AET controls

Intelligent Noncontact Radar Level Transmitter and

Guided Wave Radar Level Transmitter

Catalogues and Manuals

AET controls

CONTENTS

AET controls

Intelligent Noncontact Radar Level Transmitter

1. Summary

1.1 Brief introduction

AHHTHRD50 series instruments are advanced ra dar level transmitters. The maximum measuring range is 35 meters. They can be applicable for the level measurement of storage tanks, intermediate buffering tanks or some process containers. They output 4---20mA.

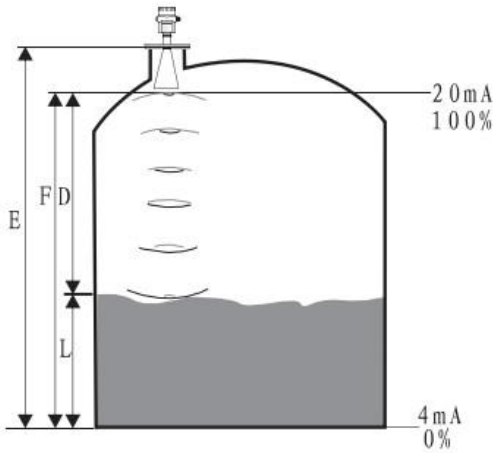
1.2 Features

- Advanced noncontact measurement
- Use the material with extreme stability on physics and chemic
- Level measurement for both liquid and solid
- Be applicable for those mediums with dielectric constant ＞1.8
- With two wires and circuit power supply technology. Power supply and output signals can be transmitted though a cable with two wires
- 4---20mA signal output or digital signal output
- 1mm of resolution
- Cannot be affected by such environment with noise, steam, dust or vacuum
- Cannot be affected by the changes of density, consistency and temperature of medium
- The process pressure can be up to 4 MPa
- The process temperature can be up to 250℃

1.3 Working principle

Micro pulses with high frequency are propagated and received through the antenna systems. The radar wave travels with the velocity of light. The flying time can be converted into signals of level through the electronic parts. A special method of extending or prolonging time can ensure the stable and exact measurement during the ultra short period.

Even under complicated working conditions, there are false echoes; the reflected echoes of the level can still be distinguished



1.4 Input

When antenna receives the reflected micro pulses, it will transmit them to the electronic circuits. The micro processer will process the signals and distinguish the reflected echoes. The identification of right echo signals can be performed by the soft wares. The accuracy can be up to millimeter level. The distance from the surface of medium D is in proportion to the flying time of the pulse T: D=C ×T/2 (C is velocity of light), refer to the figure above

The distance E when the tank is empty is known, the level L can be calculated: L=E-D

1.5 Output

Through setting the empty height E as zero point, the full point (height) as F (full scale), the applicable parameters can make the instrument adapt the measuring environment automatically corresponding 4-20mA output.

2. Brief introduction

AHHTHRD50 series intelligent radar level transmitters

AHHTHRD51

Application: working environment is simple. Be applicable for corrosive liquid, sizing agents, solid, such as waste water tanks, acid or alkaline tanks, sizing agent containers, solid particles, and small oil containers.

Measuring range: 20 meters

Process connection: G11/2 or 11/2 NPT

Medium temperature: -40-120℃

Process pressure: -1.0 – 3 bar

Repeatability:±2mm

Accuracy: ＜0.1%

Frequency range: 6.8GHz

Explosion proof and ingress protection grade: Exia IIC T6, IP67

Signal output: 4---20mA, HART (tow wires)

AHHTHRD52

Application: Be applicable for corrosive liquid, sizing agents, solid, such as waste water tanks, acid or alkaline tanks, sizing agent containers, solid particles, small oil containers.

Measuring range: 20 meters

Process connection: Flange

Medium temperature: -40-150℃

Process pressure: -1.0 – 20bar

Repeatability:±2mm

Accuracy: ＜0.1%

Frequency range: 6.8GHz

Explosion proof and ingress protection grade: Exia IIC T6, IP67

Signal output: 4---20mA, HART (tow wires)

AHHTHRD53

Application: Be applicable for different kinds of containers or process metric environment, liquid, sizing agent or solid, such as crude oil, or light oil tanks, raw coal, powdered coal silo, volatile liquid tanks, coke silo, sizing agent containers, solid particles, small oil containers.

Measuring range: 35 meters

Process connection: Flange

Medium temperature: -40-250℃

Process pressure: -1.0 – 40bar

Repeatability:±2mm

Accuracy: ＜0.1%

Frequency range: 6.8GHz

Explosion proof and ingress protection grade: Exia IIC T6, IP67

Signal output: 4---20mA, HART (tow wires)

AHHTHRD54

Application: Be applicable for solid level measurement, such as powder, particles and lump materials.

Measuring range: 35 meters

Process connection: universal flange

Medium temperature: -40-250℃

Process pressure: -1.0 – 3bar

Repeatability:±2mm

Accuracy: ＜0.1%

Frequency range: 6.8GHz

Explosion proof and ingress protection grade: Exia IIC T6, IP67

Signal output: 4---20mA, HART (tow wires)

AHHTHRD55

Application: Be applicable for liquids with low dielectric constant or liquid tank with mixer

Measuring range: 30 meters

Process connection: Flange

Medium temperature: -40-25 0℃

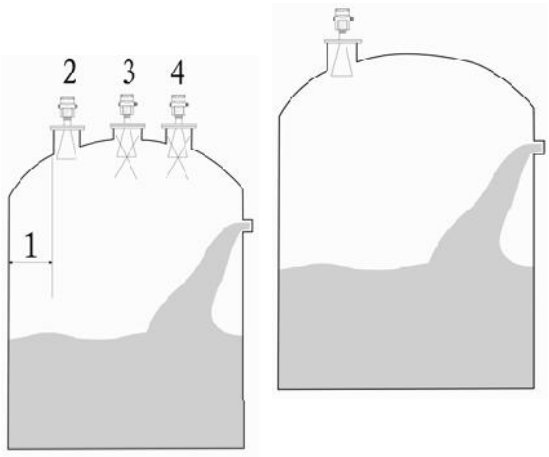
Process pressure: -1.0 – 20bar
Repeatability:±2mm
Accuracy: ＜0.1%
Frequency range: 6.8GHz
Explosion proof and ingress protection grade: Exia IIC T6, IP67
Signal output: 4---20mA, HART (tow wires)

AHHTHRD56

Application: Be applicable for solid level measurement of high silo or tanks with thick roof.
Measuring range: 35 meters
Process connection: Flange
Medium temperature: -40-500℃
Process pressure: -1.0 – 3bar
Repeatability:±2mm
Accuracy: ＜0.1%
Frequency range: 6.8GHz
Explosion proof and ingress protection grade: Exia IIC T6, IP67
Signal output: 4---20mA, HART (tow wires)

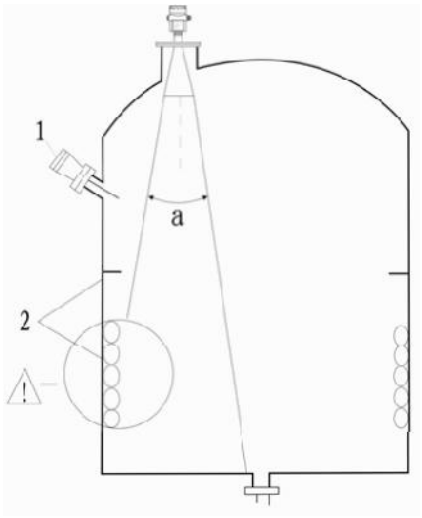
3. Guide on installation

3.1 Position of installation: refer to the figure right



- It is suggested that the distance “1” from the installing tube outer wall to the inner wall of the tank should be larger than 1/6 of the diameter.
- The minimum distance from the outer wall of the installing tube to the inner wall of the tank should be 300mm. The suggested distance is no less than 500mm.
- The instruments cannot be installed above the feeding inlet as the position “4”.
- The instruments cannot be positioned at the central point as the position “3”. Otherwise, there will be multiple reflected false echoes so that the correct echoes are interfered and are possibly lost.
- When the distance between instrument and inner wall of the tank cannot be ensured, the medium will stick to the wall and create false echoes. So, when debugging, the users should save those false echoes.

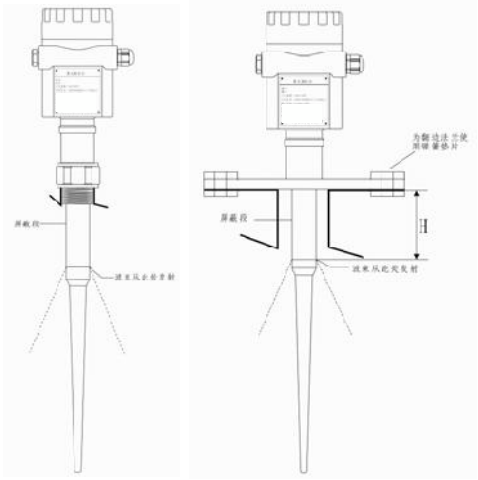
3.2 Installation inside a tank



- In the range of the signal beam, there should be no the following obstacles :“1”, such as limit switches, temperature sensors, etc.
- “2” symmetrically arranged things, such as vacuum rings, heating rings, or apron boards.
- When there is something of obstacles as “1” or “2” inside the tank, the radar transmitters should be equipped with guide wave tube to perform measurement.

3.3 Optimal installation

- Sizes of antenna: The bigger the antenna is, the smaller the beam angle is, and the weaker the interfering echoes are.
- Adjustment of antenna: Adjust the antenna to a optimal position
- Guide wave tube: Use a guide wave tube to prevent interference of echoes.



3.4. Installation of AHHTHRD51 AHHTHRD52 inside tank

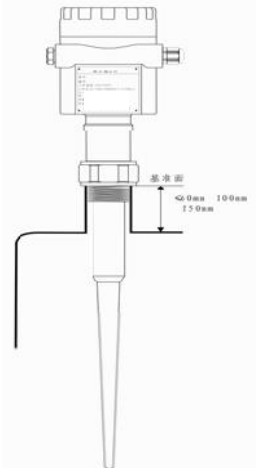
3.4.1 Standard installation

- Keep the antenna vertical. Don’t’ incline to the wall at any direction.
- In order to minimize the influence of temperature, a spring washer must be used at the flange connection.
- For rod antenna, the point of radar wave propagation must be stretched out of the installing tube.
- Keep the rod antenna to be vertical. Avoid wave beam from pointing at the wall at any direction.

3.4.2. Typical installation for AHHTHRD51 series radar level transmitters

- Transmitters with PTFE rod antenna are very applicable for the measurement of corrosive medium, such as acid, alkaline.

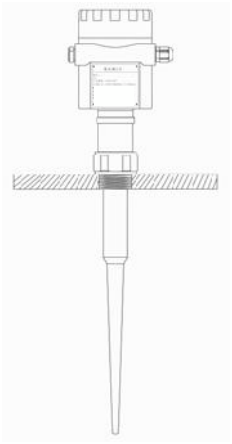
In food industry, there are lots of sterile containers. They need the instrument will not to react with the medium and has small installing sizes. PTFE rod antenna won’t react with any medium and at the same time needs small opening. The connecting size is only 50mm or G11/2A thread.



Rod antenna is connected to G11/2A threaded tube

● When measuring liquid, rod antenna can be installed directly at the opening of a container. The size of opening is G11/2A, or DN50---DN150. The length of connecting tube cannot exceed 150mm (when the antenna is relative long, the length of the connecting tube cannot exceed 250mm).

Note: PTFE rod antenna has lower carrying capacity. It is easy for it to be deformed and broken.



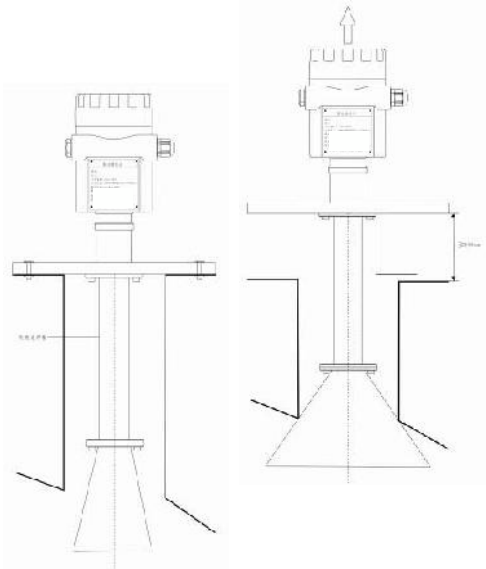
The rod antenna is connected to the thread G11/2A.

3.5 Installation of AHHTHRD53 inside a tank

3.5.1 Standard installation

● Horn antenna has to stretch out of the installing tube. Otherwise, please use an antenna extension tube.

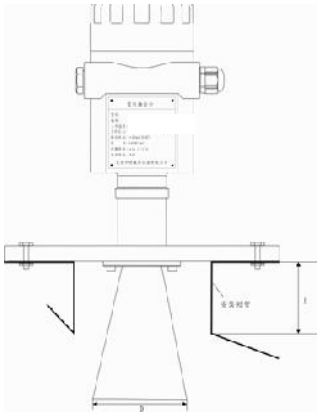
● Keep the horn antenna to be vertical and avoid the wave beam from pointing at wall at any direction.



3.5.2 (When the installing pipe is relative longer) Installation with an antenna extension tube

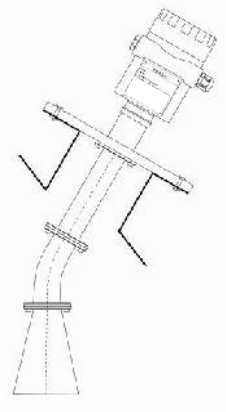
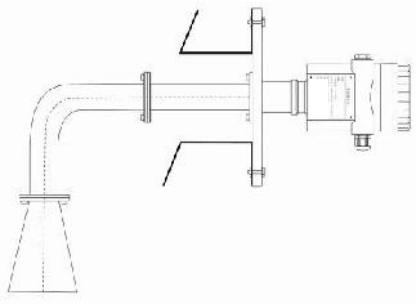
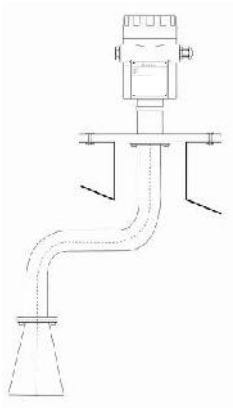
● When the length of a horn antenna is shorter than the length of a installing tube, please use an antenna extension tube.

● When the diameter of a horn antenna is larger than the diameter of the installing tube, including an extension tube, the horn antenna should be assembled inside the container. With the extension tube, raise the height of the instrument by at least 100mm.



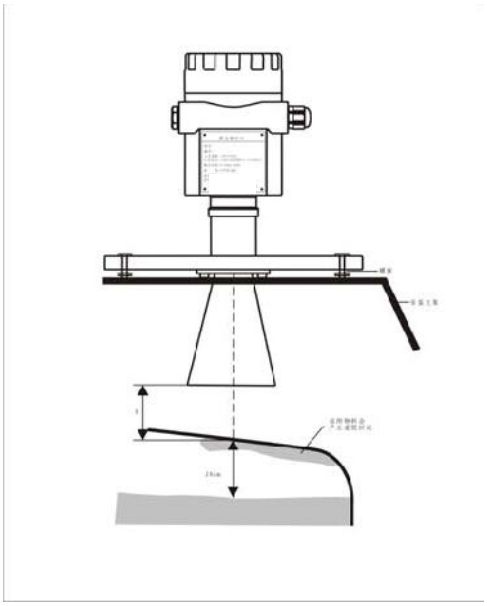
Special extension tube

- When instrument needs to be installed slantingly or vertical to tank wall, please use extension tubes with angle 120° or 90° .

Measurement at plastic container with radar wave sticking through the wall

- The dielectric constant εr is no less than 10
- The highest level of medium should be 20cm lower than the top of the tank
- The height “H” from the antenna end to the top should larger than 100mm
- It is suggested to use a holder for installation so as to adjust the height to ideal “H”.
- Avoid the instrument from being installed in cold or sticky environment. There should be shielding or protection between the antenna and the top of the tank.
- Select the material with low dielectric constant with appropriate thickness as tank material. Not use electric conductive plastic.
- When it is possible, please select an antenna with diameter DN250 or 10”
- In the range of wave beam outside of the tank, there should be no any obstacle installed which can possibly cause any interference (for example tube)



Followed are schematic charts of echo signals

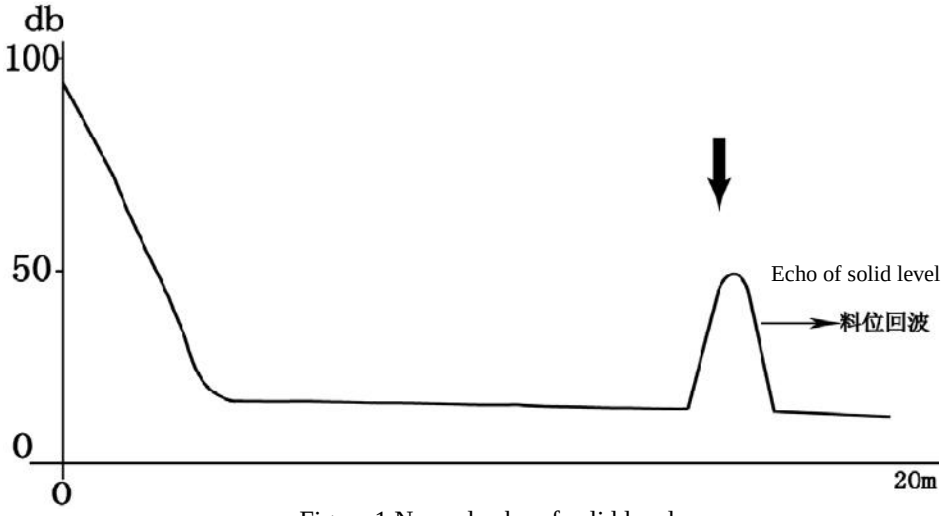


Figure 1 Normal echo of solid level

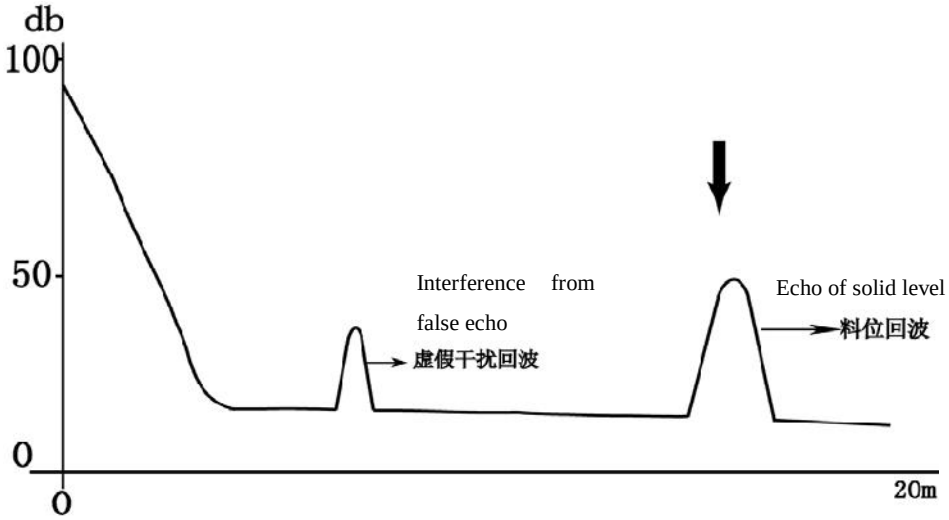
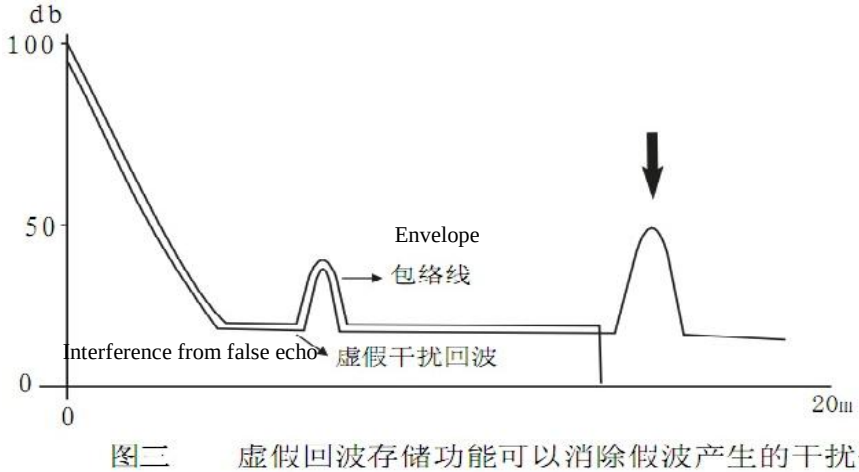


Figure 2 With false echo



图三　　虚假回波存储功能可以消除假波产生的干扰信号

Figure 3. With function of saving false echo, interference from false echoes can be eliminated

4. Measurement with wave guide pipe

4.1 Brief introduction

● When inside of the container is complicated, for example, there is heating coils, heat exchanger, or fast rotating fixer, etc, the wave guide pipe is needed. When medium has continuous vortex or there is false reflected echoes in a container, an antenna with a wave guide pipe is applicable selection.

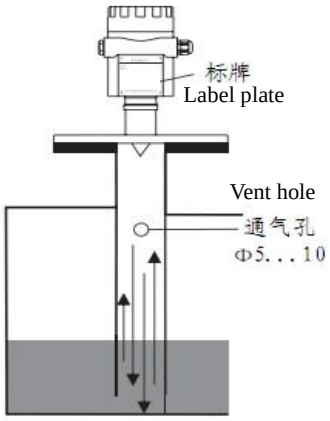
● With radar signals are focused in the wave guide pipe, the radar transmitters can measure levels of medium with lower dielectric constant (ε r=1.6 ---1.3)

● The low end of the wave guide pipe should be lower than or equal to the lowest actual liquid level. In such a manner, the measurement can be performed.

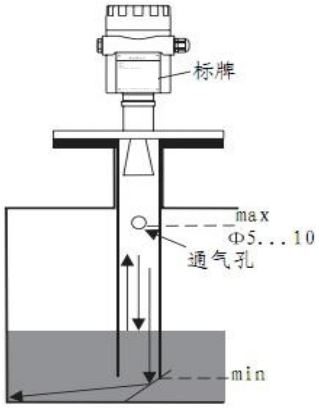
● Be sure the vent hole at upper part of wave guide pipe should be at the same line and the same side with the label plate.

● Beside having a wave guide pipe inside a container, you can also equip the instrument with a bypass tube outside the container.

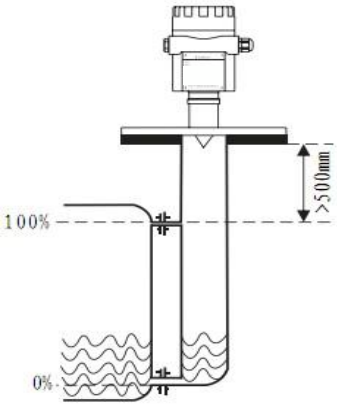
● When measurement with a wave guide pipe or a bypass tube, the flying time of the radar signals will change, the maximum measuring range will be shrunk by 5 ---20% of the original.



Wave guide pipe is welded inside a container



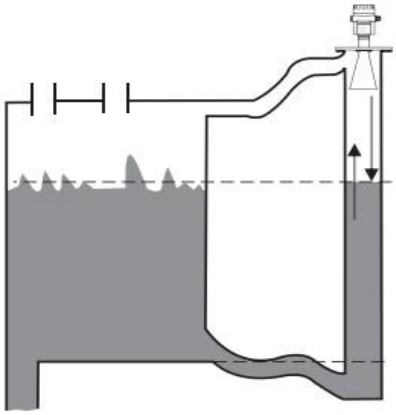
The wave guide pipe is connected with a tube inside a container



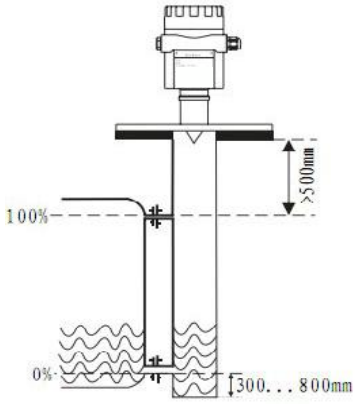
Transmitter is installed at a bypass tube

- Keep the instrument label plate to be in line with the open hole line of the wave guide pipe. Because of the polarization of the radar signals, only at this orientation, reliable measurement can be ensured.
- Shown as the figure at right, when a transmitter is installed at a bypass tube, it must be installed at a position which should be at least 500mm higher than the connecting tube between the container and the bypass tube. When the inner surface of the tube is not even and smooth, a lining tube should be lined inside of the bypass tube.
- When the dielectric constant is lower (less than 4), the length of the bypass tube should be

longer than the length of a normal tube, because part of the radar signals can go through the medium with lower dielectric constant. When there is little medium inside a bypass tube, the reflected echoes from the bottom of the tube is even stronger than those echoes reflected from the medium. Therefore, it is easy to have measuring errors. In this case, you can extend the tube (by 300---800mm) at the bottom. The radar signals can be attenuated in this part of medium. See the figures below. Or, you can install a piece of deflecting plate, which will deflect the reflected radar signals away. See the figures in the middle above.



Measure the liquid level of bad undulation with a bypass tube, prolonging the connecting tubes



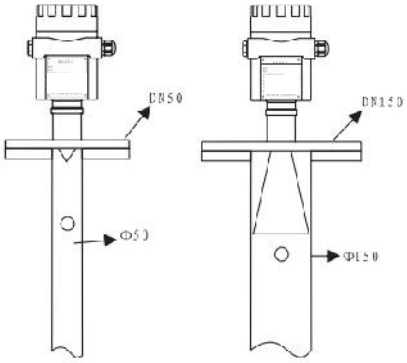
Measure level of liquid with lower dielectric constant by bypass tube

4.2 Sticky medium

● For sticky medium, the diameter of the wave guide pipe should be bigger. The diameters are usually 100mm or 150mm.

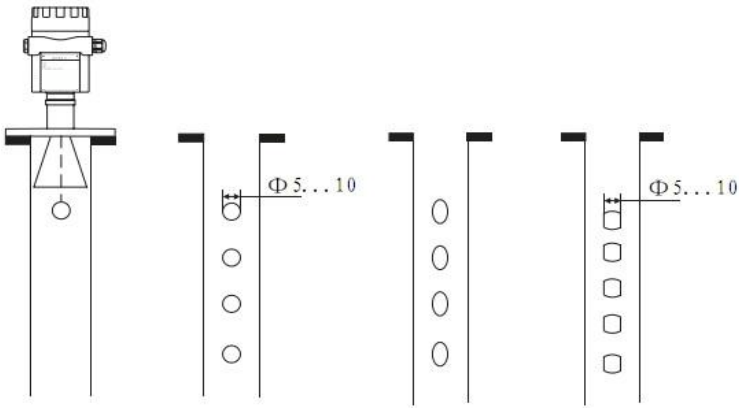
For common medium, the diameter is 50mm.

● The diameters of the wave guide pipes respectively are DN50, DN80, DN100, DN150. When medium is so sticky, you cannot use a wave guide pipe



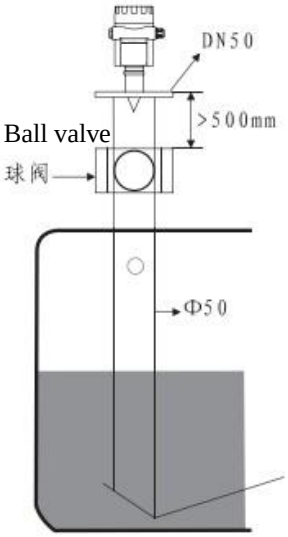
Measuring level of mixed liquids with wave guide pipe

- When you measure level of mixed liquids or layered liquids, the wave guide pipe should be cut with round holes, oval holes or rectangular holes. Opening holes is for mixing liquids completely in wave guide pipe.
- Wider rectangular holes will create false echoes. Therefore, the width cannot be wider than 10mm. For the sake of decreasing noise, oval holes are better than rectangular holes.



Homogeneous liquids Mixed liquids Mixed liquids Mixed liquids

4.4 Guide wave tube with ball valve



- When a ball valve is equipped with a wave guide pipe, the instrument can be maintained without open the container (such as when measuring liquefied coal gas or some poisonous liquid)
- In order to prevent the ball vale from affect the measurement of the transmitter, the diameter of ball valve must match with the diameter of wave guide pipe. The position of the ball valve should keep at least 500mm away from the flange of the instrument.

5. Tips on design of guide wave tube

There are five sizes of wave guide pipes match five sizes of flanges of transmitters, DN50, DN80, DN100, DN150.

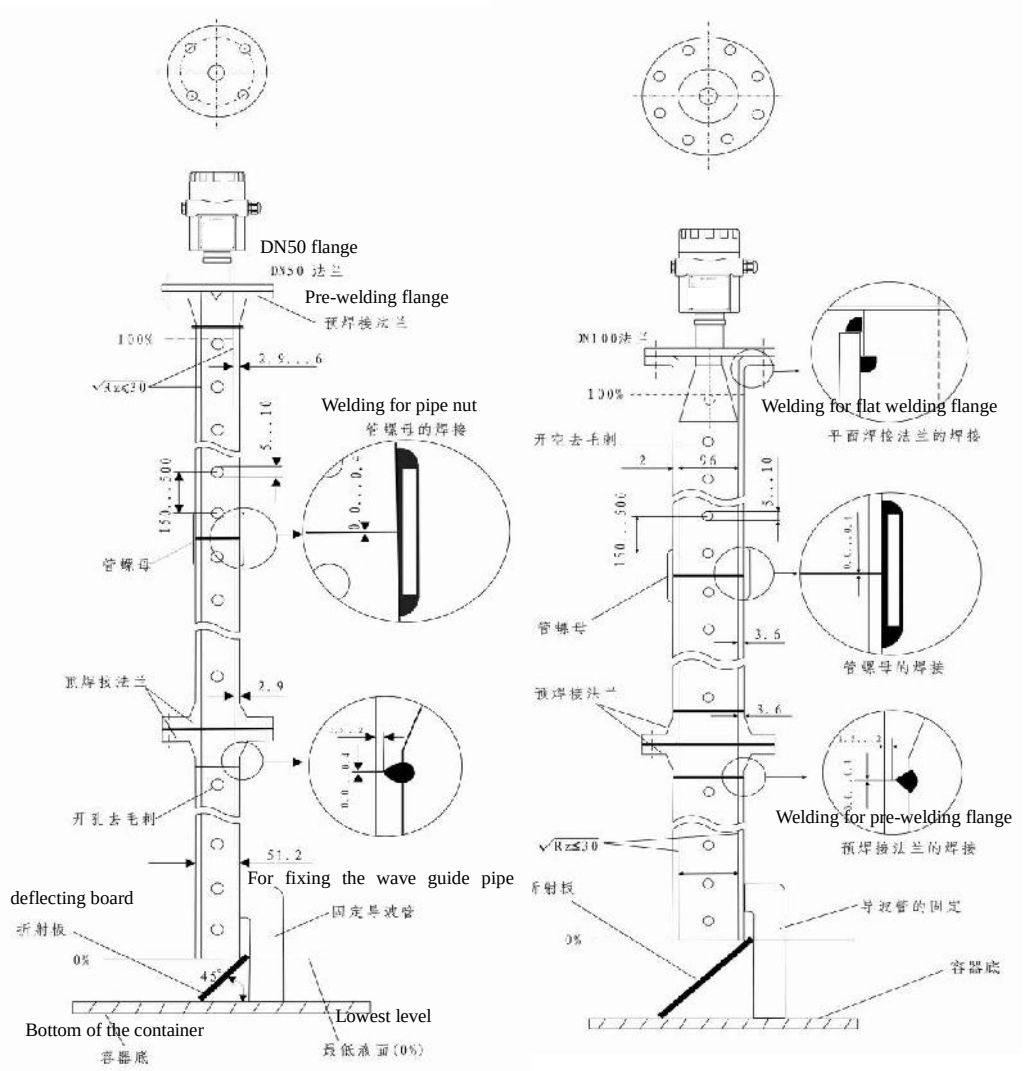
- Shown in figure 1, a wave guide pipe for DN50 of flange. Take it for example.

  The inner surface of the tube must be even and smooth (roughness average Rz ≤30). Wave guide pipe can be made of stainless tube which is formed stretching or welding. Be sure that there is no gap or bulge at the inner surface of the position where a flange or pipe is welded. Before welding, secure the pipe and flange from inside.

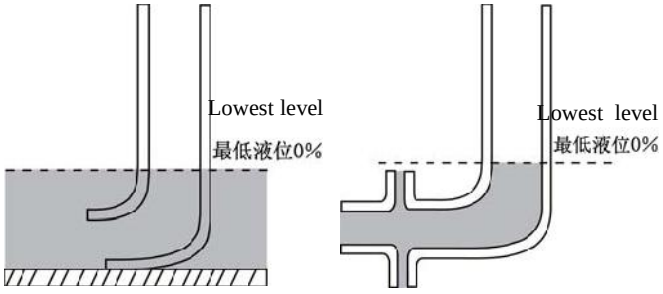
  When welding, be careful, not completely penetrate the wall of pipe. Keep the inner surface to be even and smooth. In case of completely penetrating the wall, the inner surface where there is complete penetration has to be retreated and made to be even and smooth. Otherwise, there will be big false echoes created.

- Wave guide pipe for flange of DN100

  Radar level transmitters with flange DN80, DN100, or DN150 are equipped with horn antenna. At an end of the transmitters, the pre-welding flange disk can be substituted with a flat welded flange.



● When measuring stirring or flowing medium, the lower end of the wave guide pipe should be fixed on bottom of container. For longer wave guide pipe, you have to fix it by section. When dielectric constant of medium is less than 3, radar signal will penetrate the medium. When the container is close to empty, the reflection of signal on the bottom will affect the measurement badly. In this case, you should install a deflecting plate at the bottom end of the pipe to deflect the reflected echoes from the bottom away. With the deflecting plate, the exact measurement can be ensured when the liquid level is close to empty point. Without deflecting plate, you can bend the pipe end into an angle so that the reflected echoes from bottom can also be deflected away.

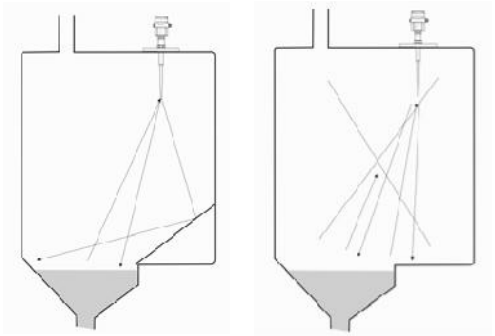


Bent end of wave guide pipe　　Bent end of bypass pipe

6. False echo

Incorrect installation will cause big false echoes. Followed are examples which are common mistake on installation and usually happen:

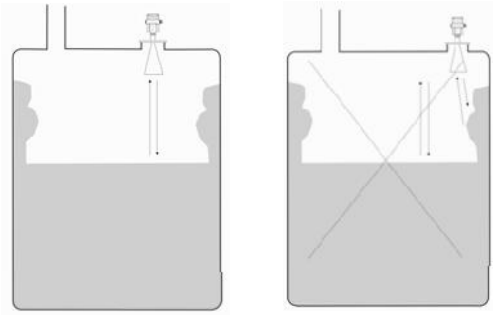
- When there is a stair-like flat surface which will badly affect the measurement. You have to put a deflecting plate on the surface to secure normal measurement.



Right Wrong

- Sticky medium

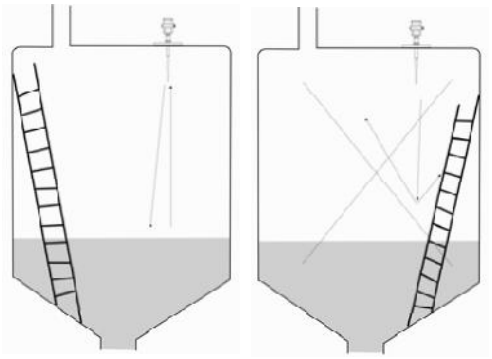
When the transmitter is installed too close to the wall, the stuck medium will create false echo. So, the instrument should keep certain distance from the wall.



Right Wrong

- Devices inside of container

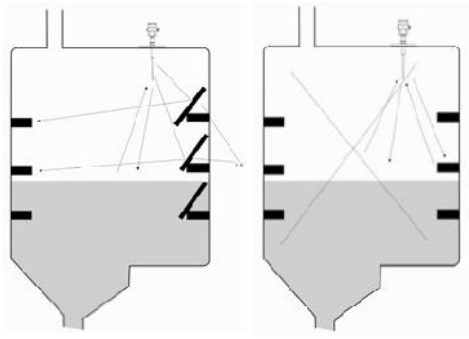
Sometimes there are some devices inside of a container, for example, a ladder, which will cause false echoes. When select an installation position, be sure there is no any obstacle which possibly prevent the radar beam' flying.



Right Wrong

- Selves or supports inside container

Selves or supports will create strong false echoes. Using deflecting plate is good method to prevent false echo from happening.

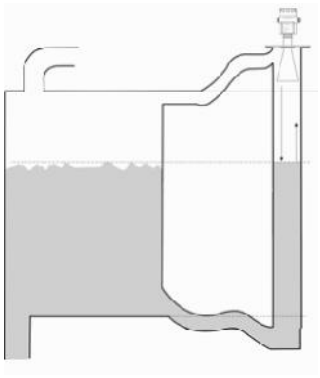


Right Wrong

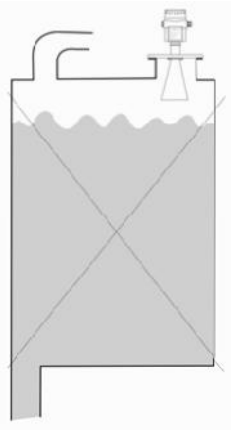
7. Typical mistakes during installation

Big undulation

- When there is big vortex in the liquid, for example, vortex caused by stirring or strong chemical reactions, etc, it is suggested to make the transmitter be equipped with a wave guide pipe or a bypass tube. Please note that the liquid cannot stick to the inner surface of the wave guide pipe or the bypass tube. If there is possibility, please select the standard pipes of 100mm diameter or bigger.



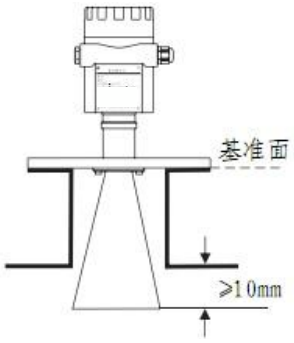
Right



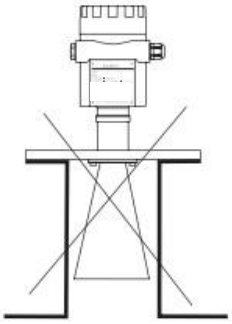
Wrong

Installing pipe is too long

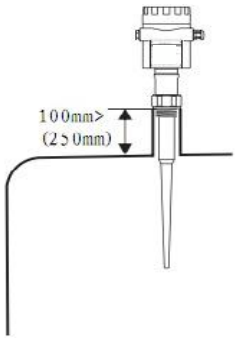
- When installing pipe is too long, there will be false echoes. Be sure that the horn antenna extends out at least 10mm from the installing pipe. If using a rod antenna, the maximum length of the installing pipe is 100mm.



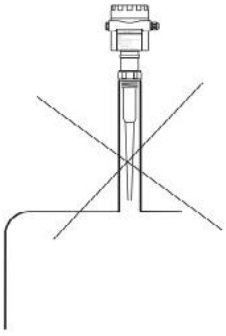
Right



Wrong



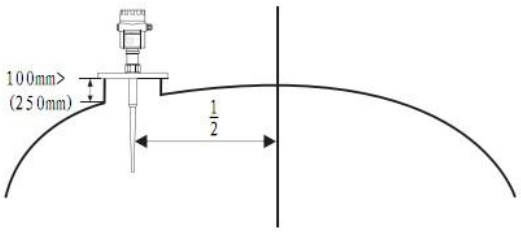
Right



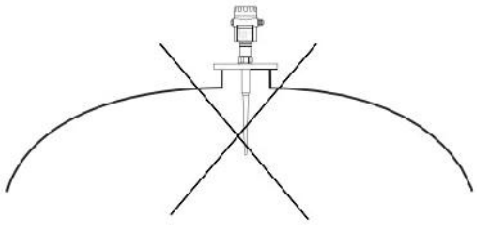
Wrong

Spherical roof or arch-shaped roof

- A spherical roof or an arch-shaped roof like a convex lens for a radar level transmitter. When the transmitter is just installed at the focus of it, the false echoes which the transmitter receives will become stronger. The best position should be at 1/2 of the diameter of the container.



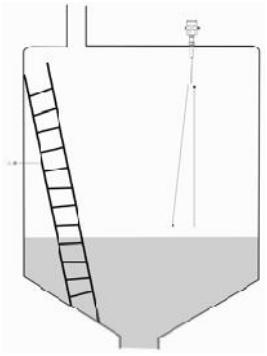
Right

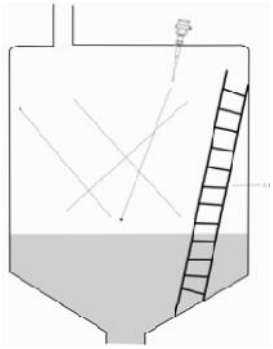


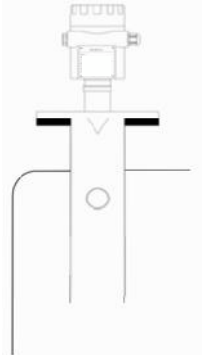
Wrong

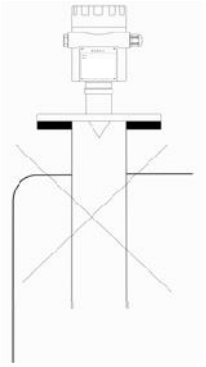
Transmitter doesn't aim at level surface

- When transmitter doesn't aim at medium surface, the measured signal will be attenuated. So, the transmitter must be installed vertically aiming at the level surface.


Right


Wrong


Right


Wrong

Possible mistake on wave guide pipe

- There is no vent hole on the wave guide pipe

The wave guide pipe must be cut with vent holes. Without vent holes, there will be errors on the measurement. See figures above.

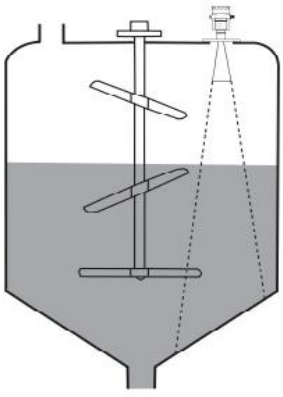
- When transmitter or its antenna is too close to the wall of a container, there will be strong false echoes. Stuck medium, rivet, screws, or welding ridges will cause false echoes reflection. So, the transmitter (antenna) must be kept a certain space with the container wall.
- In the cone range of beam angle, there should be no any obstacles.

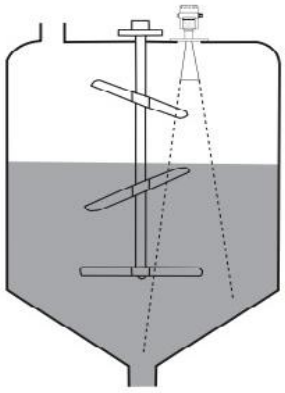
Liquids with foam

- Radar transmitters are not applicable to those liquids with thick and sticky foam.
- When there is a mixer inside a container, a radar transmitter should be installed as shown as the figures below.

搅拌罐的安装

Installation tank with mixer


正确 Right

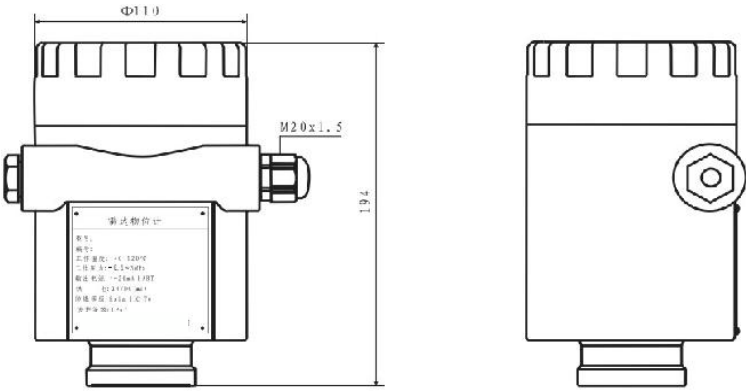

错误 Wrong

8. Dimensions of AHHTHRD50 series radar transmitters

Housing

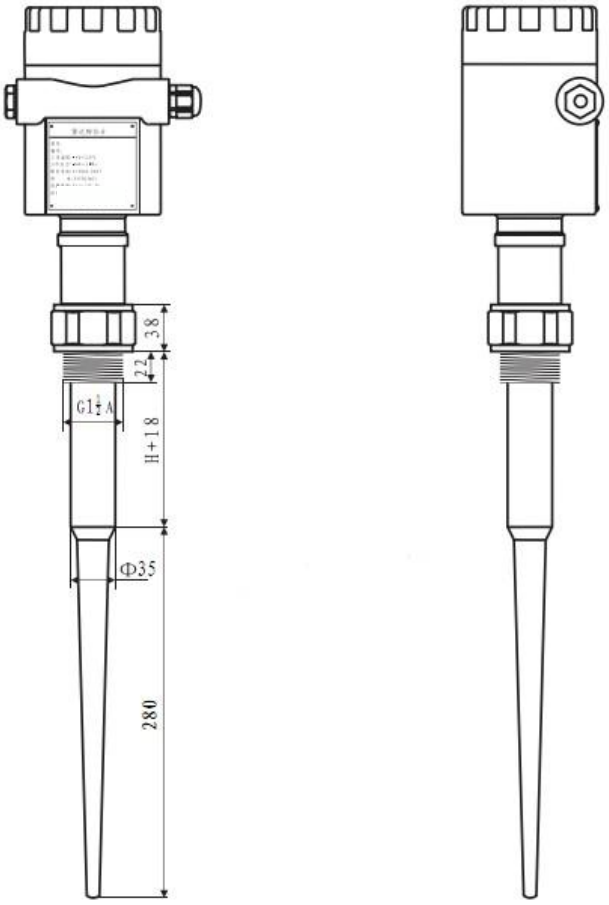
Material: Aluminium or 316L stainless steel

Dimensions: shown as the figures right and below



Dimensions of AHHTHRD51 radar level transmitters with thread process connection

Dimensions are shown as the figures below

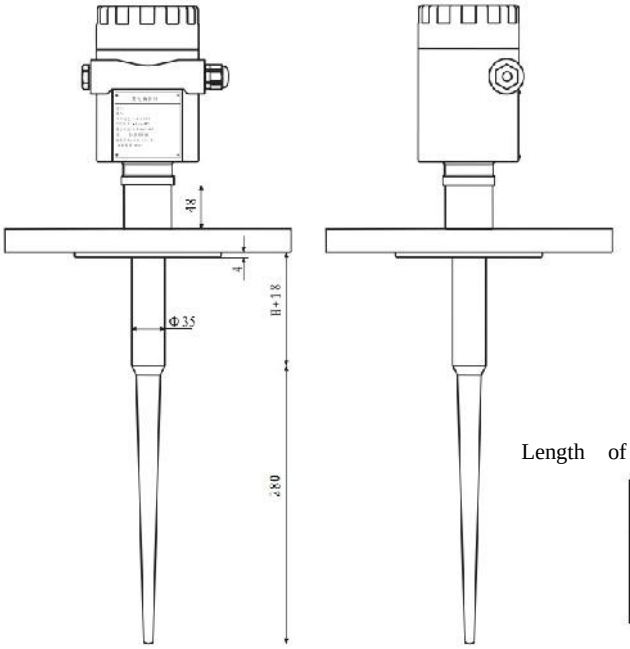


Length of installing Pipe

接管长H
50
100
150
200
250

Dimensions of AHHTHRD52 radar level transmitters with flange process connection

Dimensions are shown as the figure below

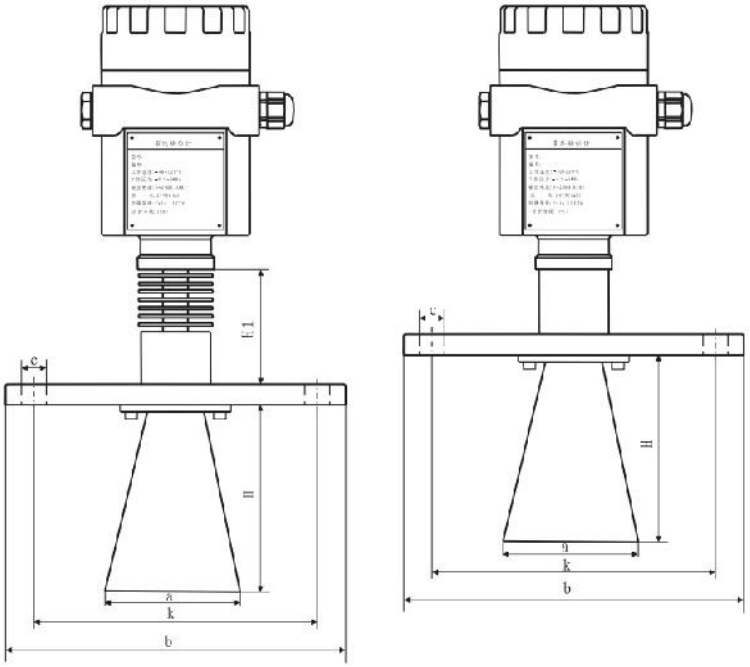


Length of installing

接管长L
50
100
150
200
250

Dimensions of AHHTHRD53 radar level transmitters with flange process connection

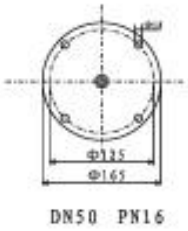
Dimensions are shown as the figure below



	d	s	b	c	H	H1
DN50		Φ125	Φ165	Φ18x4		125
DN80	Φ76	Φ160	Φ200	Φ18x8	75	125
DN100	Φ96	Φ180	Φ220	Φ18x8	120	125
DN150	Φ146	Φ240	Φ285	Φ22x8	205	125
DN200	Φ196	Φ295	Φ340	Φ22x12	296	125
DN250	Φ242	Φ355	Φ405	Φ26x12	380	125

9. Outline dimensions of flange and antennas

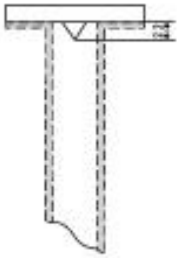
Dimensions of flange and antennas

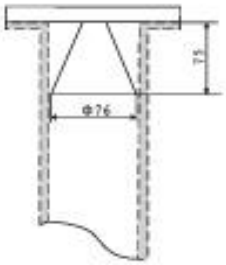


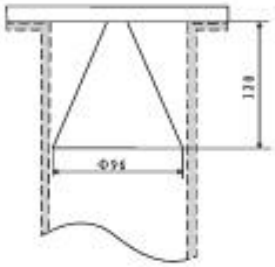
DN50 PN16

DN80 PN16

DN100 PN16

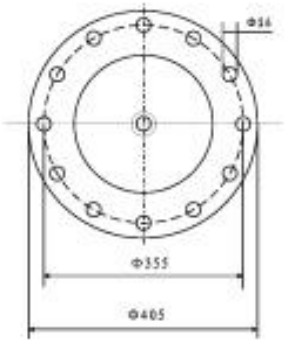




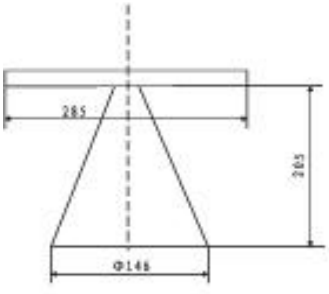


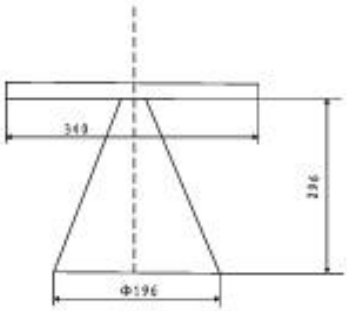
DN150 PN16

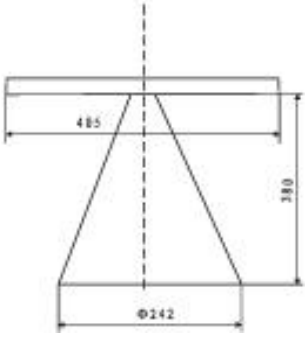
DN200 PN16



DN250 PN16







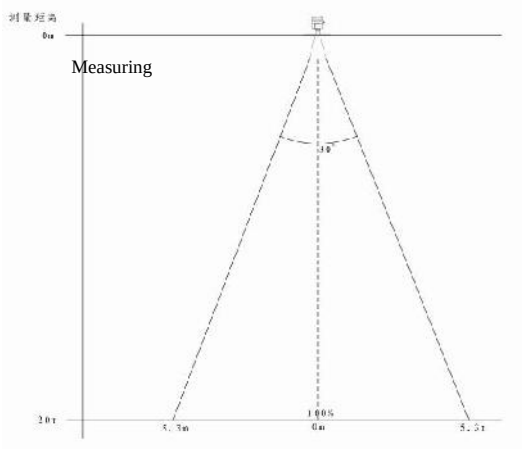
10.Beam angle and false reflection

a) The radar signals are focused through an antenna. Propagation of radar is just like the light beam of an electric torch, shaping as a cone. Size of the cone depends on the dimensions of the antenna.

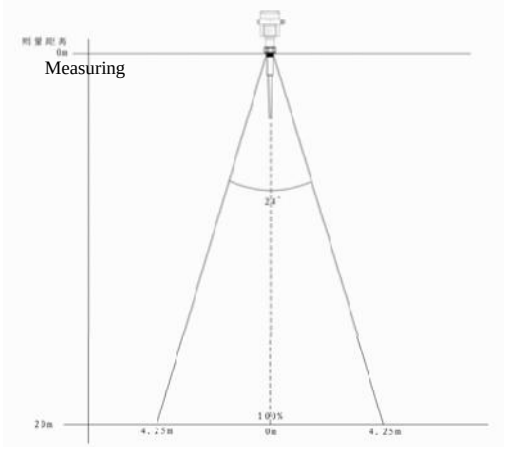
b) Any object in the beam range will reflect the radar signals. Specially, pipes, shelves, or other devices in the beam range close to the antenna will create very strong false echoes. For example, an obstacle 6 meters away from the antenna will cause false echoes nine times stronger than those echoes of medium surface level 18 meters away from the antenna.

c) The energy of false echoes from a remote obstacle is dispersed in a very large area. So, the reflected false signals are very weak. The affect is much less than those false signals from a close obstacle.

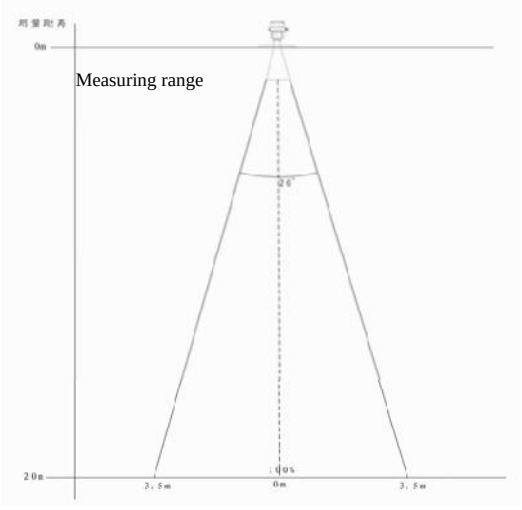
d) The radar waves must be propagated along the axis of the antenna vertically to the level surface of a medium. Avoid any device being in the range of beam angle, especially, at the very close area 1/3 of measuring range.



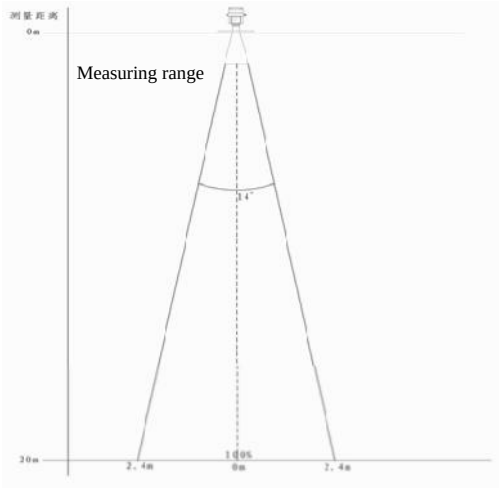
Beam angle of a rod antenna



Beam angle of a horn antenna of DN100



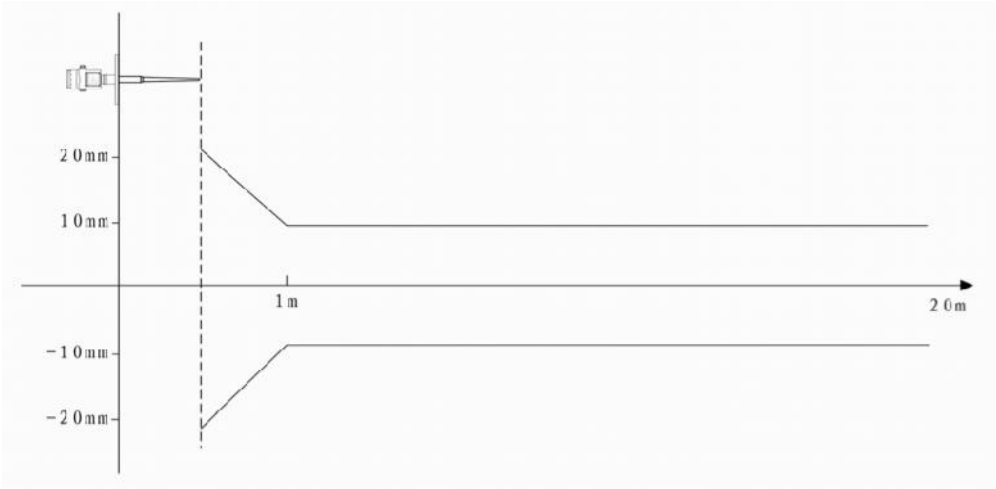
Beam angle of a horn antenna of DN150



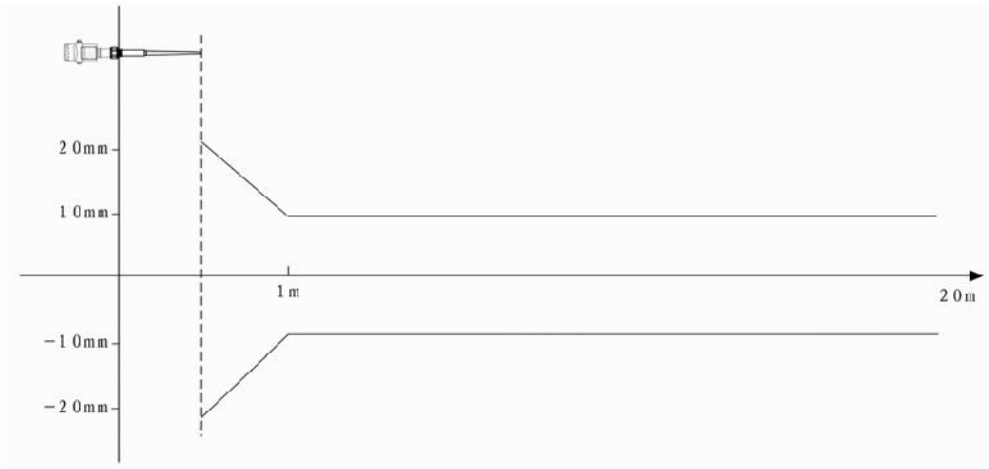
Beam angle of a horn antenna of DN250

11. Linearity of radar level transmitters

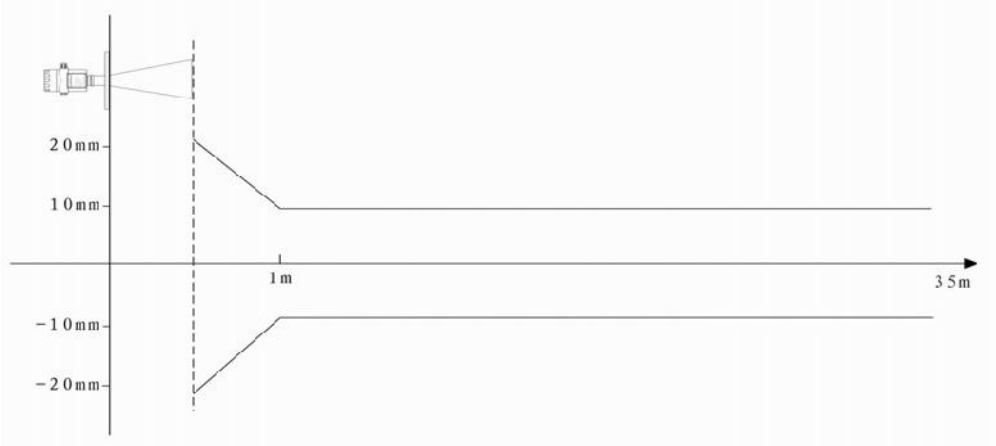
AHHTHRD51



AHHTHRD52

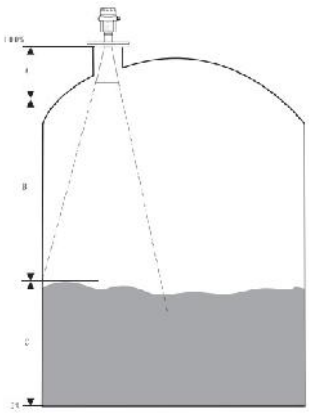


AHHTHRD53



12. Conditions of measurement

Notes:



e) The measuring range is calculated from the point at which the beam touches the bottom of the tank. In special case, when bottom is convex or cone-shape, the transmitter cannot measure the level when medium level is lower than the touching point.

f) When the medium has low dielectric constant, and when the level is low, the bottom is visible, in order to secure exact measurement, it is suggested to set the low height point “C” as zero point.

g) In theory, it is possible for the medium level to be up to the level as high as the tip point of the antenna. Considering the possible affect of corrosion and adherence from medium, the maximum height should be at 100mm away from the tip of the antenna.

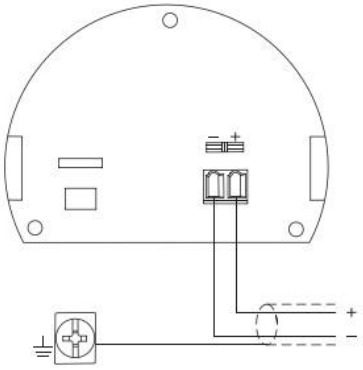
h) With regard to over flow protection, you can define a safety length and add it on the blind section.

i) Foam can either absorb the microwaves or reflect them. This depends on different densities and concentration. In another words, the liquid with foam can be measured under a certain condition.

j) When the level exceeds the measuring range, the instrument output 22mA.

13. Wiring

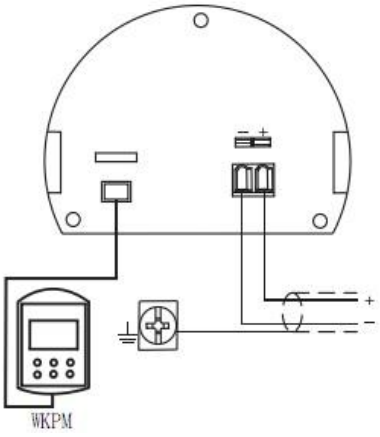
Wiring transmitter as shown as the figure right



14. Debugging

Through the three selections below, you can debug radar transmitter AHHTHRD50

- Through the adjusting module WKPM
- Through the debugging soft ware
- Through a hand held HART communicator



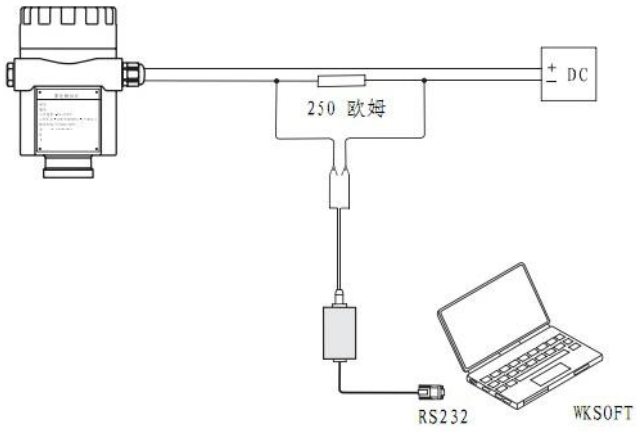
14.1 Debugging with a programmable module (WKPM)

● WKPM consists of 6 button keys and a screen, with which, you can view the menu and set parameters. It functions as an analyzing and process instrument.

14.2 Debugging with the software WKSOFT

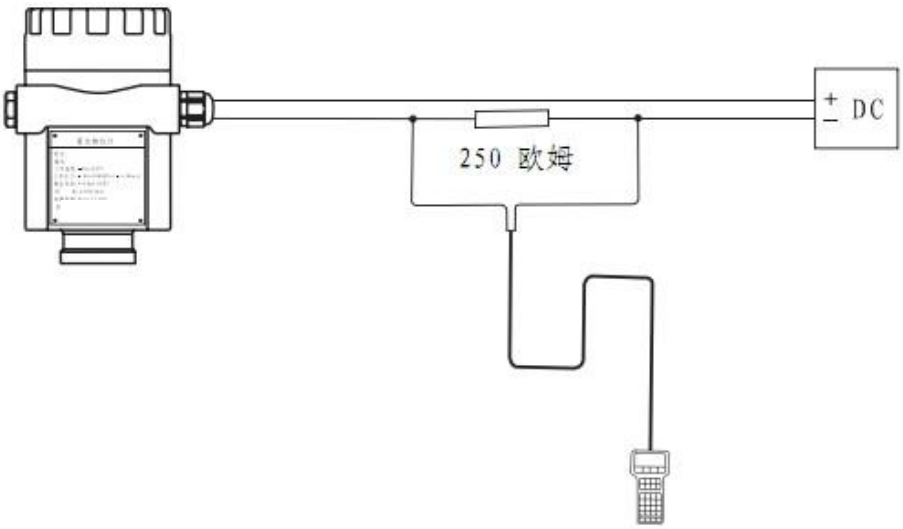
Whichever signals the transmitter output, 4---20mA or HART, the transmitter can be debugged through the software. When using the software WKSOFT, you need a drive “CONNECTCAT” for the instrument.

When debugging the transmitter with the software, supply it with 24V DC, meanwhile, connect the adapter a resistance of 250 ohm ahead of it. If the instrument is powered with a compact resistance with HART (the inner resistance is 250 ohm), it doesn’t need to have an additional resistance. The HART adapter can be connected with the wire 4---20mA in parallel.



14.3 Debugging with a HART hand held communicator or programmer

When use a HART hand held communicator to debug a transmitter, do as shown as the figure below



15.Technical specification

Basic parameters:

Work frequency: 6.8 GHz

Beam angle: 24° AHHTHRD51, AHHTHRD52

20° AHHTHRD53, with a flange of DN150

16° AHHTHRD53, with a flange of DN200

14° AHHTHRD53, with a flange of DN250

Measuring range: 0---35m

Repeatability: +/- 2mm

Resolution: 1mm

Sampling: sample echoes 55 times per second

Responding time: longer than 0.2 S (according to concrete operating condition)

Signal current: 4---20mA

H H A T H RD53: stainless steel

Communication interface: HART protocol

Process connection:

AHHTHRD51 (antenna of PP or PTFE): G11/2 A or 11/2 NPT

AHHTHRD52 (PEFE rod antenna): flanged flange DN50, DN80, DN100, DN150, DN200, DN250.

AHHTHRD53 (horn antenna): flange DN50, DN80, DN100, DN150, DN200, DN250

Power supply: 24 V DC (+/-10%), ripple voltage: 1 Vpp

Consumption: max 22.5 mA

Ambient conditions: Temperature: -40℃---70℃

Pressure vessel (gauge pressure): -1---4MPa

Explosion proof approval: ExiaIICT6

Ingress protection grade: IP67

Two wires: power supply and signal output use two wires in one cable (twin-core cable)

Cable entry: two M20*1.5 or two 1/2 NPT (cable diameter 5---9mm)

16.Model Selection

AHHTHRD51

	Explosion proof								
	P	Standard type (non explosion proof), current signal (4-20mA) output with HART protocol							
	I	Intrinsic safety (ExiaIICT6), current signal (4-20mA) output with HART protocol							
	D	Intrinsic safety + explosion suppression (isolation), current signal (4-20mA) output with HART protocol							
		Antenna type/Material/Process temperature							
		SP	Plastic rod/PP/-40---100℃						
		SF	Plastic rod/PTFE/-40---120℃						
			Process connection						
			G	Thread G11/2A					
			N	Thread 11/2 NPT					
			A	Flange of stainless steel, DN50, PN16C					
			B	Flange of stainless steel, DN80, PN16C					
			C	Flange of stainless steel, DN100, PN16C					
			E	Flange of stainless steel, DN150, PN16C					
			F	Flange of stainless steel, DN250, PN16C					
				Length of installing pipe					
				A	50mm				
				B	100mm				
				C	150mm				
				D	200mm				
				E	250mm				
				Y	Special need				
					Housing/ingress protection grade				
					P	Plastic/IP65			
					L	Aluminium/IP67			
						Cable entry			
						M	M20*1.5		
						N	1/2 NPT		
							Local indication		
							V	With local indication	
							X	Without local indication	
								Programmer	
								B	With programmer
								X	Without programmer
									Measuring range (mm)
AHHTHRD51									

AHHTHRD52

	Explosion proof									
	P	Standard type (non explosion proof), current signal (4-20mA) output with HART protocol								
	I	Intrinsic safety (ExiaIICT6), current signal (4-20mA) output with HART protocol								
	D	Intrinsic safety + explosion suppression (isolation), current signal (4-20mA) output with HART protocol								
		Antenna type/Material/Process temperature								
		SF	Plastic rod/PTFE/-40---120℃							
			Length of installing pipe of container							
			A	50mm						
			B	100mm						
			C	150mm						
			D	200mm						
			E	250mm						
			Y	Special need						
				Process connection						
				FA	PTFE rim, stainless steel flange, DN50, PN16C					
				FB	PTFE rim, stainless steel flange, DN80, PN16C					
				FC	PTFE rim, stainless steel flange, DN100, PN16C					
				FD	PTFE rim, stainless steel flange, DN150, PN16C					
				FE	PTFE rim, stainless steel flange, DN200, PN16C					
				FF	PTFE rim, stainless steel flange, DN250, PN16C					
					Seal/ Process temperature					
					P	Common seal/ -40---100℃				
					G	High temperature seal/-40----150℃				
						Housing/ingress protection grade				
						P	Plastic/IP65			
						L	Aluminium/IP67			
							Cable entry			
							M	M20*1.5		
							N	1/2 NPT		
								Local indication		
								V	With local indication	
								X	Without local indication	
									Programmer	
									B	With programmer
									X	Without programmer
										Measuring range (mm)
AHHTHRD52										

AHHTHRD53

	Explosion proof									
	P	Standard type (non explosion proof), current signal (4-20mA) output with HART protocol								
	I	Intrinsic safety (ExiaIICT6), current signal (4-20mA) output with HART protocol								
	D	Intrinsic safety + explosion suppression (isolation), current signal (4-20mA) output with HART protocol								
		Process connection								
		A	Flange DN50, PN16C							
		B	Flange DN80, PN16C							
		C	Flange, DN100, PN16C							
		D	Flange, DN150, PN16C							
		E	Flange, DN200, PN16C							
		F	Flange, DN250, PN16C							
		G	G21/2							
		Y	Special need							
			Antenna type/material							
			A	Horn antenna, diameter 76mm/stainless steel 316						
			B	Horn antenna, diameter 96mm/stainless steel 316						
			C	Horn antenna, diameter 146mm/stainless steel 316						
			D	Horn antenna, diameter 196mm/stainless steel 316						
			E	Horn antenna, diameter 242mm/stainless steel 316						
				Extension pipe of antenna						
				1	None					
				2	200mm					
				3	300mm					
				4	400mm					
					Seal/Process temperature					
					P	Common seal/-40---100℃				
					G	High temperature/-40---250℃ with radiating fins				
						Housing/Ingress protection grade				
						P	Plastic/IP65			
						L	Aluminium/ IP67			
							Cable entry			
							M	M20*1.5		
							N	1/2NPT		
								Local indication		
								V	With	
								X	Without	
									Programmer	
									B	With
									X	Without
										Measuring range (mm)
AHHTHRD53										

AHHTHRD54

	Explosion proof									
	P	Standard type (non explosion proof), current signal (4-20mA) output with HART protocol								
	I	Intrinsic safety (ExiaIICT6), current signal (4-20mA) output with HART protocol								
	D	Intrinsic safety + explosion suppression (isolation), current signal (4-20mA) output with HART protocol								
		Process connection								
		D	Cardan joint flange DN150							
		E	Cardan joint flange DN150							
		F	Cardan joint flange DN150							
		Y	Special need							
			Antenna type/material							
			D	Horn antenna, diameter 146mm/stainless steel 316						
			E	Horn antenna, diameter 196mm/stainless steel 316						
			F	Horn antenna, diameter 242mm/stainless steel 316						
				Length of extension pipe of antenna						
				1	None					
				2	200mm					
				3	300mm					
				4	400mm					
					Seal/Process temperature					
					P	Common seal/-40---120℃				
					G	High temperature/-40---250℃ with radiating fins				
						Housing/Ingress protection grade				
						P	Plastic/IP65			
						L	Aluminium/IP67			
							Cable entry			
							M	M20*1.5		
							N	1/2 NPT		
								Local indication		
								V	With	
								X	Without	
									Programmer	
									B	With
									X	Without
										Measuring range (mm)
AHHTHRD54										

AHHTHRD55

	Explosion proof								
	P	Standard type (non explosion proof), current signal (4-20mA) output with HART protocol							
	I	Intrinsic safety (ExiaIICT6), current signal (4-20mA) output with HART protocol							
	D	Intrinsic safety + explosion suppression (isolation), current signal (4-20mA) output with HART protocol							
		Process connection							
		A	Flange DN50, PN16 C						
		B	Flange DN80, PN16 C						
		C	Flange DN100, PN16 C						
		D	Special need						
			Antenna type/material						
			A	Wave guide pipe DN50/stainless steel 316					
			B	Wave guide pipe DN80/stainless steel 316					
			C	Wave guide pipe DN100/stainless steel 316					
				Seal/Process temperature					
				P	Common seal/-40-120℃				
				G	High temperature seal/-40---250℃, with radiating fins				
					Housing/ingress protection grade				
					P	Plastic/IP65			
					L	Aluminium/IP67			
						Cable entry			
						M	M20*1.5		
						N	1/2 NPT		
							Local indication		
							V	With local indication	
							X	Without local indication	
								Programmer	
								B	With programmer
								X	Without programmer
									Measuring range (mm)
AHHTHRD55									

AHHTHRD56

	Explosion proof									
	P	Standard type (non explosion proof), current signal (4-20mA) output with HART protocol								
	I	Intrinsic safety (ExiaIICT6), current signal (4-20mA) output with HART protocol								
	D	Intrinsic safety + explosion suppression (isolation), current signal (4-20mA) output with HART protocol								
		Process connection								
		A	Flange DN150, PN16 C							
		B	Flange DN200, PN16 C							
		C	Flange DN250, PN16 C							
		D	Special need							
			Antenna type/material							
			A	Horn antenna with diameter 146mm/stainless steel 316						
			B	Horn antenna with diameter 196mm/stainless steel 316						
			C	Horn antenna with diameter 242mm/stainless steel 316						
				Extension pipe of antenna						
				1	1000mm					
				2	1500mm					
				3	2000mm					
				4	2500mm					
				5	3000mm					
					Seal/Process temperature					
					P	Common seal/-40---120℃				
					G	High temperature seal/-40---500℃, with radiating fins				
						Housing material /ingress protection grade				
						P	Plastic/IP65			
						L	Aluminium/IP67			
							Cable entry			
							M	M20*1.5		
							N	1/2NPT		
								Local indication		
								V	With local indication	
								X	Without local indication	
									Programmer	
									B	With programmer
									X	Without programmer
										Measuring range (mm)
AHHTHRD56										

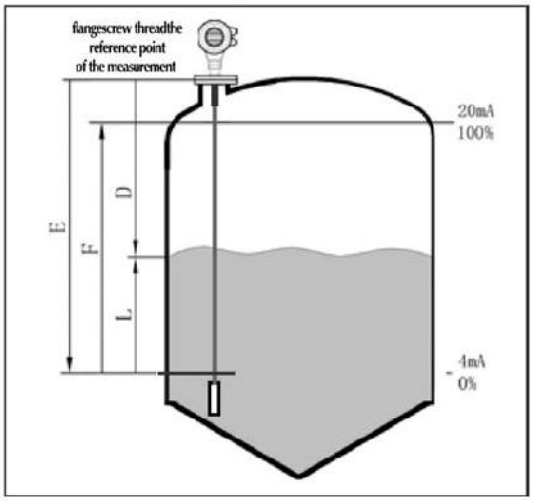
Guided Wave Radar Level Transmitter

Catalogue and Manual

1. Brief introduction

1.1 Working principle

Guided wave radar is a gauge based on “time and domain” principle, the radar waves run along a probe at speed of light, the running time can be converted to a level signal through electric components. The sensor emit high frequency impulse and transmit along the probe, when the impulse meets the material surface, it reflects back and is received by the receiver inside the transmitter, which converts the distance signals to the level signals.



Input

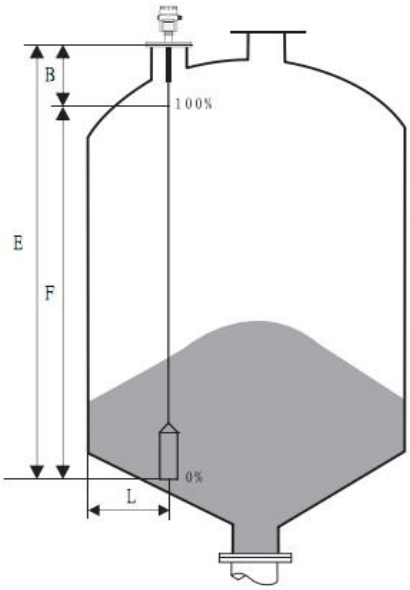
The reflected impulse signal is transmitted along the probe to the circuit of the gauge. The microwave processor processes this signal, and recognizes the wave echo of the microwave impulse from the material surface. The correct wave echo signal is recognized by the intelligent software, the distance from the material surface D is proportional to the flying time of the impulse T: D=C×T/2. Among them, C is the velocity of light. As the distance of the empty tank E is known, so L is: L=E-D

Output

By inputting empty tank height E (zero point), full tank height F (full measuring range) and some application parameters are set. With the application parameters, the transmitter will automatically adapt itself to the measuring environment, corresponding 4-20mA output.

1.2 Measuring range

F --- Measuring range
E --- Empty height
B --- Blind area at the top
L --- The minimum distance from the probe to the wall of the tank



The blind area at top is the minimum distance from the highest position of the material level to the measuring reference point (the thread of the flange).
The blind area at bottom is the distance around the bottom of the probe which cannot be measured exactly.
The effective distance is the distance from the top blind area and bottom blind area.

Caution: Transmitter can supply reliable level measurement only when the level is among the top blind area and bottom blind area.

2. Presentation of products

AHHTHRD31

Application	Liquid, solid particles
Measuring range	20m
Process connection	Thread, flange
Process temperature	-40-250℃
Process pressure	-0.1-2MPa
Accuracy	±1mm
Frequency range	100MHZ-1.8GHZ
Explosion proof/ingress protection	ExiaIICT6/IP67
Signal output	4—20mA/HART (Two wires)

AHHTHRD32

Application	Liquid, solid particles
Measuring range	6m
Process connection	Thread, flange
Process temperature	-40-250℃
Process pressure	-0.1-2MPa
Accuracy	±1mm
Frequency range	100MHZ-1.8GHZ
Explosion proof/ingress protection	ExiaIICT6/IP67
Signal output	4—20mA/HART (Two wires)

AHHTHRD33

Application	Liquid, solid particles, solid powder
Measuring range	30m
Process connection	Flange
Process temperature	-40-250℃
Process pressure	-0.1-2MPa
Accuracy	±1mm
Frequency range	100MHZ-1.8GHZ
Explosion proof/ingress protection	ExiaIICT6/IP67
Signal output	4—20mA/HART (Two wires)

AHHTHRD34

	Application	Liquid
	Measuring range	6m
	Process connection	Thread, flange
	Process temperature	-40-250℃
	Process pressure	-0.1-2MPa
	Accuracy	±1mm
	Frequency range	100MHZ-1.8GHZ
	Explosion proof/ingress protection	ExiaIICT6/IP67
	Signal output	4—20mA/HART (Two wires)

AHHTHRD35

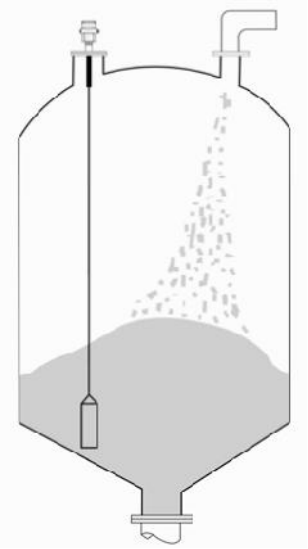
	Application	Corrosive liquid
	Measuring range	20m for cable probe, 6m for rod probe
	Process connection	Flange
	Process temperature	-40-120℃
	Process pressure	-0.1-2MPa
	Accuracy	±1mm
	Frequency range	100MHZ-1.8GHZ
	Explosion proof/ingress protection	ExiaIICT6/IP67
	Signal output	4—20mA/HART (Two wires)

AHHTHRD36

	Application	Liquid with low dielectric constant or with undulation
	Measuring range	6m
	Process connection	Flange
	Process temperature	-40-250℃
	Process pressure	-0.1-2MPa
	Accuracy	±1mm
	Frequency range	100MHZ-1.8GHZ
	Explosion proof/ingress protection	ExiaIICT6/IP67
	Signal output	4—20mA/HART (Two wires)

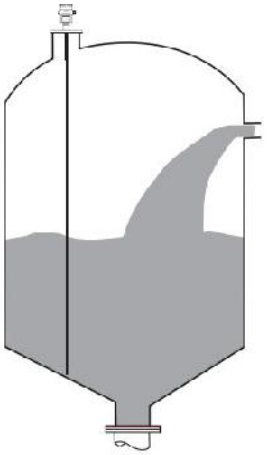
3. Guide for installation

The following installation guide is suitable for the measurement of solid granules and liquids by using cable and rod probes. Coaxial tube probe is only suitable for liquid materials.



Position of installation

a) Keep the probe far away from material inlet and outlet
b) For metal and plastic tanks, make sure the probe does not touch the wall within the whole measuring range. When it is metal tank, do not install the gauge at the center of the tank.
c) It is suggested installing the transmitter at the point of 1/4 of the tank diameter.
d) The Minimum distance from probe either cable or rod to the wall of tank is not less than 30 cm.
e) The distance between the end of probe to the bottom of the tank is about 30mm.
f) Keep the probe away from any obstacle inside the tank no less than 200mm.
g) When tank bottom is tapered, transmitter can be installed in the center of the tank top, in this case, it is possible to measure the level deep to the tank bottom.



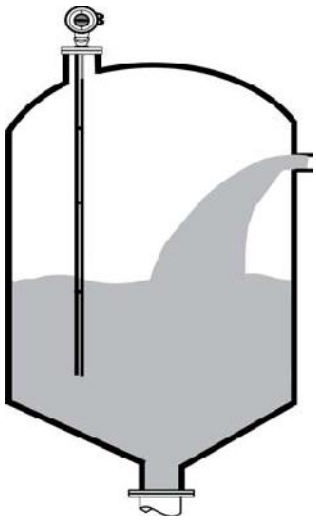
The figure right is illustration of installation of the transmitter with rod probe.

Features:

Shown as the figure right, such installation is mainly used for the measurement of liquids level.

Characteristics:

- Can measure any liquid with the dielectric constant no less than 1.9.
- It is usually used to measure the liquid with viscosity no bigger than 500cst, In this case, it is difficult for the liquid to adhere to the probe.
- The Maximum measuring range of the guided wave radar with single rod is 6 meters.
- The probe has strong adaptability for steam and foams. The measurement cannot be influenced by those factors.



The figure right show the installation of wave guided radar transmitter with twin-rod. It is mainly for measurement of liquid

Features:

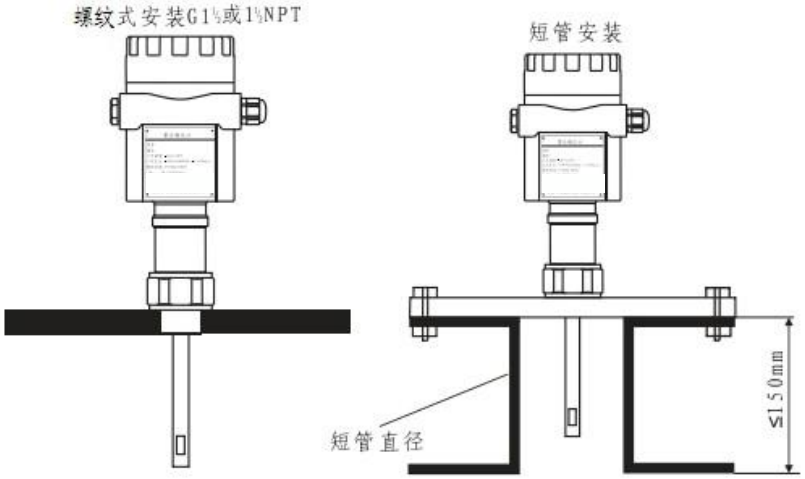
- For liquid with relatively lower electric constant, we can use the transmitter with twin rod probes to get good and precise measurement.
- It is suitable for measurement of any liquid with dielectric constant no less than 1.6
- Viscosity of the liquid should be no more than 500cst.
- Maximum measuring range of the transmitter with rod probe is 6 meters.

- The measurement cannot be influenced with steam and foams

Installation method

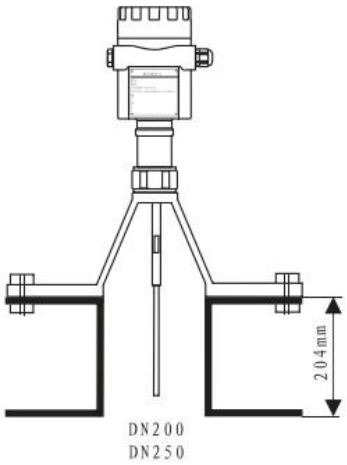
- **Reasonable installation can secure long term reliable and precise measurement**

The instrument can be connected with screw thread. The thread length shall not be more than 150mm. It is also possible to install the instrument on the short tube with diameter 2” to 6”. The height is less than 150mm. When it is installed on a relatively long short tube, the probe must be fixed at the bottom end of it or use a centering bracket to avoid the probe of touching the end of the short tube.



- **Installation with short tube for flange DN200 or DN250**

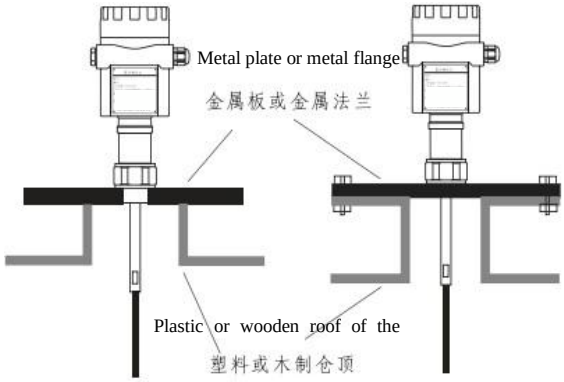
When a transmitter is installed on a short tube with diameter larger than 200mm, echoes will be produced in inner surface of the short tube, which will cause measurement error in the case of lower dielectric constant. Therefore, when the transmitter is installed in the short tube with diameter 200mm or 250mm, a special flange with corn inner surface will be needed.



- **Installation on plastic tanks**

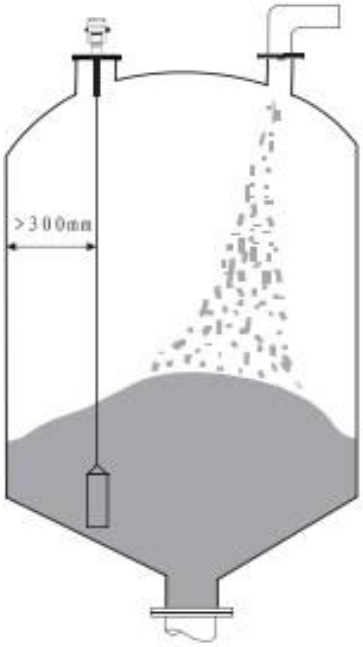
Attention

No matter what type the probe is, if you want to keep normal working condition, the process connection surface must be metal. When the instrument is installed on a plastic tank, and when the tank top is also plastic or other non-conductive materials, the transmitter needs a metal flange, when it is thread connection, it needs a piece of metal plate.



- **The distance from the probe and the wall of the tank**

It is suggested that the distance between the probe and the wall of the tank should be 1/6 or 1/4 of the diameter of the tank (at least more than 300mm, for a concrete tank, the distance should be more than 400mm). In addition, the distance from the end of the probe to the bottom of the tank should more than 30mm.



Cautions:

- **The instrument cannot be installed beneath a feeding inlet. See the figure 1**
- **The probe cannot touch with any object which is micro conductive. See the figure 2**
- **The probe cannot touch the short tube for installation. See figure 3**

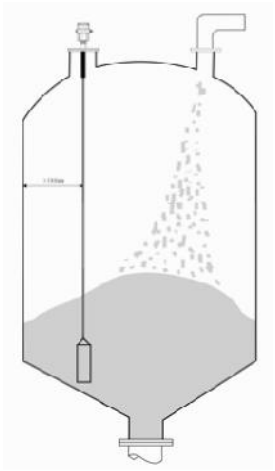


Figure 1

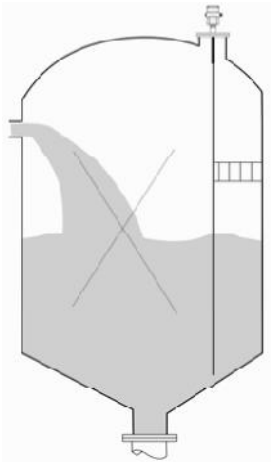


Figure 2

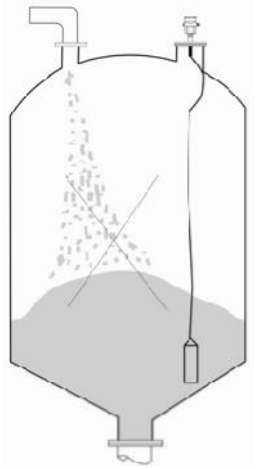


Figure 3

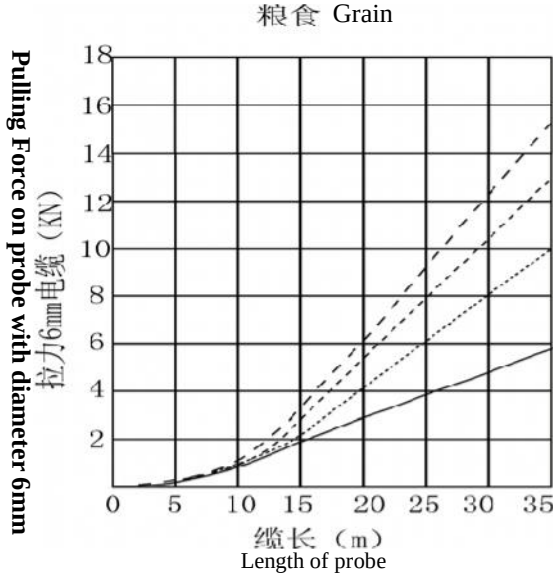
Pulling force on the probe

During feeding and discharging, the medium will produce pulling force on the probe. The force value depends on following factors:

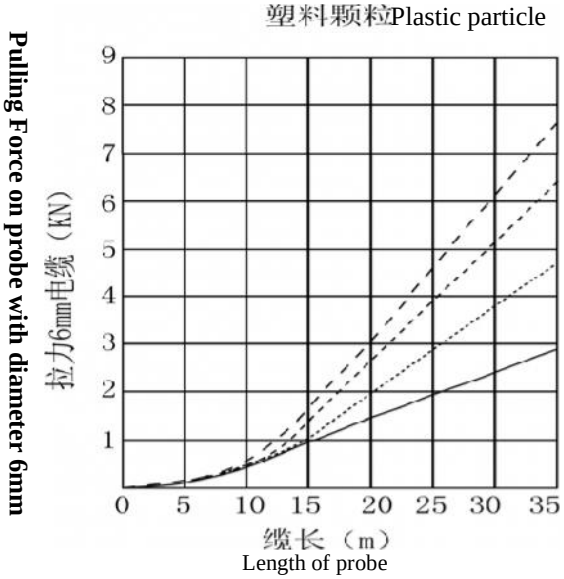
- Cable length
- Density of the material
- Tank diameter
- Probe diameter

The following charts show the typical forces on the probe with diameter 6mm. The medium are respectively grain, plastic particles, cement and sand.

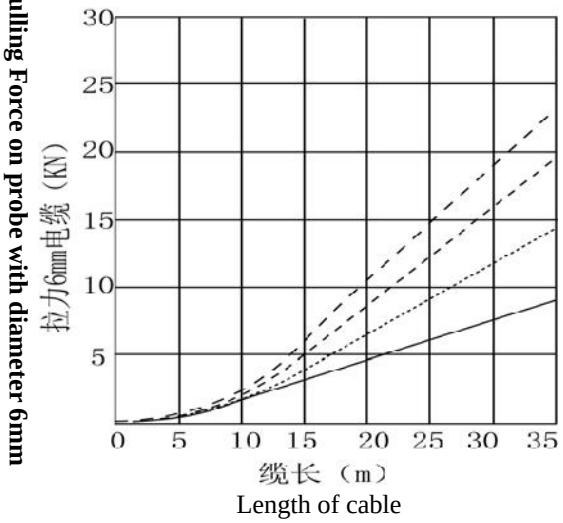
粮食 Grain



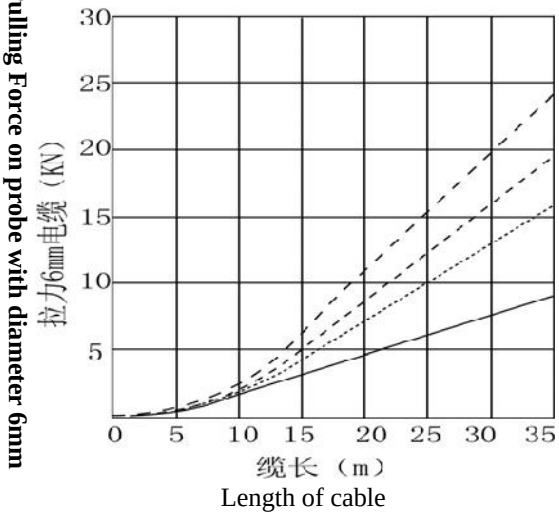
塑料颗粒Plastic particle



水泥 Cement



沙子 Sand



Optimization of interference

● Suppression of interference echo: Software can be used to suppress the echo interference so as to get ideal measurement.

● By-pass pipe and guiding pipe can be used for liquid with viscosity less than 500 cst to avoid interference

Measurement of corrosive material

When medium is corrosive, for the rod probe, plastic sleeve tube or Teflon sleeve tube can be put on the rod probe.

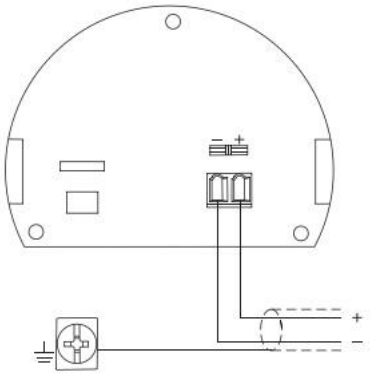
Fixing at the end of a probe

There are two kinds of method for fixing the end of a probe when there is need: one is insulative fixing; the other is uninsulated fixing.

● Insulative fixing is often used when the medium has lower dielectric constant and tank bottom is made with metal.

● Uninsulated fixing is often used when the medium has higher dielectric constant and tank material is metalloid or the tank material has higher dielectric constant or has the dielectric constant close to the dielectric constant of the medium

Note: When the customer cannot get the value of the dielectric constant of the medium and tank material, please contact and consult the manufacturer.



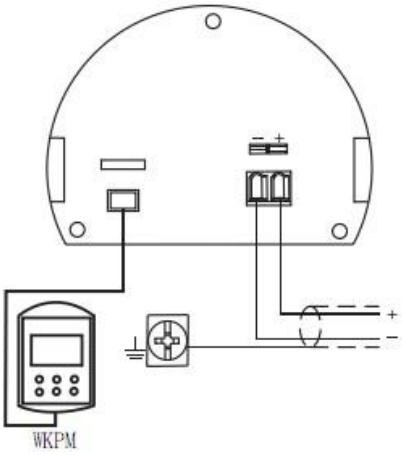
4. Wiring

Wiring the transmitter is can performed as shown as the figure right

5. Debugging

HHKTRD guided wave radar level transmitter can be debugged through the following three methods：

- Display module KTPM
- Software KTSOFT
- Hand hold HART programmer
-



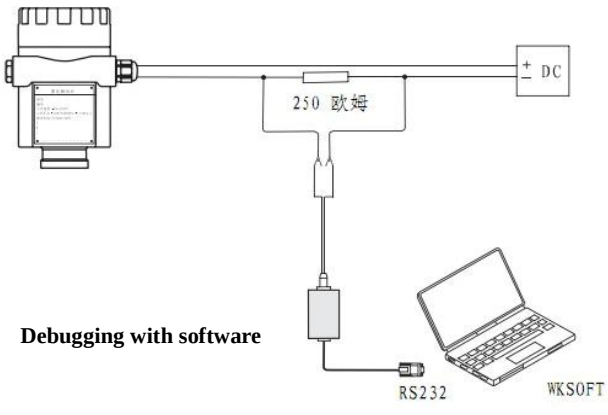
5.1 Debugging with programmer module (KTPM)

KTPM programmer consists of six keys and a display screen, which functions as a analyzing and process instrument, indicating and setting menu and parameters.

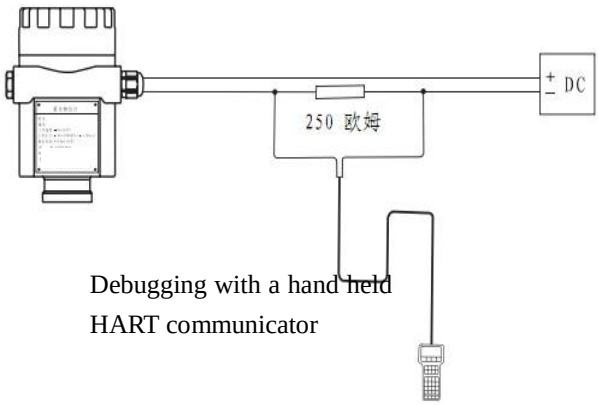
5.2 Debugging with software KTSOFT

● The radar transmitters can be debugged with a software KTSOFT, with which, you need an instrument drive “CONNECTCAT”.

● When debugging with the software, supply the instrument power with 24 V DC, connect the HART adapter with a resistance of 250 ohm (shown as the figure left below). You don’t need to connect an additional resistance when you use a compact power supply with HART resistance (an inner resistance of 250 ohm), In this case, you can connect the HART adapter directly with the wires of 4-20mA in parallel.



Debugging with software



Debugging with a hand held HART communicator

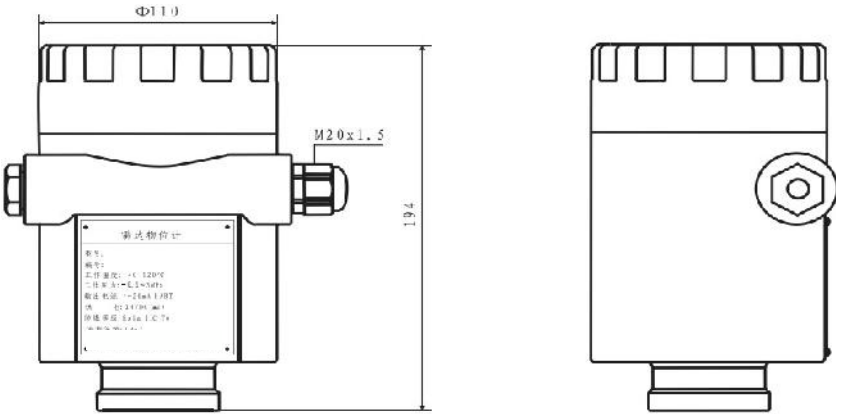
5.3 Debugging with a hand hold communicator

Shown as the figure below, the transmitter can also be debugged with a hand hold communicator.

Shown as the figure right above

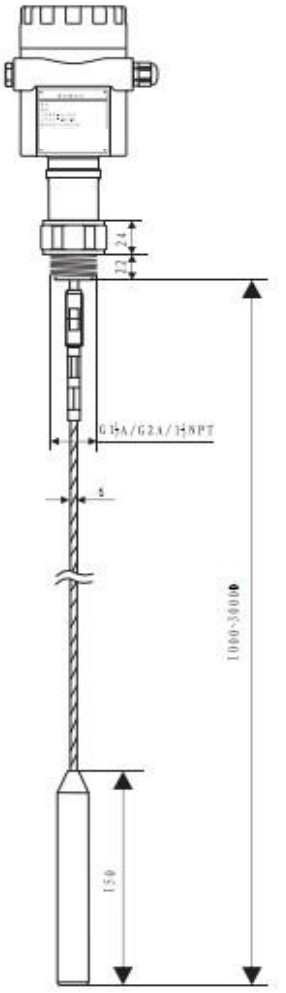
6. Dimensions of wave guided radar AHHTHRD30 transmitter

Housing, material: AL/316L



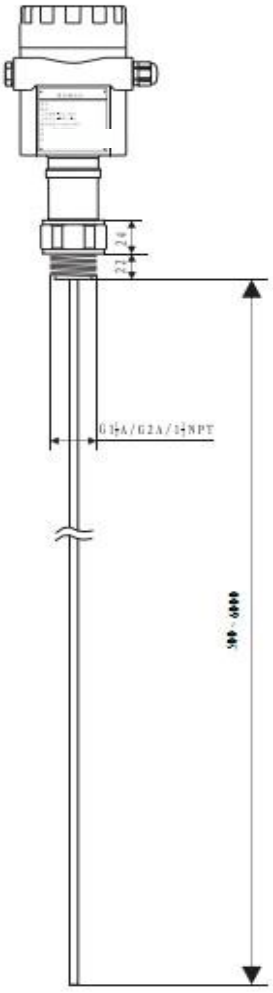
缆式

Cable probe



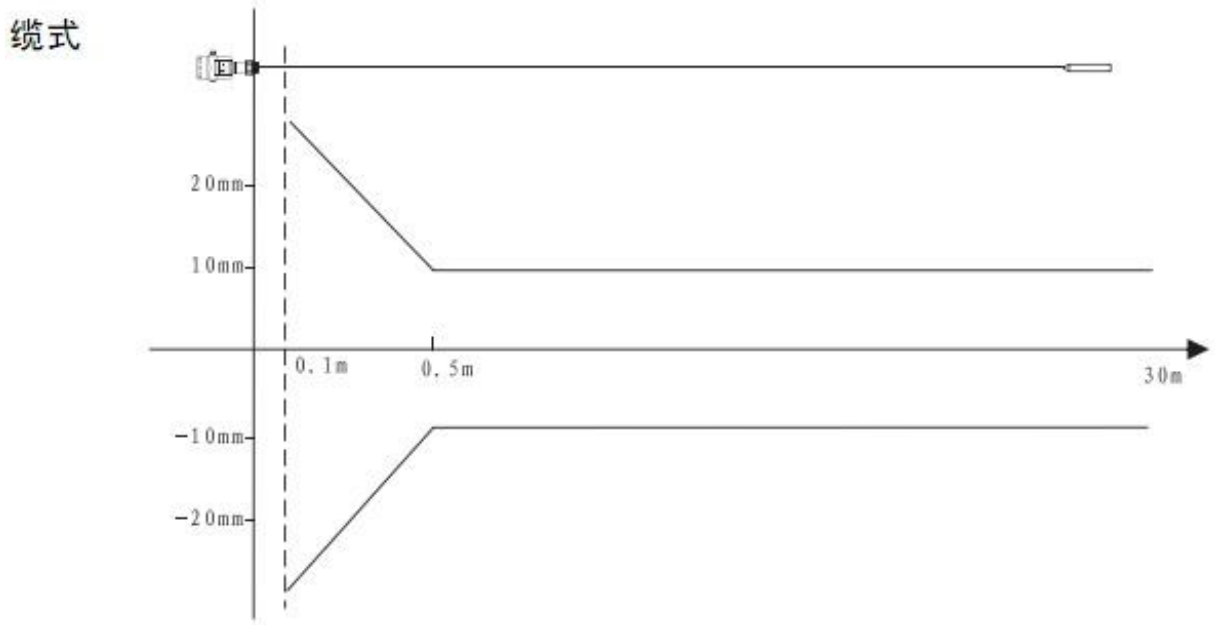
杆式

Rod probe

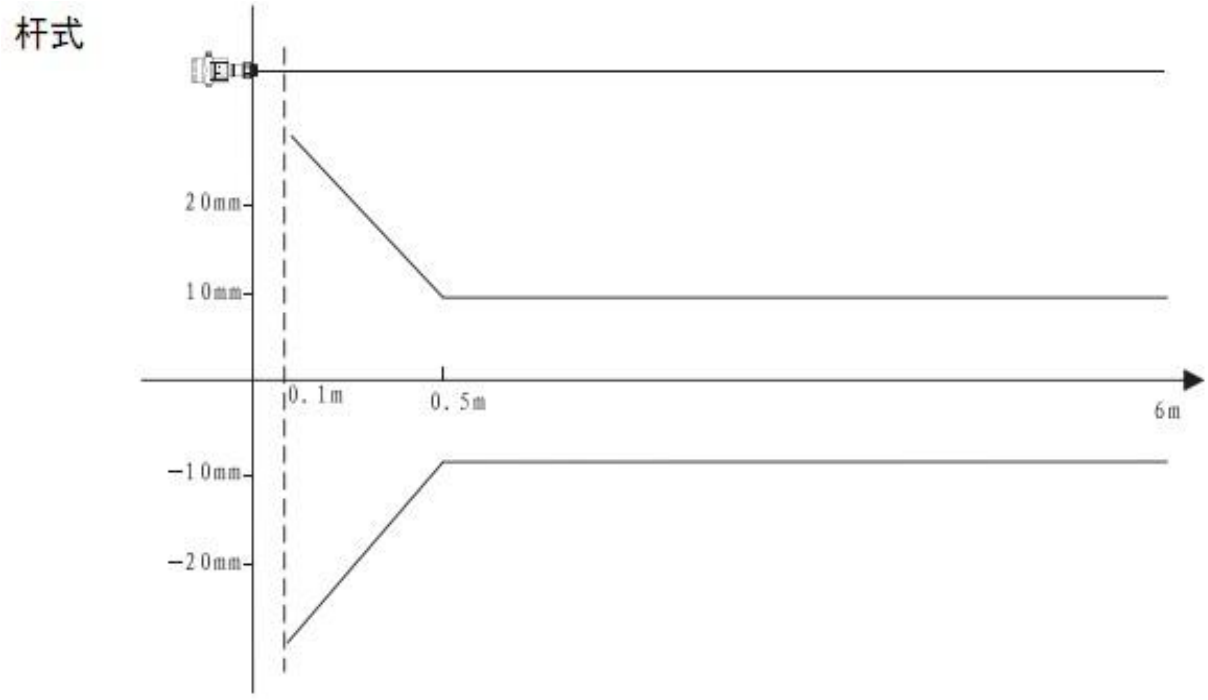


7. Linearity

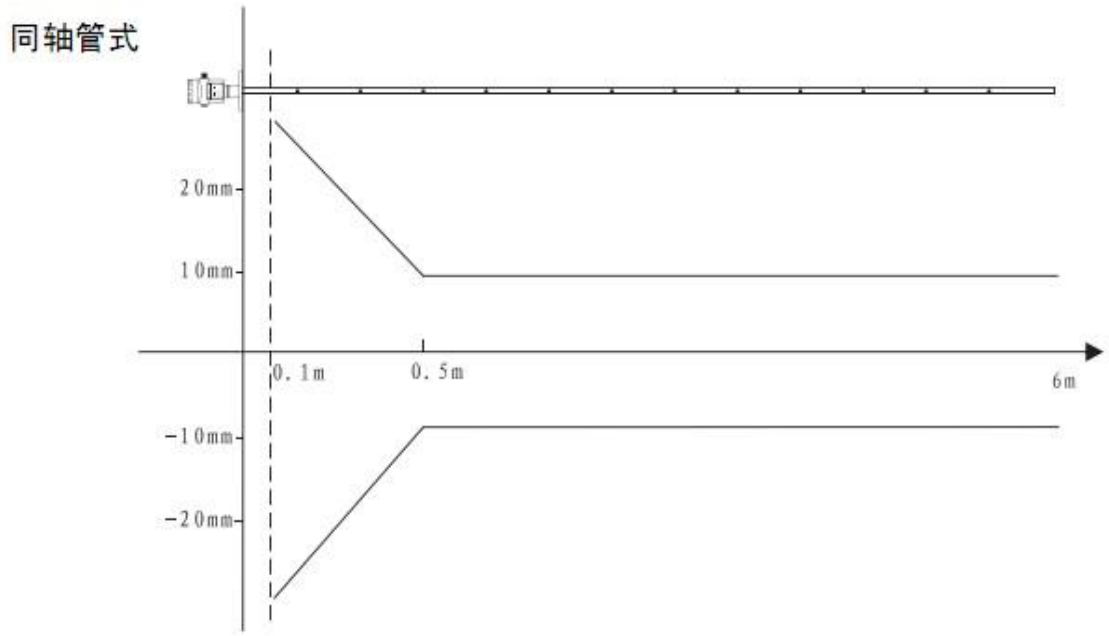
Cable probe



Rod probe



Coaxial probe



8. Technical Data

Parameter

Working frequency: 100MHZ-1.8GHZ
Measuring range: cable type：0-30m；Rod, co-axial type: 0-6m
Repeatability: ±2mm
Resolution: 1mm
Sampling: echo sampling 55 times/s
Response speed：>0.2S（depends on concrete application status）
Output current signal: 4-20mA
Precision：<0.1%
Communication interface：HART communication protocol
Process connection: G1-1/2
Flange DN50, DN80, DN100, DN150, DN200, DN250
Process pressure: -0.1-2MPa
Power supply: Power: 24V DC(±10%), ripple voltage: 1Vpp
Power consumption: max 22.5mA
Environment conditions: temperature -40℃～+70℃
Ingress protection grade: IP67
Explosion proof grade：Exia IIC T6
Two wire system: One two-core shield cable is used for instrument power supply and signal output
Cable entry: two M20×1.5 or 1/2 NPT (cable diameter 5--9mm)

Measuring distance

The following table indicates the relations between mediums and measuring distance

Mediums grouping	DK(ε) Dielectric constant	Solid particles	Liquids	Measuring range
1	1.4…1.6		condensate gas, such as N2CO2	3m（only refers to coaxial rod type probe）
2	1.6…1.9	plastic granules lime stone, special cement sugar	liquefied gas, such as propane solvent Freon 12/freon palm oil	25m
3	1.9…2.5	Common cement, plaster	Mineral oil, fuels	30m
4	2.5…4	corn, seeds Stone Sand	Benzene, styrene, toluene Furan Naphthalene	30m
5	4…7	Wet stones, minerals Salt	Chlorobenzene, Chloroform ， Cellulose spray Isocyanuric hydrochloride, Amine	30m
6	>7	Metal powder Carbon black Coal and charcoal	Water containing liquid Alcohol Liquid ammonia	30m

9. Model selection

	Instrument type, probe type, probe length, probe material							
AHHTHRD31	6mm cable probe, maximum measuring range 30000mm, stainless steel							
	Explosion proof							
	P	Non-explosion proof（Common Type）, Signal output（4-20mA）, with HART protocol						
	I	Intrinsically Safe（EXiaIICT6）, Signal output（4-20mA）, with HART protocol						
	D	Intrinsic safety+ explosion suppression (isolation) ExdiaIICT6, 4---20mA, HART protocol						
		Process connection/material						
		G	G11/2 thread, stainless steel					
		N	11/2 NPT thread, stainless steel					
		C	Flange DN50, PN16C, stainless steel					
		D	Flange DN80, PN16C, stainless steel					
		E	Flange DN100, PN16C, stainless steel					
		F	Flange DN150, PN16C, stainless steel					
		H	Flange DN200, PN16C, stainless steel					
		K	Flange DN250, PN16C, stainless steel					
		Y	Special need.					
			Seal/temperature					
			P	Common seal, -40---100℃				
			G	High temperature, -40---250℃ with radiating fins				
				Housing/ingress protection/ingress protection of probe				
				P	Plastic/IP65			
				L	Aluminium/67			
					Cable entry			
					M	M20*1.5		
					N	1/2NPT		
						Local indication		
						V	With	
						X	Without	
							Programmer	
							B	With
							X	Without
								Length of probe (mm)

RD31								

	Instrument type, probe type, probe length, probe material							
AHHTHRD32	6mm single rod probe, maximum measuring range 6000mm, stainless steel							
	Explosion proof							
	P	Non-explosion proof（Common Type）, Signal output（4-20mA）, with HART protocol						
	I	Intrinsically Safe（EXiaIICT6）, Signal output（4-20mA）, with HART protocol						
	D	Intrinsic safety+ explosion suppression (isolation) ExdiaIICT6, 4---20mA, HART protocol						
		Process connection/material						
		G	G11/2 thread, stainless steel					
		N	11/2 NPT thread, stainless steel					
		C	Flange DN50, PN16C, stainless steel					
		D	Flange DN80, PN16C, stainless steel					
		E	Flange DN100, PN16C, stainless steel					
		F	Flange DN150, PN16C, stainless steel					
		Y	Special need.					
			Seal/temperature					
			P	Common seal, -40---100℃				
			G	High temperature, -40---250℃ with radiating fins				
				Housing/ingress protection/ingress protection of probe				
				P	Plastic/IP65			
				L	Aluminium/67			
					Cable entry			
					M	M20*1.5		
					N	1/2NPT		
						Local indication		
						V	With	
						X	Without	
							Programmer	
							B	With
							X	Without
								Length of probe (mm)

RD32								

AHHTHRD30	**Instrument type, probe type, probe length, probe material**							
AHHTHRD33	6mm twin-cable probe, maximum measuring range 30000mm, stainless steel, mounted with							
	Explosion proof							
	P	Non-explosion proof（Common Type）, Signal output（4-20mA）, with HART protocol						
	I	Intrinsically Safe（EXiaIICT6）, Signal output（4-20mA）, with HART protocol						
	D	Intrinsic safety+ explosion suppression (isolation) ExdiaIICT6, 4---20mA, HART protocol						
		Process connection/material						
		D	Flange DN80, PN16C, stainless steel					
		E	Flange DN100, PN16C, stainless steel					
		F	Flange DN150, PN16C, stainless steel					
		H	Flange DN200, PN16C, stainless steel					
		K	Flange DN250, PN16C, stainless steel					
		Y	Special need.					
			Seal/temperature					
			P	Common seal, -40---100℃				
			G	High temperature, -40---250℃ with radiating fins				
				Housing/ingress protection/ingress protection of probe				
				P	Plastic/IP65			
				L	Aluminium/67			
					Cable entry			
					M	M20*1.5		
					N	1/2NPT		
						Local indication		
						V	With local indication	
						X	Without local indication	
							Programmer	
							B	With programmer
							X	Without programmer
								Length of probe (mm)

RD33								

AHHTHRD30	**Instrument type, probe type, probe length, probe material**							
AHHTHRD34	10mm, Twin-rod probe, maximum measuring range 6000mm, stainless steel, mounted with							
	Explosion proof							
	P	Non-explosion proof（Common Type）, Signal output（4-20mA）, with HART protocol						
	I	Intrinsically Safe（EXiaIICT6）, Signal output（4-20mA）, with HART protocol						
	D	Intrinsic safety+ explosion suppression (isolation) ExdiaIICT6, 4---20mA, HART protocol						
		Process connection/material						
		D	Flange DN80, PN16C, stainless steel					
		E	Flange DN100, PN16C, stainless steel					
		F	Flange DN150, PN16C, stainless steel					
		H	Flange DN200, PN16C, stainless steel					
		K	Flange DN250, PN16C, stainless steel					
		Y	Special need.					
			Seal/temperature					
			P	Common seal, -40---100℃				
			G	High temperature, -40---250℃ with radiating fins				
				Housing/ingress protection/ingress protection of probe				
				P	Plastic/IP65			
				L	Aluminium/67			
					Cable entry			
					M	M20*1.5		
					N	1/2NPT		
						Local indication		
						V	With indication	
						X	Without indication	
							Programmer	
							B	With programmer
							X	Without programmer
								Length of probe (mm)

RD34								

AHHTHRD30	**Instrument type, probe type, probe length, probe material**							
AHHTHRD35	14mm anticorrosive probe, maximum measuring range 6000mm, stainless steel, mounted with							
	Explosion proof							
	P	Non-explosion proof（Common Type）, Signal output（4-20mA）, with HART protocol						
	I	Intrinsically Safe（EXiaIICT6）, Signal output（4-20mA）, with HART protocol						
	D	Intrinsic safety+ explosion suppression (isolation) ExdiaIICT6, 4---20mA, HART protocol						
		Process connection/material						
		C	Flange DN50, PN16C, stainless steel					
		D	Flange DN80, PN16C, stainless steel					
		E	Flange DN100, PN16C, stainless steel					
		F	Flange DN150, PN16C, stainless steel					
		Y	Special need.					
			Seal/temperature					
			P	Common seal, -40---100℃				
			G	High temperature, -40---250℃ with radiating fins				
				Housing/ingress protection/ingress protection of probe				
				P	Plastic/IP65			
				L	Aluminium/67			
					Cable entry			
					M	M20*1.5		
					N	1/2NPT		
						Local indication		
						V	With	
						X	Without	
							Programmer	
							B	With
							X	Without
								Length of probe (mm)

RD35								

AHHTHRD30	**Instrument type, probe type, probe length, probe material**								
AHHTHRD36	Coaxial probe, maximum measuring range 6000mm, stainless steel, mounted with flange								
	Explosion proof								
	P	Non-explosion proof（Common Type）, Signal output（4-20mA）, with HART protocol							
	I	Intrinsically Safe（EXiaIICT6）, Signal output（4-20mA）, with HART protocol							
	D	Intrinsic safety+ explosion suppression (isolation) ExdiaIICT6, 4---20mA, HART protocol							
		Process connection/material							
		C	Flange DN50, PN16C, stainless steel						
		D	Flange DN80, PN16C, stainless steel						
		E	Flange DN100, PN16C, stainless steel						
		F	Flange DN150, PN16C, stainless steel						
		H	Flange DN200, PN16C, stainless steel						
		Y	Special need.						
			Seal/temperature						
			P	Common seal, -40---100℃					
			G	High temperature, -40---250℃ with radiating fins					
				Housing/ingress protection/ingress protection of probe					
				P	Plastic/IP65				
				L	Aluminium/67				
					Cable entry				
					M	M20*1.5			
					N	1/2NPT			
						Local indication			
						V	With local indication		
						X	Without local indication		
							Programmer		
							B	With local indication	
							X	Without local indication	
								Length of probe (mm)	

RD36								

Needed technical information for model selection

Approval on explosion proof

☐Standard (without explosion protection) ☐ Intrinsic safety (ExiaIIBT5)

☐ Intrinsic safety (ExiaIICT6)

☐Intrinsic safety + approval for marine (Exia IICT6)

☐ Intrinsic safety + explosion suppression (Exd［ia］IICT6)

Type of tanks or containers

☐Storage tanks ☐ Reaction tank ☐ Separating tank ☐ Tank in ship

Material of tank or container:

Pressure inside the tank:

Dimensions of tank or container:

Height: _____ m

Diameter:_____ m

Shape of tank roof:

☐Arch ☐ Flattop ☐ Open ☐ Cone-shape

Shape of tank bottom

☐Tapered ☐ Flat ☐ Slopping bottom ☐ Arched

Installation

☐Top mounted ☐ Wall mounted ☐ Side-side bypass pipe mounted

☐ Wave guide pipe mounted

Information on installing pipe:

Height of installing pipe: ____ mm

Diameter of installing pipe: _____ mm

Information on medium

Name of medium: _____, ☐ Liquid, ☐ Solid, ☐ Mixed

Temperature:_____℃

Dielectric constant: _____

Sticky or not: ☐ Yes, ☐ Not

Stirring or not: ☐ Yes, ☐ Not

Process connection

Thread: ☐ G11/2, ☐ 11/2NPT, ☐ G2A

Flange: DIN _____, ANSI _____,

Power supply: ☐ 24V, ☐ 220 V AC

Output: ☐4-20mA, ☐ HART, ☐ PROFIBUS PA

Local indicator: ☐Yes, ☐ No