

Linking your system



Guide Radar Level Sensors



Guide radar level sensor is suitable for all kinds of liquid and powder, such as water, oil, ethyl alcohol, etc. also for mediums those dielectric constant large than 1.4, which can resist the interference from dust, smog, foam and steam.



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Product Features



- Adopts TDR technology
- Continuous level measurement combined with switching output for simple installation and for cost-saving
- Suitable for different working places and different shapes of tanks with a unique design
- Anti-interference; Anti-static properties; High stability
- Centralized signal, suppression of disturbance
- Support HART protocol
- Capable to detect substance with low-dielectric constants such as oil and hydrocarbon

Operating Principle

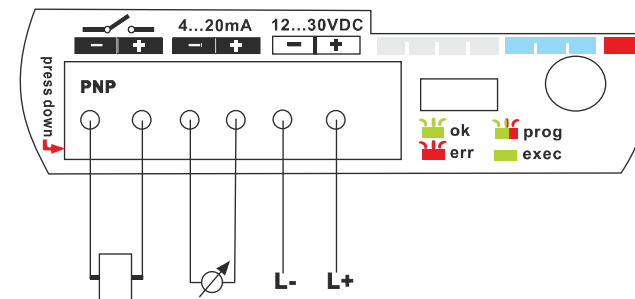
High frequency microwave pulse sent out by radar wave level transmitter is diffuse along the detect devices (steel tube or wirerope), when they meet the medium, dielectric constant changes and cause reflection, some pulse energy will be reflected back. Time interval of transmitted pulse and reflected pulse is in direct proportion to the distance.

Advantages

- Detection is not effected by below factors:
 - medium temperature
 - medium density
- Waves and foam do not affect the sensor
- Remote operation and display are provided
- The electric devices can be replaced when the lid closed

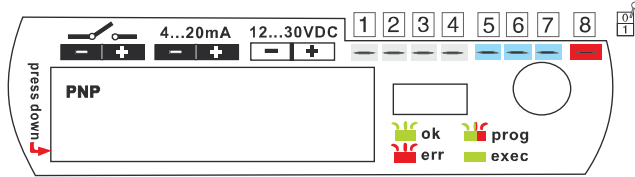
Connection

Terminals and control panel



DIP switch setting

1. Control panel and the definition of buttons



- Green blinking: Measuring mode
- Red and green blinking alternately: Configuration
- Red blinking: error
- Green continuously blinking: operating

Dip Switch Position	Dip Switch Setting	Description
1 2 3 4 5 6 7 8	0 0 0 0 0 0 0 0	Measuring mode
	0 0 0 0 0 0 0 1	Configuration mode
Function Group 1 Analog current Output		
	0 0 0 1	Lower range value(4mA);span 0%
	0 0 1 0	Upper range value [20mA];span 100%
	0 1 0 0	Response time 0.5s
	0 1 0 1	Response time 2s
	0 1 1 0	Response time 5s
Function Group 2 Switching Outputs		
	0 0 1 0	Switch-on threshold
	0 0 1 1	Switches-off threshold
	0 1 0 0	NC
	0 1 0 1	NO
Function Group 3 Disturbance Signal Suppression		
	0 0 0 1	perform disturbance signal scan
	0 0 1 0	Disturbance signal suppression on
	0 0 1 1	Disturbance signal suppression off
	0 1 0 0	Upper dead band 10mm1
	0 1 0 1	Upper dead band 180mm1
	0 1 1 0	Upper dead band 370mm1
	1 0 0 0	Amplitude threshold low
	1 0 0 1	Amplitude threshold medium
	1 0 1 0	Amplitude threshold high
	1 1 0 0	Coaxial probe
	1 1 0 1	Single rod probe
Function Group 4 Reset		
	0 0 0 1	Reset to delivery configuration
Function Group 5 Measure Probe Length		
	0 0 0 1	Measure probe length

2. Enter into configuration mode
Change DIP switch position 8 to 1, entering into configuration mode, other switches position must be on 0, otherwise errors will indicate. The follow 3~11 steps should be operated in configuration mode.

Dip Switch Position	Dip Switch Setting	Description
1 2 3 4 5 6 7 8	0 0 0 0 0 0 0 1	Configuration mode

3. Read the length of probe
Change DIP switch position 4,5,7 to 1 at the same time, then press confirmation button, the instrument will measure the length

Dip Switch Position	Dip Switch Setting	Description
1 2 3 4 5 6 7 8	0 0 0 1 1 0 1 1	Measure probe length

4. Set lower range value
Fill the liquid into the tank up to the level where you want to position the lower range value 4mA, change 4, 7 switch position to 1 at the same time, then press confirmation button, the instrument will set the level as lower range value and output 4mA.

Dip Switch Position	Dip Switch Setting	Description
1 2 3 4 5 6 7 8	0 0 0 1 0 0 1 1	Lower range value(4mA);span 0%

5. Set upper range value
Raise the liquid inside the tank up to the level where you want to position the upper range value 20mA, change 3, 7 switch position to 1 at the same time, press confirmation button, the instrument will set the level as upper range value and output 20mA.

Dip Switch Position	Dip Switch Setting	Description
1 2 3 4 5 6 7 8	0 0 1 0 0 0 1 1	Upper range value [20mA];span 100%

6. Set installation way
There are two kinds of installations, one is coaxial probe rod, the other is proberod, it should be set in advance according to different plications.

Dip Switch Position	Dip Switch Setting	Description
1 2 3 4 5 6 7 8	1 1 0 0	Coaxial probe
	1 1 0 1	Single rod probe

7. Set analog output response time
Analog output response can be set as 0.5s, 2s and 5s, DIP switch can be changed to different positions according to different applications, then press confirmation button to set it.

Dip Switch Position	Dip Switch Setting	Description
1 2 3 4 5 6 7 8	0 1 0 0	Response time 0.5s
	0 1 0 1	Response time 2s
	0 1 1 0	Response time 5s

8. Set digital output starting value
Set the value to where you want to position digital output starting value, then change switch position 3,6 to 1, press confirmation button to set it.

Dip Switch Position	Dip Switch Setting	Description
1 2 3 4 5 6 7 8	0 0 1 0 0 1 0 1	Set digital output starting value

9. Set digital output closing value
Set the value to where you want to position digital output closing value, then change switch position 3,4,6 to 1, press confirmation button to set it.

Note: The level of position digital output closing value should higher than or equal to that of digital output starting value

Dip Switch Position	Dip Switch Setting	Description
1 2 3 4 5 6 7 8	0 0 1 1 0 1 0 1	Switches-off threshold

10. Set digital output mode
There are NO/NC for digital output mode, users can set NO or NC according to their requirements.

Dip Switch Position	Dip Switch Setting	Description
1 2 3 4 5 6 7 8	0 1 0 1	NC
	0 1 0 0	NO

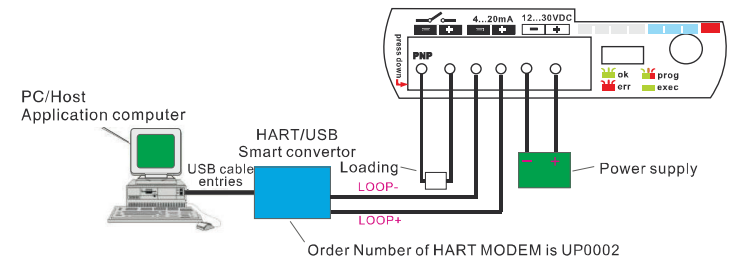
11. Disturbance signal suppression scanning
Change switch position 4,6,7 to 1, the instrument will scan disturbance signal automatically after pressing

Dip Switch Position	Dip Switch Setting	Description
1 2 3 4 5 6 7 8	0 0 0 1 0 1 1 1	Switch-on threshold

12. Return to measuring mode
Change all switch positions to 0 after setting all of these, then

Dip Switch Position	Dip Switch Setting	Description
1 2 3 4 5 6 7 8	0 0 0 0 0 0 0 0	Return to measuring mode


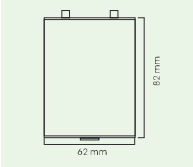
HART Configuration set

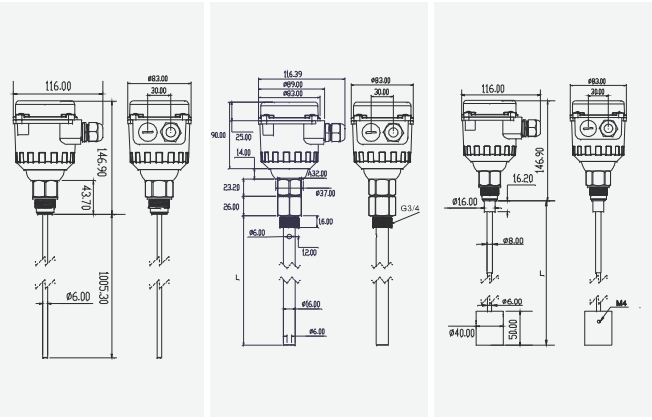


Connection	Connection picture for HART/USB convertor with 4-wire system device
Set COM	Open guided radar configuration mode setting tools, set COM to the terminal position where the HART is in HOME table.
Make connection and read serial No.	Click"send" in the line of "get serial number" in "Basic configuration" table, connecting computer with instrument and then read serial No.
Set probe length	Enter probe length in the line of "set probe length" in "local assembly" table, and then press "start" button to add the set value in instrument, it is successful if "OK" indicates in "OK/Error code"
Set probe type	Enter probe type in the line of "set probe type" in "local assembly" table, O means probe rod mouting, 1 means coaxial probe rod mouting, which depends on different applications, and then press "start" button, it is successful if "OK" indicates in "OK/Error code".

Set lower range value	Enter the value where the position of 4mA is in the line of "set lower range" in "local assembly" table, then press send button to add the set value in instruments, it is successful if "OK" indicates in "OK/Error code"
Upper range value	Enter the value where the position of 20mA in the line of "set upper range" in "local assembly" table, then press send button to add the set value in instruments, it is successful if "OK" indicates in "OK/Error code"
Set switch point output range	Enter "lower threshold switching output" in the line of lower threshold switching output in "local assembly" table, enter "upper threshold switching output" in the line of upper threshold switching output in local assembly table, click send button to add the set value in the instrument, it is successful if "OK" indicates in "OK/Error code". Note: Values set in 4-8 steps all refer the bottom area of scrow as its reference point.
Set switching output mode	Set output mode in the line of "set switching output mode" in "local assembly" table, "0" means NC, "1" means NO, clicking send button to add the set mode in instruments, it is successful

Accessories

HART module	Order No.	Drawing
	UP0002	

Dimension (mm)		
	Single rod	Coaxial probe
Type	Single rod	Coaxial probe
Connection	G3/4"A	
Cable entrance	M20 x P1.5	
Electric design	Analogue 4-20mA and DC PNP NO or NC	
Analogue output	4-20mA current output (Measuring range can be set up), HART	
Total load resistance [Ω]	<500	
Response time [s]	0.5/2/5 (can be selected)	
NO/NC Output	DC PNP NO/NC	
NO/NC Output loading [mA]	<200	
NO/NC Voltage drop [V]	<2	
NO/NC output response time [ms]	<200	
Short-circuit protection	Pulse	
Overload protection	Yes	
Reverse polarity protection	Yes	
Supply voltage [VDC]	12-30	
Current consumption [mA]	<70 (24VDC No loading)	
Application pressure [bar]	-1...40	
Medium dielectric constant [εr]	Single rod >1.8/Coaxial probe >1.4/wire rope >1.8	
Medium temperature [°C]	-40...150	
Ambient temperature [°C]	-25...80	
Storage temperature [°C]	-40...80	

Start-up time [s]	<6
Accuracy [mm]	± 3
Repeatability [mm]	<2
Resolution [mm]	<1
Probe length [mm]	1000 (standard)
Shock resistance [g]	50
Vibration resistance [g]	20
Housing material	Aluminum alloy
Probe material	Stainless steel (S316)/Teflon
O-ring material	FKM(Viton)
Protection classification	IP67

Order Information

RB	1	A	01000	S	6	1
Series	Probe type	Output	Length of Probe	Protection type	Probe material	O-ring material

RB	Guided Radar Level Sensor (TDR)
1	Probe type 1: Single rod 2: Coaxial probe 3: Wire rope
A	Output A: 4-wire, 1 x 4~20mA & 1xDC PNP/HART
01000	Length of probe Range of single rod: 100~3,000mm Range of coaxial probe: 100~6,000mm Range of wire rope: 100~20,000mm 01000=1,000mm 20000=20,000mm (standard length: 1000mm)
S	Protection type S: Standard
6	Probe material 6: Stainless steel 316 T: Teflon (suitable for single rod)
1	O-ring material 1: FKM (Viton)

Radar Wave
Level Sensors

Guided Radar
(TDR)

Ultrasonic
Level Sensors

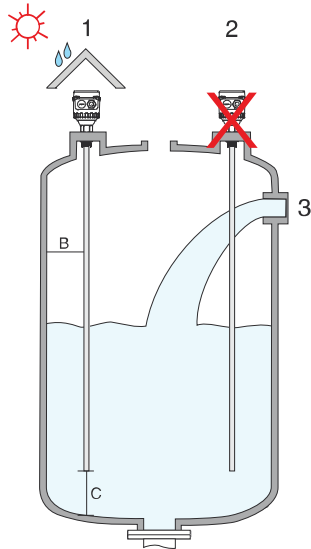
Rotating Paddle
Level Sensors

Vibrating Fork
Level Switches

Float
Level Switches

Capacitive
Level Switches

Install method



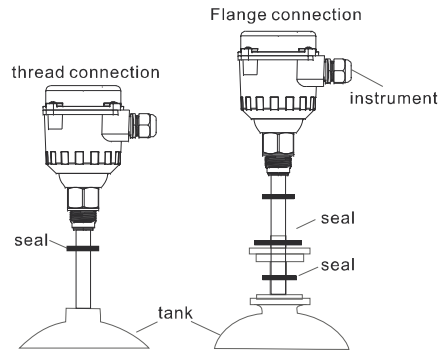
Selection of probe

single rod and wire type are suitable for the sensing range is more than 6M

Installation position

- ◆ Do not install them around of the material flow
- ◆ It is better to keep a distance from wall of tank(B), in cases with adhesion, probe should keep about 100mm away from the adhesion.
- ◆ The probe should keep away from the installed devices
- ◆ The minimum distance between probe and bottom of the tank (C)
 - wire type: 150mm
 - probe type: 100mm
- ◆ When install outdoor, it is better to use a shade(1)

- ◆ The guided radar wave transmitter should be vertical installed in the top of tank.
- ◆ Protecting jacket must be used when installed in non-metallic tank.
- ◆ There should not be any soldering install, soldering install will cause unpredictable result.
- ◆ Please do not install them around material filling nozzle or vulnerable place, if installed around a place where liquid level changes strongly, protecting jacket is needed.
- ◆ When install or move the transmitter, please do not take the probe directly, please take the instrument parts or thread parts.



Effect of internal equipments of the tank

- ◆ During the installation and operating process, please make sure the whole probe keep a distance more than 300mm from internal equipments(such as limit switches, stands, etc.)
- ◆ The probe should not be contacted with any equipments in the measuring range.

Optimization selection

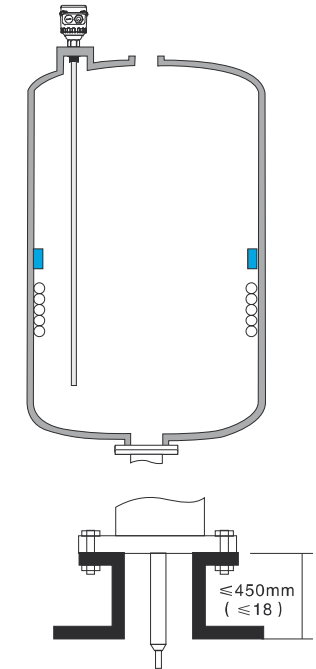
- ◆ Clutter echo suppression

Installation notice

- ◆ When install on the plastic tank, the diameter of tube is at least DN50/2".
- ◆ When the wire type install on tube whose height is 450mm, centering bracket must needed.
- ◆ When installed on narrow well, the diameter of narrow well should greater than 25mm.
- ◆ The diameter of nozzle should greater than 50mm, the height should less than 300mm.

Cleanness of probe

There are some burrs and accumulation on the probe during use, small quantity will not effect the measuring, if there are too much accumulations, they will lessen the measuring range. In some aggressive situation, generated crystallization will cause the measuring error. In this situation, please use non-contact measuring method, or clean the probe regularly



Inactive area

Top inactive area (=A) is the minimum distance between measurement reference point (flange) and top level of material, bottom inactive area (=B) is the distance that can not be measured

- F=measuring range
- E=initial value(=0)
- A=top inactive area
- B=bottom inactive area
- L=probe length
- C=minimum distance between probe and tank wall

