



## R901-26GHz 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 10 meters
- Wide application of hygienic, cryogenic, high pressure and high temperature
- Wide variety of I/O and expansive communication protocols

**Copyright © 2020 Reliant Instruments Inc. All Rights Reserved**

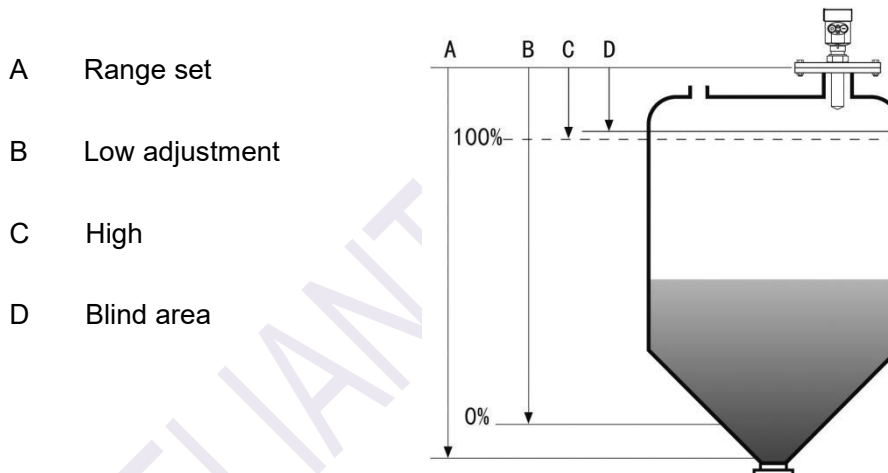
No part of this publication may be copied or distributed, transmitted, transcribed, stored in a retrieval system, or translated into any human or computer language, in any form or by any means, electronic, mechanical, manual, or otherwise, or disclosed to third parties without the express written permission. The information contained in this manual is subject to change without notice.

## OVERVIEW

This series of radar level meter adopted 26G high frequency radar sensor, the maximum measurement range can reach up to 10 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).



**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 interference.
- ◆ The measuring range is smaller, for a measurement will yield good results.
- ◆ High signal-to-noise ratio, the level fluctuation state can obtain better performance.
- ◆ High frequency, measurement of solid and low dielectric constant of the best choice.

## APPLICATION

### Industries

- ◆ Chemicals
- ◆ Food & Beverages
- ◆ Machinery
- ◆ Minerals & Mining
- ◆ Oil & Gas
- ◆ Pharmaceuticals
- ◆ Power Plant
- ◆ Pulp & Paper
- ◆ Water
- ◆ Waste Water

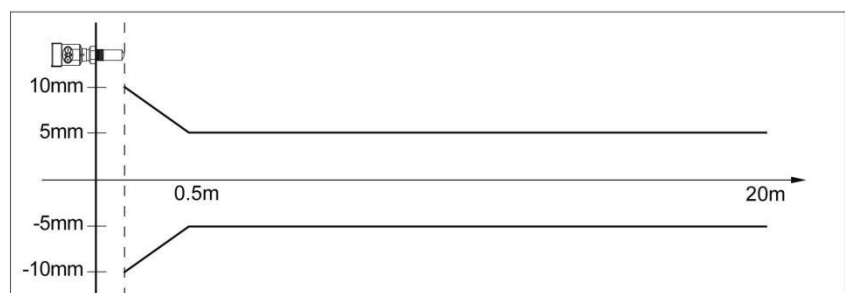
## TECHNICAL PARAMETERS

<b>Process Connection</b>	Thread G1½"A/Thread 1½" NPT/Flange
<b>Antenna Material</b>	Stainless Steel / PTF
<b>The outer shell</b>	
The seal between the shell and the shell cover	Silicone rubber
Casing window	Polycarbonate
The ground terminal	Stainless steel
<b>Power Supply</b>	
<i>2-wire system</i>	Standard type (16 to 26) V DC Intrinsically safe (21.6 to 26.4) V DC Power dissipation max 22.5mA / 1W Allowable ripple <100Hz U <sub>ss</sub> <IV (100to100K) Hz U <sub>ss</sub> <10mV
<i>Flameproof</i>	(22.8 to 26.4) V DC, 2-wire system (198 to 242)VAC, 4-wire system/110VAC, 4-wire system
<b>Cable parameters</b>	

Cable entrance / plug	1-M20x1.5 cable entrance, 1- blind plug
Terminal	Conductor cross section 2.5mm <sup>2</sup>
<b>Output and Communication</b>	
Output signal	(4 to 20) mA /RS485
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>	10 meters (Liquid type)
<b>Accuracy</b>	± 5mm
<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 (depending on the parameter settings)
<b>Display resolution</b>	1 mm
<b>Storage and transportation temperature</b>	-40 to100 °C
<b>Process Temperature</b>	(40 to 130)°C (Depend on the antenna part)
<b>Pressure</b>	Max. 4MPa
<b>Seismic</b>	Mechanical vibration 10m/s <sup>2</sup> , (10 to 150) Hz

## LINEARITY

Emission angle 20°, Precision: See chart



## MODEL SELECTION

- R901

Type	
P	Standard (Non-explosion-proof)
I	Intrinsically safe (Exia IIC T6 Ga)
G	Flameproof (Exd IIC T6 Gb)
Antenna Type / Material / Temperature	
F	Sealing horn / PTEE / -40... 130 °C
Process Connection / Material	
G	Thread G1½" A
N	Thread 1½" NPT
A	Flange DN50 /PP
B	Flange DN80 /PP
C	Flange DN100 /PP
Y	Special custom
The Outlet	Pipe Length of the Container
A	Outlet pipe 100mm
B	Outlet pipe 200mm
The Electronic Unit	
3	(4to20) mA / 24V DC / HART two wire system
4	(4to20) mA / 220V AC / HART four wire system
5	RS485 Modbus / 6to24V/ Four wire system
Outer Covering / Protection	
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/ Programmer	
A	With
X	Without

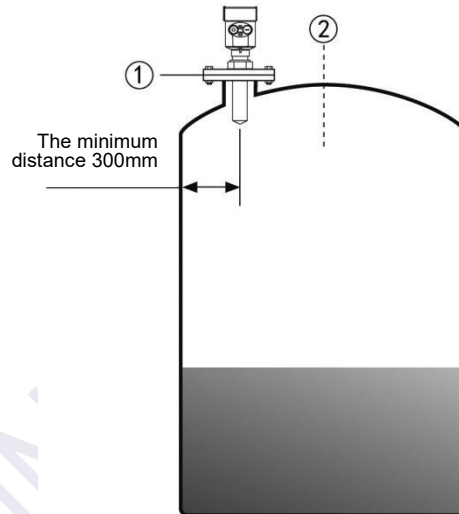
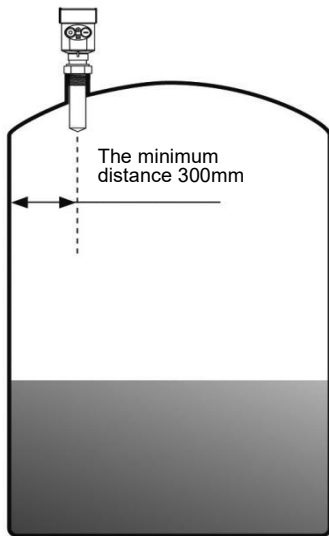
## INSTALLATION

● **Installation guide:**

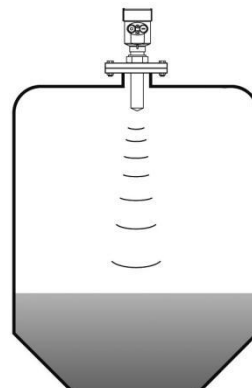
The 901 radar level gauge can be mounted using a threaded connection and flange connection, typically used for the measurement of corrosive liquids in smaller tanks. The instrument is installed at 1/4 or 1/6 of the diameter and the PTFE rod is to be inserted into the measuring tank.

Note: The minimum distance from the tank wall should be 300mm.

Note: ① datum ② The container center or axis of symmetry



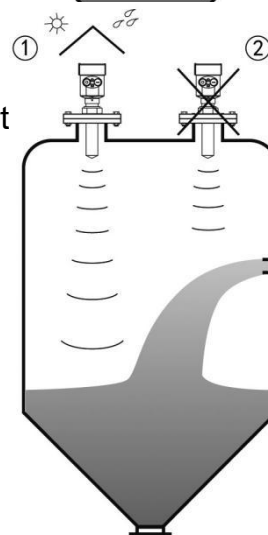
- The top conical tank level, can be installed at the top of the tank is intermediate, can guarantee the measurement to the conical bottom.



● **Typical installation errors:**

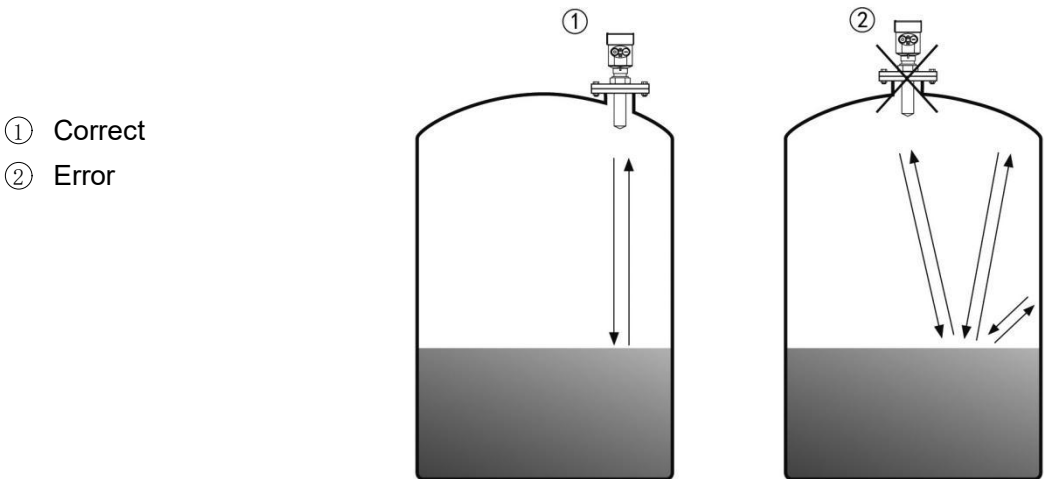
- Conical tank cannot be installed above the feed port

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

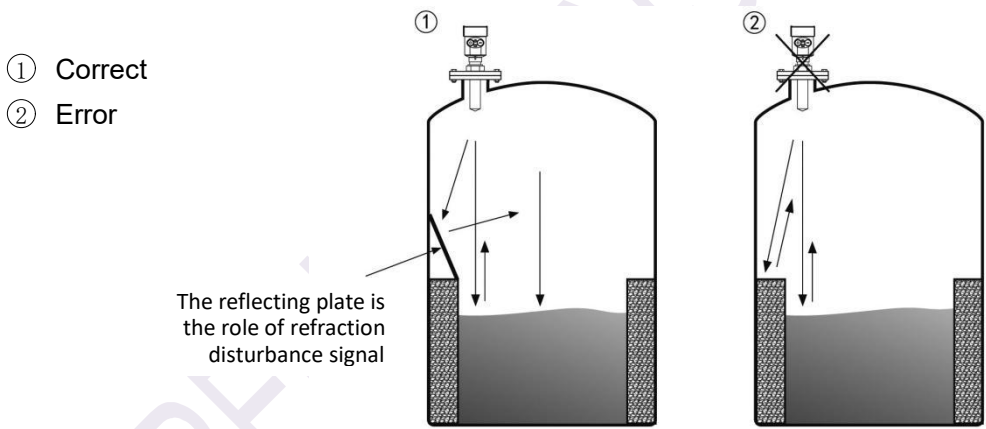


- ① Correct
- ② Error rainproof measures

- 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.

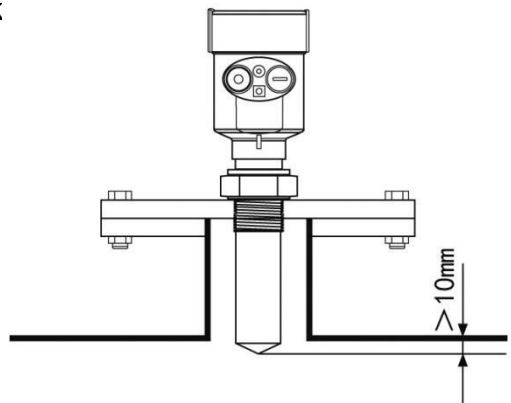


- There are obstacles affecting measurement needed reflection plate.



● Height of nozzle:

Antenna extends into the tank at least 10mm distance.





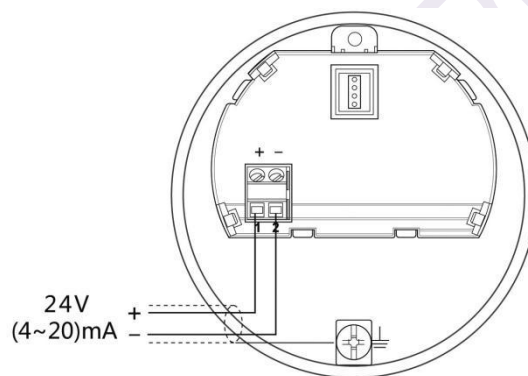
## ELECTRICAL CONNECTION

- **The power supply voltage:**

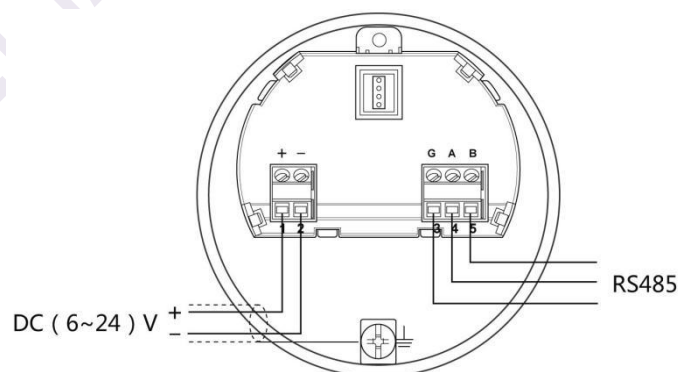
(4to20)mA/HART (2-wire system)	The power supply and the output current signal sharing a two core shield cable. The supply voltage range see technical data. For intrinsically safe type must be a safety barrier between the power supply and the instrument.
(4to20)mA/HART (4-wire system)	Separate power supply 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 follows:



- 6to24V RS485/Modbus wiring diagram as follows:

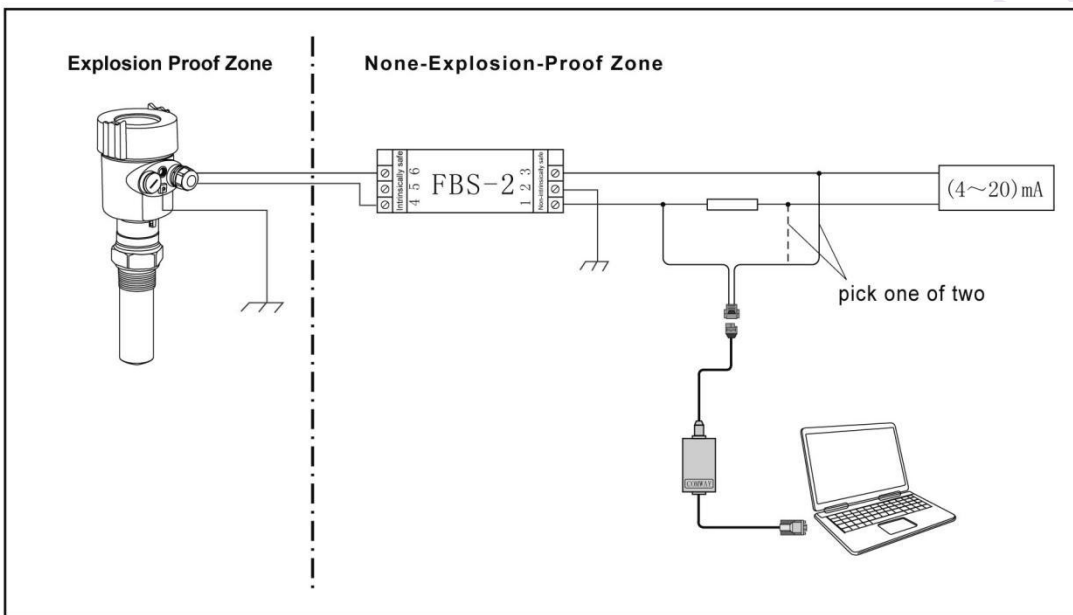


- **Explosion Proof Connection**

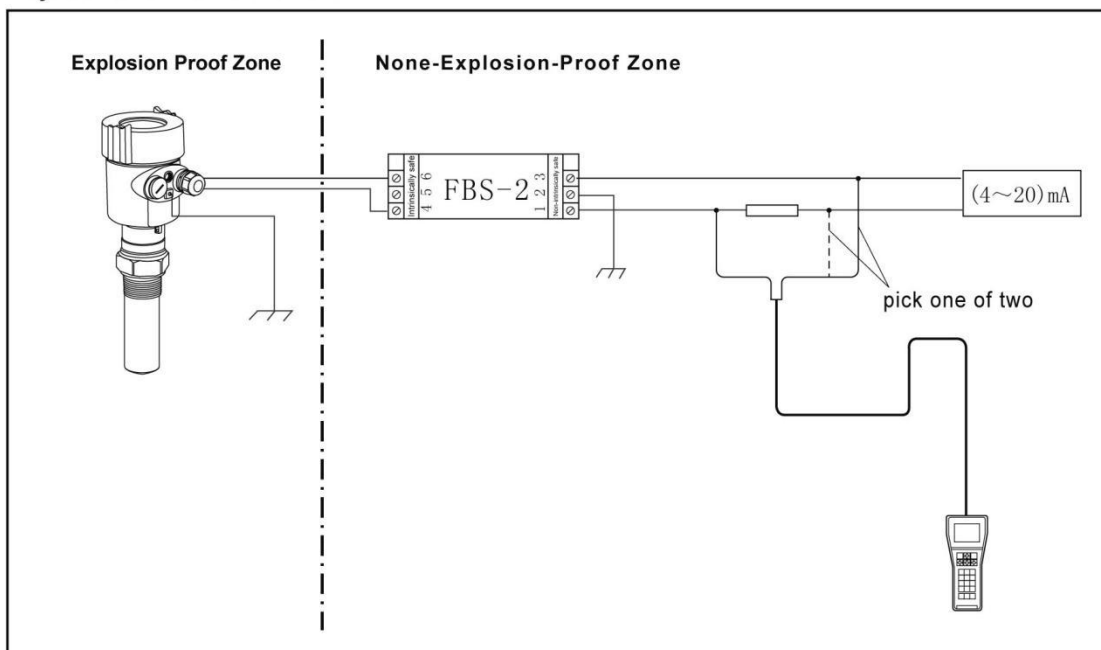
The intrinsic safety version sensors (Exia IIc T6) use Alu-die casting housing and filling Silicone rubber sealants internal structure aimed to prevent sparks resulted from circuit failure from leaking out.

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: 24V DC±5%, short-circuit current: 135mA, operating current: 4...20mA.

All cables must be shielded. The max length is 500m for the cable from the barrier to the sensor. Stray capacitor≤0.1μF/Km, stray inductance 1mH/Km. Instrument must be connected to the ground potential. Any unapproved associated device is not allowed to be used.



Adjustment with Software



Adjustment with HART Handheld Programmer

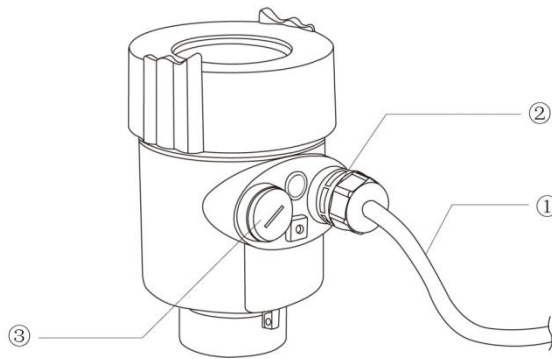
● **Safety instructions:**

- 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.

● **Protection grade:**

This instrument meets the protection 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:**

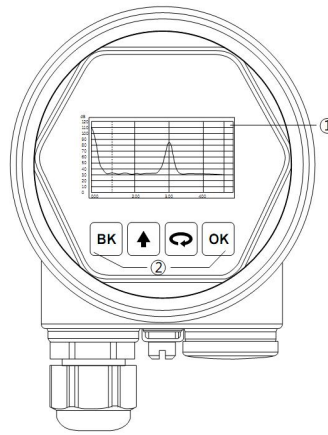
- 1) Display / Keyboard
- 2) Host debugging
- 3) HART handheld programmer

● **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

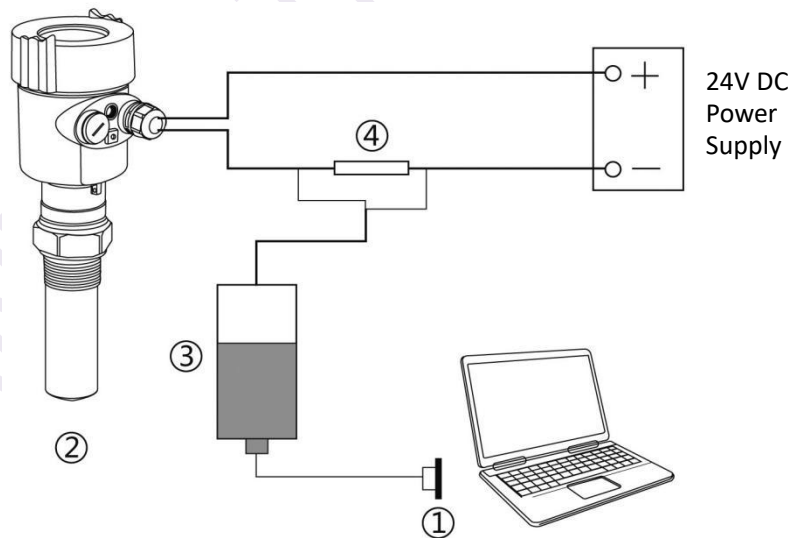
- ① Liquid crystal display(LCD)
- ② The key



● **PC debugging:**

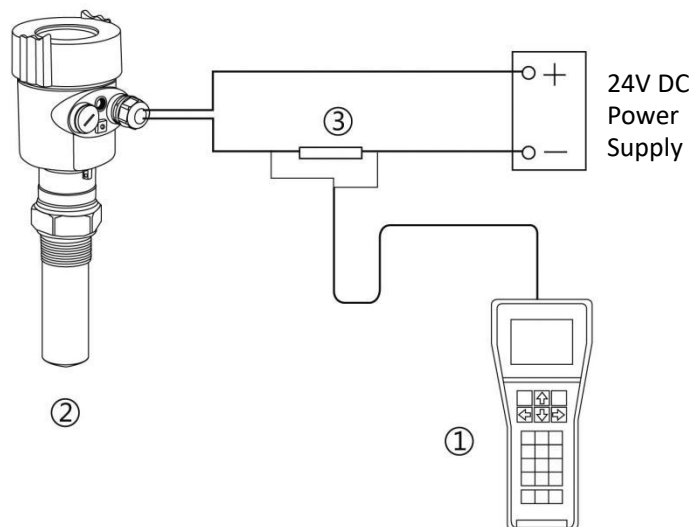
Connected to PC by HART

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



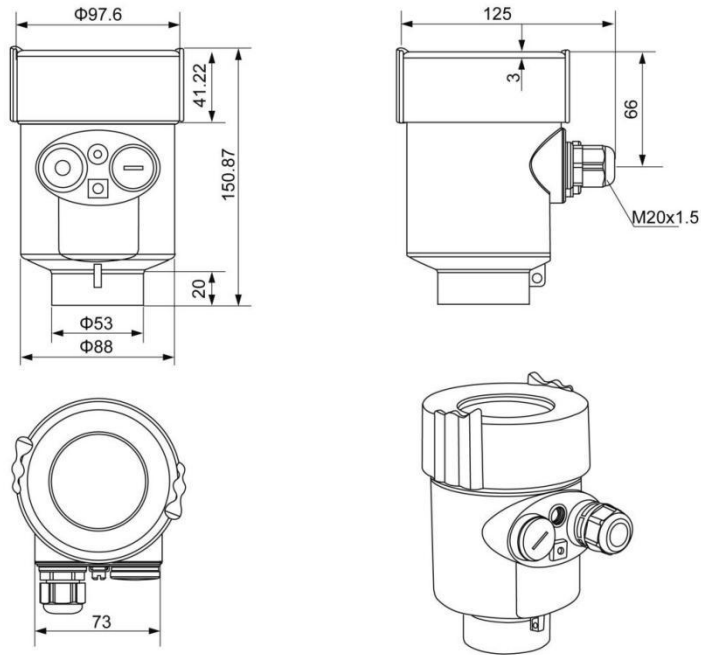
● **HART handheld programmer:**

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

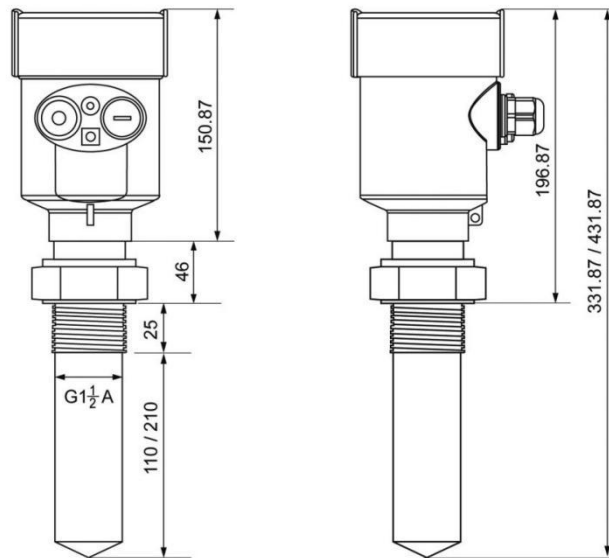


**STRUCTURE SIZE** (Unit: mm)

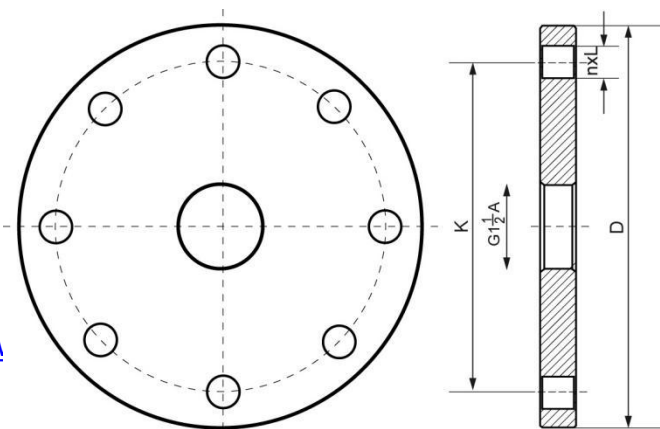
● The outer shell:



● Appearance size:



● 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

**Reliant Instruments Inc.**  
16655 Telge Road, Cypress,  
TX 77429, USA  
Phone: (+1) 281 224 2457  
Email: [sales@reliantinstruments.com](mailto:sales@reliantinstruments.com)  
[www.reliantinstruments.com](http://www.reliantinstruments.com)

**Shanghai Representative Office**  
320 Building 4, 299 Songqiu Road,  
Shanghai 201703 China  
Mobile: (+86) 137 8890 0279  
Email: [steven.shao@reliantinstruments.com](mailto:steven.shao@reliantinstruments.com)  
[www.reliantinstruments.com](http://www.reliantinstruments.com)

