(26GHZ) HIGH FREQUENCY INTELLIGENT NONCONTACT RADAR LEVEL TRANSMITTER



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1. Product description

series transmitters are 26GHz high-frequency radar level transmitters with analog signals 4-20mA, the Max. measuring distance is up to 70m. The antenna has been further optimized, and the latest update microprocessor can make higher speed signals analysis, which enables the level transmitters can be used in very complicated measuring applications such as reaction kettles or solid bunkers.

• Working principle

The radar level transmitter antenna emits narrower micro wave pulses which will be transmitted via the antenna. The micro wave will be reflected back after touching the surface of a medium, and then antenna system will receive it and transmit it into the electrical circuit, which will be automatically turned into the level signals.

Measuring reference is the bottom surface of threads or the sealing surface of a flange.

Note: when using the radar level transmitter, must keep the highest level of medium out of the dead zone (see area D shown in the drawing).

• Features

The radar level transmitter adapts the emitting frequency of 26GHz,

therefore it has the following features:

- > Noncontact measuring, no abrasion, no contamination
- Easy installation due to small size of antenna
- Shorter wave length, which can get better reflection for the inclined solid surface.
- Smaller measuring dead zone, which can get better measuring results for small tanks.
- Smaller beam angle, which makes the energy be more concentrated, enhancing the wave reflection ability which can keep signals more powerful to avoid obstacles.
- > Almost unaffected by corrosion and foams.
- Almost unaffected by changes of steam, changes of temperature and pressure in the air.
- Even in heavy dust environment, the transmitter can also receive the real level return wave.
- > High SNR, which can make the instrument get better performance.
- Frequency 26GHz is the best option for measuring solid and low dielectric constant medium.

2. Instrument introduction

- Application: all aggressive liquids
- Measuring range (Maximum): 20m (depends on dielectric constant of different medium and the concrete working conditions)
- Process connection: thread, flange
- Medium temperature: -40°C ~+120°C
- Process pressure: -0.1~0.3MPa

- Accuracy: ±5mm
- Frequency range: 26GHz
- Explosion proof: Ex ia IIC T6 Gb
- Enclosure protection grade: IP67
- Signal output: 4-20mA/ HART (2-wire), RS485/ Modbus
- Application: liquids with high temperature, high pressure and light corrosion.
- Measuring range (maximum): 30m (depends on dielectric constant of different medium and the concrete working conditions)
- Process connection: thread, flange
- Medium temperature: -40 °C ~+250 °C
- Process pressure: -0.1~4.0MPa
- Accuracy: ±3mm
- Frequency range: 26GHz
- Explosion proof: Ex ia IIC T6 Gb
- Enclosure protection grade: IP67
- Signal output: 4-20mA/ HART (2-wire) , RS485/ Modbus
- Application: solid material, process tank or heavy dust or ash, or easy crystallization and condensation place.
- Measuring range (maximum): 70m (depends on dielectric constant of different medium and the concrete working conditions)





- Process connection: thread, flange
- Medium temperature: -40 °C ~+250 °C
- Process pressure: -0.1~0.3MPa
- Accuracy: ±15mm
- Frequency range: 26GHz
- Explosion proof: Ex ia IIC T6 Gb
- Enclosure protection grade: IP67
- Signal output: 4-20mA/ HART (2-wire), RS485/ Modbus
- Application: solid material, process tank or heavy dust or ash, or easy crystallization and condensation place.
- Measuring range (Maximum): 70m (depends on dielectric constant of different medium and the concrete working conditions)
- Process connection: thread, flange
- Medium temperature: -40°C~+250°C
- Process pressure: -0.1~0.3MPa
- Accuracy: ±15mm
- Frequency range: 26GHz
- Explosion proof: Ex ia IIC T6 Gb
- Enclosure protection grade: IP67
- Signal output: 4-20mA/ HART (2-wire), RS485/ Modbus
- Application: solid particles and dust
- Measuring range (Maximum): 30m (depends on dielectric constant of different medium and the concrete working conditions)





- Process connection: thread, flange
- Medium temperature: -40 °C ~+250 °C
- Process pressure: -0.1~0.3MPa
- Accuracy: ±10mm
- Frequency range: 26GHz
- Explosion proof: Ex ia IIC T6 Gb
- Enclosure protection grade: IP67
- Signal output: 4-20mA/ HART (2-wire), RS485/ Modbus
- Application: sanitary liquid storage containers, heavy corrosive liquids
- Measuring range (Maximum): 20m (depends on dielectric constant of different medium and the concrete working conditions)
- Process connection: flange
- Medium temperature: -40 °C ~+150 °C
- Process pressure: -0.1~0.3MPa
- Accuracy: ±3mm
- Frequency range: 26GHz
- Explosion proof: Ex ia IIC T6 Gb
- Enclosure protection grade: IP67
- Signal output: 4-20mA/ HART (2-wire), RS485/
 - Modbus

3. Installation

• Preparation before installation

Please note the below items to make sure the proper installation of the instrument:



Please leave enough space for the (2)installation. 1 Please keep the installation position away from where there is strong vibration. 500mm In order to make the fast, easy and safe installation, please follow the installation instructions below! Installation instruction (refer to the figure \geq upper right): the instrument should be mounted at 1/6 of the tank diameter and the minimum distance between the symmetrical central line of the transmitter and the inner tank wall should be more than 500mm Note: (1): Reference surface

2: Symmetrical central line of the tank

Tapered tank: When the top surface of a tank is flat, the instrument can be mounted in the middle of the top, which can ensure the measurement to the bottom of the tank.



Tank with pile: the antenna should focus on the material surface vertically. When the solid level surface is not flat and horizontal, and repose angle is big, a flange with a universal joint must be used, with which the angle of the antenna can be adjusted and focus on the material surface as much as possible.



- Typical installation error
- Instrument can not be mounted above feeding inlet. Keep the installation place away from sunshine or rain for the outdoor installation.
- 1 : Correct
- 2 : Wrong
 - The instrument cannot be mounted at the middle of an arch tank. If not, it will have indirect echoes and be affected by multiple echoes. Multiple echoes amplitudes might be stronger than those of the real return signals. The arch top can cause multiple echoes, therefore, the instrument cannot be mounted at the center of the tank top.





measurement and lead to wrong measuring result. In this case, a wave



Installation by a wave guide pipe (a wave guide pipe or a bypass pipe) can avoid being affected by any obstacle, foams or liquid waves.



Note: the isobaric hole diameter is (5~10) mm. Min. diameter of a wave guide pipe is at least 50mm with smooth inner wall.

With a wave guide pipe, instruments can only measure a liquid with good

liquidity. Measurement with a wave guide pipe is not suitable for viscous liquids.

Height of the extension pipe: the antenna must be extended into the tank at least 10mm. (please refer to the pictures below)



4. Wiring

• Power supply

(4~20) mA/ HART (2-wire)

Power supply shares one 2-wire cable with the output signal. Regarding to the actual power supply voltage, see the technical data. A safety barrier

must be installed between the power supply and the transmitter for the intrinsically safe type.

(4~20) mA/ HART (4-wire)

Power supply and signal current are separate; each has one 2-wire cable. See the technical data for the actual power supply voltage.

RS485/Modbus

Power supply and the Modbus signal wire are separate; each has one 2-wire shielded cable. See the technical data for the actual power supply voltage.

Cable

General introduction

Cable OD: 5 ~ 9mm (M20 x 1.5)

3.5mm ~ 8.7mm (½NPT)

2-wire or 4-wire cables are used for the electric connection. Due to the electromagnetic interference from the motor drive device, power supply wires or remission devices, the transmitter wires need to be the shielded cable.

(4~20) mA/ HART (2-wire)

Normal 2-wire cable can be used for the power supply.

(4~20) mA/ HART (4-wire)

Cables with ground wire for the power supply.

RS485/ Modbus

Power supply cables should be shielded cable.

Shielded wire and ground wire of the cable

Ideally the two ends of shielded wire should be connected the ground. But note that: there will be the grounding compensation

current passing through the shielded wire. A grounding electric capacity (e.g. 1μ F: 1500V) can be connected to one end (e.g. switch cabinet) when the both ends are connected to the ground. Try to use a resistance with much possible lower value to be connected to the ground. (Note: if the transmitter is used in the Explosion proof area, it is not allowed to connect the both ends to the ground due to the potential output.)

- Wiring
- > 24V, 2-wire:



➤ 24V, 4-wire:



> 24V, RS485/ Modbus:



• Safety instruction

All the electric connection must be done under the situation of power being off. Please follow the instructions of the manual.

Please follow the requirements of the local regulation on electrical connection.

Please follow the local regulations on human health and safety. All the electrical operation must be done by the qualified professional technicians. Please check the nameplate of a transmitter to ensure it can meet your technical requirements. Please make sure the power supply is in accordance with the value printed on the name plate.

• Enclosure protection grade

This instrument is in fully conformity with the requirements of the enclosure protection grade IP67. Please make sure the waterproof performance of the cable entry seal. See the drawing on the right:



How to make sure the installation can meet the requirements of IP67:

Please make sure the cable entry seal is not damaged.

Please make sure the cable is not damaged.

Please make sure the cable meets the requirements of the electrical connection regulations.

Bend the cable down before entering the electrical inlet, which will keep the water away from the housing, see mark (1) at the above drawing.

Please tighten the cable entry seal, see mark (2) at the above drawing.

Please tighten the unused cable entry with a seal cap. See mark ③ at the above drawing.

5. Transmitter calibration

• Methods of debugging

There are three debugging methods for VRPWRD90:

- ①: With display/ buttons
- 2: With a PC with a software
- ③: With a HART hand-hold communicator
- Display/ button: Debugging can be done with the 4 buttons on the display screen. Menu language is optional. After debugging, the display

keeps the normal working condition. The

measured values can be clearly read through the glass screen.

Display/button

- ① : LCD display
- 2: Buttons
- ③: Wiring terminal



Debugging with a PC with a software



Flange selection table



Flange Model (GB/T9119-2000)					
No.	Size	OD	Hole Center Distance K	Holes Quantity N	Hole Diameter L
1	DN50	Ø165	Ø125 4		18
2	DN80	Ø200	Ø160	8	18
3	DN100	Ø220	Ø180	8	18
4	DN150	Ø285	Ø240	8	22
5	DN200	Ø340	Ø295	12	22
6	DN250	Ø405	Ø355	12	26

7. Technical data

General data

Housing

Seal between housing and cover: silicon rubber

Housing and display screen: PC

Ground connection: Stainless steel

Power supply:

2-wire Standard type: (16~26) V DC Intrinsically safe: (21.6~26.4) V DC Power consumption: max 22.5mA/ 1W Allowed ripple: <100Hz Uss<1V (100~100K)Hz Uss<10mV

Cable parameter

Cable inlet/ plug: 1 M20x1.5 cable entry (cable diameter 5~9mm), one blindness block, M20x1.5 Wiring terminal: cross section 2.5mm²

Output parameter

Output signal/ communication protocol: (4~20) mA/ HART,

RS485/ Modbus

Resolution: 1.6µA

Error signal: output current no change, 20.5mA, or 22mA, or

3.9mA

2-wire, load resistance, see the drawing below:

Integral time: (0~50) s, adjustable

Features:

Dead zone: the remote end of an antenna

Note: the maximum measuring range depends on the dielectric constant and concrete working conditions.

Micro-wave frequency: 26GHz

Modbus communication protocol; Measuring interval: approx. 1 second (depends on the parameter setting) Adjustable time: approx. 1 second (depends on the parameter setting) Display resolution: 1mm Ambient temperature: (-40~+70)℃ Relative humidity: <95% Pressure: Max. 4Mpa Resistance to vibration: mechanic vibration 10m/s², (10-150) Hz



Beam angle depends on the antenna dimension

Antenna Size (mm)	Beam angle
Φ 46	18°
Φ76	12°
Φ96	8°
Ф 121	6°

For the accuracy, please refer to the graph below:



Beam angle depends on size of antenna

Antenna Size (mm)	Beam angle		
Φ46	18°		
Φ76	12°		
Φ96	8°		
Ф121	6°		

For the accuracy, please refer to the graph below



Beam angle depends on size of antenna

Antenna Size (mm)	Beam angle
Ф 196	5°
Φ242	4 °

For the accuracy, please refer to the graph below:



Beam angle depends on size of antenna

Antenna Size (mm)	Beam angle	
Ф 76	12°	
Φ96	8°	
Φ121	6°	



Beam angle depends on size of antenna

Antenna Size (mm)	Beam angle
Φ46	18°
Φ76	12°
Φ96	8°

For the accuracy, please refer to the graph below



9. Model selection data sheet					
Customer infor	mation				
Company:		Conta	ct person:		
Address: Post code:					
Telephone:		Fax:			
Mobile phone:		E-mail	:		
Date:					
Certificate					
□ Standard type	e (non-explosion proof)	🗆 Intrin	sically type	(Ex ib IIB T5	5)
□ Intrinsically ty	ype (Ex ib IIC T6 Gb)				
□ Intrinsically ty	ype +marine approval (E	x ib IIC T	[6 Gb)		
□ Intrinsically + explosion proof type (Ex d ib IIC T6 Gb)					
Tank/container information:					
Tank type:	Storage tank	C	□ Reaction	tank	
	Separation tank		Marine ta	ank	
Tank structure:					
	Tank material :		Tank pressu	ire :	
Tank size:					
	Height of tank:	n	Diameter o	f tank:	m
Top of a tank:					
□ Arch	□ Flat top	🗆 Оре	en	Conic to	ор
Bottom of a tan	k:				

Tapered Flat			□ Arc
Installation position:			
□ Top □ Side	🗆 Вур	ass pipe	□ Wave guide pipe
Extension pipe (important info	rmation):		
Extension pipe height (Length):	mm,	
Extension pipe diameter:		mm	
Measuring medium:			
Medium name:	🗆 Liquid	Solid	
Medium temperature: °C		Dielectric cor	istant:
Adhesive: 🗆 Yes 🛛	No	Stirring:	□ Yes □ No
Process connection:			
Thread: □ G1½ □ 1½	″ NPT		
□ Flange (DN=)		Flange (A)	NSI=)
Power supply:			
□ 24V DC 2-wire □ 24V D	C 4-wire	□ 220V AC	□ 6V DC □12V DC
Output:			
□ 4-20mA	Hart		□RS485/Modbus
Display:			
With display and programmer			
Without display and programmer			