Guided Wave Radar Level Meter

Instruction manual





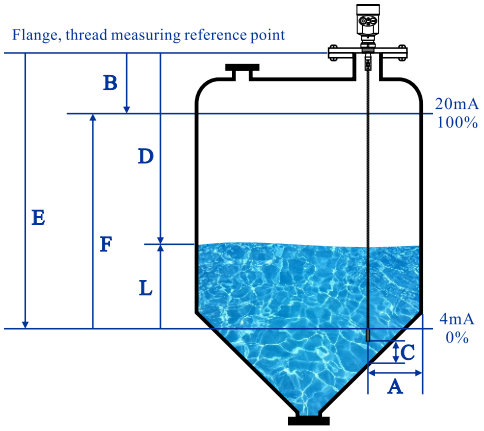


China

Guided Wave Radar Level Meter

Operating principle

The high frequency microwave pulse emitted by guided wave radar propagates along the detection module (steel cable or steel bar) and meets the measured medium. Due to the sudden change of dielectric constant the pulse energy is reflected and part of the pulse energy is reflected back. The time interval between the transmitting pulse and the reflection pulse is proportional to the distance of the medium to be measured.



A. Minimum distance from probe to tank wal
B. Blind area range
C. Probe bottom to the tank wall minimum distance
D. Distance from material surface
E. The distance of empty tank is
F. Full range
L. Real level

◎ Input

The input guided wave radar is a measuring instrument based on the principle of time travel. The radar wave runs at the speed of light and the operating time can be converted into object level signal through electronic components.
The probe sends out high frequency pulse and propagates along the cable or rod probe. When the pulse meets the surface of the material, it is reflected back and received by the receiver in the instrument, and the distance signal is converted into the level signal. The reflected pulse signal is transmitted along the cable or rod probe to the electronic circuit of the instrument, which is processed by the microprocessor to identify the echo generated by the microwave pulse on the surface of the material. The correct echo signal recognition is accomplished by the pulse software and distance from the material surface. The distance D is proportional to the time line T of the pulse: DX C × T / 2,
where C is the speed of light due to the distance E of the empty tank, then the object level L is: the L=E-D

◎ Output

Passes through the input empty tank height E (= zero point), The full tank height F (= full range) and some application parameters are set. The application parameters will automatically make the instrument adapt to the measuring environment, corresponding to the 4-20mA

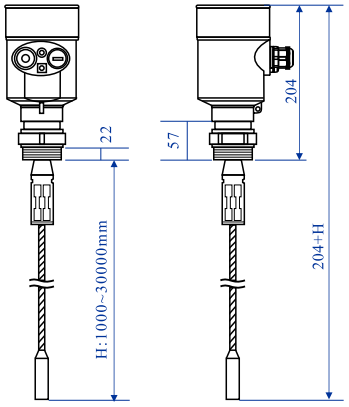
Design characteristics

◎ Guided wave radar level meter adopts advanced microwave processing technology and unique Echo Discovery echo processing technology. The contact measurement has high accuracy and more accurate measurement. At the same time, guided wave radar anti-adhesion, not affected by the medium temperature, adhesion and other external environment.
◎ The 70X series guided wave radar level meter is suitable for various complicated working conditions and applications. Such as: high temperature, high pressure and small dielectric constant, etc.
◎ Pulse working mode, the product emission power is very low, can be installed in a variety of metal, non-metallic containers, on the human body and ring No harm to the environment.

Technical parameters

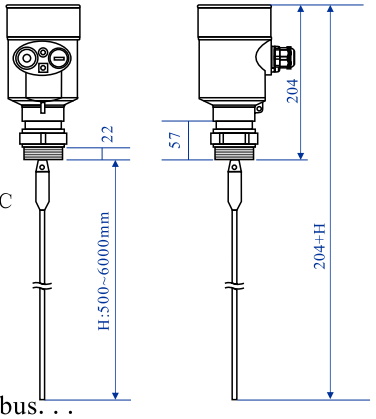
● VF/RD701

Applications: liquid, powder, solid particle
Antenna material: soft cable / 304/PTFE (optional)
Measurement range: 30m
Accuracy: ±1mm
power supply: 24VDC (two-wire, four-wire)
Dielectric temperature: -40 ~ 130 ℃, -40 ~ 250 ℃
Process pressure:-0.1~4.0MPa
Process connection: thread, flange (optional)
Protection grade: IP67
Explosion-proof grade: Exia Ⅱ CT6 (optional)
Signal output: 4. . . 20mA/HART/RS485/Modbus. . .



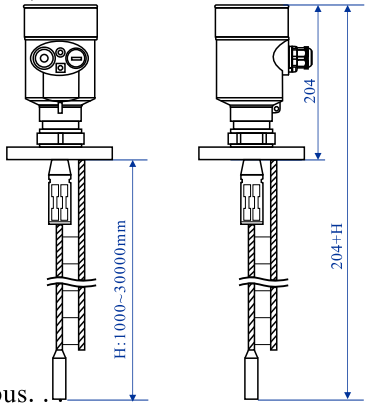
● VF/RD702

Application: no stirring liquid,
Powder material: rod / 304/PTFE (optional)
Measurement range: 6m
Accuracy: ±1mm
Power supply: 24VDC (two-wire, four-wire)
Dielectric temperature: -40 ~ 130 ℃, -40 ~ 250 ℃
Process pressure:-0.1~4.0MPa
Process connection: thread, flange (optional)
Protection grade: IP67
Explosion-proof grade: Exia Ⅱ CT6 (optional)
Signal output: 4. . . 20mA/HART/RS485/Modbus. . .



● VF/RD703

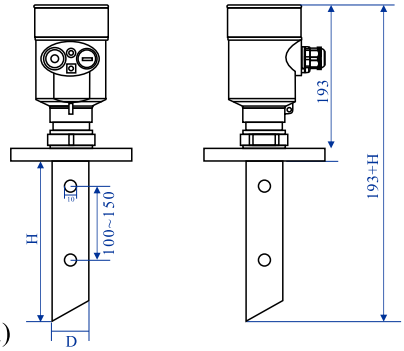
Applications: low dielectric constant liquid, powder, solid
Antenna material: double cable / 304 (optional)
Measurement range: 30m
Accuracy: ±1mm
Power supply: 24VDC (two-wire),
Medium temperature: -40 ~ 150 ℃
Process pressure:-0.1~4.0MPa
Process connection: flange (optional)
Protection grade: IP67
Explosion-proof grade: Exia Ⅱ CT6 (optional)
Signal output: 4. . . 20mA/HART/RS485/Modbus. . .



Technical parameters

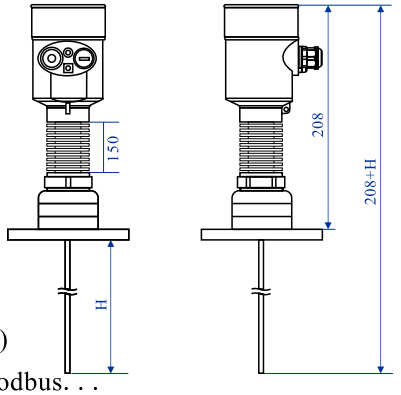
VF/RD704

Applications: liquid, especially for low dielectric constant
Sky wire material: 304 (optional)
Measurement range: 6m
Accuracy: ±1mm
Power supply: 24VDC (two-wire), Four wire)
Medium temperature: -40 ~ 130 ℃
Process pressure:-0.1~0.3MPa
Process connection: thread, Flange (optional)
Protection grade: IP67
Explosion-proof grade: Exia Ⅱ CT6 (optional)
Signal output: 4. . . 20mA/HART/RS485/Modbus. . .



VF/RD705

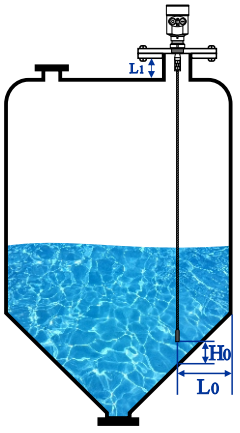
Applications: liquid, especially high temperature, high pressure
Antenna material: 304 (optional)
Measuring range: 15m
Measurement accuracy: ±1mm
Power supply: 24VDC (two-wire), Four wire)
Medium temperature: -40 ~ 500 ℃
Process pressure:-0.1~4.0MPa
Process connection: thread, Flange (optional)
Protection grade: IP67
Explosion-proof grade: Exia Ⅱ CT6 (optional)
Signal output: 4. . . 20mA/HART/RS485/Modbus. . .



Installation requirements

Standard installation method

- ◎ It is recommended to install 1 / 4 or 1 / 6 of the diameter of the container.
  Note: minimum distance from tank wall L0 ≥ 300mm H0 ≥ 50mm
- ◎ Stay away from feed and exit ports
- ◎ Away from limit switch, heating coil, agitator and other obstacles.
  Attention: the distance between probe and obstacle is more than 200mm.
- ◎ When the container is a metal tank, the radar does not touch the wall and bottom of the tank throughout the range.
- ◎ If the bottom of the container is conical, the radar can be mounted in the center of the tank roof.
- ◎ Installation of short pipe height shall be L1 ≤ 10 cm.



Electrical connections

◎ Supply Power

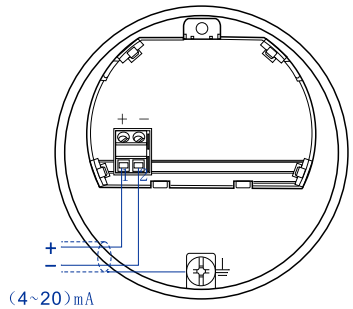
(4~20)mA/HART — The power supply and output current signals share a two-core shielded cable. See the technical data for the specific supply voltage range. For intrinsically safe type, a safety barrier must be added between the power supply and the meter.

(4~20)mA/HART — The power supply and the current signal are separated, and each uses a two-core shielded wire. See the technical data for the specific supply voltage range.

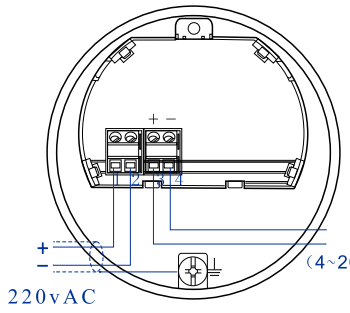
RS485/Modbus — The power supply and Modbus signals are separated, and each uses a two-core shielded cable. Seethe technical data for the specific supply voltage range.

◎ Connection method

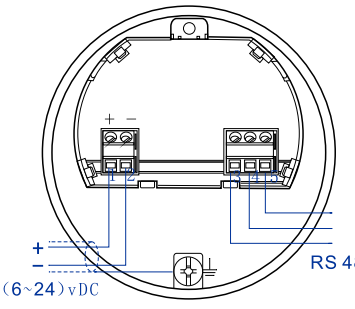
The 24VDC two-wire wiring diagram is as follows



The 220VAC four-wire wiring map is as follows



The RS485/Modbus wiring diagram is as follows

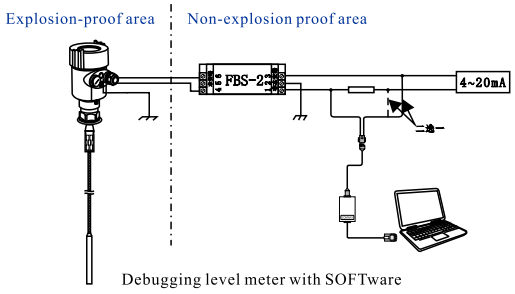


◎ Explosion-proof connection

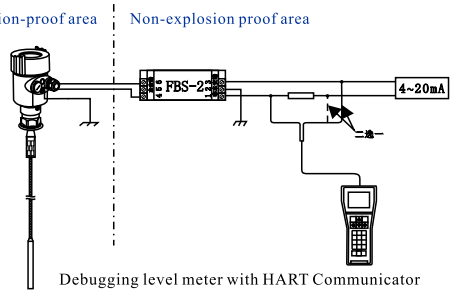
The explosion-proof form of this product is intrinsically safe. Explosion proof mark: Exia IIC T6. The internal safety guided wave radar level gauge is made of die-cast aluminum shell material, and the electronic component adopts a rubber seal structure, so as to ensure that the sparks generated when part of the circuit failure will not be released. This product is suitable for continuous level measurement of flammable medium below Exia IIC T 6 explosion proof grade.

This product should be used with a safety grid power supply. FBS- 2 safety gate is the associated equipment of the product, explosion-proof form is intrinsically safe. Explosion-proof sign: [Exia] IIC, supply voltage (21.6) V DC,) 26. 4) V DC, short circuit current is 135 mA, working current (4o 20) mA

All cables shall be shielded, with a maximum length of 500 m from the instrument to the safety fence. Distributed capacitance ≤ 0.1 μ F / km, distributed inductance ≤ 1mH/ km. The instrument must be connected to the earth when it is installed. No other associated equipment without explosion proof inspection shall be used.



Debugging level meter with SOFTware



Debugging level meter with HART Communicator

Model Selection

Selection example: VF/RD701-AC233CAPMA1000

Factory Number

VF/RD

Product model

701 range 30m
702 range 6m
703 range 30m
704 range 6m
705 range 15m

Antenna/Size/Material

A Cable antenna/ 304
B Cable antenna/ PTFE
C Rod antenna/ 304
D Rod antenna/ PTFE
E Double cable antenna / 304
F Double rod antenna / 304
G Guided tube antenna/ 304
Y Special custom typ

Process control

A Thread connection : G1½A
B Thread connection : G1A
C Thread connection : G¾A
D Thread connection : 1½NPT
E Flange connection : DN50
F Flange connection : DN80
G Flange connection : DN100
H Flange connection : DN150
I Flange connection : DN200
J Flange connection : DN250
Y Special Custom Type

Output/Supply Power

2 4~20mA/24VDC两线制
3 4~20mA/24VDC/Hart两线制
4 4~20mA/220VAC/Hart四线制
5 RS485/Modbus

Process temperature

1 −40~+130℃
2 −40~+150℃
3 −40~+250℃
4 −40~+400℃
Y Special Custom Type

Process pressure

1 −0.1~+0.3MPa
2 −0.1~+2.0MPa
3 −0.1~+4.0MPa
Y Special Custom Type

Sealing

V Viton
K Kalrez
Y Special Custom Type

Shell material/ Protection

A Aluminum/IP67
D Aluminum (Double chamber) /IP67
S SS 304/IP68
Y Special Custom Type

Explosion-proof grade

P Standard
L Exia IICT6
G Exd[ia] IICT6
Y Special Custom Type

Electrical Interface

M M20×1. 5
N 1/2″NPT
Y Special Custom Type

Display

A Belt
X Without

Rang (Unit : cm)

X . . . . . .

Application field

◎ Power plants: coal piles, raw coal bunkers, fuel bunkers, reservoirs, exhaust gas purification tanks, warehouse pumps, steam drums, ash storage, fuel tanks, etc.;
◎ Oilfield: crude oil storage tank, product oil storage tank, three-phase separator, settling tank, sewage tank, oil-water interface, drilling mud tank, etc.;
◎ Chemical industry: crude oil distillation tower, raw material warehouse, intermediate silo, reaction tank, ammonia water tank, solid silo, separator, asphalt storage tank, etc.;
◎ Metallurgy: blast furnace, ore silo, ore crusher, raw material warehouse, auxiliary material warehouse, alumina powder warehouse, electrolytic tank buffer tank, etc.;
◎ Water conservancy: canals, reservoirs, farmland irrigation, river level monitoring, flash flood warning, urban shackles, etc.;
◎ Cement: stone silo, raw silo, cement silo, coal powder silo, slag storage silo, commercial warehouse, etc.;
◎ Food: juice factory, milk factory, raw sugar storage tank, ketchup storage tank, brewery storage tank, etc.;
◎ Pharmaceutical: Chinese medicine storage tanks, separators, fermenters, etc.;
◎ Water treatment: reservoir, sewage pool, water treatment tank, sedimentation tank, deep well, drinking water network, etc.;
◎ Papermaking: raw material warehouse, storage tower, drying drum, chemical material storage warehouse, etc.;
◎ Others: quarry, coal mine, environmental protection, shipbuilding and other industries.

Appreciating Working Diagram

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