

Edition 2022

Ultrasonic Distance (Liquid Level) Gauge

Installation Guide Manual

Integrated, Three/Four-wire System

V1.00

Non-contact measurement for the distance and material level of the liquid, pasty and small particle materials

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Welcome

Thank you for purchasing our ultrasonic distance (liquid level) gauge!

The instrument contains many patented technologies, featured by safety, cleanliness, high precision, long service life, excellent stability & reliability, and convenient installation & maintenance, suitable for acid, alkali, salt, anti-corrosion, high temperature and other fields.

The instrument may be connected to the display meter or various DCS systems through 4-20mA or RS485 (Modbus protocol or other customization protocols), providing the real-time liquid level data for the automatic operation of the industry.

Application

- Continuous and non-contact measurement for the material level of the liquid, pasty and small particle materials
- Maximum measuring distance of the instrument

Measuring Medium \ Measuring Range	Maximum Measuring Distance			
	Liquid/Fluid	5m	10m	15m
High Temperature with Water Vapor*	3m	6m	9m	12m
Solid (Particle>4mm)*	2m	4m	6m	8m

* Note: The maximum measuring distance of the ultrasonic distance (liquid level) gauge is affected by operating conditions. The data in the above table are for reference only.

Features

- Integrated design; higher cost performance;
- Automatic detection of on-site electrical interference, and interference suppression;
- Internal integrated temperature sensor, and real-time temperature compensation for sound velocity;
- Non-contact measurement, and long service life;
- Sensitive response, and rapid measurement for the quick rise and fall of the liquid level.

Technical Parameters

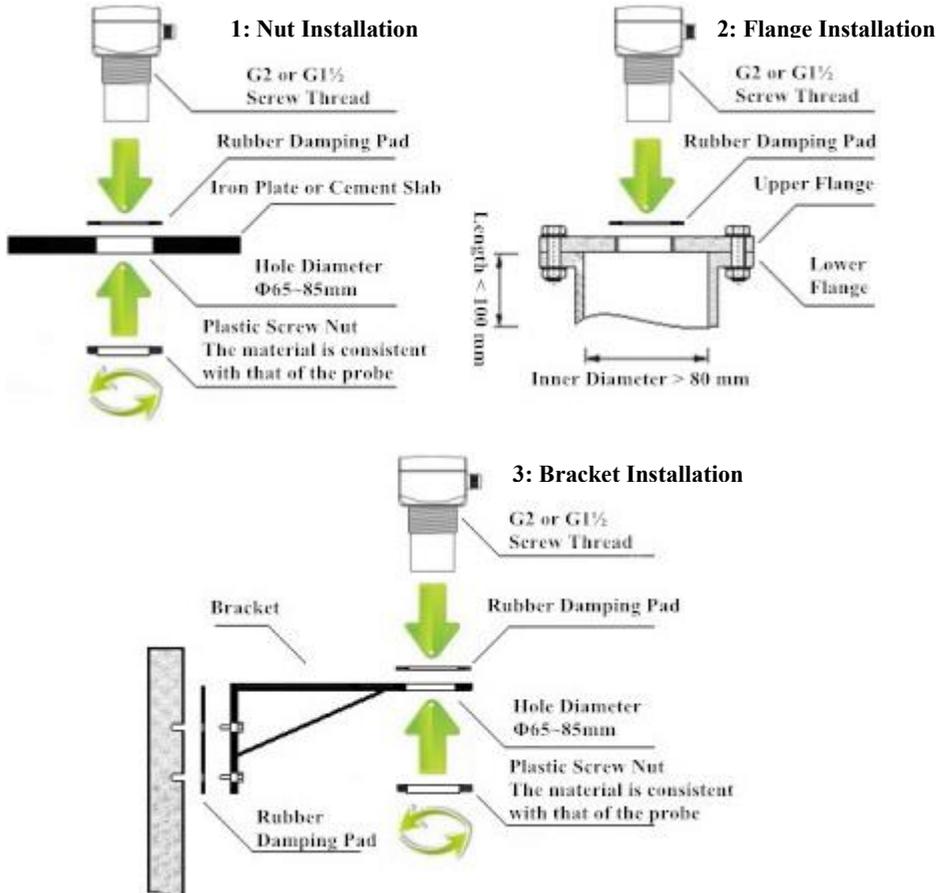
Content \ Type	Three/four-wire system
	Integrated
Measuring Range	0.25~3m, 0.35~10m, 0.5~15m, 0.7~20m
Blind Zone	0.25m~0.8m (Depend on the measuring range)
Measuring Precision	±0.3%FS* (Standard conditions*)
Resolution	1mm
Supply Voltage	DC12V~36V / 80mA
Probe Frequency	40KHz±2KHz
Measurement Frequency	0.5 second/time
Analog Output	4~20mA / bit12 current output (Load < 500Ω)
Digital Output	RS485 interface/Modbus-RTU protocol (Optional)
Transmitter Material	ABS engineering plastics
Probe Material	Ordinary waterproof ABS/corrosion-resistant ETFE/customize polytetrafluoroethylene (PTFE) probe
Electrical Interface	PG9 interface
Process Interface	G2, M70*2 (Customize G1 1/2 or other)
Environmental Temperature	-20°C ~ +60°C*
Process Temperature	-20°C ~ +90°C (If the temperature exceeds +60°C, it is required to indicate the requirements at the time of ordering)
Waterproofing Grade	IP65
	The instrument is in the humid environment all the year round. It is recommended to apply the glass cement to the waterproof joints and instrument cover seams.
Process Pressure	0.8~3bar/altitude < 2,000 m

*Standard Conditions: Operate the instrument in the air, with the temperature of 20 °C±5 °C, humidity of 45%~75%, and atmospheric pressure of 1 bar, and no wind around.

*FS: Full scale.

Installation Methods

The ultrasonic distance (liquid level) gauge involves three instrument installation methods. Please reasonably select them according to the on-site conditions!

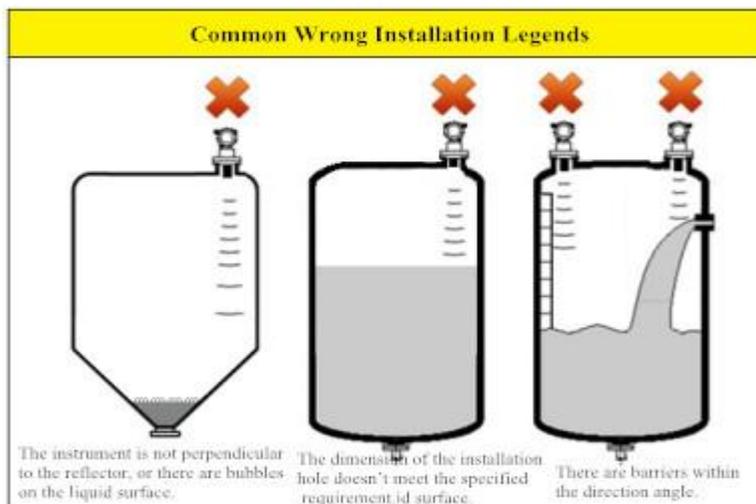
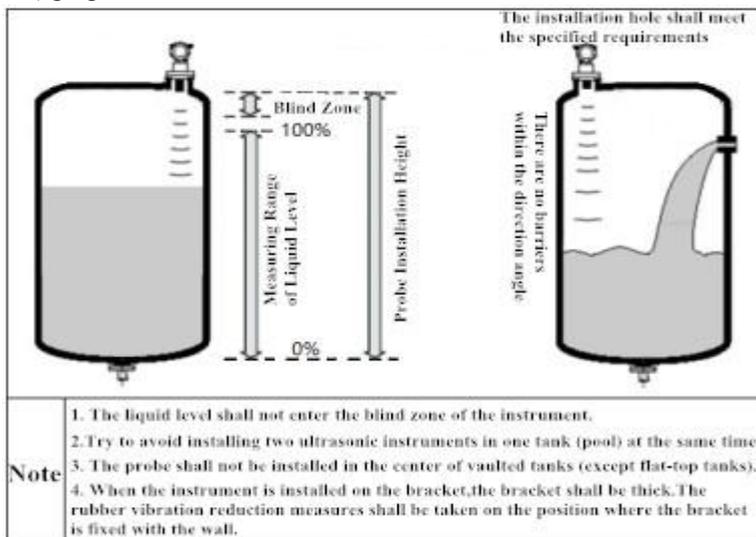


Note:

- The instrument is provided with plastic screw nuts. The flange with various specifications may be customized according to the user requirements.
- The recommended arm length of the bracket is 30-50 cm. The bracket shall be thick, and the vibration reduction measures shall be considered on the position where the bracket is fixed with the pool wall.
- The instrument and probe are in the humid environment for a long time. It is required to apply the glass cement to the line inlet & outlet of the probe, as well as the cover seam.

Installation Location

The reason why many ultrasonic distance (liquid level) gauges are not operated normally is that the installation location and operating conditions don't meet the requirements of the instrument. It is particularly important to choose the reasonable installation location for ultrasonic distance (liquid level) gauges.



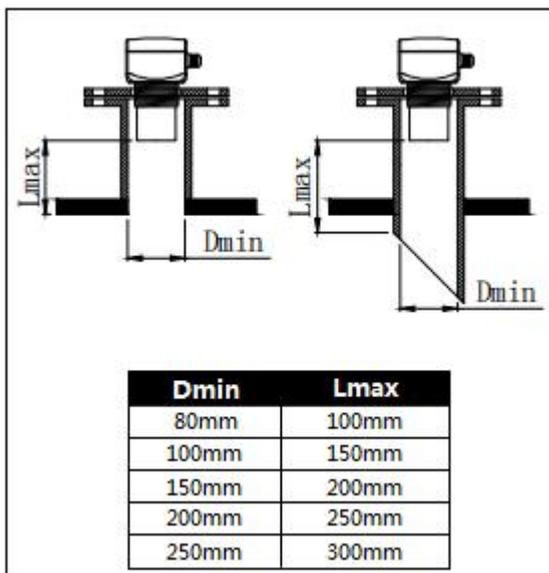
Note: The blind zone varies with the measuring range of the instrument. The blind zone of the instrument will be indicated on the label.

Installation Hole (Extension Tube) Requirements

If the highest liquid level can enter the blind zone of the instrument, then it is required to install the extension tube and raise the installation height of the probe.

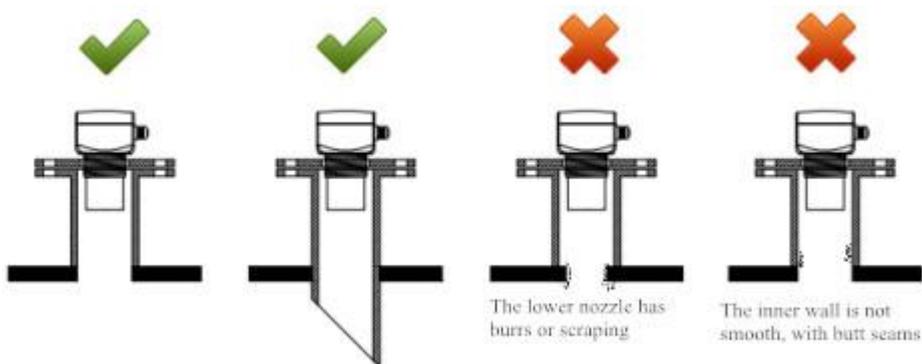
The diameter and length of the extension tube shall meet the requirements of the instrument. The related requirements are shown in the right figure.

Please determine the size of L_{max} and D_{min} according to the actual conditions.



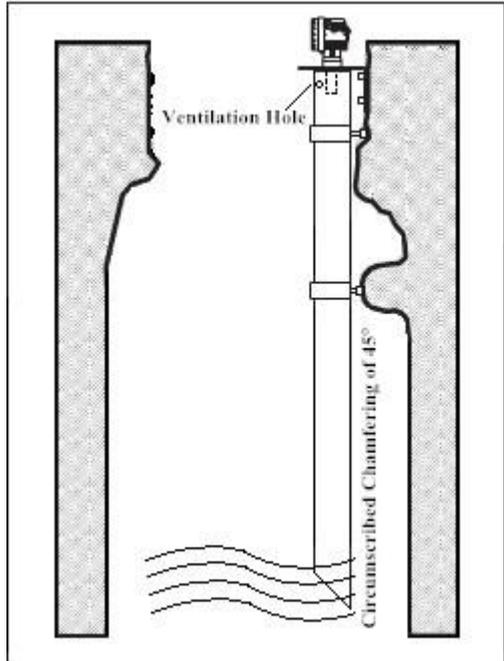
Note:

- The inner wall of the extension tube shall be smooth (without welding seams or butt seams).
- The lower nozzle of the extension tube shall be smooth, without burrs. It is better that the chamfering is 45°.



Waveguide Tube

If there is strong echo interference (such as narrow shafts, steps that cannot be avoided, and agitating vanes), or a large number of bubbles exist on the liquid surface, then it is recommended to use the PE or PVC tube with the diameter of over 100 mm as the waveguide tube of ultrasound.



Note:

- There is a ventilation hole on the top, to ensure that the internal and external liquid levels of the tube are consistent.
- The inner wall of the waveguide tube shall be smooth (without welding seams or butt seams).
- The nozzle of the waveguide tube shall be smooth. It is better that the chamfering is 45°.
- When the waveguide tube is fixed, it is required to consider the vibration reduction measures, so as to prevent the existence of acoustic interference in the tube.
- In order to ensure that there is no material hanging on the inner wall of the waveguide tube, it is necessary to regularly clean/check the waveguide tube.

Instrument Debugging

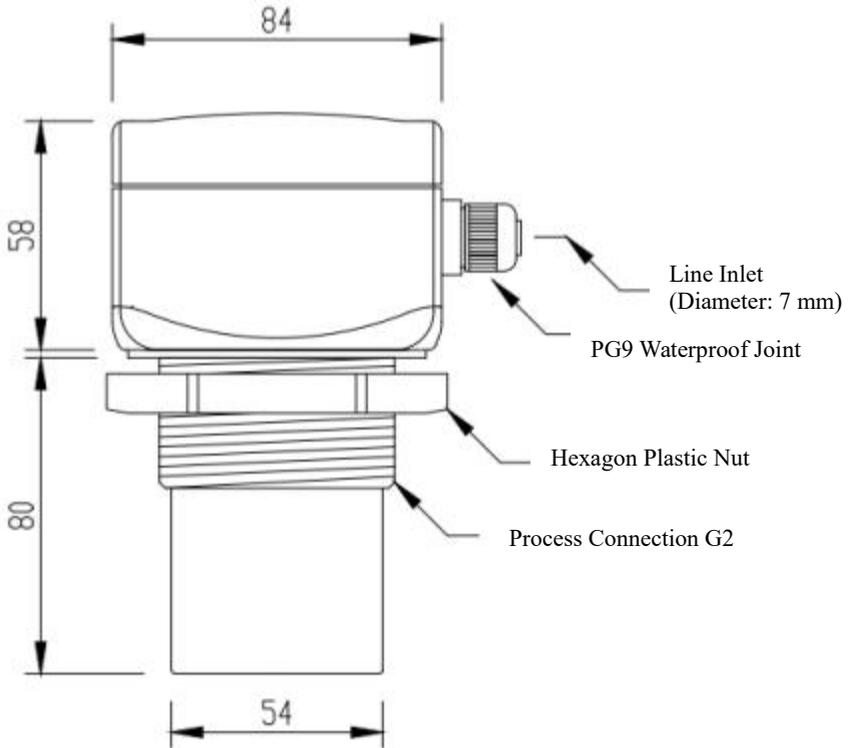
The measuring range of the instrument has been set before the instrument leaves the factory. After being energized, the instrument uploads the distance/liquid level to the PLC through the electric current of 4-20mA. The PLC also reads the distance or liquid level in the instrument through RS485 communication/ModBusRTU protocol. When the instrument cannot receive the liquid level, 4-20mA/RS485 remains unchanged.

When the instrument is energized, the luminescent tube flickers for three times. During normal operation, the luminescent tube flickers regularly.

If the luminescent tube is always on or off, this indicates that the instrument cannot receive the echo. Please remove the fault according to the following steps:

- The supply voltage is less than DC12V;
- The actual distance exceeds the measuring range of the instrument;
- The liquid surface has poor reflection (check if there are bubbles or floating substances);
- There is a lot of vapor, or the probe is blocked;

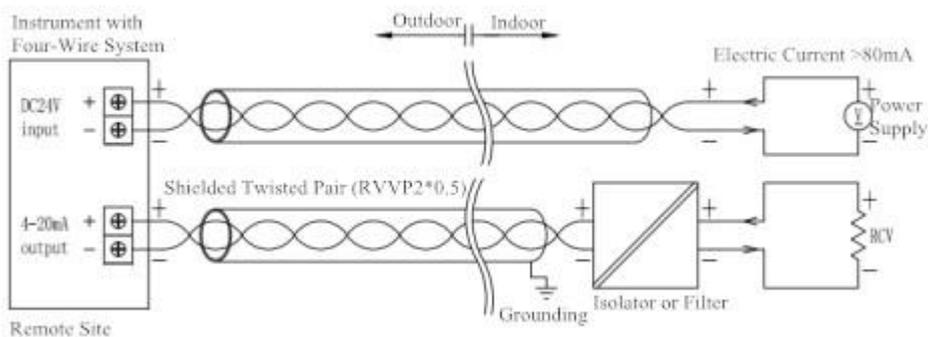
Appendix 1: Instrument Dimension Diagram



Note:

- The instrument is in the humid environment all the year round. It is recommended to apply the glass cement to the cable inlet and instrument cover seam.
- The transducer is made of ABS engineering plastics.
- The cable diameter is 6-8 mm.

Appendix 2: Instrument Wiring Diagram



Note:

- The ultrasonic distance (liquid level) gauge belongs to the instrument with weak current, having high magnification, so instrument grounding is very important.
- 4-20mA wire shall adopt RVVP2×0.5 shielded cable, and shall not run parallel to the power cable.
- The instrument shall be kept away from frequency converters and high-power motors, and shall not use the same power supply as the frequency converter.
- The instrument is in the humid environment all the year round. It is recommended to apply the glass cement to the cable inlet and instrument cover seam.
- The current output of the power supply for the instrument shall be more than 100mA. The power supply whose current output is less than 100mA is not suitable for the instrument.

Appendix 3: Modbus-RTU Communication Protocol

The instrument can communicate with the DCS/PLC/computer through RS485 interface/ModBusRTU protocol.

The register address of the instrument is shown in the following table. The liquid level, distance and temperature data respectively occupy 2 registers (4 bytes). The data adopts the IEEE754 floating-point number format. The default setting of RS485 serial port is shown below: Baud Rate: 4,800, Stop Bit: 1, Parity Bit: N/A, ID No.: 01.

Register Address Arrangement				
Address	Data Content	Data Format		Unit
0000H	Reserved			
0001H	Reserved			
0002H	Liquid level value	IEEE754 floating-point number	Higher than 2 bytes	m
0003H			Lower than 2 bytes	
0004H	Distance value	IEEE754 floating-point number	Higher than 2 bytes	m
0005H			Lower than 2 bytes	
0006H	Temperature value	IEEE754 floating-point number	Higher than 2 bytes	°C
0007H			Lower than 2 bytes	

For example: Read the liquid level value in the instrument

Query frame (data protocol sent from the PLC & computer to the instrument, 8 bytes in total)

Data 01H 03H 00H 02H 00H 02H 65H CBH

Response frame (data protocol sent from the instrument to the PLC & computer, 9 bytes in total)

Data 01H 03H 04H 40H 64H 49H BAH 18H 0FH

Among them, 0x406449BA is IEEE754 floating-point number, which indicates that the liquid level is 3.567 m.

[Note]

- The sending frequency of the query command sent by the upper computer shall be more than 3s;
- The instrument has the remote parameter setting function;

Packing List

No.	Equipment or Accessory Name	Unit	Quantity	Remark
1	Ultrasonic Distance (Liquid Level) Gauge	Set	1	
2	Plastic Nut (Default) DN32 Flange or Bracket (Optional)	Piece	1	
3	Operation Manual	Piece	1	
4	Product Qualification Certificate	Piece	1	

Attentions

- During operation and transportation, please do not violently shake or hit the equipment.
- During instrument transportation and storage, the environmental temperature shall not be less than $-40\text{ }^{\circ}\text{C}$ or more than $+70\text{ }^{\circ}\text{C}$, the relative humidity shall not be more than 85%, and there is no corrosive gas or strong electromagnetic field around it; the original packaging box shall be used during transportation.

Copyright

The company reserves all patents around the world. Without the prior written approval by the company, any part of the instrument, including source code, shall not be duplicated, transmitted, transcribed or translated into any language or computer language in any form or by electronic, electromagnetic, optical, manual or other methods.

Without the prior written approval by the company, the manual shall not be duplicated, photocopied, reprinted, translated or transmitted to any electronic or machine-readable medium, in whole or in part.

The name and logo displayed on the product are the registered trademark or brand of the company. All other trademarks, commodity names or company names referenced herein are used for identification purposes, and are the property of their respective owners.

Return Receipt of Warranty Card

User Name			
Address			
Contact Person		Telephone	
Product Model		Product No.	
Ex-factory Date		Installation Manager	

.....

Warranty Card Description

Product Model		Product No.	
Ex-factory Date		Installation Manager	

Warranty Policy:

- The user shall show the warranty card when applying for maintenance. For faults arisen from normal operation within the warranty period, the user may enjoy the specified warranty service free of charge with the warranty card.
- Warranty Period: The product warranty period of the company is 24 months from the ex-factory date. The company may provide the paid service of extending the warranty period.

The following circumstances are not within the free warranty scope:

- The product or its parts have exceeded the free warranty period.
- The hardware failure is generated because the operating environment doesn't meet the use requirements of the product.
- The fault or damage is generated because the power supply environment is poor or the foreign matters enter the equipment.
- The fault is generated because the user cannot carry out the operation according to the use methods and attentions described in the operation manual.
- The fault is caused by force majeure events, such as thunder & lightning, flood, fire, and other natural factors. The failure or damage is caused by unauthorized disassembly for repair, unauthorized modification, or abuse.

Restriction Description:

- Please properly keep the warranty card as the warranty certificate. If lost, the warranty card will not be reissued.
- The interpretation right of the warranty card shall be owned by the company. The company has the right to modify the content of the card, without prior notice.

