



## R903-26GHz Radar Level Meter

## **BEST MEASUREMENT PERFORMANCE**

- Best measurement performance on liquid
- Optimum level measurement
- Reliable level measurement for the most complicate applications
- Excellent design to reduce installation cost and eliminate daily maintenance

## **BEST FIT- FOR- APPLICATION**

- Wide range up to 70 meters
- Wide application of hygienic, cryogenic, high pressure and high temperature
- Wide variety of I/O and expansive communication protocols

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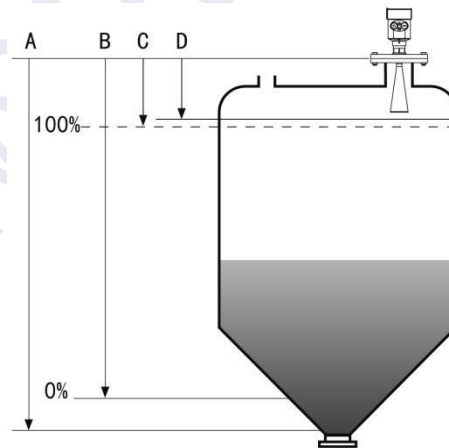
## OVERVIEW

This series of radar level meter adopted 26G high frequency radar sensor, the maximum measurement range can reach up to 70 meters. Antenna is optimized further processing, the new fast microprocessors have higher speed and efficiency can be done signal analysis, the instrumentation can be used for reactor, solid silo and very complex measurement environment.

## PRINCIPLE

Radar level transmitter antenna microwave pulse is narrow, the downward transmission antenna. Microwave exposure to the medium surface is reflected back again by the antenna system receives, sends the signal to the electronic circuit automatically converted into level signals (because the microwave propagation speed, electromagnetic wave to reach the target and the reflected back to the receiver this time is almost instantaneous).

- A Range set
- B Low adjustment
- C High
- D Blind area



**Datum measurement:** Screw thread bottom or the sealing surface of the flange.

**Note:** Make sure the radar level meter the highest level cannot enter the measuring blind area (Figure D shown below).

## DESIGN & BENEFIT

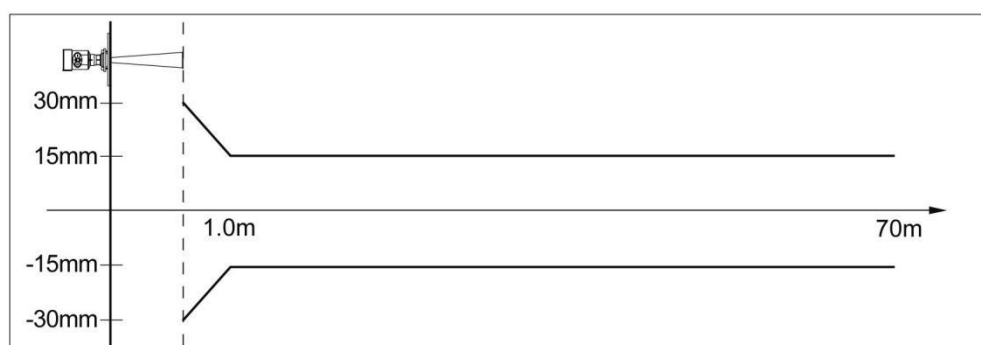
- ◆ Small antenna size, easy to install; Non-contact radar, no wear, no pollution.
- ◆ Almost no corrosion, bubble effect; almost not affected by water vapor in the atmosphere, the temperature and pressure changes.
- ◆ Serious dust environment on the high level meter work has little effect.
- ◆ A shorter wavelength, the reflection of solid surface inclination is better.
- ◆ Beam angle is small, the energy is concentrated, can enhance the ability of echo and to avoid



Communication protocol	HART/ Modbus
Resolution	1.6μA
Fault signal	Constant current output; 20. 5mA 22mA 3.9mA
Integral time	(0 to 36) s, adjustable
<b>Blind area</b>	the ends of the antenna
<b>Max. distance measurement</b>	70 meters
<b>Accuracy</b>	± 15mm
<b>Display</b>	LCD, Programmable
<b>Enclosure</b>	IP67
<b>Ex-Grade</b>	Exia II C T6 Ga/ Exd II C T6 Gb
<b>Frequency</b>	26GHz
<b>Communication interface</b>	HART communication protocol
<b>Measurement interval</b>	about 1 second (depend on parameter settings)
<b>Adjust the time</b>	about 1 second (depend on parameter settings)
<b>Display resolution</b>	1 mm
<b>Storage temperature</b>	(-40 to 100) °C
<b>Process Temperature</b>	(-40 to 130)°C / (-40 to 250)°C
<b>Pressure</b>	Max. 4.0MPa
<b>Seismic</b>	Mechanical vibration 10m/s <sup>2</sup> , (10 to 150) Hz

## LINEARITY

Emission angle	Depending on the size of the antenna
- ∅ 46mm	18°
- ∅ 76mm	12°
- ∅ 96mm	8°
- ∅ 121mm	6°
Precision	See chart



## MODEL SELECTION

- R903-

### Type

- P Standard (Non-explosion-proof)
- I Intrinsically safe (Exia IIC T6 Ga)
- G Flameproof Type (Exd IIC T6 Gb)

### Process Connection / Material

- G Thread G1½"A / Stainless Steel 304
- N Thread 1½" NPT / Stainless Steel 304
- B Flange DN80 / Stainless Steel 304
- C Flange DN100 / Stainless Steel 304
- M Flange DN80 / Universal joint
- K Flange DN100 / Universal joint
- Y Special Custom Made

### Antenna Type / Material

- B Horn Antenna Φ76mm/ Stainless Steel 316L (With blow holes or dust cover)
- C Horn Antenna Φ96mm/ Stainless Steel 316L (With blow holes or dust cover)
- D Horn Antenna Φ121mm/ Stainless Steel 316L (With blow holes or dust cover)
- Y Special Custom

### Seal Up / Process Temperature

- V Viton / (-40 to 130) °C
- P PFA / (-40 to 250) °C

### Electronic Unit

- 3 (4 to 20) mA / 24V DC / HART 2-wire system
- 4 (4 to 20) mA / 220V AC / HART 4-wire system
- 5 RS485 / Modbus / 6 to 24V / Four wire system

### Outer Covering / Protection Grade

- L Aluminum / Single chamber / IP67
- H Aluminum / Double chamber / IP67
- G Plastic / Single chamber / IP65
- K Stainless steel / Single chamber / IP67

### Cable Line

- M M 20x1.5
- N ½" NPT

### Field Display/The Programmer

- A With
- X Without

## INSTALLATION

### 1. Installation Requirements

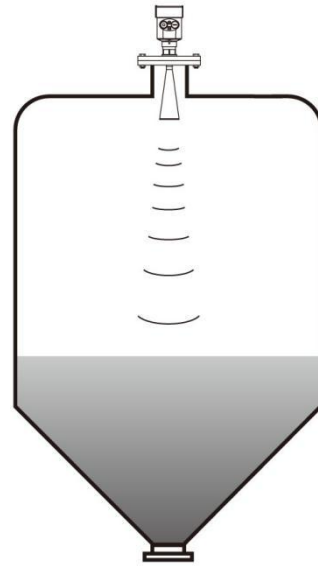
#### ● Installation guide:

Be installed in the diameter of the 1/4 or 1/6.

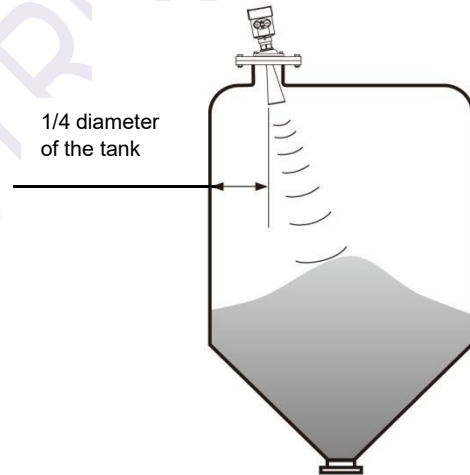
Note: The minimum distance from the tank wall should be 200mm.

Note: ① datum

② The container center or axis of symmetry



- The top conical tank level, can be installed at the top of the tank is intermediate, can guarantee the measurement to the conical bottom.



- A feed antenna to the vertical alignment surface. If the surface is rough, stack angle must be used to adjust the angle of cardan flange of the antenna to the alignment surface.

(Due to the solid surface tilt will cause the echo attenuation, even Loss of signal.)

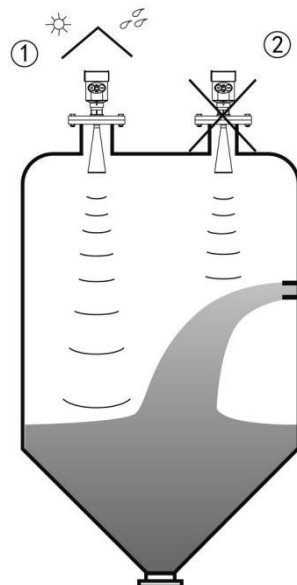
#### ● Typical installation errors:

- Conical tank cannot be installed above the feed port.

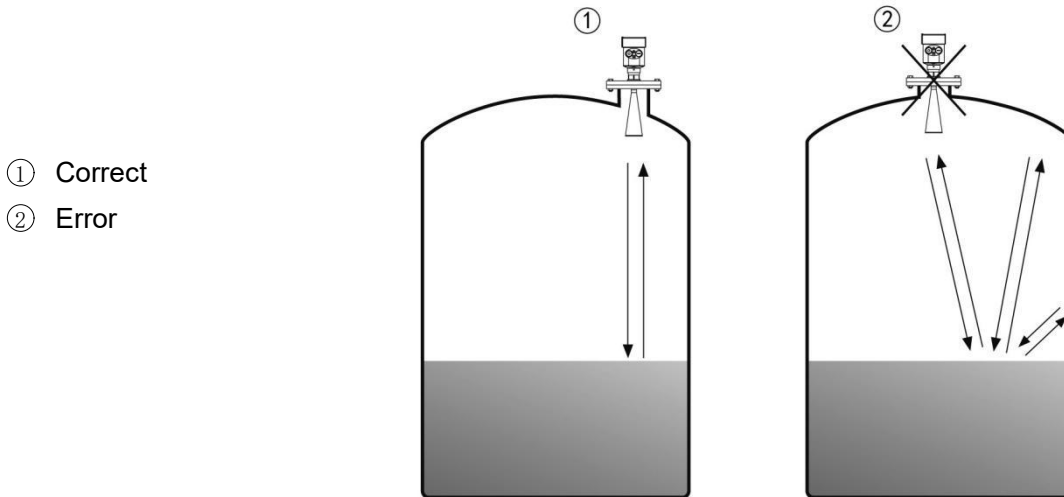
**Note:** outdoor installation should adopt sunshade.

① Correct

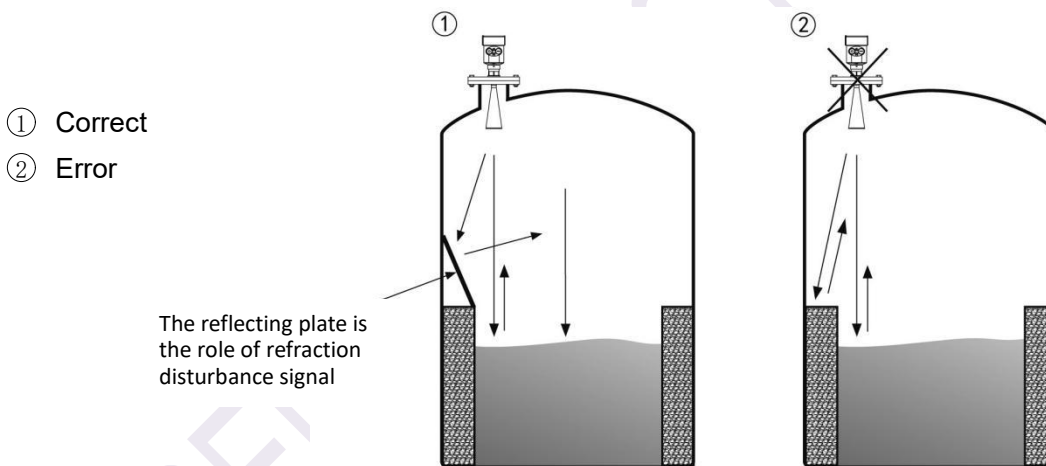
② Error rainproof measures



- The instrument cannot be installed in the arched or domed roof intermediate. In addition to produce indirect echo is also affected by the echoes. Multiple echo can be larger than the real value of signal echo, because through the top can concentrate multiple echo. So cannot be installed in a central location.

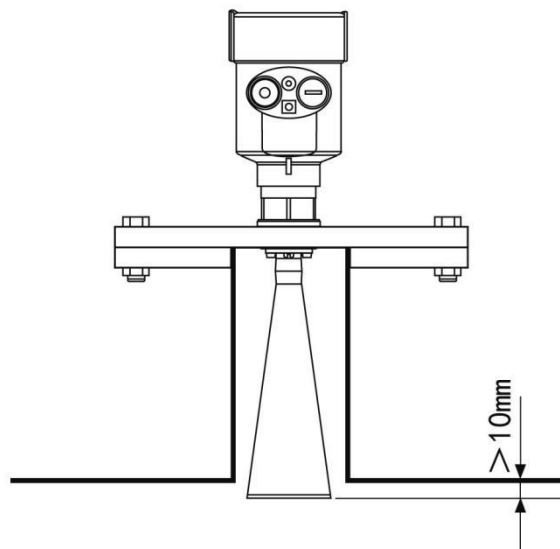


- There are obstacles affecting measurement needed reflection plate.



● **Height of nozzle:**

Antenna extends into the tank at least 10mm.





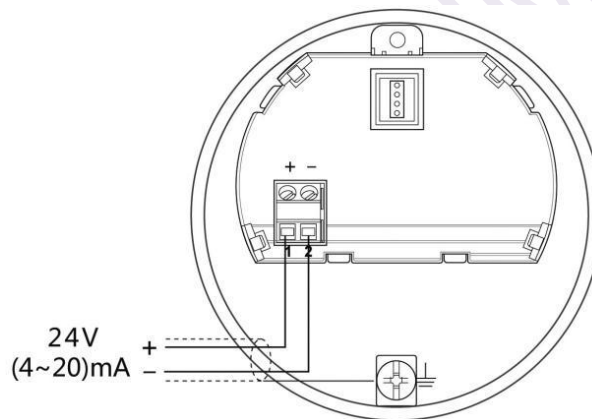
## ELECTRICAL CONNECTION

### ● The power supply voltage:

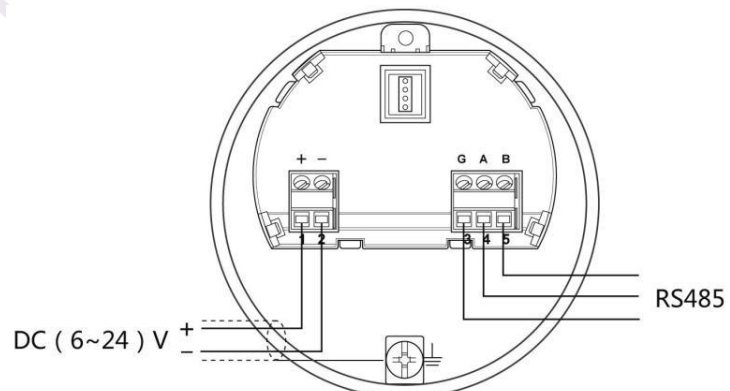
(4to20)mA/HART (2-wire system)	The power supply and the output current signal sharing a two core shield cable. The supply voltage range see technical data. For intrinsically safe type must be a safety barrier between the power supply and the instrument.
(4to20)mA/HART (4-wire system)	Separate power supply and the current signal, respectively using a two-core shielded cable. The supply voltage range see technical data.
RS485 / Modbus	Power supply and Modbus signal line separated respectively using a two-core shielded cable, the power supply voltage range see technical data.

### ● Connection mode:

- 24V two wire wiring diagram as right:



- 6to24V RS485/Modbus wiring diagram as right:



### ● Explosion Proof Connection

The intrinsic safety version sensors (Exia IIc T6) use Alu-die casting housing and filling Silicone rubber sealants internal structure aimed to prevent sparks resulted from circuit failure from leaking out. It is applicable for the continuous level measurement of flammable medium under Exia IIc T6.

A safety barrier FBS-2 must be used together with the intrinsic safety instrument. It is an associated device to this product for the power supply of this product. The main specification is intrinsic safety: Exia IIC, voltage of power supply: 24VDC  $\pm$  5%, short-circuit current: 135mA, operating current: 4 to 20mA.

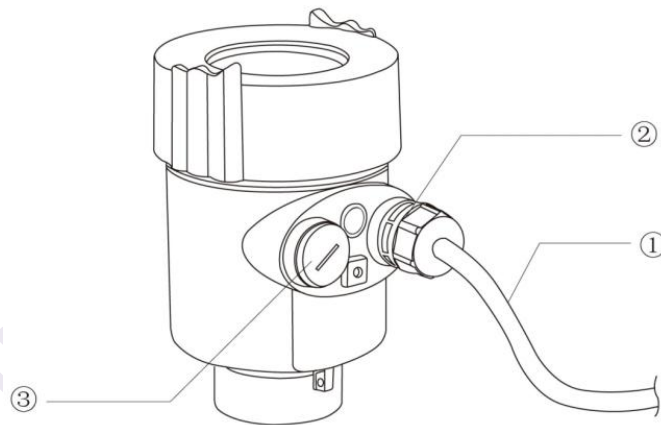


● **Safety instructions:**

- Please observe the local electrical code requirements!
- Please comply with local requirements for personnel health and safety regulations.  
All electrical components of instrument operation must be completed by the formal training of professionals.
- Please check the instrument nameplate to provide product specifications meet your requirements.  
Please make sure that the power supply voltage and instrument nameplate on the requirements.

● **Enclosure grade:**

This instrument meets the enclosure class IP66/67 requirements, please ensure the waterproof cable sealing head. The following diagram:



**How to install to meet the requirements of IP67:**

Please make sure that the sealing head is not damaged.

Please make sure that the cable is not damaged.

Please make sure that the cable for use with electrical connection specification.

Cable into the electrical interface before its curved downward, ensure that the water will not flow into the shell, see the ①

Tighten the cable seal head, see the ②

Please electrical interface will not use blind plug tight, see the ③

## INSTRUMENT COMMISSIONING

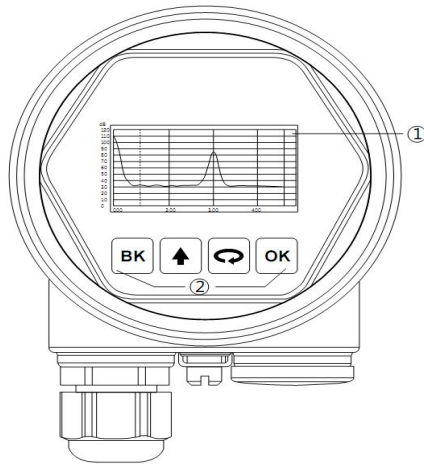
● **There are three kinds of debugging method:**

- 1) Display / Keyboard
- 2) Host debugging
- 3) HART handheld programmer

● **Display / Keyboard:**

Please debug the instrumentation by four buttons on the display screen. There are three debug menu languages optional. After debugging is generally used only for display, through the glass window can read measured value very clearly.

Display / Keyboard



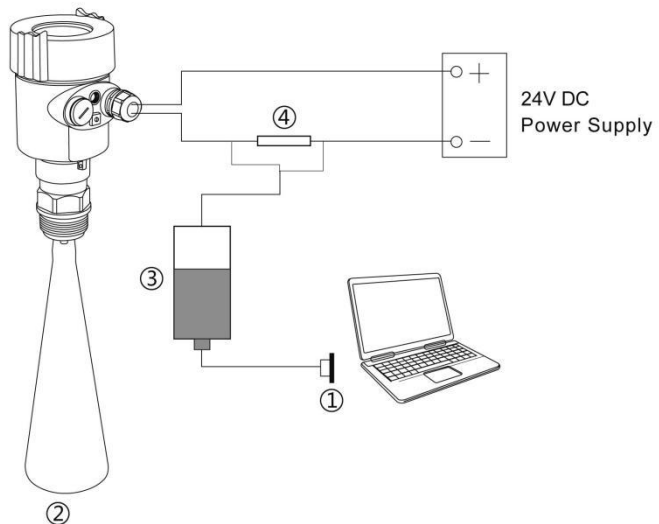
① Liquid crystal display(LCD)

② The key

● **PC debugging:**

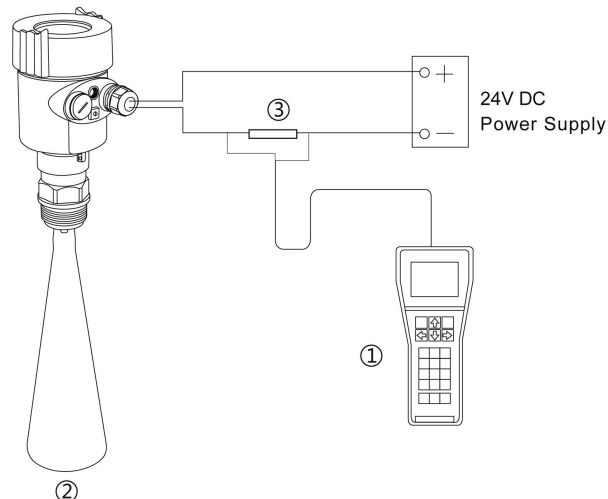
Connected to PC by HART

- ① RS232 interface or USB interface
- ② Radar level meter
- ③ HART adapter
- ④ 250 Ω resistor



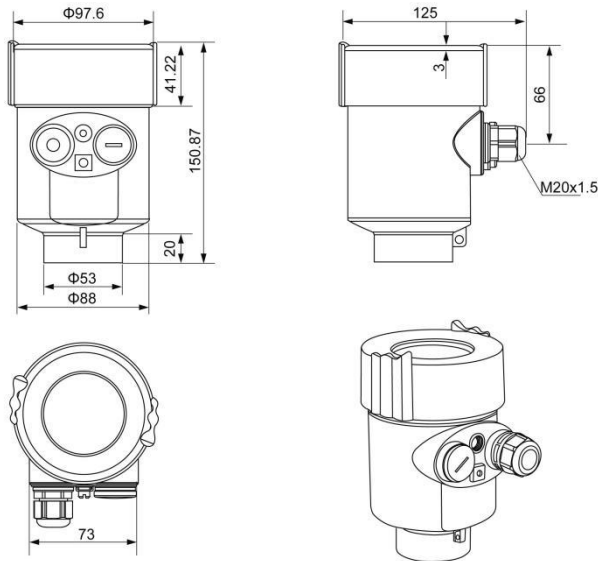
● **HART handheld programmer:**

- ① HART handheld programmer
- ② Radar level meter
- ③ 250 Ω resistor



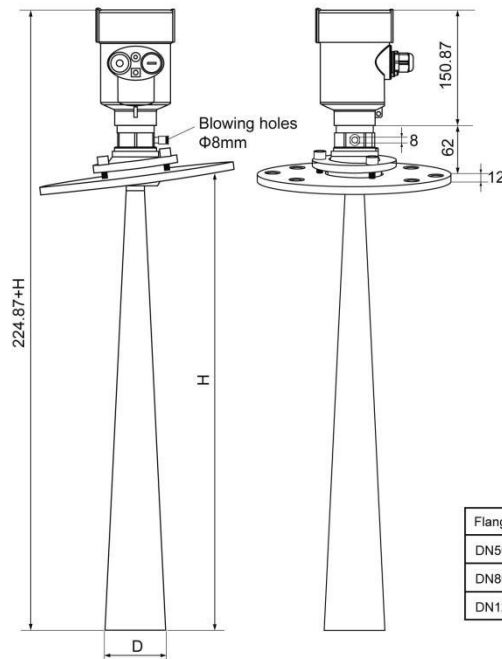
**STRUCTURE SIZE** (Unit: mm)

● The outer shell:



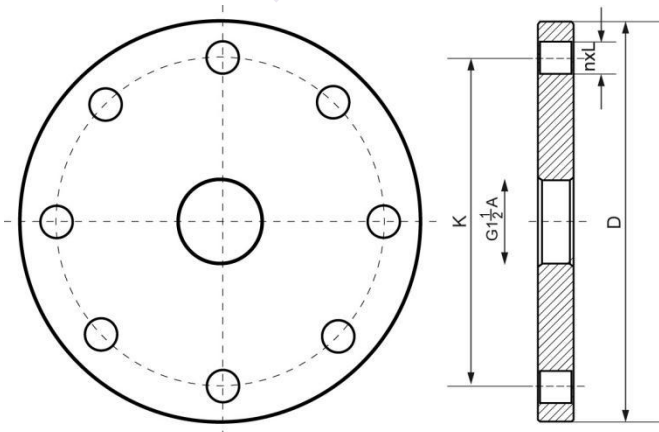
● Appearance size:

903



Flange	Trumpet diameter D	Trumpet height H
DN50	Φ76	205
DN80	Φ96	290
DN125	Φ121	610

● Flange type:



Flange Selection Tables				
Specification	Outer diameter D	Hole center distance K	Number of Holes n	Hole diameter L
DN50	Φ165	Φ125	4	18
DN80	Φ200	Φ160	8	18
DN100	Φ220	Φ180	8	18
DN125	Φ250	Φ210	8	18
DN150	Φ285	Φ240	8	22
DN200	Φ340	Φ295	12	22
DN250	Φ405	Φ355	12	26

## Level Meter Selection Parameter Table

### Customer information

Company: \_\_\_\_\_ Contact: \_\_\_\_\_  
 Address: \_\_\_\_\_ Zip code: \_\_\_\_\_  
 Tel: \_\_\_\_\_ Fax: \_\_\_\_\_ Mobile phone: \_\_\_\_\_  
 E-mail: \_\_\_\_\_ Date: \_\_\_\_\_

### License

- The standard type (Non-explosion-proof)     Intrinsically safe (Exia IIB T5)  
 Intrinsically safe (Exia IIC T6 Ga)     Intrinsically safe+marine license (Exia IIC T6 Ga)  
 Flame proof (Exd IIC T6 Gb)

### Tank / Container Information

#### The Types of Tank:

- Tank                       Reaction Tank                       Separation Tank                       Marine Tank

#### The Tank Structure:

Material of Tank: \_\_\_\_\_ Pressure: \_\_\_\_\_

#### Tank size:

Tank Height: \_\_\_\_\_ m                      Diameter: \_\_\_\_\_

#### The top of the tank:

- Vault                       Flat                       Open                       Cone type

#### The bottom of the tank:

- Cone bottom                       Flat                       Slope bottom                       Arc bottom

#### Installation:

- Top installation                       Side installation  
 The bypass pipe mount                       Guided wave pipe installation

#### Installation takes over the top of the tank (information):

Height of take over : \_\_\_\_\_ mm                      Diameter of take over : \_\_\_\_\_ mm

### Measurement of Medium

Media name:     Liquid                       Solid                       Mixed Media

Medium temperature: \_\_\_\_\_ °C

Dielectric Constant: \_\_\_\_\_

Linked material:     Yes                       No

Mixing:                       Yes                       No

### Process Connection

Thread:                       G1½" A                       1½" NPT

Flange                       Flange (DN= )                       Flange (ANSI= )

#### Power supply:

- 24V DC Two wire system                       24V DC Four wire system                       220V AC Four wire system

Output:                       4-20mA                       HART

Display:     Take the meter display program                       Without meter display program



**Warning**

- Ensure the explosion-proof class marked on the nameplate to meet or exceed the required rating of the relevant installation environment.
- Ensure that the enclosure rating indicated on the nameplate to meet the requirements of the installation environment.
- Ensure that the ambient and process temperature ranges marked on the nameplates to meet the application requirements.

## CONTACT INFORMATION

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