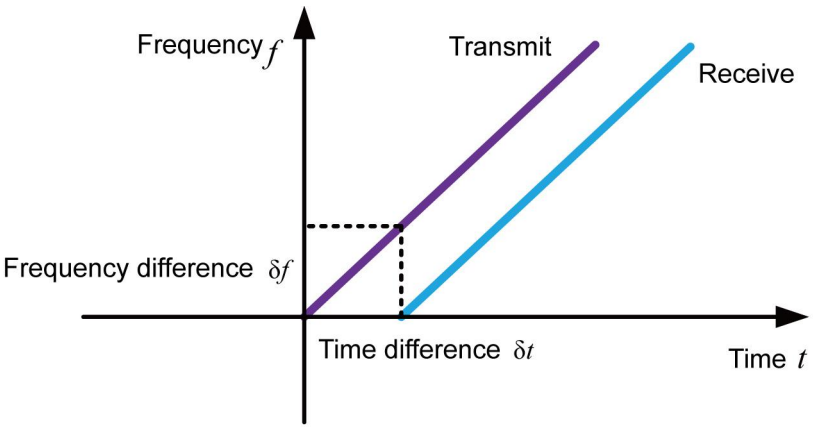
Product Manual | High Frequency Radar Level Transmitter

80G FM Radar Level Meter

Principle：

The general principle of the FM continuous wave radar level gauge is that the radar emits electromagnetic waves on the top of the tank, and the electromagnetic waves are received by the radar after being reflected by the medium. The frequency difference δf between the received signal and the transmitted signal is proportional to the distance R from the surface of the medium: R=C (speed)*δf (frequency difference)/2/K (frequency modulation slope). Because the speed of light C and the frequency modulation slope K are known, the frequency difference δf can be estimated to obtain the distance R from the radar installation position to the material surface, and then through the known total height of the tank, subtract the spatial distance from the radar to the material surface (referred to as Empty height) to get the height of the material level.



Time difference $\delta t=2R/C$

Frequency difference $\delta f=K\cdot\delta t$

⇒ Distance $R=C\cdot\delta f/2/K$

Note: K is the frequency modulation slope

Characteristic：

1. Millimeter-wave radar, with a measurement accuracy of up to ±1mm, and a minimum blind area of 0.1m.
2. The smaller antenna size satisfies the measurement of more working conditions.
3. A variety of lens antennas, smaller launch angle, more concentrated energy, stronger echo signal, under the same industrial and mining conditions, compared to
4. Other radar products have higher reliability.
5. With stronger penetrability, it can be used normally even if there is adhesion and condensation.
6. The dynamic signal range is larger, and the measurement of low dielectric constant medium is more stable.
7. A variety of measurement modes, the radar reaction time in the fast measurement mode is less than 1S.

Product Introducion

● FMW11S

Measuring medium: Liquid
Measuring range: 0.1m~10m
Process connection: Thread G¾"A / ¾"NPT
Flange ≥DN25
Process temperature: -40～100℃
Process pressure: -0.1～1.6 MPa
Antenna size:21mm lens antenna
Antenna material: PTFE
Accuracy: ±5mm
Protection level: IP67
Launch angle:14°
Power source: Two-wire system/DC24V
Four-wire system/AC220V
Six-wire system/DC12-24V
Shell:Aluminum/Plastic/Stainless steel
Signal output: Two-wire system/4...20mA/Hart protocol
Four-wire system/4...20mA/Hart protocol
Six-wire system/4...20mA/Hart protocol

● FMW11

Measuring medium: Liquid
Measuring range: 0.1m~30m
Process connection: Thread G½"A /1 ½"NPT
Flange ≥DN40
Process temperature: -40～80℃
Process pressure: -0.1～0.3 MPa
Antenna size:32mm lens antenna
Antenna material: PTFE
Accuracy: ±2mm
Protection level: IP67
Launch angle: 8°
Power source: Two-wire system/DC24V
Four-wire system/AC220V
Six-wire system/DC12-24V
Shell: Aluminum/Plastic/Stainless steel
Signal output: Two-wire system/4...20mA/Hart protocol
Four-wire system/4...20mA/Hart protocol
Six-wire system/4...20mA/Hart protocol

● FMW12

Measuring medium: Liquid
Measuring range: 0.1m~30m
Process connection:Flange ≥DN40
Process temperature: -40～100℃
Process pressure: -0.1～1.6 MPa
Antenna size:32mm len s antenna
Antenna material: PTFE
Accuracy: ±2mm
Protection level: IP67
Launch angle: 8°
Power source: Two-wire system/DC24V
Four-wire system/AC220V
Six-wire system/DC12-24V
Shell: Aluminum/Plastic/Stainless steel
Signal output:Two-wire system/4..20mA/Hart protocol
Four-wire system/4...20mA/Hart protocol
Six-wire system/4...20mA/Hart Protocol

● FMW13

Measuring medium: Liquid
Measuring range: 0.2m~30m/0.3~150m
Process connection:Flange ≥DN80 /Thread G3 A
Process temperature: -40～120℃
-40-110℃(Athread)
Process pressure: -0.1～1.0 MPa
Antenna size:76mm lens antenna
Antenna material: PTFE
Accuracy: ±2mm
Protection level: IP67
Launch angle: 3°
Power source: Two-wire system/DC24V
Four-wire system/AC220V
Six-wire system/DC12-24V
Shell: Aluminum/Plastic/Stainless steel
Signal output: Two-wire system/4..20mA/Hart protocol
Four-wire system/4...20mA/Hart protocol
Six-wire system/4...20mA/Hart Protocol

● FMW14

Measuring medium: Liquid
Measuring range: 0.1m~30m
Process connection:Flange ≥DN50
Process temperature: -40～200℃
Process pressure: -0.1～2.5 MPa
Antenna size:44mm lens antenna
Antenna material: PTFE
Accuracy: ±2mm
Protection level: IP67
Launch angle: 6°
Power source: Two-wire system/DC24V
Four-wire system/AC220V
Six-wire system/DC12-24V
Shell: Aluminum/Plastic/Stainless steel
Signal output:Two-wire system/4..20mA/Hart protocol
Four-wire system/4..20mA/Hart protocol
Six-wire system/4.20mA/Hart protocol

● FMW15

Measuring medium: Liquid
Measuring range: 0.3m~30m
Process connection:Flange ≥DN80
Process temperature: -40～200℃
Process pressure: -0.1～2.5 MPa
Antenna size:76mm lens antenna
Antenna material: PTFE
Accuracy: ±2mm
Protection level: IP67
Launch angle: 3°
Power source: Two-wire system/DC24V
Four-wire system/AC220V
Six-wire system/DC12-24V
Shell: Aluminum/Plastic/Stainless steel
Signal output: Two-wire system/4...20mA/Hart protocol
Four-wire system/4...20mA/Hart protocol
Six-wire system/4...20mA/Hart Protocol

● FMW21

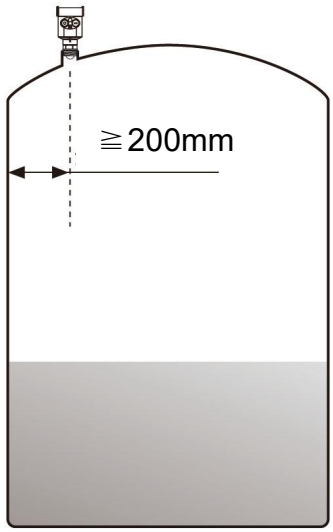
Measuring medium: Solid
Measuring range: 0.1m~30m/0.3~150m
Process connection:Flange ≥DN80
Process temperature: -40～80℃/-40～200℃
Process pressure: -0.1～0.3 MPa
Antenna size:76mm lens antenna
Antenna material: PTFE
Accuracy: ±5mm
Protection level: IP67
Launch angle: 3°
Power source: Two-wire system/DC24V
Four-wire system/AC220V
Six-wire system/DC12-24V
Shell: Aluminum/Plastic/Stainless steel
Signal output: Two-wire system/4...20mA/Hart protocol
Four-wire system/4...20mA/Hart protocol
Six-wire system/4...20mA/Hart Protocol

● FMW21S

Measuring medium: Solid
Measuring range: 0.1m~30m/ 0.3m~150m
Process connection:Flange ≥DN80
Process temperature: -40～80℃
Process pressure: -0.1～0.3 MPa
Antenna size:76mm lens antenna
Antenna material: PE
Accuracy: ±5mm
Protection level: IP67
Launch angle: 3°
Power source: Two-wire system/DC24V
Four-wire system/AC220V
Six-wire system/DC12-24V
Shell: Aluminum/Plastic/Stainless steel
Signal output: Two-wire system/4...20mA/Hart protocol
Four-wire system/4...20mA/Hart rotocol
Six-wire system/4...20mA/Hart protocol

- **General installation method**

➢ 1.Threaded installation (applicable to FMW11s/11/13)

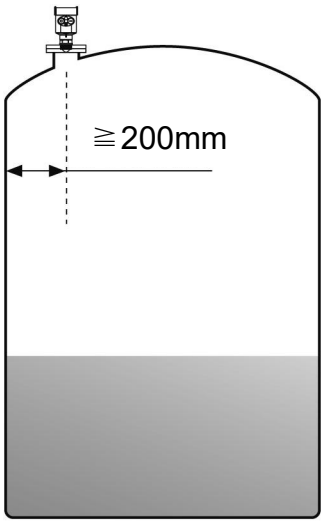


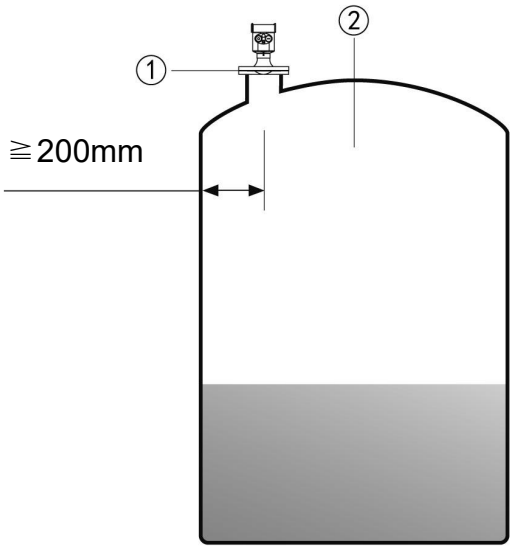
➢ 2.Flange installation

The meter should be installed at 1/4 or 1/6 of the diameter of the tank when using flange, and the minimum distance between the meter and the tank wall should be more than 200mm.

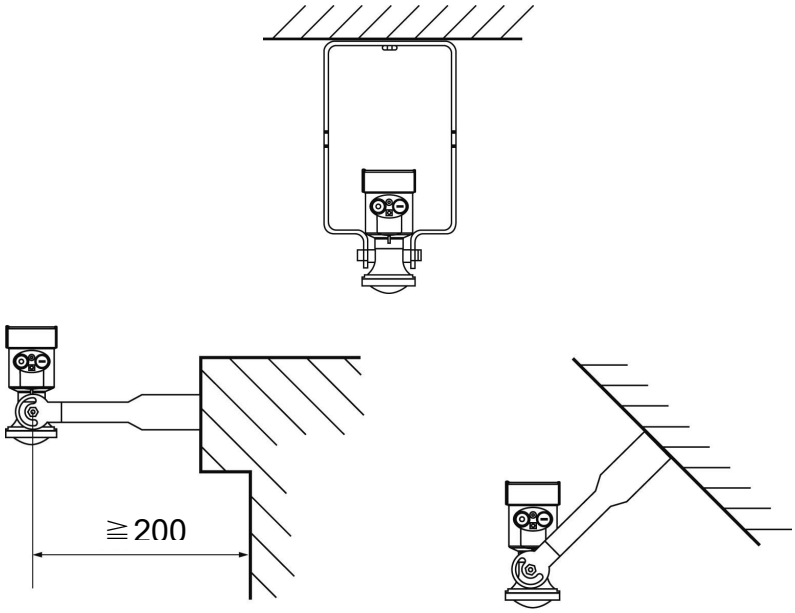
Note: ①Datum

②Container center or axis of symmetry



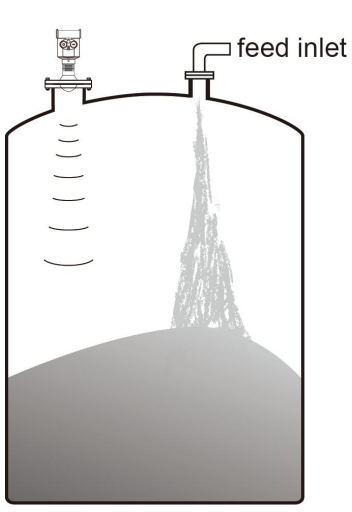


➢ 3.Lifting (selected according to specific installation conditions)

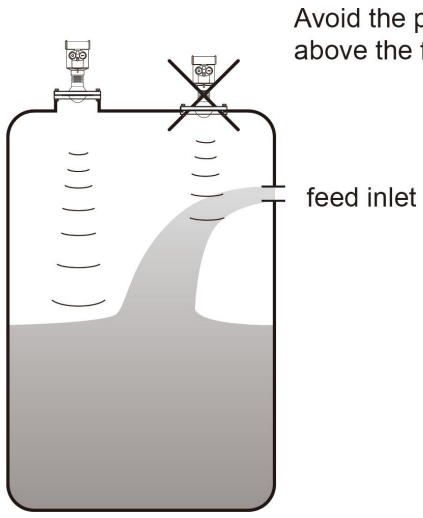


- **Installation requirements:**

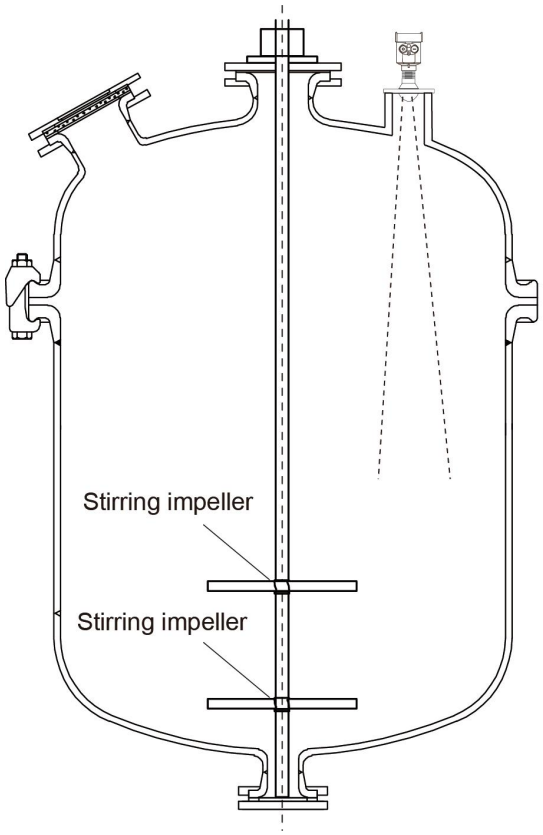
  When installing the instrument, avoid installing it above the material inlet, and try to avoid various objects that affect the signal, such as stirring paddles, etc.



Solid measurement

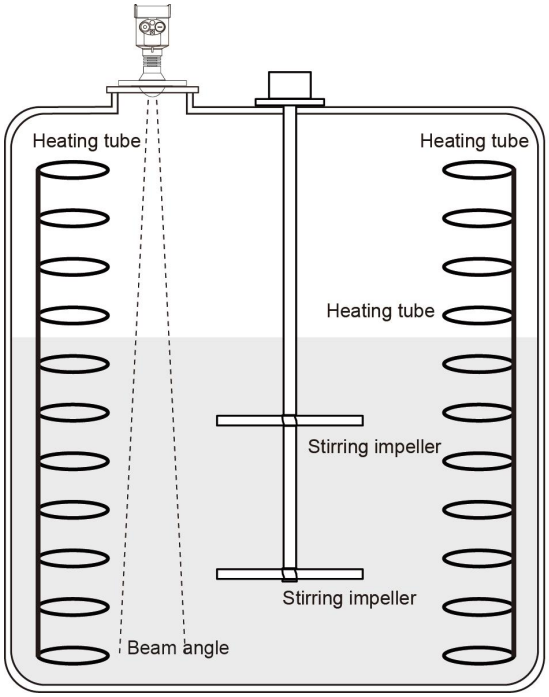


Measuring liquid



Remarks: Cannot be installed above the inlet, there can be no obstacles under the meter

Under extremely complex working conditions, the instrument can work normally with the radar installation point as the center and no obstacles in the area with a radius of 20 cm.



Extremely low emission angles ensure accurate measurements under extreme conditions

Selecting table:

1. Type							
1S	1	2	3	4	5	21	21S
11S	11	12	13	14	15	21	21S

2. Process connection			
T	F	C	X
Thread	Flange	Tri-Clamp	Customization

3. Connection material		
P1-SS304	P2-SS316L	X-Customization

4. Operating temperature		
V-(-40~+130℃)	K-(-40~+250℃)	X-Customization

5. Signal/power			
D1	D2	D3	X
4~20mA 24VDC (2 wires)	4~20mA 220VAC (4 wires)	4~20mA 24VDC (4 wires)	Customization

6. Communication	
H-HART	M-RS485/Modbus (4 wires)

7. Housing
L -Aluminum / IP67

8. Electric interface		
M	N	X
M20*1.5	1/2”NPT	Customization

9. Explosion proof		
N	i	e
N/A	Exia II CT6Ga	Exd II CT6Gb

HKD-RDFMW [1]-[2] [3] [4] [5] [6] [7] [8] [9]

Selecting table:

1. Type	
1	2
Liquid	Solid

2. Process connection			
T	F	C	X
Thread	Flange	Tri-Clamp	Customization

3. Connection material		
P1-SS304	P2-SS316L	X-Customization

4. Operating temperature		
V-(-40~+130℃)	K-(-40~+250℃)	X-Customization

5. Signal/power			
D1	D2	D3	X

4~20mA 24VDC (2 wires)	4~20mA 220VAC (4 wires)	4~20mA 24VDC (4 wires)	Customization

6. Communication	
H-HART	M-RS485/Modbus (4 wires)

7. Housing
L -Aluminum / IP67

8. Electric interface		
M	N	X
M20*1.5	1/2”NPT	Customization

9. Explosion proof		
N	i	e
N/A	Exia II CT6Ga	Exd II CT6Gb

10.Measuring range
直接写量程数值（单位 mm）

HKD-RDFMW 1 - 2 3 4 5 6 7 8 9 / 10

HKD-RD-1FP1VD1HLMN/20

HKD-RD-1FP1VD1HLMN/50

HKD-RD-1FP1VD1HLMN/100

HKD-RD-2FP1VD1HLMN/20

HKD-RD-2FP1VD1HLMN/50

HKD-RD-2FP1VD1HLMN/100

Instrava
INDUSTRIAL MEASUREMENT
& CONTROL INSTRUMENTS

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Manufacturer 1 : Zigong City, Sichuan Province, China

Manufacturer 2 : Chengdu City, Sichuan Province, China