics temperature	Temperature	-
Meas. certainty		-
Simulation		Percent
Curve indication	Echo curve	-
	False signal suppression	-
Echo curve memory		-

Menu - Additional adjustments

Menu item	Default setting
Instrument units	Distance in m Temperature in °C
False signal suppression	-
Linearization	Linear
PIN	-
Date/Time	Actual date/Actual time
Reset	-
HART mode	Address 0
Copy instrument settings	-

Menu - Info

Menu item	Parameter
Device name	VEGAPULS 6.
Instrument version	Hardware and software version
Date of manufacture	Date
Instrument features	Order-specific characteristics

6 Supplement

6.1 Technical data

Electromechanical data - version IP 66/IP 67

Cable gland	M20 x 1.5 or ½ NPT
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Wire cross-section (spring-loaded terminals)

- | | |
|---------------------------------|---|
| – Massive wire, stranded wire | 0.2 ... 2.5 mm ² (AWG 24 ... 14) |
| – Stranded wire with end sleeve | 0.2 ... 1.5 mm ² (AWG 24 ... 16) |

Voltage supply

Operating voltage

- | | |
|-----------------------------|---|
| – Version for low voltage | 9.6 ... 48 V DC, 20 ... 42 V AC, 50/60 Hz |
| – Version for mains voltage | 90 ... 253 V AC, 50/60 Hz |

Reverse voltage protection	Integrated
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Max. power consumption	4 VA; 2.1 W
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Printing date:

All statements concerning scope of delivery, application, practical use and operating conditions of the sensors and processing systems correspond to the information available at the time of printing.

Subject to change without prior notice

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47155-EN-160215



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