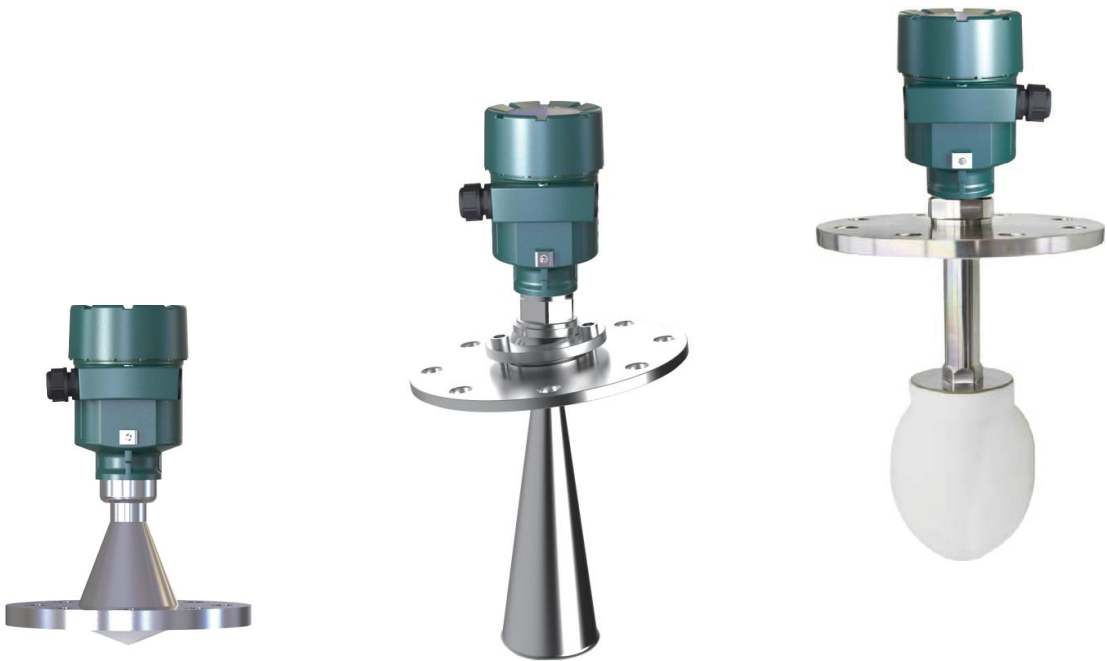




HIGH FREQUENCY (26GHZ) INTELLIGENT NONCONTACT RADAR LEVEL TRANSMITTER



(FOURTH GENERATION RADAR)

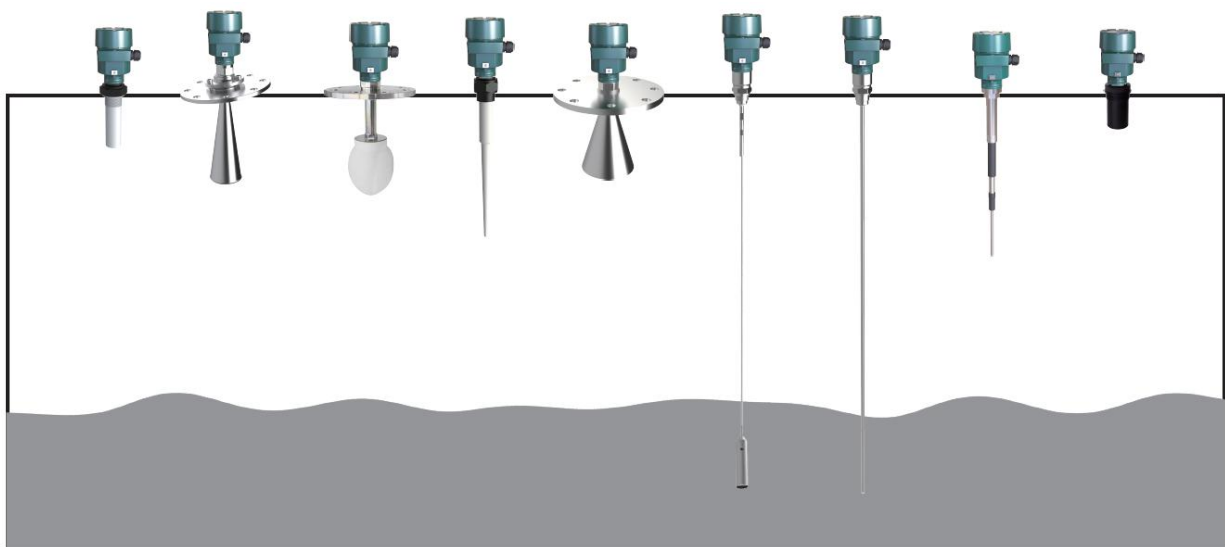
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DANDONG VIRTUE RIVER TECHNOLOGY CO., LTD



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Product description

VRPWRD90 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 are transmitted via the antenna. The micro waves are reflected after touching the surface of a medium, and then antenna system receives them and transmits them into the electrical circuit where they are automatically turned into the level signals.

A. Setting measuring range

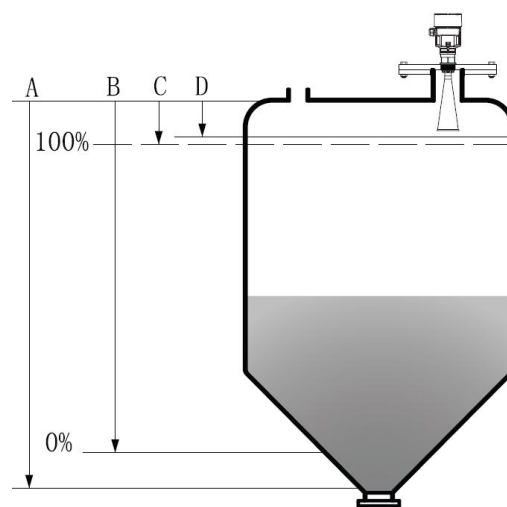
B. Low level adjustment

C. High level adjustment

D. Dead zone

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

VRPWRD91

- Features: Corrosion resistant and wholly sealed radar antenna, short dead zone and easy installation.
- Application: It's mainly used for measurement of strong corrosive liquids such as hydrochloric acid, nitric acid, sulfuric acid, alkali liquids, and so on in industries of chemical, metallurgy, refinery, food processing, water treatment etc.
- Measuring range: up to 20m (depends on dielectric constant of different medium and the concrete working conditions)
- Process connection: Thread, flange
- Medium temperature: -60°C to +120°C
- Process pressure: -0.1 to +0.3MPa
- Accuracy: $\pm 3\text{mm}$
- Repeatability: $\pm 1\text{mm}$
- Frequency range: 26GHz
- Signal output: 4-20mA/ HART (24V DC; 2-wire/ 4-wire),
4-20mA/ HART (220V AC; 4-wire),
RS485/ Modbus is available on request
- Explosion proof: Ex ia IIC T6 Ga





- Enclosure protection grade: IP67
- The backlight for display is available on request

VRPWRD92

- Features: Suitable for liquid level measurement, small beam angle, strong wave focusing, high accuracy. Optional for horn antenna, anti-corrosive antenna, drip antenna, or horn plastic antenna.
- Application: It's mainly used for level measurement of liquids in a storage tank in industries such as petroleum, chemical, refining, water treatment or monitoring, etc.
- Measuring range: up to 30m (depends on dielectric constant of different medium and the concrete working conditions)
- Process connection: Thread, flange
- Medium temperature: -60 ~ +250°C
- Process pressure: -0.1 ~ +4.0 MPa
- Accuracy: $\pm 2\text{mm}$
- Repeatability: $\pm 1\text{mm}$
- Frequency range: 26GHz
- Signal output: 4-20mA/ HART (24V DC; 2-wire/ 4-wire),
4-20mA/ HART (220V AC; 4-wire),
RS485/ Modbus is available on request
- Explosion proof: Ex ia IIC T6 Ga
- Enclosure protection grade: IP67
- The backlight for display is available on request



VRPWRD93

- Features: Suitable for level measurement in heavy dust environment and long distance with joint universal flange, high accurate sensitivity. Optional for horn antenna or drip antenna.
- Application: It is mainly used for solid level measurement such as powder, particles, bulks, with heavy dust in industries of

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cement, steel, power plant, coal, building material, etc.

- Measuring range: up to 70m (depends on dielectric constant of different medium and the concrete working conditions)
- Process connection: Thread, flange
- Medium temperature: -60°C~+250°C
- Process pressure: ATM
- Accuracy: ±15mm
- Repeatability: ±2mm
- Frequency range: 26GHz
- Signal output: 4-20mA/ HART (24V DC; 2-wire/ 4-wire),
4-20mA/ HART (220V AC; 4-wire),
RS485/ Modbus is available on request
- Explosion proof: Ex ia IIC T6 Ga
- Enclosure protection grade: IP67
- The backlight for display is available on request

VRPWRD94

- Features: Parabolic antenna, small beam angle, strong signal strength, high sensitivity, especially for medium with low dielectric constant.
- Application: Suitable for level measurement of solid powder, particles, bulks, especially heavy dust environment in industries of cement, steel, power, coal, building material, etc.
- Measuring range: up to 70m (depends on dielectric constant of different medium and the concrete working conditions)
- Process connection: Thread, flange
- Medium temperature: -60°C ~ +250°C
- Process pressure: ATM
- Accuracy: ±15mm



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- Repeatability: $\pm 2\text{mm}$
- Frequency range: 26GHz
- Signal output: 4-20mA/ HART (24V DC; 2-wire/ 4-wire),
4-20mA/ HART (220V AC; 4-wire),
RS485/ Modbus is available on request
- Explosion proof: Ex ia IIC T6 Ga
- Enclosure protection grade: IP67
- The backlight for display is available on request

VRPWRD95

- Features: Suitable for liquid level measurement and solid particles or bulks with small range. Equipped with joint universal flange, with small beam angle and strong signal strength, high accuracy. Optional for horn antenna, anti-corrosive antenna, drip antenna, or horn plastic antenna.
- Application: It's mainly used for level measurement of a storage tank in industries such as petroleum, chemical, refining, water treatment or monitoring, cement, steel, power plant, coal, building materials.
- Measuring range: up to 35m (depends on dielectric constant of different medium and the concrete working conditions)
- Process connection: Thread, flange
- Medium temperature: $-60^{\circ}\text{C} \sim +250^{\circ}\text{C}$
- Process pressure: ATM
- Accuracy: $\pm 3\text{mm}$ (for liquids); $\pm 10\text{mm}$ for solids
- Repeatability: $\pm 1\text{mm}$
- Frequency range: 26GHz
- Signal output: 4-20mA/ HART (24V DC; 2-wire/ 4-wire),
4-20mA/ HART (220V AC; 4-wire),
RS485/ Modbus is available on request
- Explosion proof: Ex ia IIC T6 Ga





- Enclosure protection grade: IP67
- The backlight for display is available on request

VRPWRD95 (F)

- Feature: Sealed antenna with PVDF anti-corrosion cover
- Application: be suitable for strong acids, alkalis, or other strongly corrosive liquids, etc.
- Measuring range: up to 35m (depends on dielectric constant of different medium and the concrete working conditions)
- Process connection: Flange
- Antenna size: 62mm, with flange sizes, DN80, DN100;
96mm, with flange sizes, DN150, DN200
- Working temperature range: -60 to +150°C
- Process pressure: ATM
- Accuracy: +/-3mm
- Working frequency: 26GHz
- Signal output: 4-20mA/ HART (24V DC; 2-wire/ 4-wire);
4-20mA/ HART (220V AC; 4-wire);
RS485/ Modbus is available on request
- Explosion proof: Ex ia IIC T6 Ga
- Enclosure protection grade: IP67
- The backlight for display is available on request



VRPWRD95 (FF)

- Feature: Whole PVDF sealed structure
- Application: be suitable for strongly corrosive liquids tanks with corrosive environment
- Measuring range: up to 35m (depends on dielectric constant of different medium and the concrete working conditions)
- Process connection: Flange





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- Antenna size: 62mm, with flange sizes, DN80, DN100;
96mm, with flange sizes, DN150, DN200
- Working temperature range: -60 to +150°C
- Process pressure: ATM
- Accuracy: +/-3mm
- Working frequency: 26GHz
- Signal output: 4-20mA/ HART (24V DC; 2-wire/ 4-wire),
4-20mA/ HART (220V AC; 4-wire),
RS485/ Modbus is available on request
- Explosion proof: Ex ia IIC T6 Ga
- Enclosure protection grade: IP67
- The backlight for display is available on request

VRPWRD96

- Features: Composite antenna, sanitary antenna, small beam angle, strong signal strength, high accuracy.
- Application: Suitable for level measurement of sanitary liquid storage containers in food, pharmaceutical industries, and so on.
- Measuring range: up to 20m (depends on dielectric constant of different medium and the concrete working conditions)
- Process connection: Flange
- Medium temperature: -60 ~ +200°C
- Process pressure: ATM
- Accuracy: ±2mm
- Repeatability: ±1mm
- Frequency range: 26GHz
- Signal output: 4-20mA/ HART (24V DC; 2-wire/ 4-wire),
4-20mA/ HART (220V AC; 4-wire),
RS485/ Modbus is available on request



- Explosion proof: Ex ia IIC T6 Ga
- Enclosure protection grade: IP67
- The backlight for display is available on request

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 installation.

Please keep the installation position away from where there is strong vibration.

Please follow the installation instructions below to make the fast, easy and safe installation:

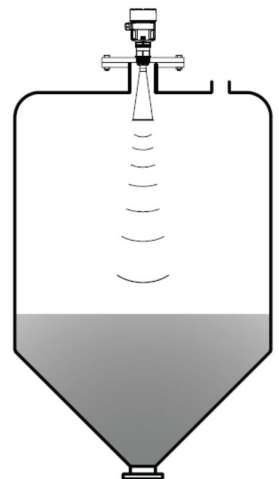
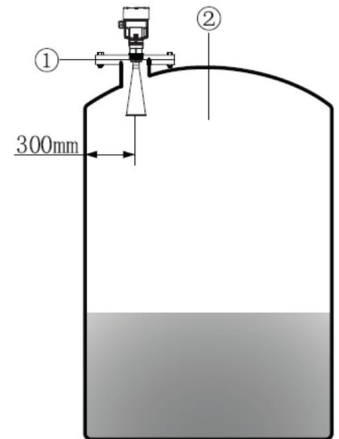
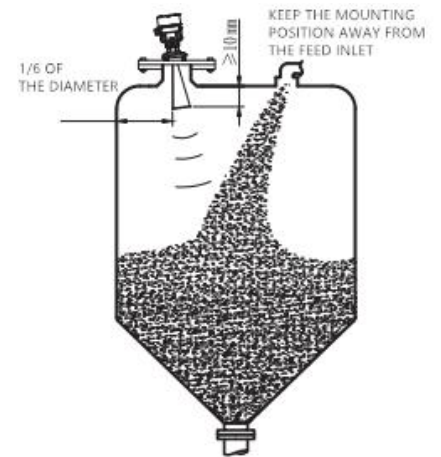
- Installation instruction (refer to the figure upper right): the instrument should be mounted at 1/6 of the tank diameter and the minimum distance between the symmetrical central line of the transmitter and the inner tank wall should be more than 300mm

Note: ①: Reference surface

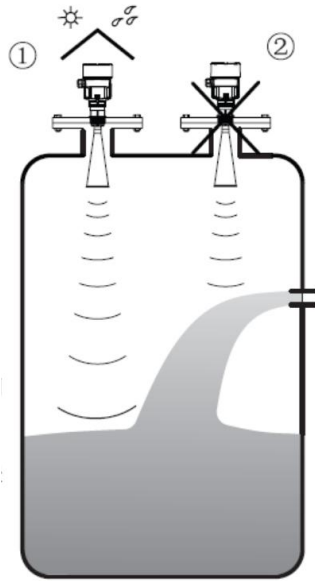
②: Symmetrical central line of the tank

- 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.

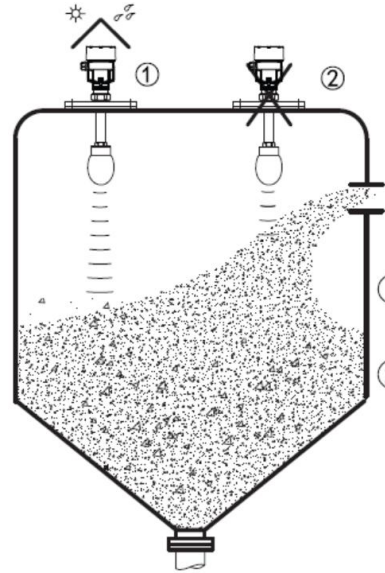
- Typical installation error



- Instrument cannot be mounted above feeding inlet. Keep the installation place away from sunshine or rain for the outdoor installation.

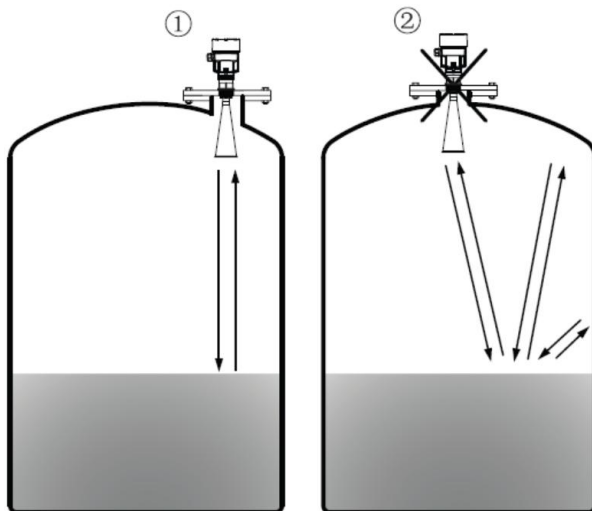


① : Correct
② : Wrong



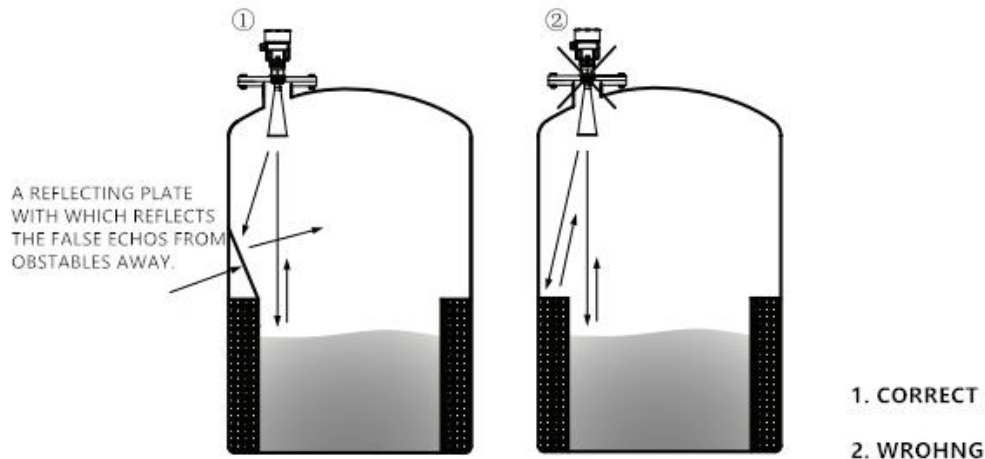
① : Correct
② : Wrong

- The instrument cannot be mounted at the middle of a tank with arc top. If so, 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.



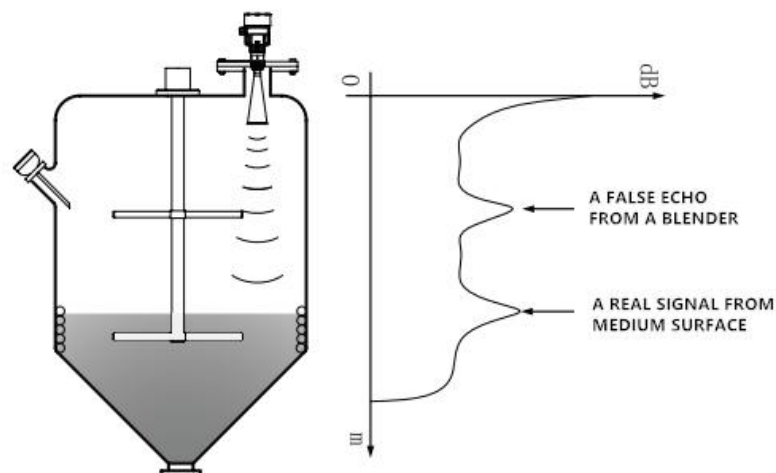
① : Correct
② : Wrong

- A reflector is needed when there is an obstacle which may interrupt the measurement in the tank.

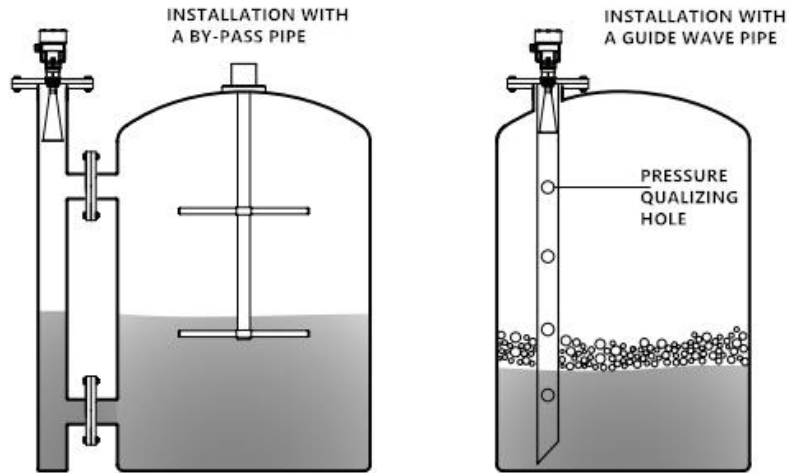


- Measurement with wave guide pipe

- When there is an obstacle in the way of the signal beam, e.g. a ladder, a limit switch, a heating device, a rack or a blender, and so on, it will interrupt the measurement and lead to wrong measuring result. In this case, a wave guide pipe is needed for the measurement.



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



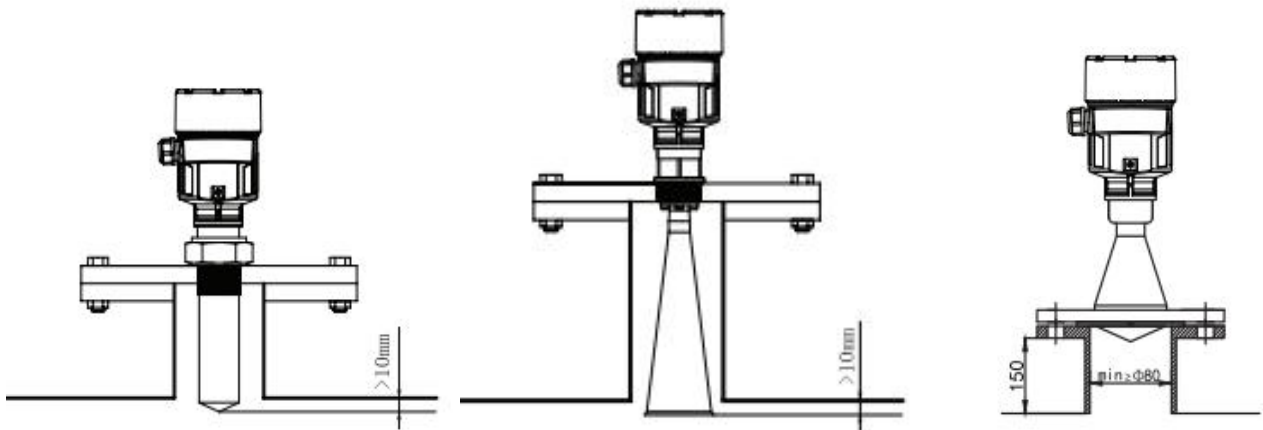
Note:

The isobaric hole diameter is (5~10) mm.

Min. diameter of a wave guide pipe is at least 50mm with smooth I_{I} isobaric hole

With a wave guide pipe, instruments can only measure a liquid with good liquidity, but not suitable for viscous liquids.

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



4. Electric Connection

- 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.

- **Cable**

General introduction

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

3.5mm ~ 8.7mm (1/2" NPT)

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)

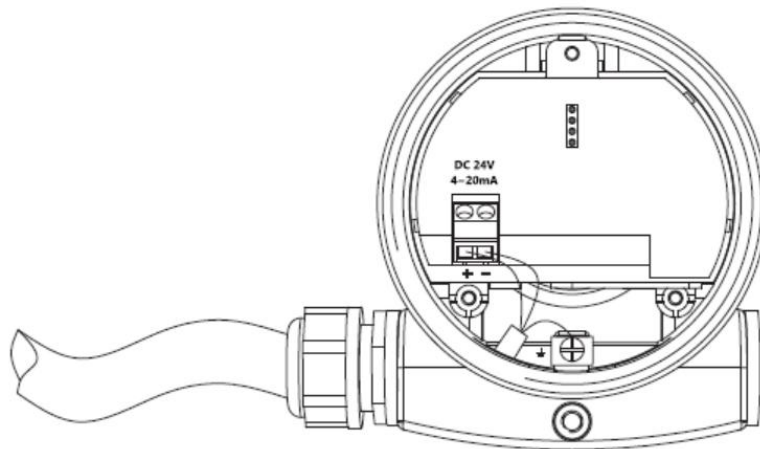
Cables with ground wire for the power supply.

Shielded wire and ground wire of the cable

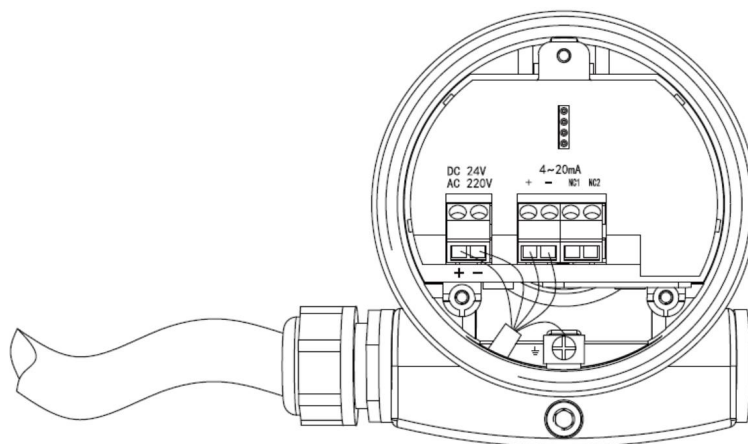
Ideally the two ends of shielded wire should be connected the ground. But note that: there will be the grounding compensation current passing through the shielded wire. A grounding electric capacity (e.g. 1μF: 1500V) can be connected to one end (e.g. switch cabinet) when the both ends are connected to 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**

➤ 2-wire: 24V DC power supply (12V DC is optional), 4-20mA output



- 4-wire: 220V AC/ 50Hz or 24V DC power supply (12V DC is optional), 4-20mA output



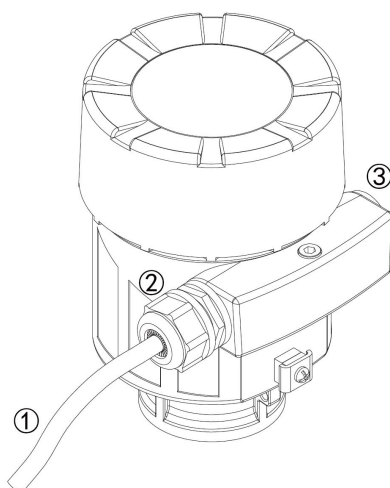
• Safety instruction

- 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.

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- **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 picture on the next page:



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 picture.
- Please tighten the cable entry seal, see mark ② at the above picture.
- Please tighten the unused cable entry with a seal cap. See mark ③ at the above picture.

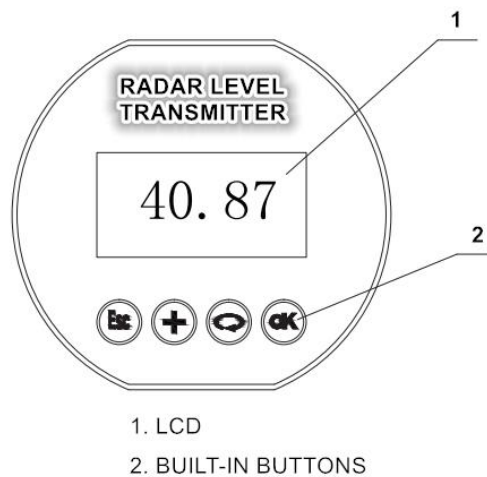
5. Transmitter calibration

- **Methods of debugging**

There are three debugging methods for VRPWRD90:

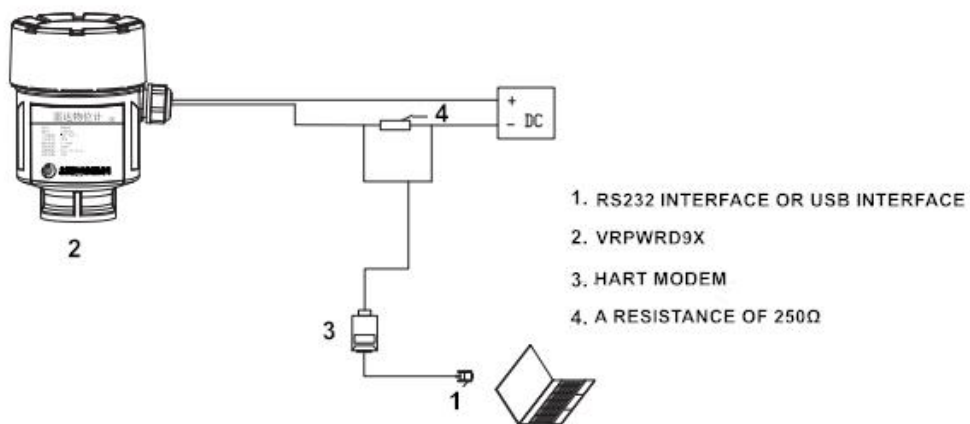
- ①: With programmer module

- ②: With a PC with a software
- ③: With a HART hand-hold communicator
- **Programmer module:** Debugging can be done with the 4 buttons on the programmer module. Menu language is optional. After debugging, the display keeps the normal working condition. The measured values can be clearly read through the glass screen.



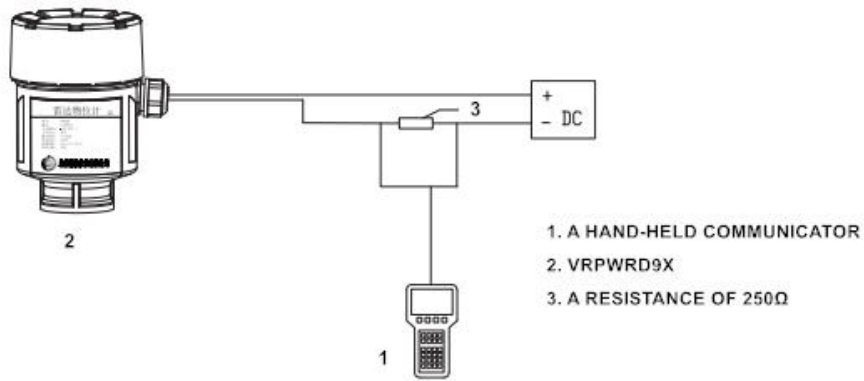
- **Debugging with a PC with a software**

Connect a PC with a HART modem



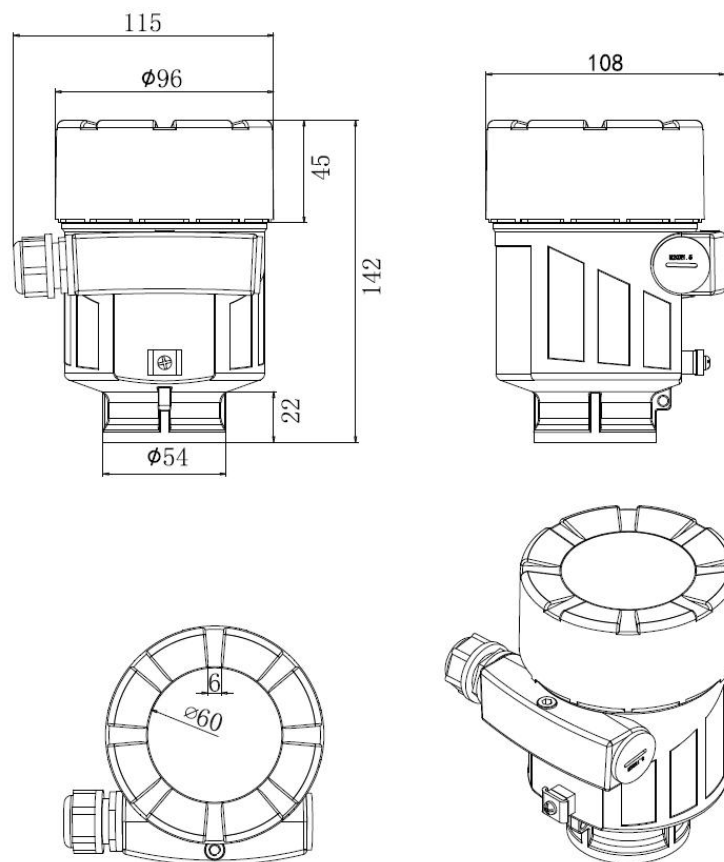
• **HART hand-hold communicator**

VRPWRD9X radars can be calibrated with a HART hand-hold communicator.



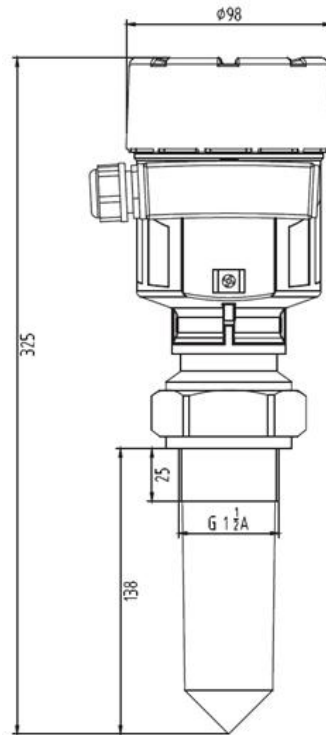
6. Structure dimensions (unit: mm)

Housing

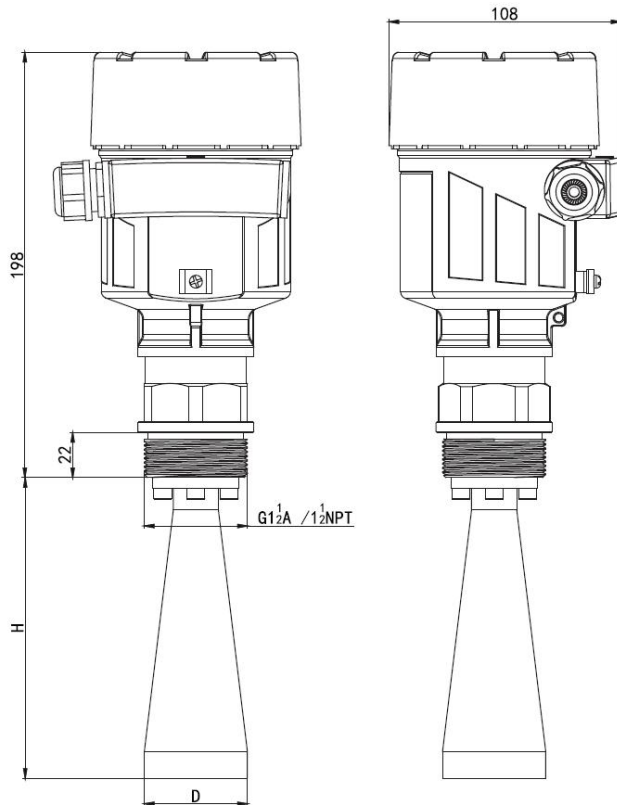




VRPWRD91



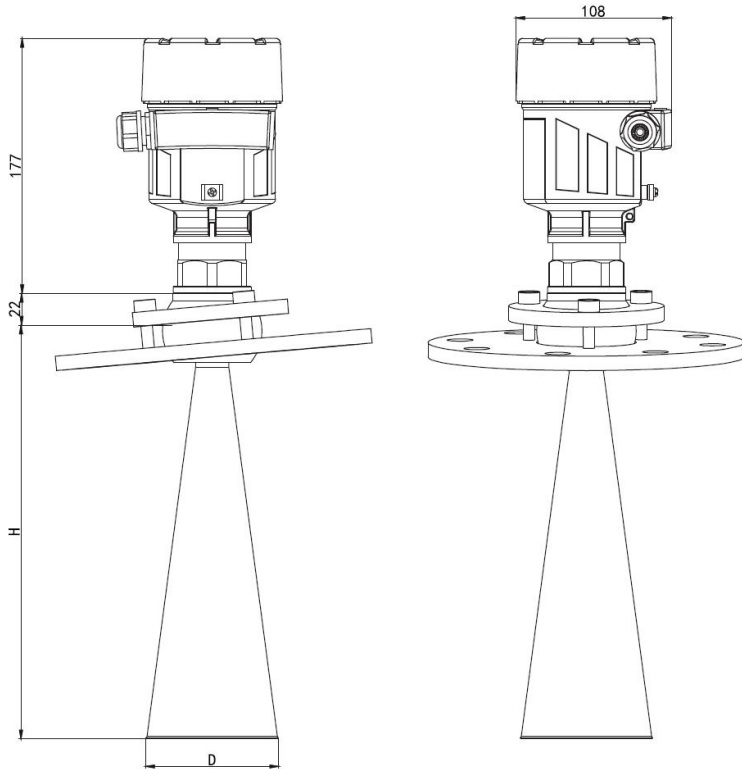
VRPWRD92



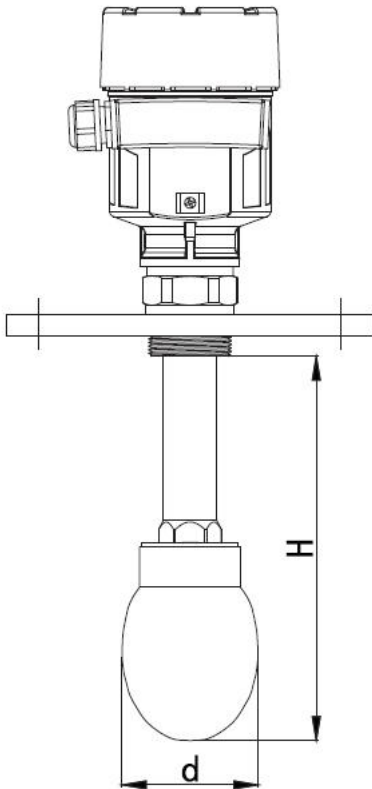
Size of Antenna Horn (mm)	
Horn diameter D (mm)	Length of antenna H (mm)
$\Phi 46$	140
$\Phi 76$	227
$\Phi 96$	288
$\Phi 121$	620



VRPWRD93

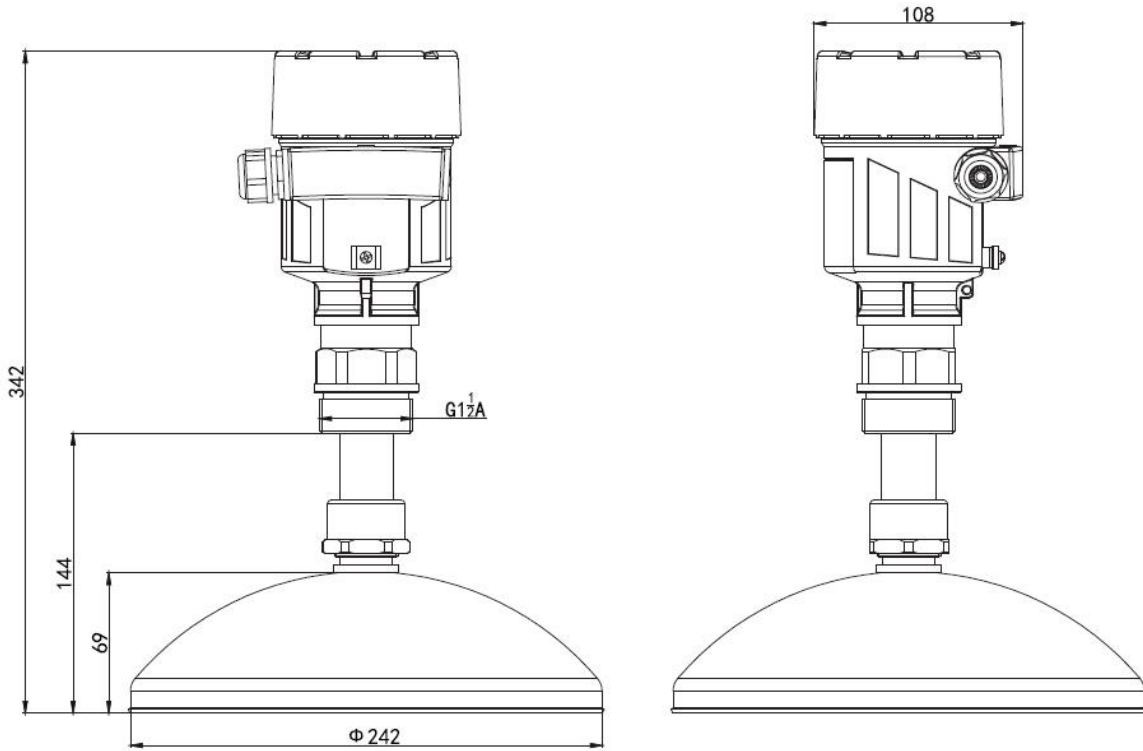


Size of Antenna Horn (mm)	
Horn diameter D (mm)	Length of antenna H (mm)
Φ 76	227
Φ 96	288
Φ121	620

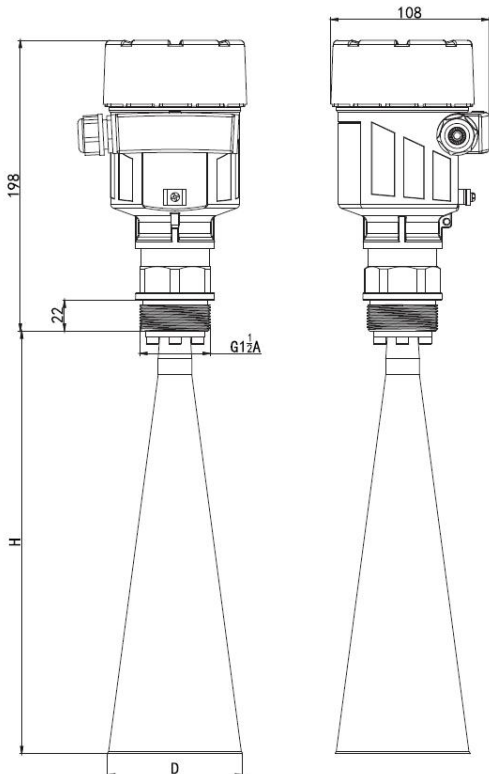


Size of Drip Antenna (mm)	
Drip diameter d (mm)	Length of antenna H (mm)
Φ 75	207
Φ 95	233
Φ145	287

VRPWRD94

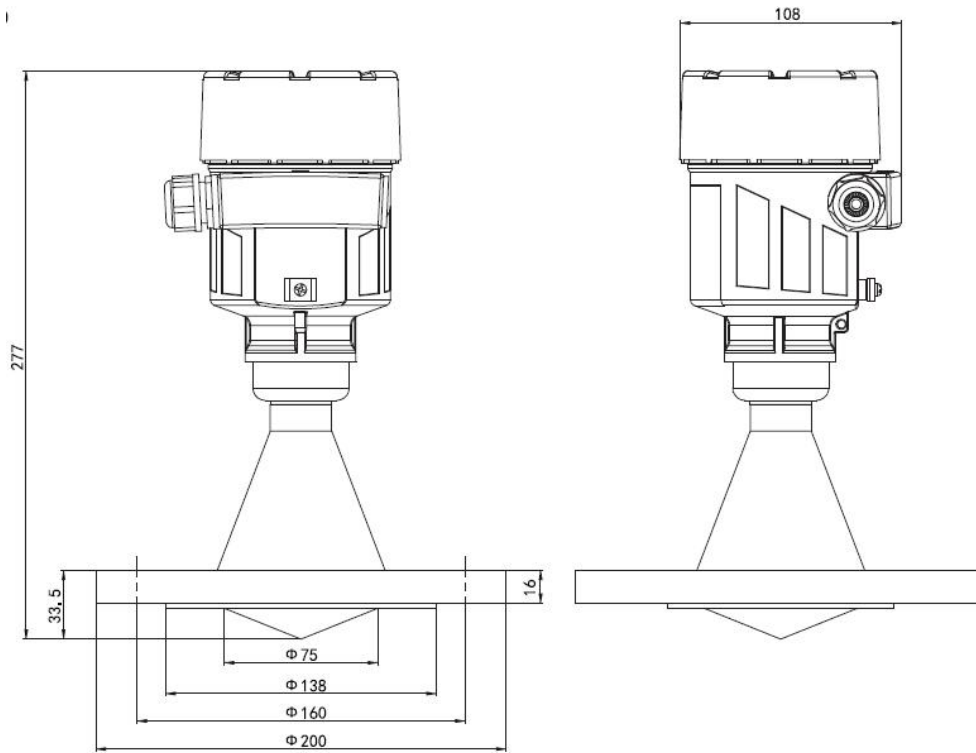


VRPWRD95

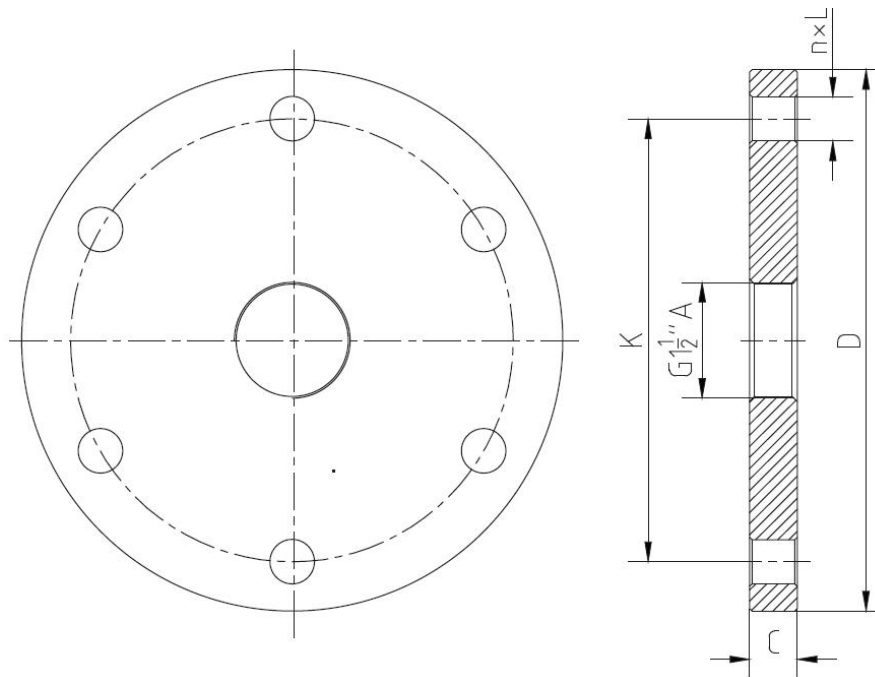


Size of Antenna Horn (mm)	
Horn diameter D (mm)	Length of antenna H (mm)
$\Phi 76$	227
$\Phi 96$	288
$\Phi 121$	620

VRPWRD96



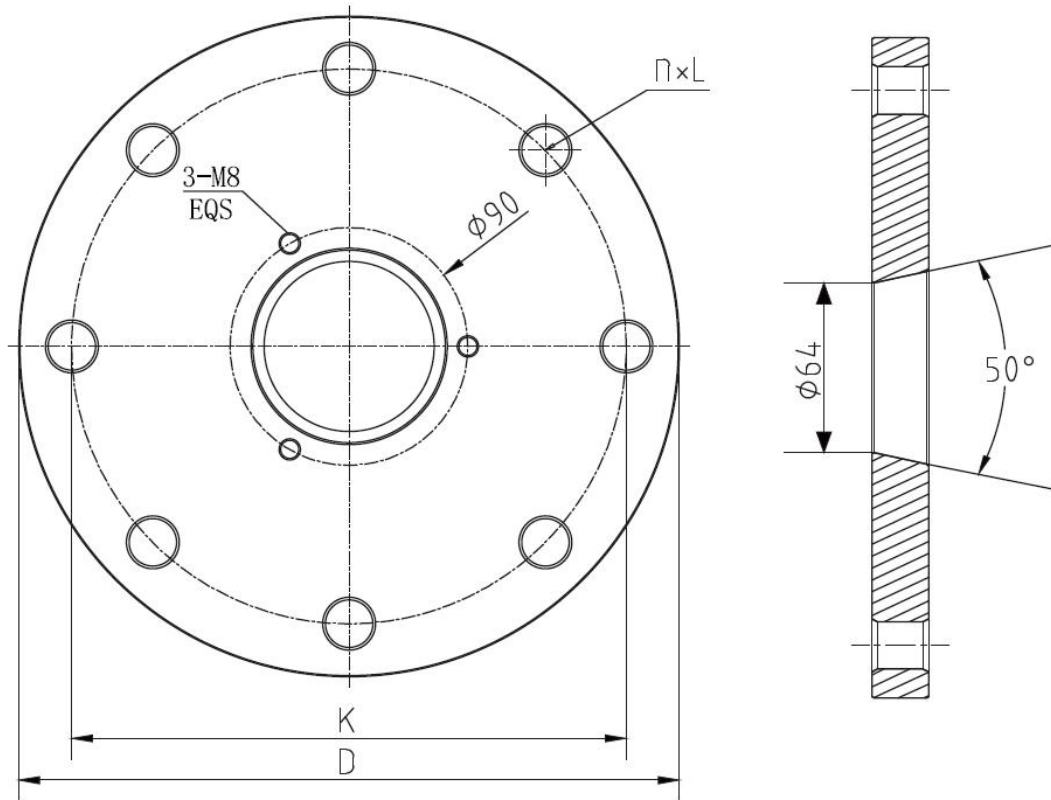
Flange selection table





Flange Model (GB/T9119-2000)						Unit: mm
No.	Size	OD	Hole Center Distance K	Holes Quantity N	Hole Diameter L	Thickness C
1	DN50	Ø165	Ø125	4	Φ18	12
2	DN80	Ø200	Ø160	8	Φ18	
3	DN100	Ø220	Ø180	8	Φ18	
4	DN150	Ø285	Ø240	8	Φ22	
5	DN200	Ø340	Ø295	12	Φ22	
6	DN250	Ø405	Ø355	12	Φ26	

Joint universal flange

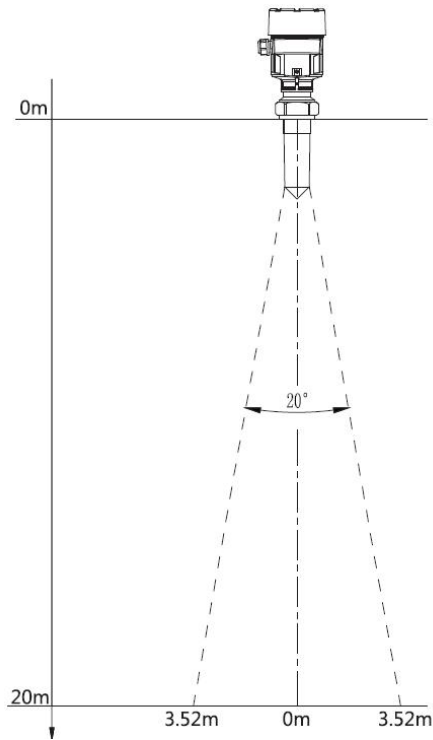




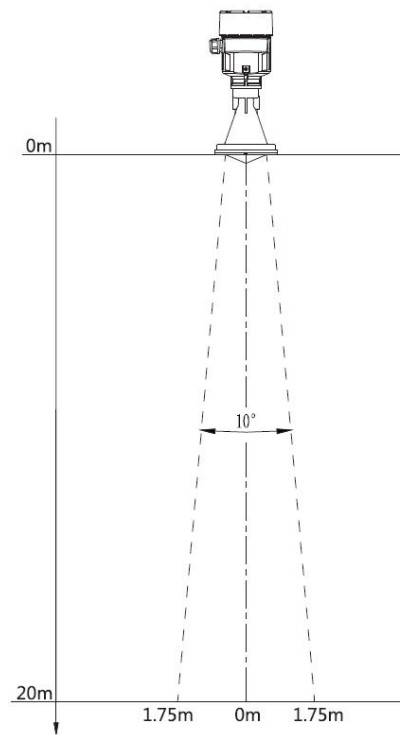
Flange Model (GB/T9119-2000)						Unit: mm
No.	Size	OD	Hole Center Distance K	Holes Quantity N	Hole Diameter L	Thickness C
1	DN80	Ø200	Ø160	8	Φ18	12
2	DN100	Ø220	Ø180	8	Φ18	
3	DN125	Ø250	Ø210	8	Φ18	
4	DN150	Ø285	Ø240	8	Φ22	
5	DN200	Ø340	Ø295	12	Φ22	
6	DN250	Ø405	Ø355	12	Φ26	

7. Beam angle and false echo

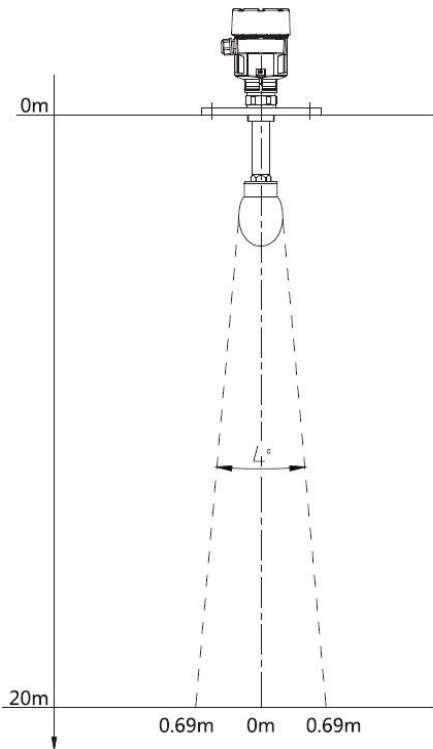
- The emission of radar signal transmitting through its antenna system is just like the beam from a flashlight with a horn shape. The size of a horn beam angle depends on size of an antenna.
- Any obstacles within the horn beam will reflect radar signal. The false echo reflected from pipes, bracket, or other devices in the first few meters close to the radar is especially strong.
- The energy of radar signal from distant false echo is distracted to a large area, which makes it very weak, therefore, its influence to measurement not as strong as the false echo nearby.
- The signal must be emitted along the axis of the sensor perpendicular to medium surface and avoid any obstacles within the full beam angle, especially the 1/3 area closed to antenna.
- It is the best measurement condition when the emitting signal of radar is perpendicular to medium surface with not any obstacles along the way.



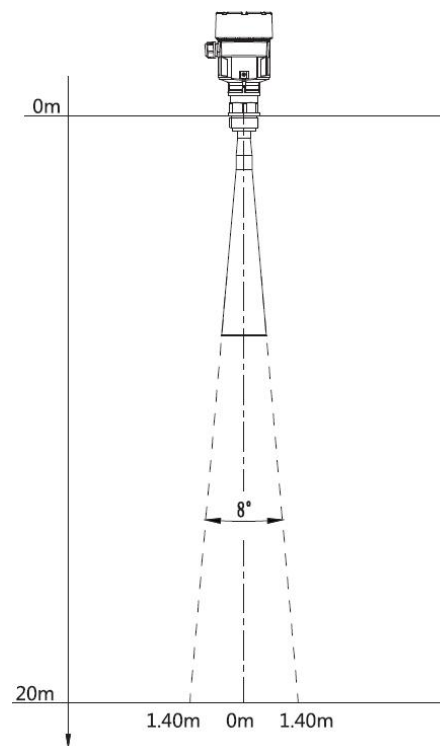
Beam angle of rod antenna



Beam angle of plastic antenna



Beam angle of $\Phi 145$ mm drip antenna



Beam angle of $\Phi 96$ mm horn antenna



8. Technical data

- General data

Model	VRPWRD91	VRPWRD92	VRPWRD93	VRPWRD94	VRPWRD95	VRPWRD96
Process Connection	Thread G1½" A	Thread G1½" A	Thread G1½" A	Thread G1½" A	Thread G1½" A	N/A
	Thread 1½" NPT	Thread 1½" NPT	Thread 1½" NPT	Thread 1½" NPT	Thread 1½" NPT	N/A
	Flange	Flange	Flange	Flange	Flange	Flange
	N/A	Dragon gate frame	Dragon gate frame	N/A	Dragon gate frame	N/A
Antenna Material	PVDF	Stainless/ PTFE	Stainless/ PTFE	Stainless/ PTFE	Stainless/ PTFE	Stainless/ PTFE

Housing

Seal material between housing and cover: VITON

Display window material: PC

Ground connection terminal material: Stainless steel

Weight:

- VRPWRD91 1kg (depends on the process connection)
- VRPWRD92 2kg (depends on the process connection)
- VRPWRD93 6kg (depends on the process connection)
- VRPWRD94 7kg (depends on the process connection)
- VRPWRD95 2kg (depends on the process connection)
- VRPWRD96 3kg (depends on the process connection)

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 U_{ss} <1V

(100~100K)Hz U_{ss} <10mV

Cable parameter

Cable inlet/ plug: 1 M20x1.5 cable entry (cable diameter 5~9mm), one plug, M20x1.5

Wiring terminal: cross section 2.5mm²

Output parameter

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

Resolution: 1.6μA

Error signal: output current no change, 20.5mA, or 22mA, or 3.9mA

Integral time: (0~50) s, adjustable

Features:

Dead zone: the remote end of an antenna

Max. measuring range: VRPWRD91	20m (liquids)
VRPWRD92	30m (liquids)
VRPWRD93	70m (solids)
VRPWRD94	70m (solids)
VRPWRD95	35m (liquids or solids)
VRPWRD96	20m (liquids)

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

Micro-wave frequency: 26GHz

Communication connection: HART communication protocol/

Modbus communication protocol;

Measuring interval: approx. 1 second (depends on the parameter setting)

Adjustable time: approx. 1 second (depends on the parameter setting)

Repeatability: +/-2mm

Display resolution: 1mm

Temperature during working storage and transportation: (-40~+100)°C

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Process temperature (temperature of antenna):

VRPWRD91	(-40°C~+120°C)
VRPWRD92	(-40°C~+250°C)
VRPWRD93	(-40°C~+250°C)
VRPWRD94	(-40°C~+250°C)
VRPWRD95	(-40°C~+250°C)
VRPWRD96	(-40°C~+150°C)

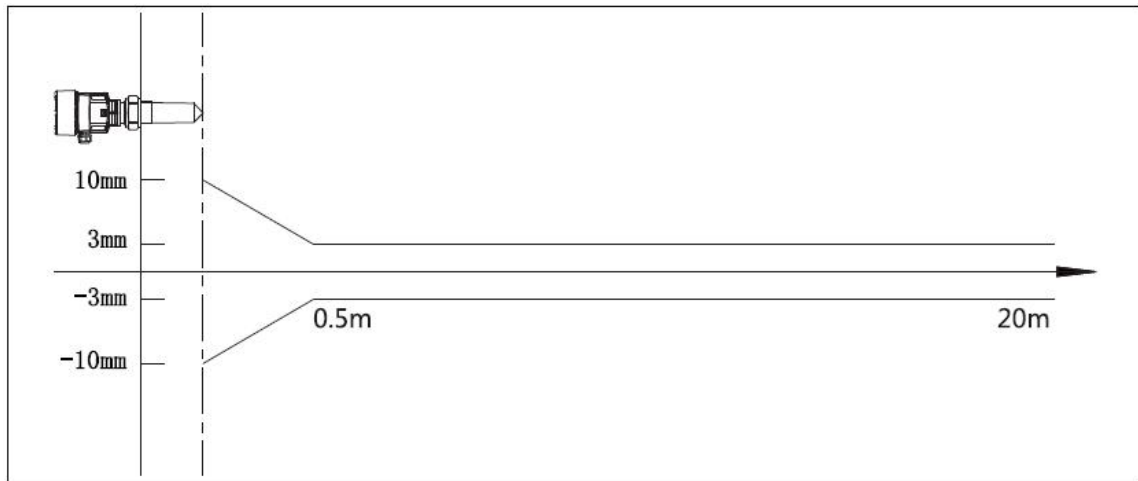
Relative humidity: <95%

Pressure: Max. 4Mpa

Resistance to vibration: mechanic vibration 10m/s², (10-150) Hz

9.Transmitter linearity

VRPWRD91: Beam angle is 20°

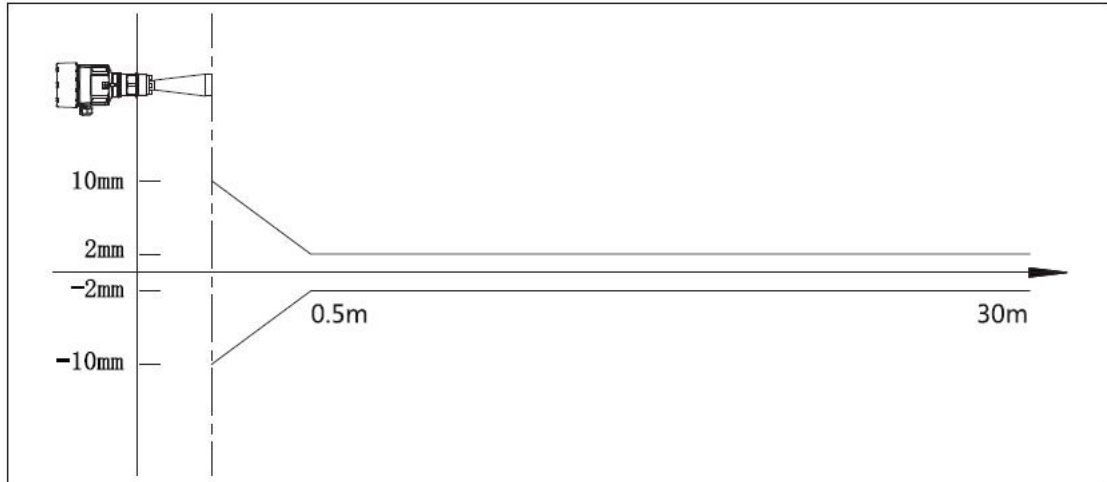


VRPWRD92

Beam angle varies with the antenna dimension change

Antenna Size (mm)	Φ46	Φ76	Φ96	Φ121
Beam angle	18°	12°	8°	6°

For the accuracy, please refer to the graph below:

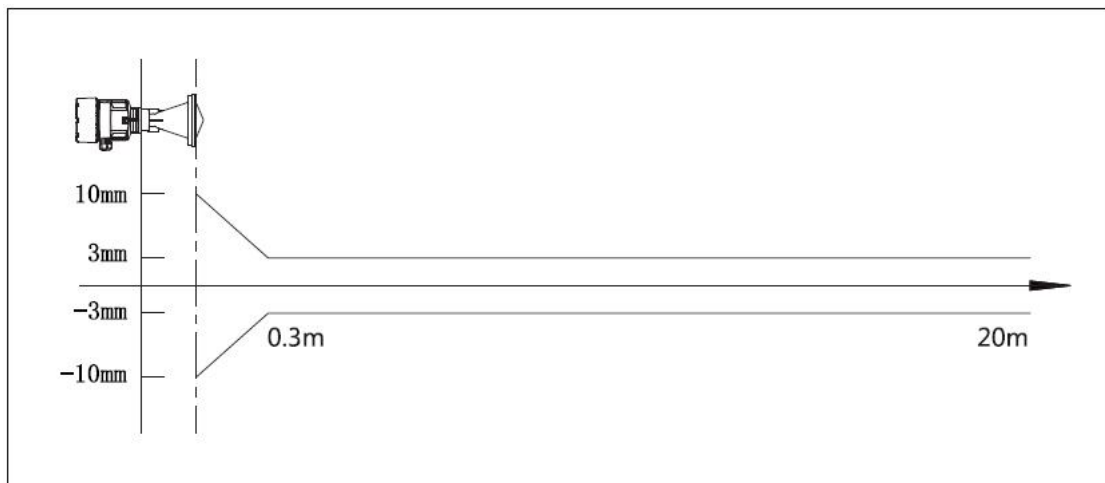


VRPWRD92 with plastic horn antenna

Beam angle is shown as the table below:

Antenna Size (mm)	Φ75
Beam angle	10°

For the accuracy, please refer to the graph below:



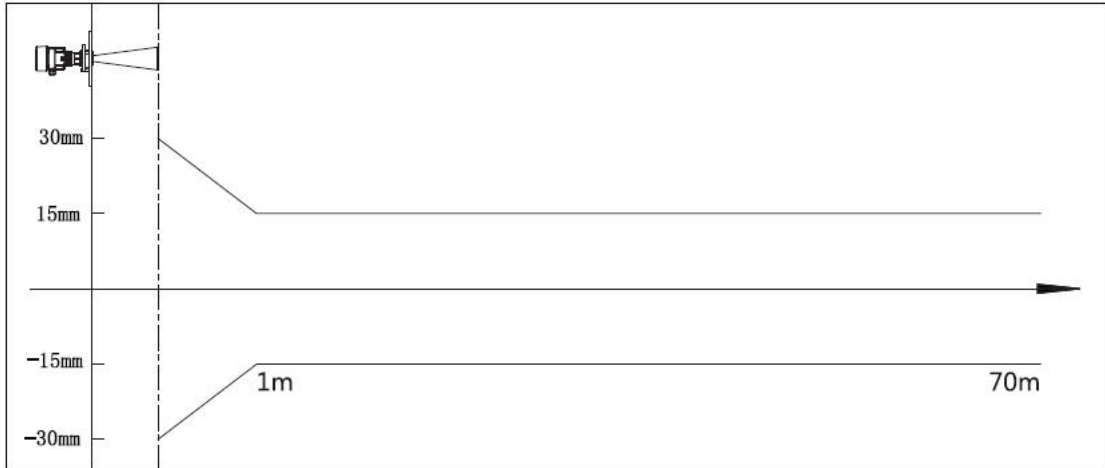
VRPWRD93

Beam angle varies with size change of antenna



Antenna Size (mm)	Φ46	Φ76	Φ96	Φ121
Beam angle	18°	12°	8°	6°

For the accuracy, please refer to the graph below

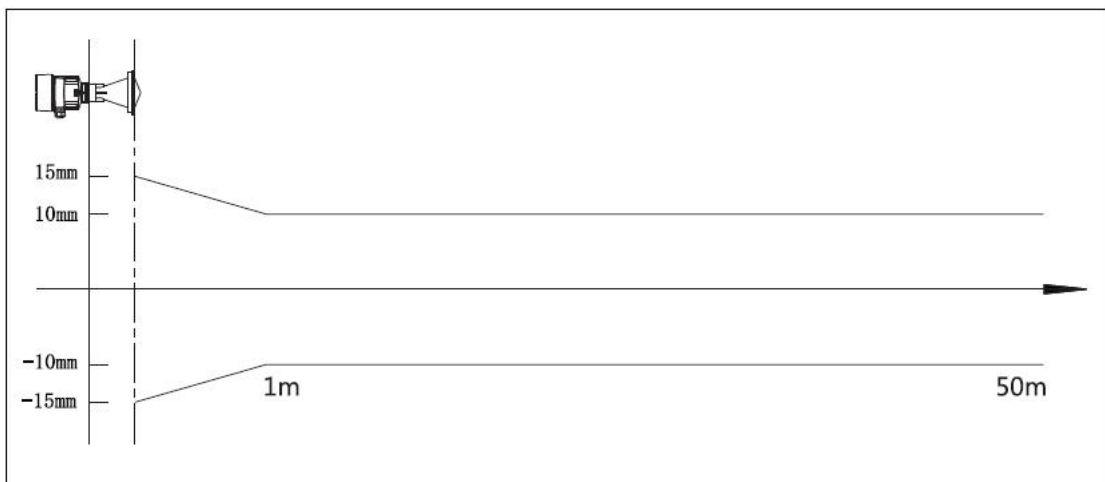


VRPWRD93 with plastic horn antenna

Beam angle is shown as the table below

Antenna Size (mm)	Φ75
Beam angle	10°

For the accuracy, please refer to the graph below:

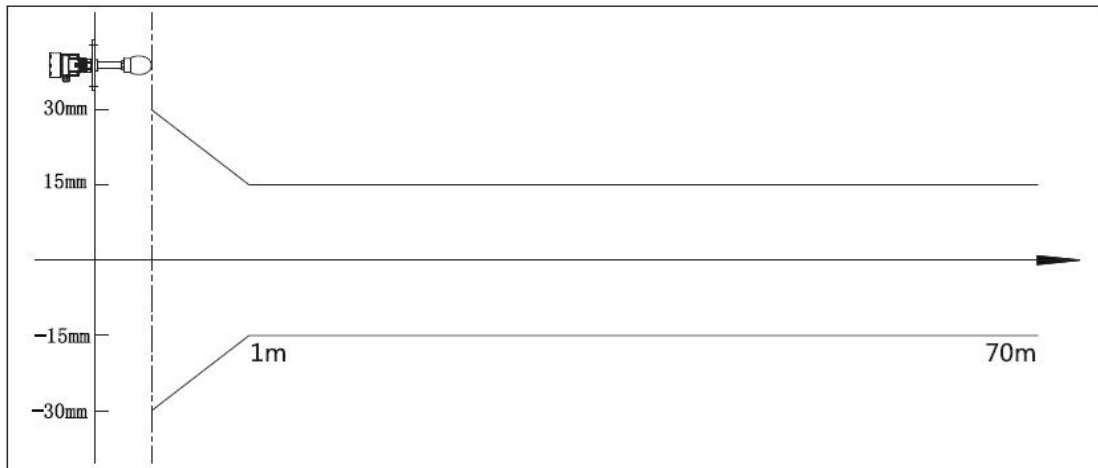




VRPWRD93 with drip antenna

Drip antenna Size (mm)	Φ75	Φ95	Φ145
Beam angle	8°	6°	4°

For the accuracy, please refer to the graph below:

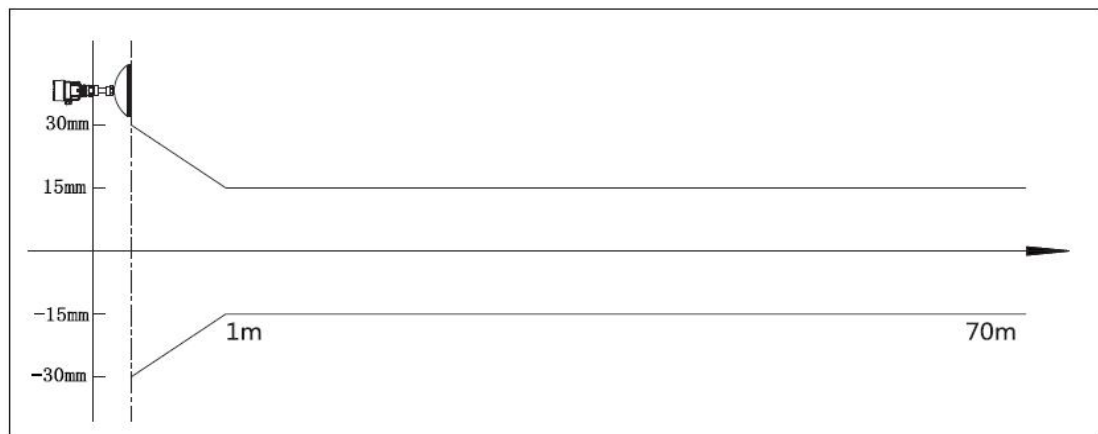


VRPWRD94 with parabolic antenna

Beam angle is shown as the table below

Antenna Size (mm)	Φ196	Φ242
Beam angle	5°	4°

For the accuracy, please refer to the graph below:



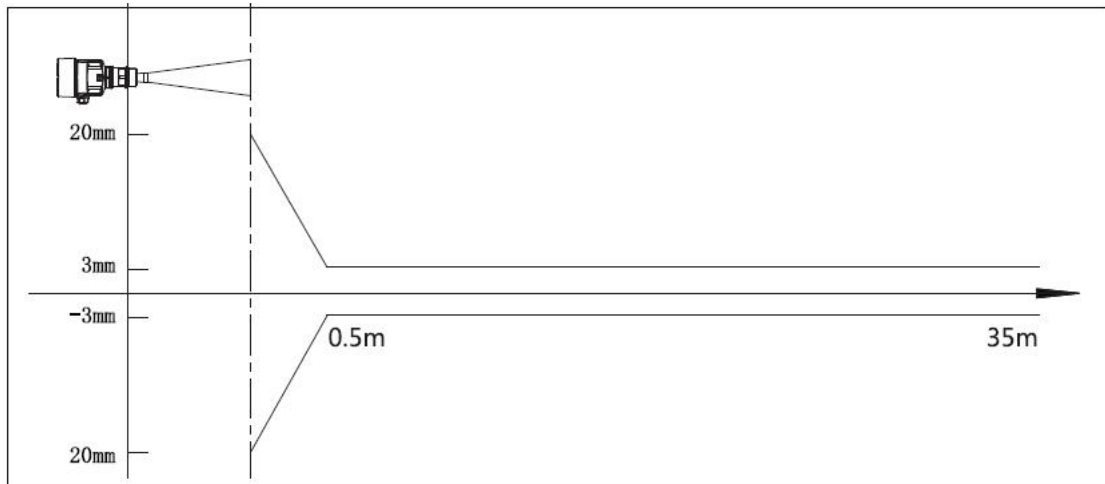


VRPWRD95

Beam angle varies as size change of antenna

Antenna Size (mm)	Φ76	Φ96	Φ121
Beam angle	12°	8°	6°

For accuracy, please refer to the graph below

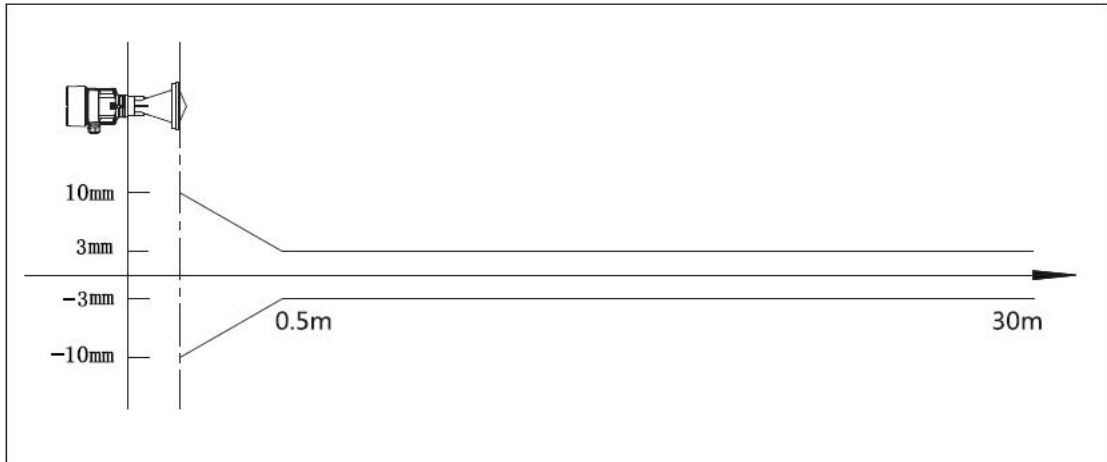


VRPWRD95 with plastic horn antenna

Beam angle is shown as the table below:

Antenna Size (mm)	Φ75
Beam angle	10°

For the accuracy, please refer to the graph below:



VRPWRD95 with drip antenna

Beam angle varies with size change of antenna

Drip antenna Size (mm)	Φ75	Φ95	Φ145
Beam angle	8°	6°	4°

For the accuracy, please refer to the graph below:



VRPWRD96

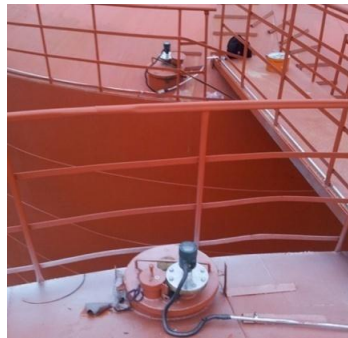
Beam angle varies with size change of antenna

Antenna Size (mm)	Φ46	Φ76
Beam angle	18°	10°

For the accuracy, please refer to the graph below



Photos below show some practical applications of our third generation high frequency radar level transmitters:






10. Model selection

VRPWRD91

Code	Approvals				
P	Standard type (Non-explosion)				
I	Intrinsically safe (Ex ia IIC T6 Ga)				
D	Explosion isolation proof type (Ex d IIC T6 Gb)				
Code	Antenna type/ Material/ Process temperature				
F	Sealed horn antenna/ PVDF/ (- 60 ~ +120)°C				
Code	Process connection/ Material				
GP	Thread G1½" A/ PVDF				
Code	Flange matching/ Material				
Flange size	Material	PP	PTFE	304 SS	316L SS
	Code	(Face flange)	(Face flange)	(Face flange)	(Face flange)
DN50, PN16		BP	BF	BA	BB
DN80, PN16		DP	DF	DA	DB
DN100, PN16		EP	EF	EA	EB
X	None				
Y	Special design				
Code	Antenna length				
A	50mm				
B	138mm				
Code	Electronic unit				
2	(4~20)mA/ 24V DC 2-wire	5	(4~20)mA/ 24V DC/ HART, 2-wire		
3	(4~20)mA/ 24V DC 4-wire	6	(4~20)mA/ 24V DC/ HART, 4-wire		
4	(4~20)mA/ 220V AC 4-wire	7	(4~20)mA/ 220V AC/ HART, 4-wire		
Y	Special design				

Code	Housing/ Enclosure protection grade
L	Aluminum/ IP67
G	Stainless steel/ IP67
Code	Cable entry
M	M20x1.5
N	1/2" NPT
Code	Display/ Programmer
V	With standard display
B	With backlight display
X	Without

VRPWRD92

Code	Approvals				
P	Standard type (Non-explosion)				
I	Intrinsically safe (Ex ia IIC T6 Ga)				
D	Explosion isolation proof type (Ex d IIC T6 Gb)				
E	Certificate for shipbuilding (CCS)				
Code	Process connection/ Material				
GA	Thread G1 1/2" A/ 304 stainless steel				
GB	Thread G1 1/2" A/ 316L stainless steel				
GC	Dragon gate frame only for plastic antenna				
NA	NPT thread 1 1/2" / 304 stainless steel				
NB	NPT thread 1 1/2" / 316L stainless steel				
GH	Bracket mounting/ Carbon steel				
Code	Flange matching/ Material				
Flange size	Material Code	PP (Face flange)	PTFE (Face flange)	304 SS (Face flange)	316L SS (Face flange)

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DN40, PN16	AP	AF	AA	AB
DN50, PN16	BP	BF	BA	BB
DN65, PN16	CP	CF	CA	CB
DN80, PN16	DP	DF	DA	DB
DN100, PN16	EP	EF	EA	EB
DN125, PN16	FP	FF	FA	FB
DN150,PN16	GP	GF	GA	GB
ANSI 1.5", 150lb	APM	AFM	AAM	ABM
ANSI 2", 150lb	BPM	BFM	BAM	BBM
ANSI 2.5", 150lb	CPM	CFM	CAM	CBM
ANSI 3", 150lb	DPM	DFM	DAM	DBM
ANSI 4", 150lb	EPM	EFM	EAM	EBM
ANSI 5", 150lb	FPM	FFM	FAM	FBM
ANSI 6", 150lb	GPM	GFM	GAM	GBM
DN100 Chuck flange	---	---	EAK	EBK
DN125 Chuck flange	---	---	FAK	FBK
DN150 Chuck flange	---	---	GAK	GBK
X	None			
Y	Special design			
Code	Antenna type/Material			
Flange size	Material	Stainless steel 304		Stainless steel 316L
	Code	304		316L
	Horn antenna Φ36mm	AA		AB
	Horn antenna Φ46mm	BA		BB
	Horn antenna Φ62mm	CA		CB
	Horn antenna Φ76mm	DA		DB

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Horn antenna Φ96mm		EA	EB
Horn antenna Φ121mm		FA	FB
Drip antenna Φ75mm		KA/ PTFE	---
Drip antenna Φ95mm		LA/ PTFE	---
Drip antenna Φ145mm		MA/ PP	---
Plastic horn antenna Φ75mm Only under ATM/ AMB condition		PA/ Plastic	---
Y		Special design	
Code	Anti-corrosive function		
A	With		
B	Without		
Code	High temperature adaptor/ Process temperature		
P	Without/ (-60~150)°C		
G	With/ (-60~250)°C		
Code	Electronic unit		
2	(4~20)mA/ 24V DC 2-wire	5	(4~20)mA/ 24V DC/ HART, 2-wire
3	(4~20)mA/ 24V DC 4-wire	6	(4~20)mA/ 24V DC/ HART, 4-wire
4	(4~20)mA/ 220V AC 4-wire	7	(4~20)mA/ 220V AC/ HART, 4-wire
Y	Special design		
Code	Housing/ Enclosure protection grade		
L	Aluminum/ IP 67		
G	Stainless steel 304/ IP 67		
P	Plastic/ IP 66		
Code	Cable entry		
M	M20x1.5		
N	½" NPT		



Code	Programmer/ Display
V	With standard display
B	With backlight display
X	Without

Note: 1. There is no anti-corrosive option available for horn diameter 36mm and 46mm.

VRPWRD93

Code	Approvals			
P	Standard type (Non-explosion)			
I	Intrinsically safe (Ex ia IIC T6 Ga)			
D	Explosion isolation proof type (Ex d IIC T6 Gb)			
Code	Process connection/ Material			
GA	Thread G1½" A/ 304 stainless steel			
GB	Thread G1½" A/ 316L stainless steel			
GC	Dragon gate frame only for plastic antenna			
NA	NPT thread 1½" / 304 stainless steel			
NB	NPT thread 1½" / 316L stainless steel			
GH	Bracket mounting/ Carbon steel			
Code	Flange matching/ Material			
	Material	304 SS	316L SS	304 SS
Flange size	Code	(Face flange)	(Face flange)	(Universal flange)
DN40, PN16		AA	AB	—
DN50, PN16		BA	BB	—
DN65, PN1		CA	CB	—
DN80, PN16		DA	DB	DW
DN100, PN16		EA	EB	EW
DN125, PN16		FA	FB	FW

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DN150, PN16	GA	GB	GW
DN200, PN16	HA	HB	HW
DN250, PN16	JA	JB	JW
ANSI 1.5", 150lb	AAM	ABM	—
ANSI 2", 150lb	BAM	BBM	—
ANSI 2.5", 150lb	CAM	CBM	—
ANSI 3", 150lb	DAM	DBM	DWM
ANSI 4", 150lb	EAM	EBM	EWM
ANSI 5", 150lb	FAM	FBM	FWM
ANSI 6", 150lb	GAM	GBM	GWM
ANSI 8", 150lb	HAM	HBM	HWM
ANSI 10", 150lb	JAM	JBM	JWM
DN100 Chuck flange	EAK	EBK	---
DN125 Chuck flange	FAK	FBK	---
DN150 Chuck flange	GAK	GBK	---
X	None		
Y	Special design		
Code	Air purging		
A	With		
B	Without		
Code	Antenna type/ Material		
Flange size	Material	Stainless steel 304	Stainless steel 316L
	Code		
	Horn antenna Φ36mm	AA	AB
	Horn antenna Φ46mm	BA	BB
	Horn antenna Φ62mm	CA	CB

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Horn antenna Φ76mm	DA	DB
Horn antenna Φ96mm	EA	EB
Horn antenna Φ121mm	FA	FB
Drip antenna Φ75mm	KA/ PTFE	---
Drip antenna Φ95mm	LA/ PTFE	---
Drip antenna Φ145mm	MA/ PP	---
Plastic horn antenna Φ75mm Only under ATM/ AMB condition	PA/ Plastic	---
Y	Special design	
Code	Dust proof	
A	With	
B	Without	
Code	Radiation fins/ Process temperature	
P	Without/ (-60 ~ +150)°C	
G	With/ (-60 ~ +250)°C	
Code	Electronic unit	
2	(4~20)mA/ 24V DC 2-wire	5
3	(4~20)mA/ 24V DC 4-wire	6
4	(4~20)mA/ 220V AC 4-wire	7
Y	Special design	(4~20)mA/ 24V DC/ HART, 2-wire (4~20)mA/ 24V DC/ HART, 4-wire (4~20)mA/ 220V AC/ HART, 4-wire
Code	Housing/ Enclosure protection grade	
L	Aluminum/ IP 67	
G	Stainless steel 304/ IP 67	
P	Plastic/ IP 66	
Code	Cable entry	

M	M20x1.5
N	½" NPT
Code	Programmer/ Display
V	With standard display
B	With backlight display
X	Without

Note: 1. There is no anti-dust option available for horn diameter 36mm and 46mm.

VRPWRD94

Code	Approvals			
P	Standard type (Non-explosion)			
I	Intrinsically safe (Ex ia IIC T6 Ga)			
D	Intrinsically and explosion proof type (Ex d IIC T6 Gb)			
Code	Process connection/ Material			
GA	Thread G1½" A/ 304 SS			
GB	Thread G1½" A/ 316L SS			
NA	Thread 1½" NPT/ 304 SS			
NB	Thread 1½" NPT/ 316L SS			
Code	Flange matching/ Material			
Flange size	Material	304 SS	316L SS	304 SS
	Code	(Face flange)	(Face flange)	(Universal flange)
DN40, PN16		AA	AB	—
DN50, PN16		BA	BB	—
DN65, PN16		CA	CB	—
DN80, PN16		DA	DB	DW
DN100, PN16		EA	EB	EW
DN125, PN16		FA	FB	FW

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DN150, PN16	GA	GB	GW
DN200, PN16	HA	HB	HW
DN250, PN16	JA	JB	JW
ANSI 1.5", 150l	AAM	ABM	—
ANSI 2", 150lb	BAM	BBM	—
ANSI 2.5", 150lb	CAM	CBM	—
ANSI 3", 150lb	DAM	DBM	DWM
ANSI 4", 150lb	EAM	EBM	EWM
ANSI 5", 150lb	FAM	FBM	FWM
ANSI 6", 150lb	GAM	GBM	GWM
ANSI 8", 150lb	HAM	HBM	HWM
ANSI 10", 150lb	JAM	JBM	JWM
X	None		
Y	Special design		
Code	Air Purging		
A	With		
B	Without		
Code	Antenna type/ Material		
HA	Parabolic antenna Φ 196mm/ stainless steel 304		
JA	Parabolic antenna Φ 242mm/ stainless steel 304		
Code	Radiation fins/ Process temperature		
P	Without/ (-60 ~ +150) $^{\circ}$ C		
G	With/ (-60 ~ +250) $^{\circ}$ C		
Code	Electronic unit		
2	(4~20)mA/ 24V DC 2-wire	5	(4~20)mA/ 24V DC/ HART, 2-wire
3	(4~20)mA/ 24V DC 4-wire	6	(4~20)mA/ 24V DC/ HART, 4-wire
4	(4~20)mA/ 220V AC 4-wire	7	(4~20)mA/ 220V AC/ HART, 4-wire
Y	Special design		
Code	Housing/ Enclosure protection grade		

L	Aluminum/ IP 67
G	Stainless steel 304/ IP 67
P	Plastic/ IP 66
Code	Cable entry
M	M20x1.5
N	1/2" NPT
Code	Programmer/ Display
V	With standard display
B	With backlight display
X	Without

VRPWRD95

Code	Approvals			
P	Standard type (Non-explosion)			
I	Intrinsically safe (Ex ia IIC T6 Ga)			
D	Explosion isolation proof type (Ex d IIC T6 Gb)			
E	Certificate for shipbuilding (CCS)			
Code	Process connection/ Material			
GA	Thread G1 1/2" A/ 304 stainless steel			
GB	Thread G1 1/2" A/ 316L stainless steel			
GC	Dragon gate frame only for plastic antenna			
NA	NPT thread 1 1/2" / 304 stainless steel			
NB	NPT thread 1 1/2" / 316L stainless steel			
GH	Bracket mounting/ Carbon steel			
Code	Flange matching/ Material			
Flange size	Material	304 SS	316L SS	316L SS
	Code	(Face flange)	(Face flange)	(Universal flange)
DN40, PN16		AA	AB	—
DN50, PN16		BA	BB	—
DN65, PN16		CA	CB	—

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DN80, PN16	DA	DB	DW
DN100, PN16	EA	EB	EW
DN125, PN16	FA	FB	FW
DN150, PN16	GA	GB	GW
ANSI 1.5", 150lb	AAM	ABM	—
ANSI 2", 150lb	BAM	BBM	—
ANSI 2.5", 150lb	CAM	CBM	—
ANSI 3", 150lb	DAM	DBM	DWM
ANSI 4", 150lb	EAM	EBM	EWM
ANSI 5", 150lb	FAM	FBM	FWM
ANSI 6", 150lb	GAM	GBM	GWM
DN100 Chuck flange	EAK	EBK	---
DN125 Chuck flange	FAK	FBK	---
DN150 Chuck flange	GAK	GBK	---
X	None		
Y	Special design		
Code	Air purging		
A	With		
B	Without		
Code	Antenna type/ Material		
	Material	304 SS	316L SS
Size	Code		
Horn antenna Φ36mm		AA	AB
Horn antenna Φ46mm		BA	BB
Horn antenna Φ62mm		CA	CB

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Horn antenna Φ76mm		DA	DB
Horn antenna Φ96mm		EA	EB
Horn antenna Φ121mm		FA	FB
Drip antenna Φ75mm		KA/ PTFE	---
Drip antenna Φ95mm		LA/ PTFE	---
Drip antenna Φ145mm		MA/ PP	---
Plastic horn antenna Φ75mm Only under ATM/ AMB condition		PA/ Plastic	---
Y		Special design	
Code	Anti- corrosive function		
A	With		
B	Without		
Code	Dust-proof function		
A	With		
B	Without		
Code	High temperature adaptor/ Process temperature		
P	Without/ (- 60 ~ +150)°C		
G	With/ (- 60 ~ +250)°C		
Code	Electronic unit		
2	(4~20)mA/ 24V DC 2-wire	5	(4~20)mA/ 24V DC/ HART, 2-wire
3	(4~20)mA/ 24V DC 4-wire	6	(4~20)mA/ 24V DC/ HART, 4-wire
4	(4~20)mA/ 220V AC 4-wire	7	(4~20)mA/ 220V AC/ HART, 4-wire
Y	Special design		
Code	Housing/ Enclosure protection grade		

L	Aluminum/ IP 67
G	Stainless steel 304/ IP 67
P	Plastic/ IP 66
Code	Cable entry
M	M20x1.5
N	½" NPT
Code	Programmer/ Display
V	With standard display
B	With backlight display
X	Without

Note:

1. There is no anti-corrosive option and anti-dust option available for horn diameter 36mm and 46mm.
2. Anti-corrosive function is optional for liquid level measurement and anti-dust function is optional for solid level measurement

VRPWRD96

Code	Approvals		
P	Standard type (Non-explosion)		
I	Intrinsically safe (Ex ia IIC T6 Ga)		
D	Explosion isolation proof type (Ex d IIC T6 Gb)		
Code	Flange matching/ Material		
Flange size	Material	304 SS (Plane complex flange)	316L SS (Plane complex flange)
	Code		
DN50, PN16		BA	BB
DN65, PN16		CA	CB

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DN80, PN16	DA	DB
DN100, PN16	EA	EB
DN125, PN16	FA	FB
DN150, PN16	GA	GB
ANSI 2", 150lb	BAM	BBM
ANSI 2.5", 150lb	CAM	CBM
ANSI 3", 150lb	DAM	DBM
ANSI 4", 150lb	EAM	EBM
ANSI 5", 150lb	FAM	FBM
ANSI 6", 150lb	GAM	GBM
Y	Special design	
Code	Antenna type/ Material	
Size	Material Code	304 SS 316L SS
Horn antenna Φ46mm	BA	BB
Horn antenna Φ76mm	DA	DB
Y	Special design	
Code	Radiation fins/ Process temperature	
P	Without/ (- 60 ~ +150)°C	
Code	Electronic unit	
2	(4~20)mA/ 24V DC, 2-wire	
3	(4~20)mA/ 24V DC , 4-wire	
4	(4~20)mA/ 220V AC , 4-wire	
5	(4~20)mA/ 24V DC/ HART, 2-wire	
6	(4~20)mA/ 24V DC/ HART, 4-wire	
7	(4~20)mA/ 220V AC/ HART, 4-wire	
Y	Special design	

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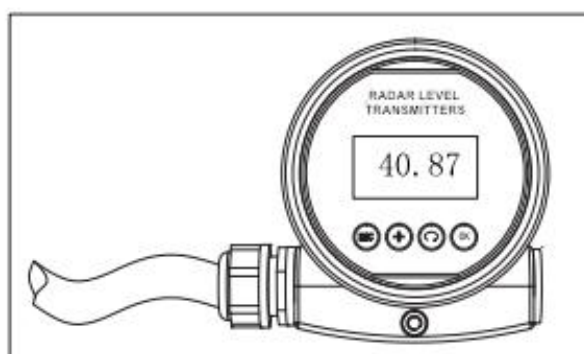


Code	Housing/ Enclosure protection grade
L	Aluminum/ IP 67
G	Stainless steel 304/ IP 67
Code	Cable entry
M	M20x1.5
N	1/2" NPT
Code	Programmer/ Display
V	With standard display
B	With backlight display
X	Without

11. Debug menu

Calibration introduction:

Shown as the figure right, there are four buttons in the indication face board, by pressing which, you can set and debug the instrument. Menu languages are selectable. After setting or calibration, LCD indicates measured values, which can be read clearly through a glass window.



Following bellows are functions of the four built-in buttons:

Button “ESC”:

- Exit from editing state;
- Return to the previous menu;



- Shift between a measured value and an echo curve during operation;

Button “⊕”:

- Amend values of parameters;
- Select model of indication;

Button “⊙”:

- Select a setting item
- Select digit of edited parameters
- Indicate the content of the selected parameter

Button “OK”:

- Enter editing state
- Confirm settings
- Save parameter modification

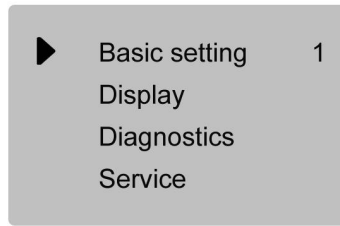
Programming method:

At any time when an instrument under running state press button **OK** to enter programming state, and display programming main menu. Each edited parameter can be confirmed by pressing button **OK**, otherwise, the editor is invalid. After an editing is finished, press button **ESC** to exit programming state, and return to running status. At any time during an editing, press button **ESC** to give up programming, exit programming state of parameters.


Editing method of parameters (character/ figure programming):

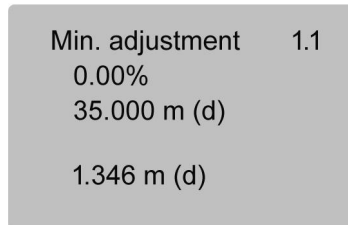
when entering character/ figure programming state, the first digit of the edited parameter will become black. At the time, press button **⊕** to change the character or figure until the required character or figure appears. Then press button **⊙**, character or figure will turn black in order, then edit them one by one. When the editing is finished, press button **OK** for confirmation.




At any time when an instrument under running state, press button **OK** to enter programming state, and display programming main menu.




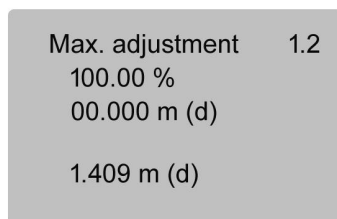
Note: the upper right corner of the screen, a digital representation of the menu number.

1.1.Min. adjustment: Min. adjustment is for measuring range setting. It together with Max. adjustment determines the proportion of output current linearity corresponding relationship. In main menu, when the menu number is 1, press button  to enter the submenu of basic settings. LCD indicates as follows:



Press button  to enter programming percentage of Min. level. Please refer to the aforementioned “character/ figure parameter editing method” in parameter editing method to edit the percentage value and distance value. After editing, press button  for confirmation, or press button  to quit the editing.

1.2. Max. adjustment: Max. adjustment is for measuring range setting. It together with Min. adjustment determines the proportion of output current linearity corresponding relationship. When LCD indicates menu number 1.1, press button  to enter Max. adjustment. LCD indicates as follows:




At the time, you can edit the Max. adjustment with button 





Note: Min. adjustment means the distance from bottom surface of process connection
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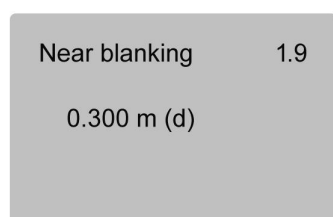
flange to tank bottom, which is 4mA. Max. adjustment means the distance from bottom surface of process connection flange to full level of medium, which is 20mA.





1.8. Range: measuring range must be set to get correct measuring result. When LCD indicates the menu number 1.7, press button  to enter Range setting menu. LCD indicates as follows:



Press button , the corresponding parameter turns black, press button  or button  for setting parameters, then press button  for confirmation.

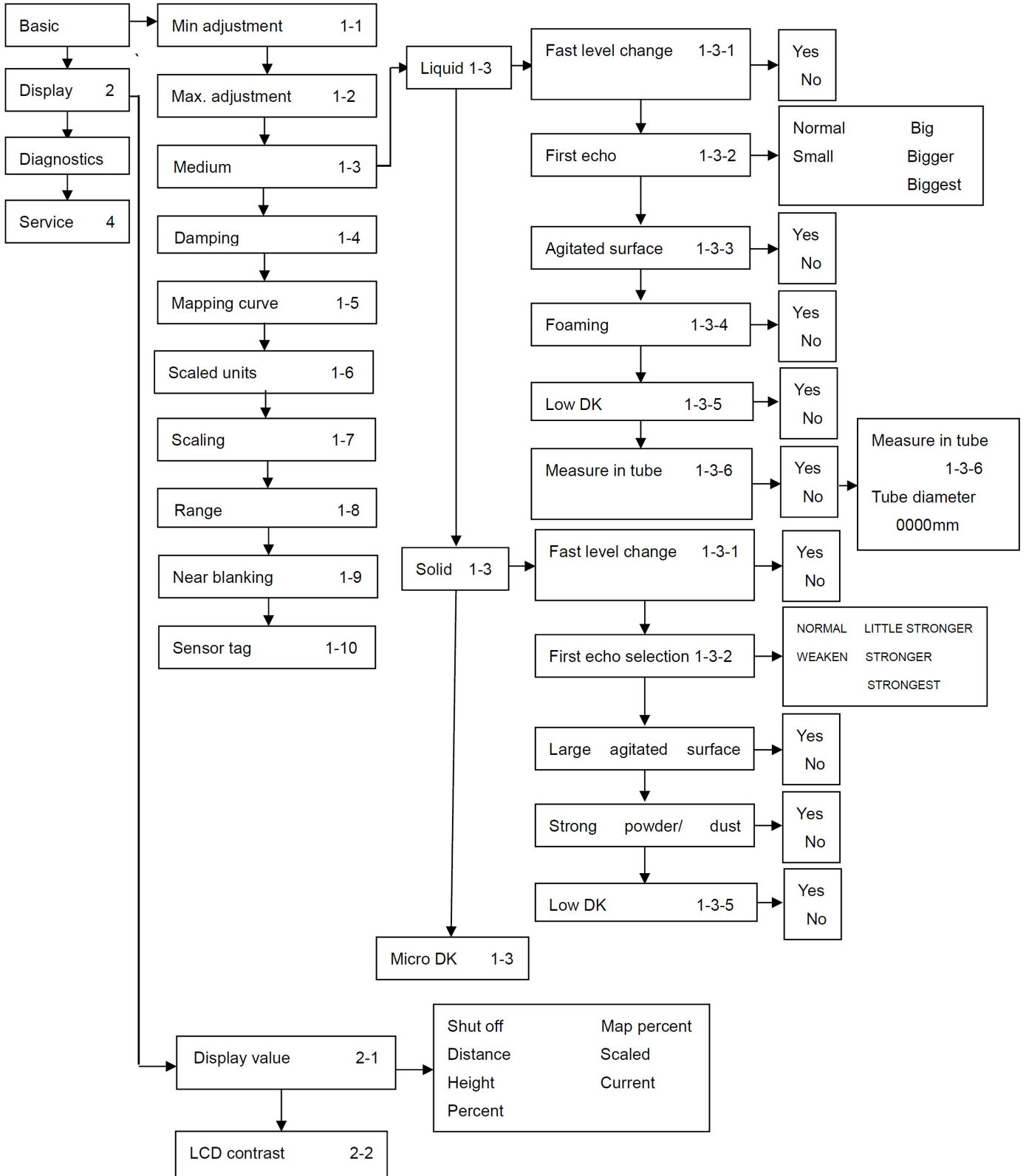
1.9. Near blanking: Near blanking setting can be used to avoid measurement error when a fixed obstacle which is close to the propagator interfere the measurement and meanwhile the maximum medium level is lower than the position of the obstacle. When LCD indicates menu number 1.8, press button  to enter Near blanking setting menu. LCD indicates as follows:

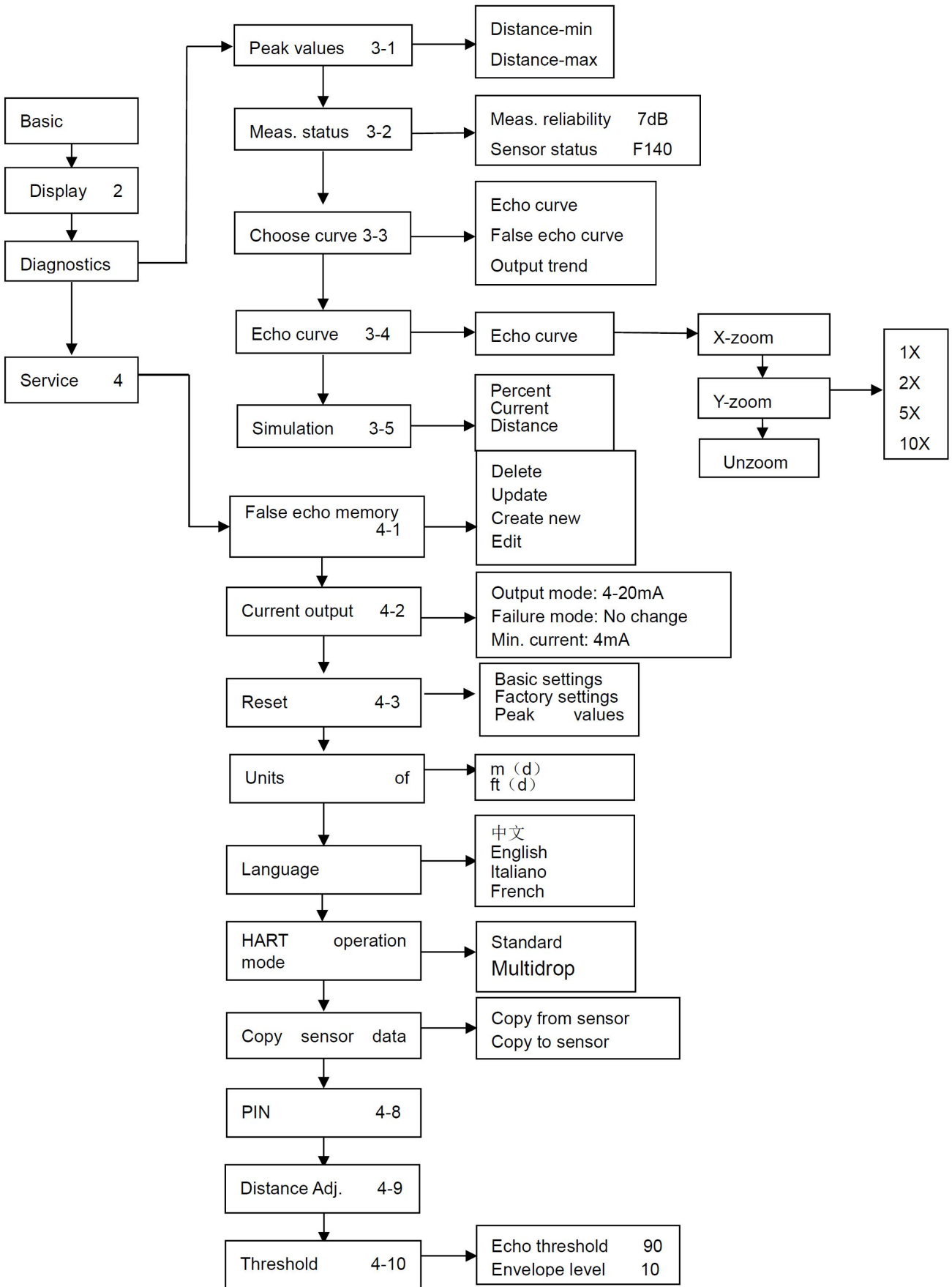


Press button , the corresponding parameter turns black. Press button  or button  for setting parameters, and press button  for confirmation.



Menu diagram







12. Transportation and Storage

The condition of transportation and storage of radar level transmitter should meet regulations of JB/T 9329 and rules as below:

Transportation of radar level transmitter should follow strictly product features and requirements in the instruction.

Radar level transmitters should be stored in a ventilated dry room between 0 to 40°C with relative humidity less than 80%, which cannot be stored with something corrosive. Radar level transmitters stored for long term should be sold and used after inspection and test.

13. Information requested when inquiry

Customer information

Company: _____ Contact person: _____
 Address: _____ Post code: _____
 Telephone: _____ Fax: _____
 Mobile phone: _____ E-mail: _____
 Date: _____

Certificate

- Standard type (non-explosion proof)
- Intrinsically type (Ex ia IIC T6 Ga)
- Intrinsically type +marine approval (Ex ia IIC T6 Ga)
- Explosion proof type (Ex d IIC T6 Gb)

Tank/container information:

Tank type: Storage tank Reaction tank
 Separation tank Marine tank

Tank structure:

Tank material : _____ Tank pressure : _____

Tank size:

Height of tank: _____ m Diameter of tank: _____ m

Top of a tank:

- Arch Flat top Open Conic top

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Bottom of a tank:

- Tapered
- Flat
- Inclined
- Arc

Installation position:

- Top
- Side
- Bypass pipe
- Wave guide pipe

Extension pipe (important information):

Extension pipe height (Length): mm,

Extension pipe diameter: mm

Measuring medium:

Medium name: Liquid Solid Mixed

Medium temperature: °C Dielectric constant:

Adhesive: Yes No Stirring: Yes No

Process connection:

Thread: G1½" 1½" NPT

Flange (DN=) Flange (ANSI=)

Power supply:

- 12V DC
- 24V DC
- 220V AC

Output:

- 4-20mA
- Hart
- RS485/Modbus

Display:

- With display and programmer
- Without display and programmer



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DANDONG VIRTUE RIVER TECHNOLOGY CO., LTD



德行天下 泽润四方

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Dandong Virtue River Technology Co., Ltd

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