

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

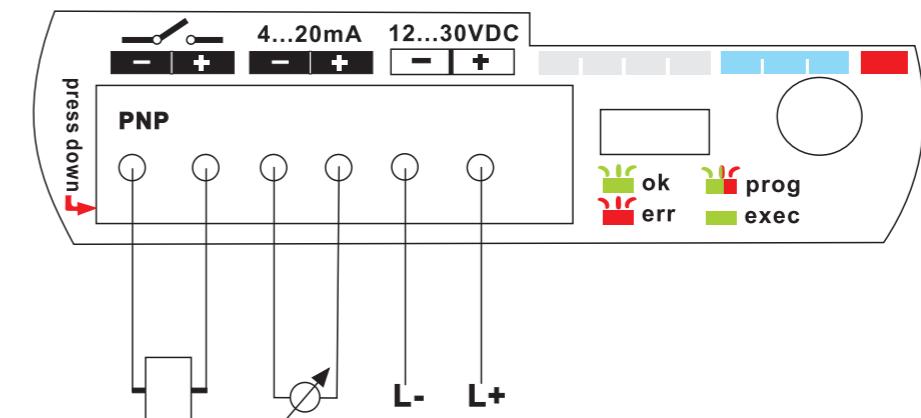
High frequency microwave pulse sent out by radar wave level transmitter is diffuse along the detect devices (steel tube or wire rope), when they meet the medium, dielectric constant changes and cause reflection, some pulse energy will be reflected back. Time interval of transmitted pulse and reflected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

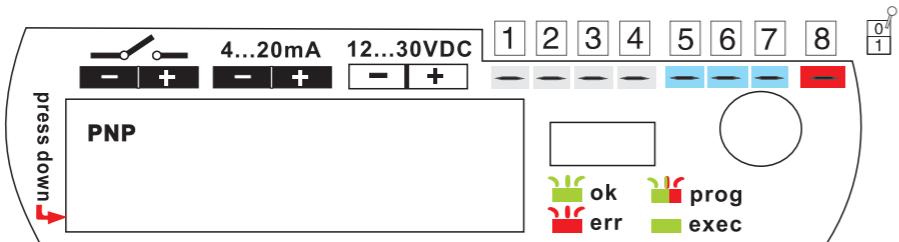
Connection

Terminals and control panel



DIP switch setting

1. Control panel and the definition of buttons



Green blinking: Measuring mode
Red blinking: error

Red and green blinking alternately:Configuration
Green continuously blinking:operating

Dip Switch Position

1 2 3 4 5 6 7 8

Dip Switch Setting

Description

0 0 0 0	0 0 0 0	0	Measuring mode
0 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
1 0 0 0	Reset to delivery configuration

Function Group 5

Measure Probe Length

0 0 0 1	Measure probe length
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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

1 2 3 4 5 6 7 8

Dip Switch Setting

Description

0 0 0 0 0 0 0 0	Configuration mode
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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

Function Group 4

Reset

0 0 0 1	Reset
1 0 0 0	Reset to delivery configuration

Function Group 5

Measure Probe Length

0 0 0 1	Measure probe length
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6. Set installation way

There are two kinds of installations, one is coaxial probe rod, the other is probe rod, it should be set in advance according to different applications.

Dip Switch Position

1 2 3 4 5 6 7 8

Dip Switch Setting

Description

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

1 2 3 4 5 6 7 8

Dip Switch Setting

Description

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

1 2 3 4 5 6 7 8

Dip Switch Setting

Description

0 0 1 0 0 1 0 1	Set digital output starting value
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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

1 2 3 4 5 6 7 8

Dip Switch Setting

Description

0 0 1 1 0 1 0 1	Switches-off threshold
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HART Configuration set

PC/Host Application computer

USB cable entries

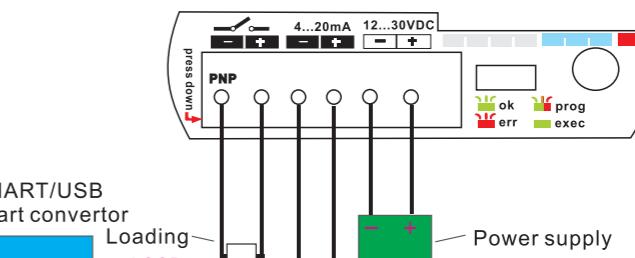
HART/USB Smart convertor

Loading

LOOP-

LOOP+

Power supply



Order Number of HART MODEM is UP0002

Connection

Connection picture for HART/USB convertor with 4-wire system device

Open guided radar configuration mode setting tools, set COM to the terminal position where the HART is in HOME table.

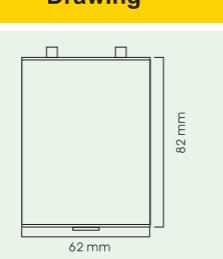
Click "send" in the line of "get serial number" in "Basic configuration" table, connecting computer with instrument and then read serial No.

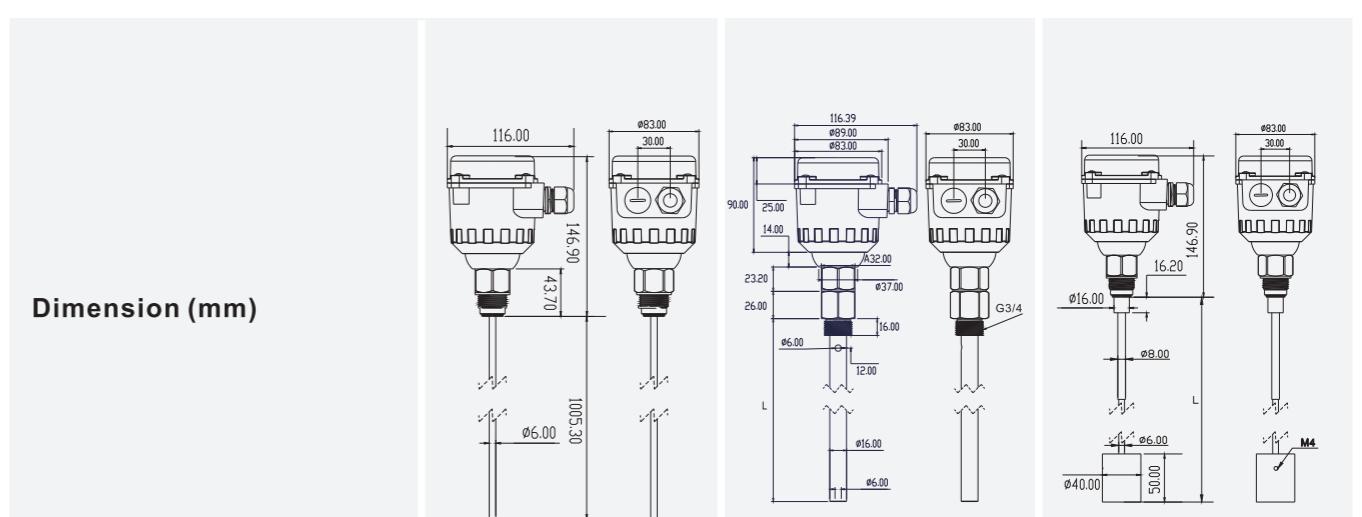
Enter probe length in the line of "set probe length" in "local assembly" table, and then press "start" button to add the set value in instrument, it is successful if "OK" indicates in "OK/Error code"

Enter probe type in the line of "set probe type" in "local assembly" table , 0 means probe rod mounting, 1 means coaxial probe rod mounting, 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 to the bottom area of screw 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	



Type	Single rod	Coaxial probe	Wire rope
Connection	G3/4"A	G1"A	G1"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		

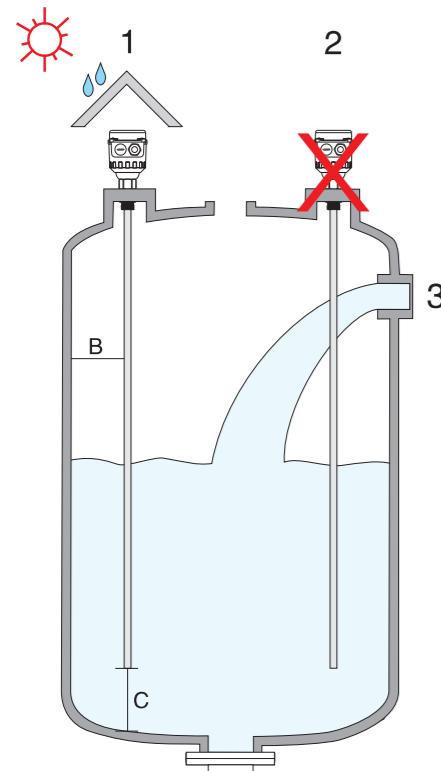
RadarWave
Level SensorsGuided Radar
(TDR)Ultrasonic
Level SensorsRotating Paddle
Level SensorsVibrating Fork
Level SwitchesFloat
Level SwitchesCapacitive
Level Switches

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 SensorsGuided Radar
(TDR)Ultrasonic
Level SensorsRotating Paddle
Level SensorsVibrating Fork
Level SwitchesFloat
Level SwitchesCapacitive
Level Switches

Install method



Selection of probe

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

Installation position

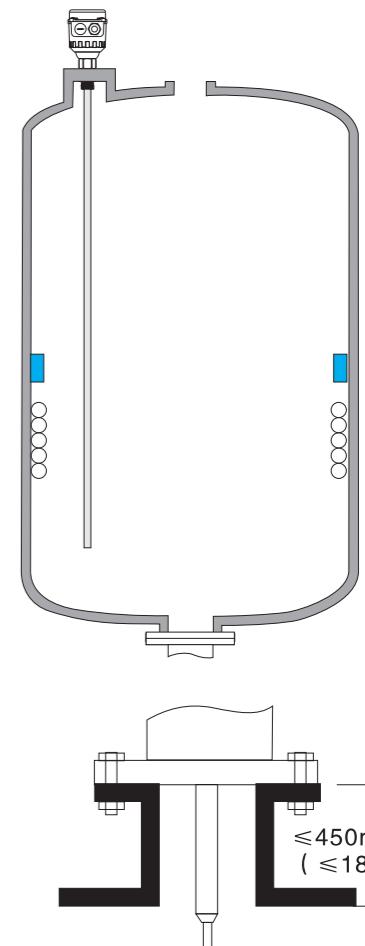
- ◆ Do not install them around of the material flow
- ◆ It is better to keep a distance from wall of tank(B), in cases with adhesion, probe should keep about 100mm away from the adhesion.
- ◆ The probe should keep away from the installed devices
- ◆ The minimum distance between probe and bottom of the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

Installation notice

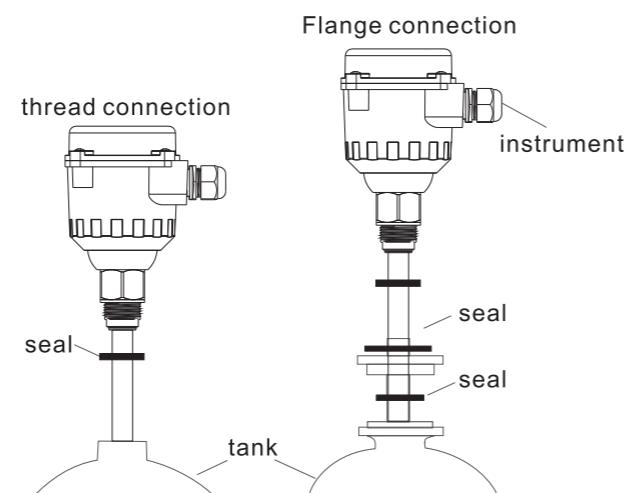
- ◆ When install on the plastic tank, the diameter of tube is at least DN50/2".
- ◆ When the wire type install on tube whose height is 450mm, centering bracket must needed.
- ◆ When installed on narrow well, the diameter of narrow well should greater than 25mm.
- ◆ The diameter of nozzle should greater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



- ◆ The guided radar wave transmitter shoule 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

Inactive area

Top inactive area (=A) is the minimum distance between measurement reference point (flange) and topes 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

