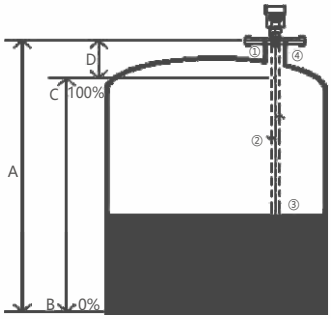
The selection is detailed on page 11

PDG70-G
Guided Wave Radar Level Meter

Working principle

Time 1: The initial pulse is generated
② Time 2: Travel down the conductor, speed C (light speed)
③ Time 3: The pulse is reflected on the surface of the measured medium
Time 4: The reflected pulse is received and recorded by the processor
⑤ The time difference T between the pulse signal from being transmitted to being received is proportional to the distance D from the datum surface to the medium surface: D=CXT/2
⑥ The datum of measurement is: the bottom surface of the thread or the sealing surface of the flange
⑦A: range B: low C: full D: blind area
⑧ When running, ensure that the highest material level can not enter the measurement blind area D



Product description

Excellent level measurement solution
Guided wave radar level meter is a contact level measuring instrument based on the principle of time domain reflectometry (TDR). It can be widely used to measure the distance, level, volume, weight of liquid, slurry and paste, and can also be used to measure solid media such as powder and particle. Because of its higher dynamic signal and narrower pulse, it has better accuracy and repeatability than traditional radar level meters.Two-wire circuit power supply technology, power supply voltage and output signal through a two-core cable transmission, saving costs, using advanced microprocessor and unique echo processing technology, can be applied to a variety of complex conditions. Very low transmission power, can be installed in a variety of metal, non-metal containers, no harm to the human environment.

Functional characteristics

Higher dynamic signals and narrower pulses lead to higher accuracy and repeatability
The best choice for low dielectric constant media
Energy concentration, with stronger anti-interference ability, greatly improve the reliability
The measurement blind area is smaller, and the measurement of small tanks will also achieve excellent results
Sensitive measurement, fast refresh speed, easy installation, durable, maintenance-free
Almost unaffected by temperature, pressure, water steam, foam, dust and other complex conditions
The display with buttons makes it easier to set instrument parameters
Smaller volume reduces installation difficulty

Product application

Electricity: Chemicals and petrochemicals

Energy: Water and sewage

Pharmaceutical: Paper and pulp

Other: Food and beverages

Technical parameter

Specification	
structure	The whole measuring system is composed of a meter head and a sensor, and has only one body structure
Measurement principle	Time domain reflectometry (TDR), 2GHz pulse frequency
Measurable medium	Liquid, slurry, powder, particle
Basic measurement	The time difference between emitted and reflected waves
Additional measurement	Level, distance, volume, weight
Dead zone	Base level up to 0.3m, depending on the type of sensor and the dielectric constant of the measured medium
Maximum range	Cable 30m
	Bar 6m
	External PTFE 6m
	See measurement distance diagram
Relative permittivity of the measured medium (εr)	1.5 or higher
precision	See the accuracy diagram (the reference conditions of the accuracy index comply with the JJG971-2002 standard, see the table on the next page)
repeatability	±1mm
Explosion-proof class	Ex ia IICT3...T6 Ex db IICT6...T1Gb
Class of protection	IP67
Damping time	Default 1s (adjustable 0... 40s)
Maximum level change	10 m/min
reveal	LCD display (Chinese, English, German) with 4 buttons
Display operating temperature	- 20 ℃... +70 ° C (Above this temperature range, the LCD may be damaged)
Display resolution	1mm
Transport and storage temperature	- 40 ℃... 100 ℃
Ambient temperature	- 20 ℃... +70℃ (according to the temperature standard of industrial products components)
Relative humidity	< 95%
Process temperature and pressure (process junction)	- 40 ℃... 200 ℃
	0.1... 4.0 Mpa
	It depends on the temperature and pressure levels present simultaneously at the process joints
Thermal shock tolerance	<40℃/s
Vibration proof	Mechanical vibration 10m/s2, (10 ~ 150)Hz
Process connection	Optional threaded connection or flange connection
	G11/2A
	DN50-DN250/PN16-PN40. Please consult for special specifications

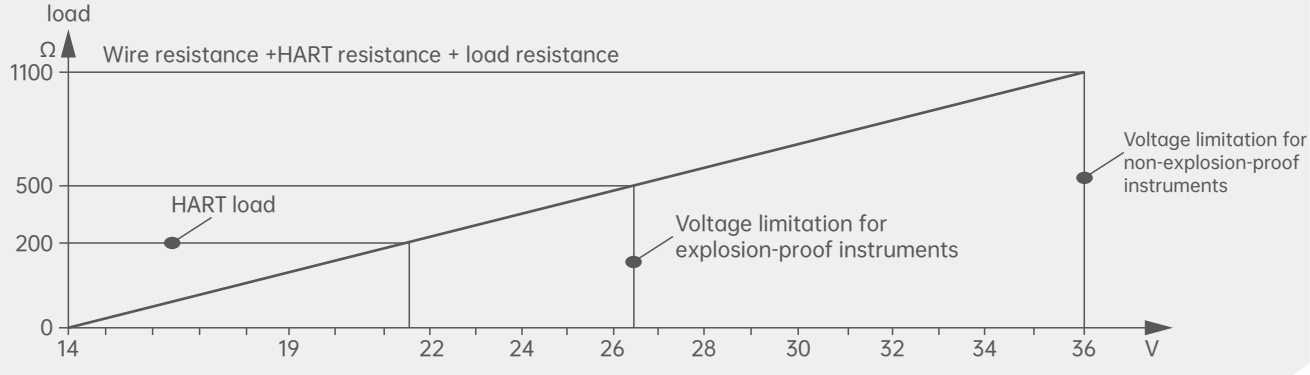
Technical parameter

Electrical connection	
Supply voltage	Two-wire standard :(16... 36)V DC
	Intrinsic safety type :(21.6... 26.4) V DC
	Power consumption: max 22.5mA/ 1W
	Ripple allowed:<100Hz Uss<1V
	(100...100K) Hz Uss<10mV
	Four-wire intrinsic safety + flameproof :(22.8... 26.4) V DC/(198... 242) V AC
	Power consumption: max 1VA / 1W
Electrical interface	1 M20*1.5 or 1/2NPT cable seal head
	1 blind plug
Cable specification	Standard material: Plastic
	Optional material: Stainless steel 304
	(0.5... 1.5) mm2/ Cable diameter :5... 9mm
Output parameter	
Output signal	4...20mA;HART (Two wire/four wire); RS485; Modbus
Current resolution	±1.6uA
Communication protocol	HART; I²C
Temperature drift	10ppm /℃
Fault signal	Current output unchanged (default); 22 mA ; 20.5 mA; 3.9 mA
Four-wire load resistance	Maximum 500Ω, two-wire system
Two-wire load resistance	See diagram of two-wire load resistance
The reference conditions of the precision index comply with JJG971-2002 standard	
temperature	+20℃±5℃
stress	1 standard atmosphere
Relative humidity	50% plus or minus 15%
The object under test	A metal disc placed in a silent darkroom
Instrument material	
Instrument housing	Aluminum, 316L
Shell window	Tempered glass
sensor	Stainless steel 316L, PTFE
Liquid material	Stainless steel 316L, fully outsourced PTFE
Process connection	Stainless steel 316L, PTFE
O-ring	fluorosilicone
Cooling fin	Aluminum, stainless steel 316L

Precision diagram

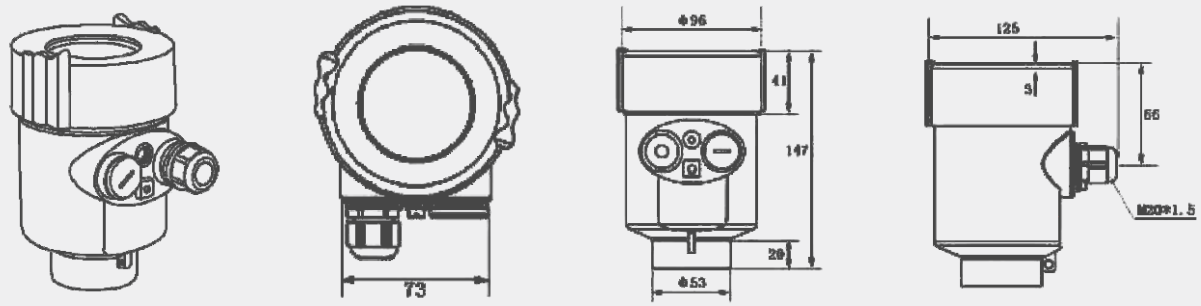
Dielectric grouping	DK (ε)	Solid particle	liquid	Measuring range
1	1.4...1.6	-	Condensing gases, such as N2CO2	3m (Refers to coaxial probes only)
2	1.6...1.9	Plastic strip particle White limestone, special cement sugar	Liquefied gas, such as propane solvent Freon 12/ Freon Palm oil	25m
3	1.9...2.5	Regular cement, plaster	Mineral oil, fuel	30m
4	2.5...4	Grains, Seeds rock Sand grain	Benzene, styrene, toluene furan naphthalene	30m
5	4...7	Wet stone, ore salt	Chlorobenzene, chloroform Cellulose spray Isocyanogen hydrochloric acid, benzamine	30m
6	> 7	Metal powder Carbon black coal	Aqueous liquid Alcohol Liquid ammonia	30m

Diagram of two-wire load resistance

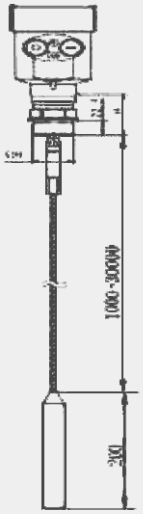


Size mm

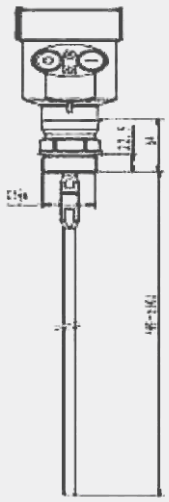
Case size



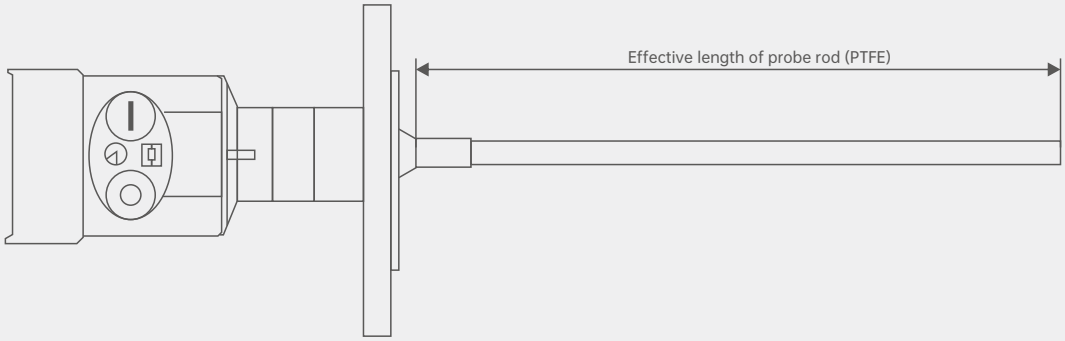
Cable type



Rod type

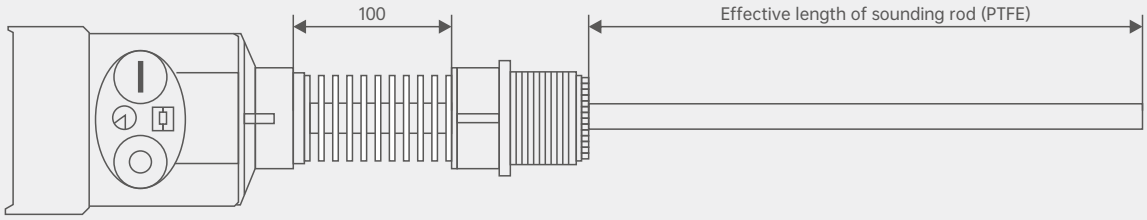


External PTFE type



Size mm

High temperature type

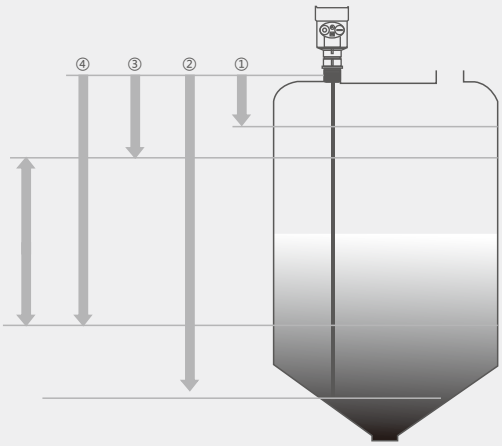


Legend description

The datum of measurement is the thread or flange sealing surface.

① Range of blind areas
② Cable length
③ High position
④ low position

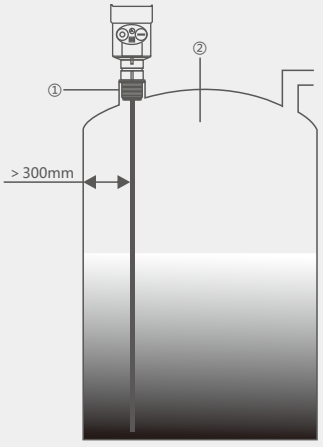
Note: Using guided wave radar level timing, be sure to ensure that the material level will not enter the blind area.No interference source exists within a diameter of 600mm around the cable. False echoes should be stored if necessary.



Recommended installation location

Keep away from discharge and feed ports as much as possibleRecommended installation at 1/4 of tank diameter... 1/6 of the wayThe minimum distance between the probe and the tank wall is not less than 300mmThe minimum distance between the probe and the obstacle in the tank is not less than 300mm

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



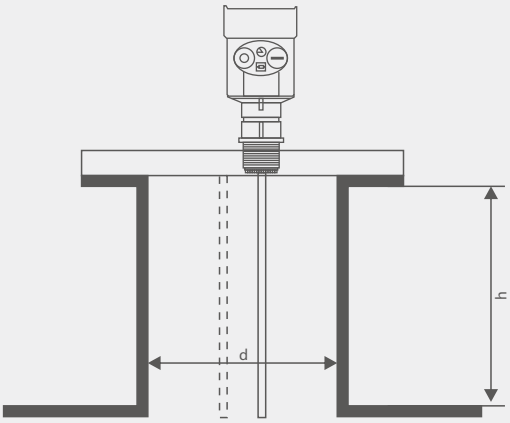
Legend description

Conical bottom tank

For conical containers with flat tank items, the best place to install the meter is right in the middle of the tank top, which ensures measurement to the bottom of the container.

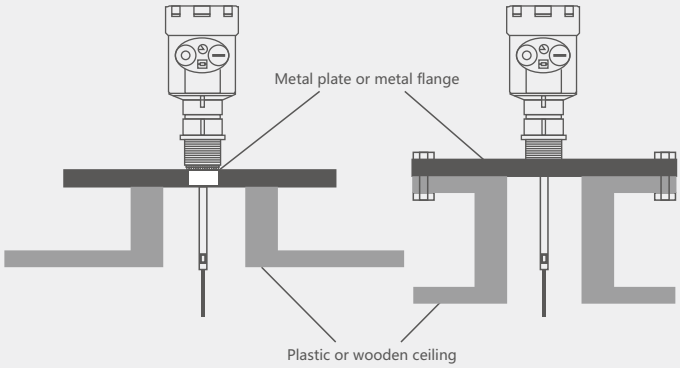
Recommended installation location

Try to avoid takeover installation or takeover height h is as small as possibleWhen the nozzle diameter d is φ50m... When φ150mm, the nozzle height h should be less than 150mm, which is the ideal heightAvoid contact between cable probe and short tube endDo not allow the container nozzle to penetrate deep into the container



Mount on non-metal cans

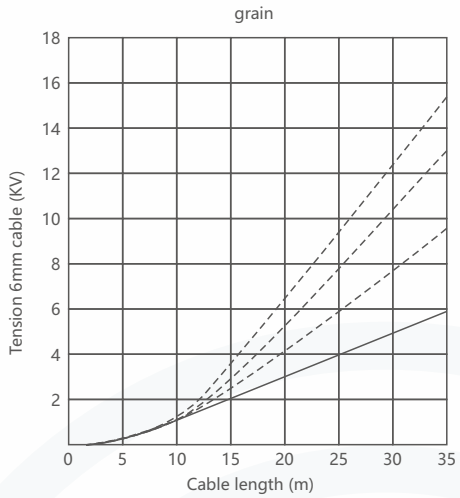
If the meter is mounted on a non-metal can, the meter needs to be equipped with a metal flange, if the thread connection is used, a metal plate is required. In order to increase the signal strength, measurement stability.

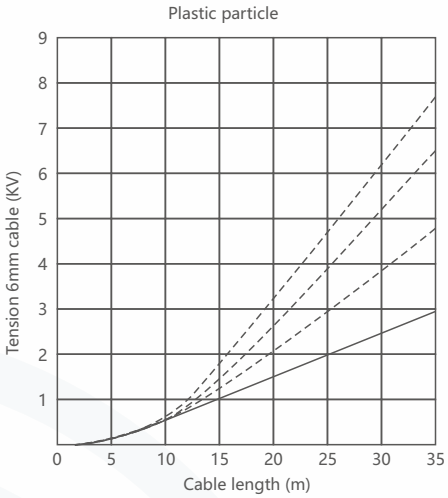


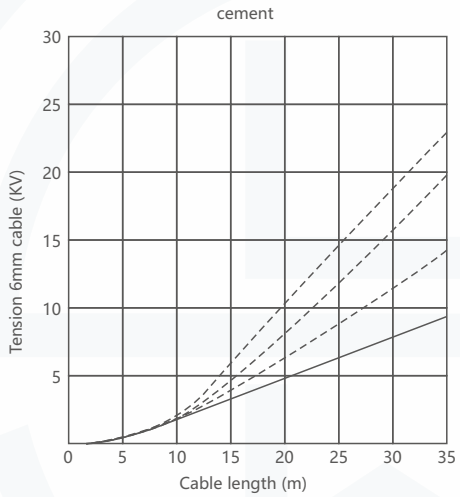
Below are the pull forces generated by the typical media of a 6mm cable probe

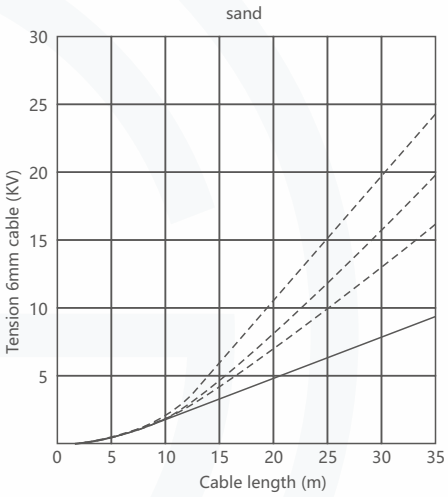
Measure the downward tension of the solid dielectric cable probe

When the medium buries the cable probe, it will produce a downward tension on the cable probe, and the magnitude of the downward tension
Depends on the following factors:
Cable probe length
Material density
Diameter of the silo
Diameter of cable probe









Optimization of interference

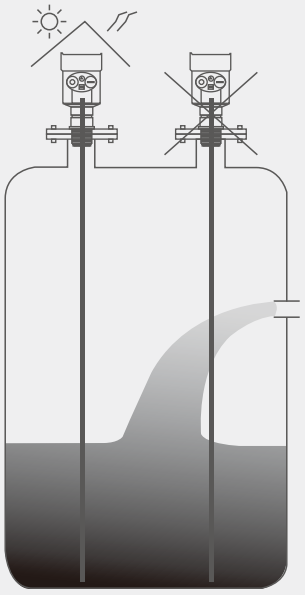
Interference echo suppression: The software can realize the suppression of interference echo, so as to achieve the ideal measurement effectInstalling wave guide tube or bypass tube can effectively suppress the interference echo generated by complex operating conditions.

Measurement of corrosive media

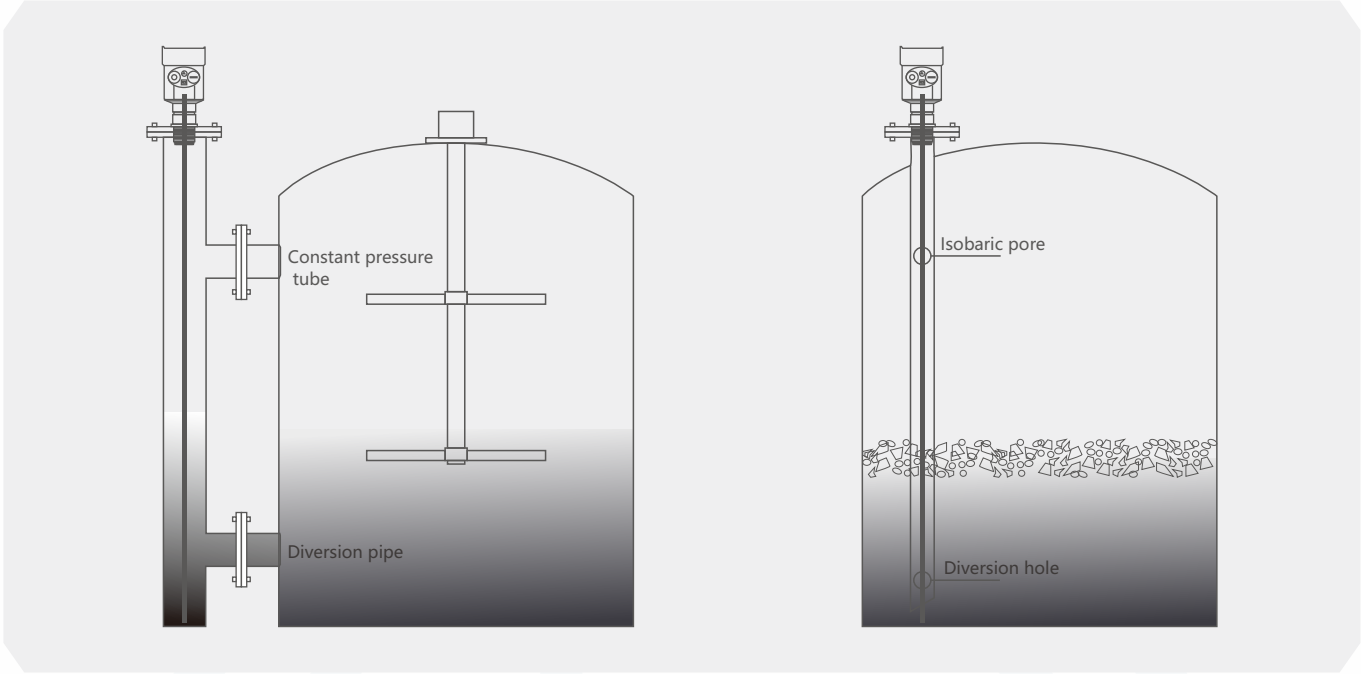
If measuring corrosive media, the rod or cable probe can be wrapped in plastic or tetrafluorotube

Fixing of probe ends of guided wave radar

The guided wave radar is installed in conditions that require fixing, such as mixing tanksThere are two types of fixing: one is insulated fixing, and the other is non-insulated fixingInsulation fixed: The dielectric constant of the measured medium is low, and when it is fixed in a metal tank, it needs insulation fixedNon-insulated fixing: When the dielectric constant of the measured medium is very high and the tank is made of non-metallic material, non-insulated fixing is required



Special recommendation for liquid measurement



Measurement in waveguide or bypass tube

The use of waveguide or bypass tube installation can avoid the influence of obstacles in the container, foam, liquid surface fluctuation on the measurement. A waveguide or by-pass tube is recommended for the following situationsThere is a conductive foamThe liquid level fluctuates wildlyThere are too many obstacles in the installation positionMeasurement of liquids in internal floating roof tanks (such as certain media in the petrochemical industry)Medium with too small dielectric constant

Note: Media that are too viscous cannot be measured with waveguides or bypass tubes

Coaxial probe

The coaxial probe can be selected for conditions where the waveguide or bypass tube is not suitableThe coaxial probe can effectively improve the instrument stability, and the principle of the waveguide is the same, and the selection is the sameShaft probe, need clean medium, low viscositySelect coaxial probe, no need to install wave guide tube or bypass tube

Requirements for waveguides or by-passes

Requirements for waveguides or by-passes

The waveguide or bypass tube must be a conductor

The inner diameter of the waveguide or bypass tube shall not be less than 50mm

The waveguide or bypass tube must be vertical

The inner wall of the waveguide or bypass tube must be smooth to avoid large welds and cracks, and the roughness must be better than ±0.1mm

The inner diameter of waveguide or bypass tube is not allowed to change, if there is a change, it should be less than 1 mm

The waveguide must be open at the bottom

When installing the waveguide, open an isobaric hole above the highest point where the liquid level may reach. The diameter of the isobaric hole is 5 to 10 mm

When there are multiple mixed liquid media in the tank, multiple diversion holes/pipes facilitate the free flow of liquid in and out of the tank

When there are multiple mixed liquid media in the tank, the spacing of multiple diversion holes/tubes must be less than the minimum layer thickness

When installing the bypass pipe, the position of the top isobaric pipe should be higher than the highest point that the liquid in the tank can reach

When installing the bypass pipe, the position of the bottom guide pipe should be lower than the lowest possible liquid level in the tank

Instrument debugging

Instrument debugging

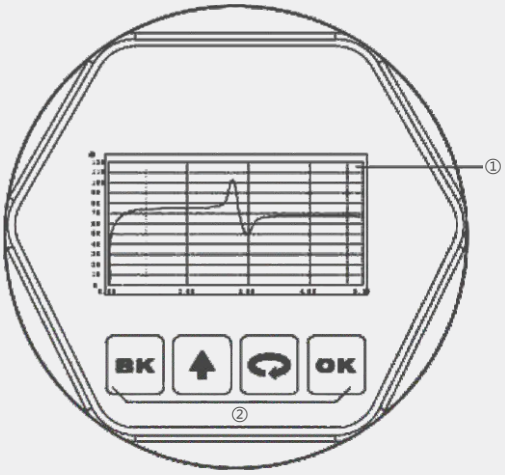
It is recommended to debug the instrument in the case of empty tank。

Debugging method

There are three ways to debug the instrument:
Display/key debugging
Upper computer debugging
HART handheld programmer debugging

Display key debugging

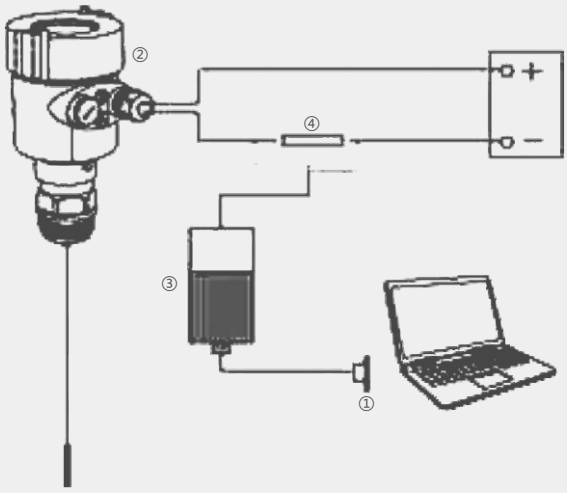
The instrument is debugged with four buttons on the display screen. After debugging, it is generally only used for display, and the measured value can be read out very clearly through the glass window.



Upper computer debugging

HART can be connected to the host computer and I²C can be connected to the host computer

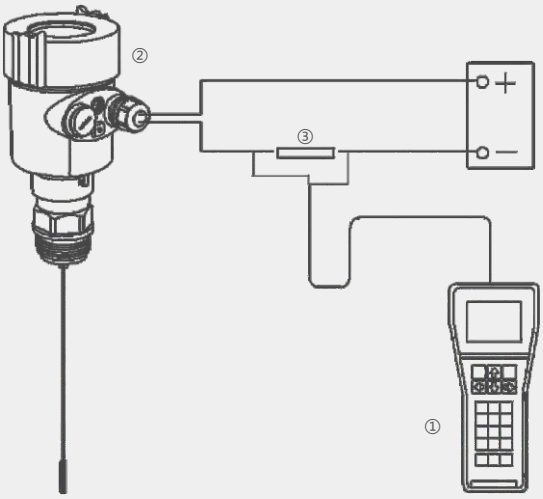
① RS232 or USB port
② Instrument
③ HART adapter
④ HART uses 250Ω resistor



Universal HART handheld programmer debugging

Debugging can be programmed with HART handheld programmer

① HART handheld programmer
② Instrument
③HART uses 250Ω resistor



PDG70-G-Selection composition

Selection example **PDG70-G**

A	I	K	O	Y	A	G	N	S	A	I
1	2	3	4	5	6	7	8	9	10	11

1.Maximum range/ probe form	A	2m/ steel cable type
	B	4m/ steel cable type
	C	6m/ steel cable type
	D	2m/ probe type
	E	4m/ probe type
2.Explosion-proof requirement	G	Intrinsically safe explosion protection
	H	flameproof
	I	Non-explosion proof
3.Probe size/material	K	Cable probe Ø8mm/ stainless steel 304
	L	Cable probe Ø4mm/ stainless steel 316L
	M	Rod probe Ø10mm/ stainless steel 304
	N	Rod probe Ø10mm/ stainless steel 316L
	T( )	Other
4.Specification of threaded connection(Flange item is not selected)	N	Thread G1"A
	O	Thread 1"NPT
	T( )	Other
4.1.Flange connection specification(Thread item is not selected)	T	DN20
	U	DN25
	V	DN32
	W	DN40
	X	DN50
	Y	DN65
	Z	DN80
	S	DN100
	R	DN125
	Q	DN150
	P	DN200
	T( )	Other flange specifications
5.Seal/process temperature	Y	Ordinary type (-40~130)℃
	Z	High temperature type (-40~250)℃
6.Output signal	A	4-20mA
	B	4-20mA+HART
	C	4-20mA+Modbus
	D	4+20mA+RS485
	T( )	Other output types
7.Pressure rating	G	PN16
	I	DN25
	J	DN32
	H	PN40
	K	PN63
	T( )	Other pressure levels
8.Power source	N	24V DC
	O	220V AC

PDG70-G-Selection composition

Selection example **PDG70-G**

1	2	3	4	5	6	7	8	9	10	11
A	I	K	O	Y	A	G	N	S	A	I

9.Housing/ protection class	S	Aluminum/Single cavity /IP67
	U	Aluminum/Double cavity /IP67
	V	Plastic/single chamber IP65
	W	Stainless steel/Single chamber /IP67
10.Electrical interface	A	M20*1.5
	B	1/2NPT
11.Field display/ programming	R	with
	I	Not carry

Instructions:

It indicates that the PDG70-G type guided wave radar level meter has a measuring range of 2m/ steel cable type, no explosion-proof, cable probe Ø8mm/304 stainless steel, process connection is 1"NPT (4,4.1) as one of the two options, ordinary type (-40~130℃), output 4-20mA, voltage grade PN16, power supply is 24V DC, housing is aluminum/single cavity, Protection class IP67, electrical interface is M20*1.5, without field display.

Product Certification

Compliance and approval; Rodwig flow meters meet key standards and certifications for process measurement technology; To ensure the highest reliability in such settings;

CE Ex SIL

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LUDWIG INSTRUMENT