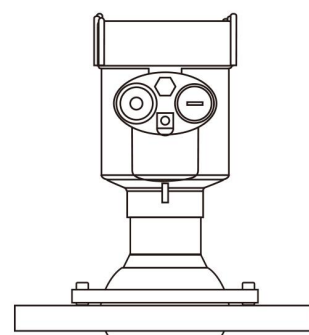
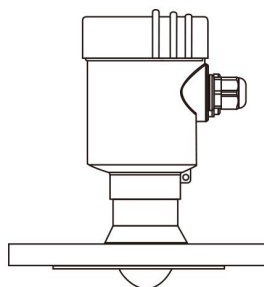
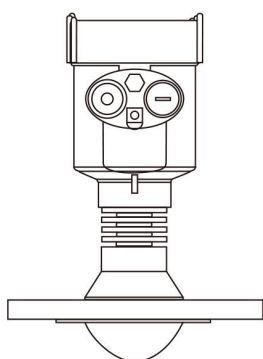
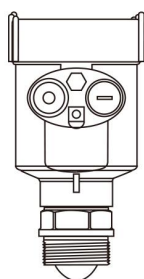




80G

FMW Radar Level Meter

Product Manual

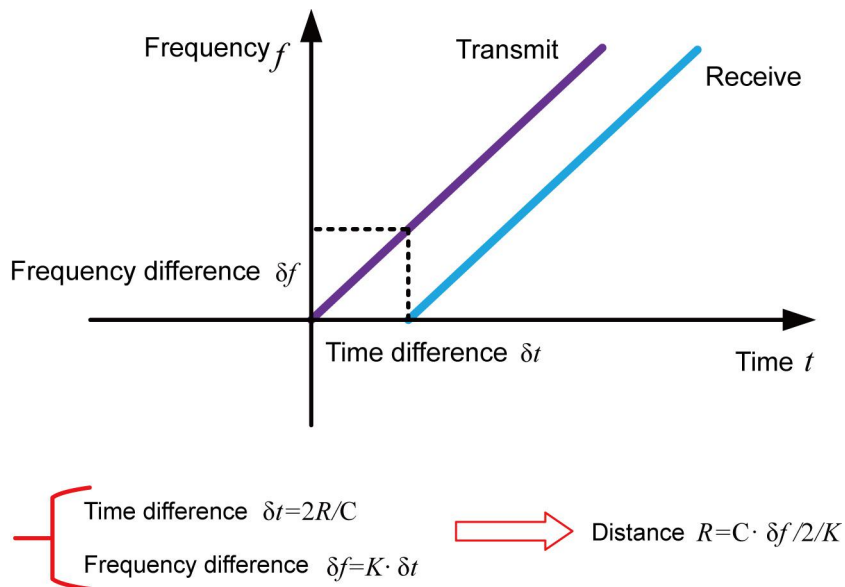
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80G FMW Radar Level Meter

Principle:

The general principle of the FMW 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: $R = C \cdot (\text{speed}) \cdot \delta f \text{ (frequency difference)} / 2 / K \text{ (frequency modulation slope)}$. 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.



Note: K is the frequency modulation slope

Characteristic:

1. Millimeter-wave radar, with a measurement accuracy of up to $\pm 1\text{mm}$, 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 Other radar products have higher reliability.
4. With stronger penetrability, it can be used normally even if there is adhesion and condensation.
5. The dynamic signal range is larger, and the measurement of low dielectric constant medium is more stable.
6. A variety of measurement modes, the radar reaction time in the fast measurement mode is less than 1S .

● Product Introduction

30301-FMW11S



Measuring medium: Liquid
Measuring range: 0.1m~10m
Process connection: Thread G $\frac{3}{4}$ "A / $\frac{3}{4}$ "NPT
Flange $\geq$ DN25
Process temperature: -40~100℃
Process pressure: -0.1~1.6 MPa
Antenna size: 21mm lens antenna
Antenna material: PTFE
Accuracy: ± 5 mm
Protection level: IP67
Center frequency: 80GHz
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

● 30301-FMW11



Measuring medium: Liquid
Measuring range: 0.1m~30m
Process connection: Thread G $\frac{1}{2}$ "A / 1 $\frac{1}{2}$ "NPT
Flange $\geq$ DN40
Process temperature: -40~80℃
Process pressure: -0.1~0.3 MPa
Antenna size: 32mm lens antenna
Antenna material: PTFE
Accuracy: ± 2 mm
Protection level: IP67
Center frequency: 80GHz
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

- **30301-FMW12**



Measuring medium: Liquid
 Measuring range: 0.1m~30m
 Process connection: Flange $\geq$ DN40
 Process temperature: -40~100℃
 Process pressure: -0.1~0.3 MPa
 Antenna size: 32mm lens antenna
 Antenna material: PTFE
 Accuracy: ± 2 mm
 Protection level: IP67
 Center frequency: 80GHz
 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

- **30301-FMW13**



Measuring medium: Liquid
 Measuring range: 0.2m~30m/0.3~150m
 Process connection: Flange $\geq$ DN80
 Process temperature: -40~120℃
 Process pressure: -0.1~1.0 MPa
 Antenna size: 76mm lens antenna
 Antenna material: PTFE
 Accuracy: ± 2 mm
 Protection level: IP67
 Center frequency: 80GHz
 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

● 30301-FMW14



Measuring medium: Liquid
Measuring range: 0.1m~30m
Process connection: Flange $\geq$ DN50
Process temperature: $-40\sim 200^{\circ}\text{C}$
Process pressure: $-0.1\sim 2.5\text{ MPa}$
Antenna size: 44mm lens antenna
Antenna material: PTFE
Accuracy: $\pm 2\text{mm}$
Protection level: IP67
Center frequency: 80GHz
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

● 30301-FMW15



Measuring medium: Liquid
Measuring range: 0.3m~30m
Process connection: Flange $\geq$ DN80
Process temperature: $-40\sim 200^{\circ}\text{C}$
Process pressure: $-0.1\sim 2.5\text{ MPa}$
Antenna size: 76mm lens antenna
Antenna material: PTFE
Accuracy: $\pm 2\text{mm}$
Protection level: IP67
Center frequency: 80GHz
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

- 30301-FMW21

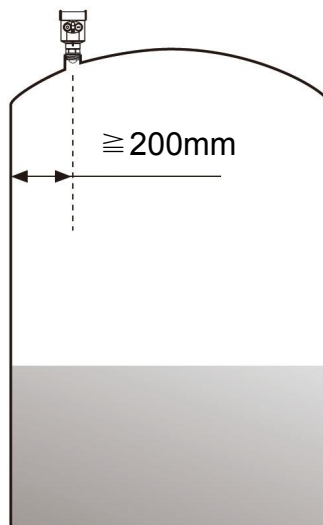


Measuring medium: Solid
 Measuring range: 0.1m~30m/0.3~150m
 Process connection: Flange $\geq$ DN80
 Process temperature: $-40\sim 80^{\circ}\text{C}$ / $-40\sim 120^{\circ}\text{C}$
 Process pressure: $-0.1\sim 0.3$ MPa
 Antenna size: 76mm lens antenna
 Antenna material: PTFE
 Accuracy: ± 5 mm
 Protection level: IP67
 Center frequency: 80GHz
 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

FMW Installation requirements:

- Installation method

- 1. Threaded installation (applicable to 30301-FMW11S, HBRD-30301-FMW11)

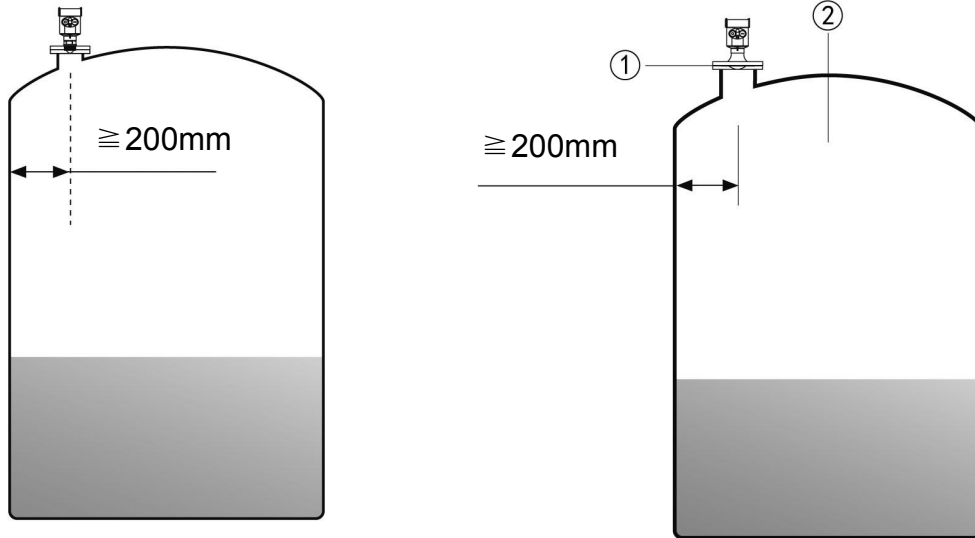


➤ 2. Flange installation

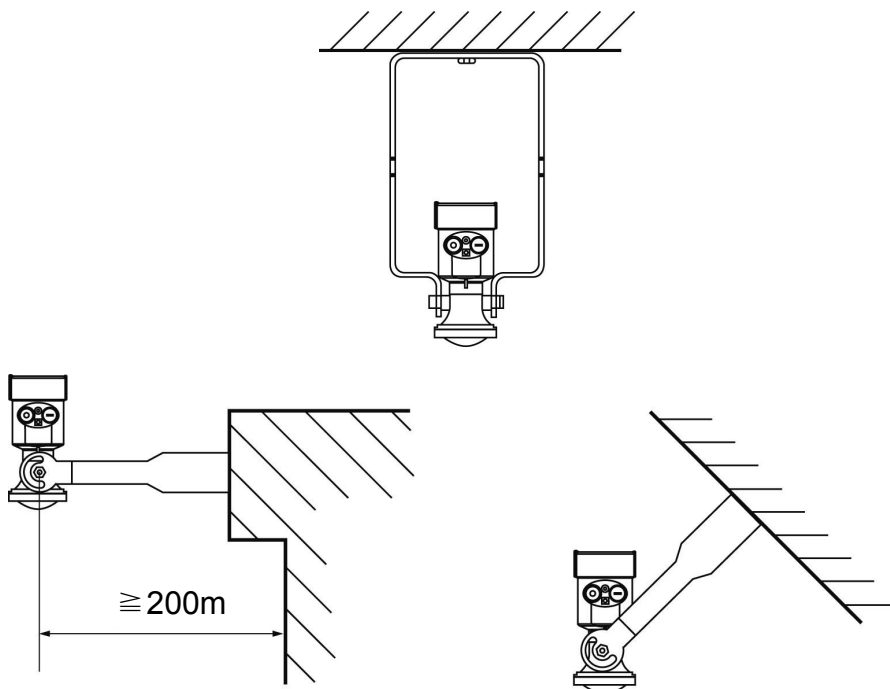
When using flange mounting, the minimum distance between the meter and the tank wall should be 200mm.

Note: ①Datum

②Container center or axis of symmetry

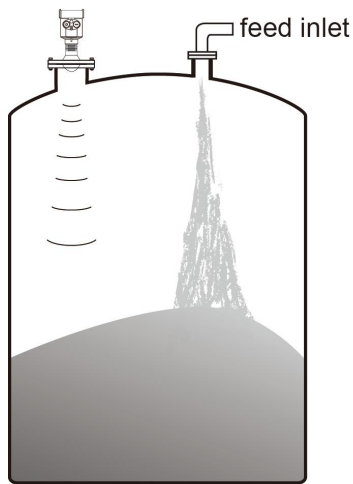


➤ 3. Lifting (selected according to specific installation conditions)

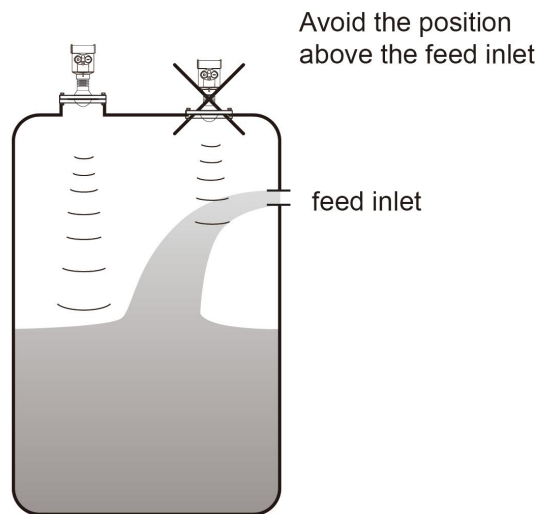


- **Installation requirements:**

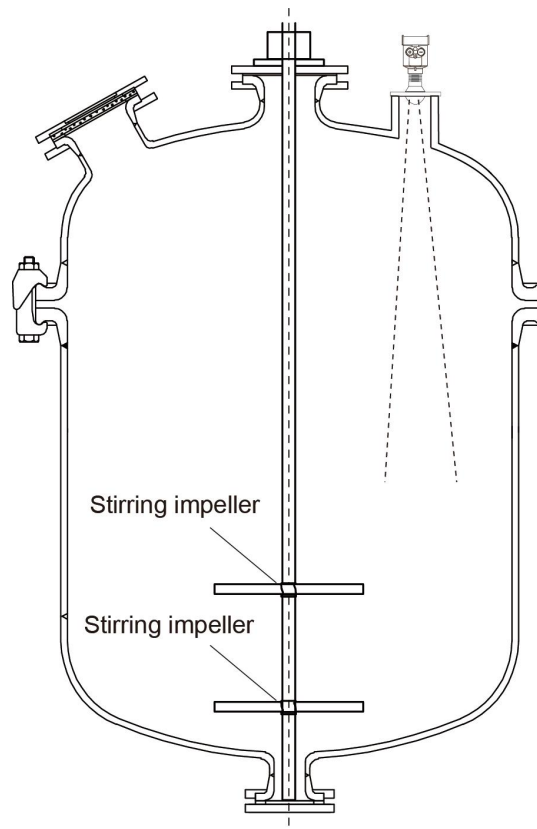
When installing the instrument, avoid installing it above the material inlet, and try to avoid various objects that affect the signal, such as stirring paddles, etc.



Solid measurement

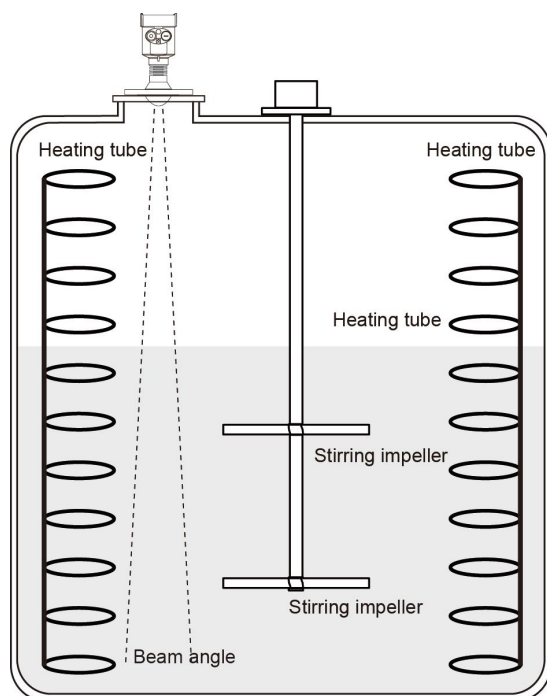


Measuring liquid



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.



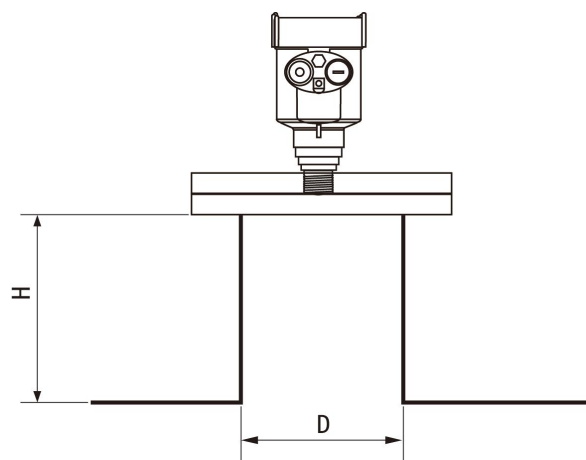
Extremely low emission angles ensure accurate measurements under extreme conditions

❖ Schematic diagram of installation and takeover

The maximum installation stub height H_{max} depends on the installation stub diameter D and the product launch angle.

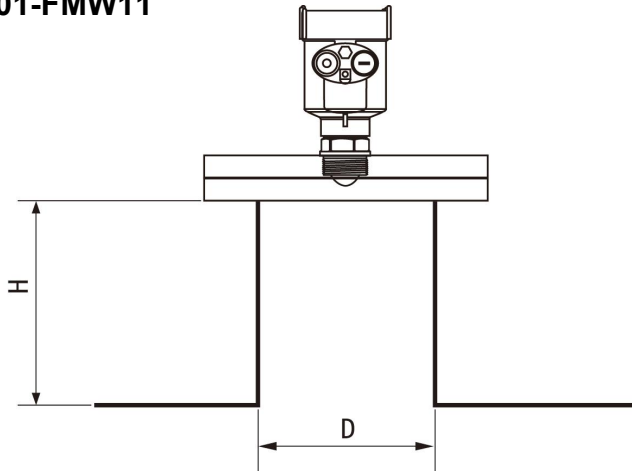
Long installation and takeover will affect radar performance.

➤ 30301-FMW11S



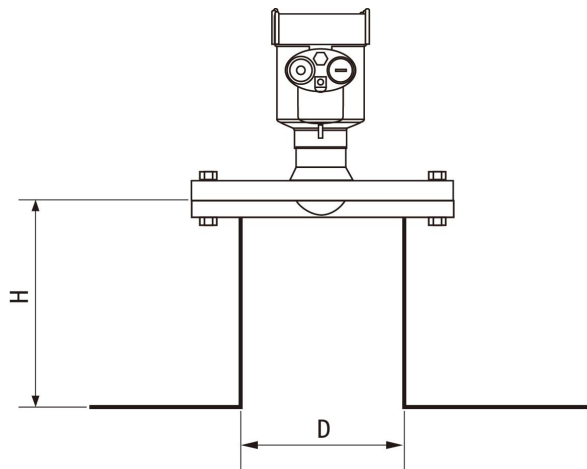
Flange	D	H max
DN25	25mm (2")	90mm
DN40	40mm (2.5")	140mm
DN50	50mm (3")	180mm
DN65	65mm (4")	240mm

➤ **30301-FMW11**



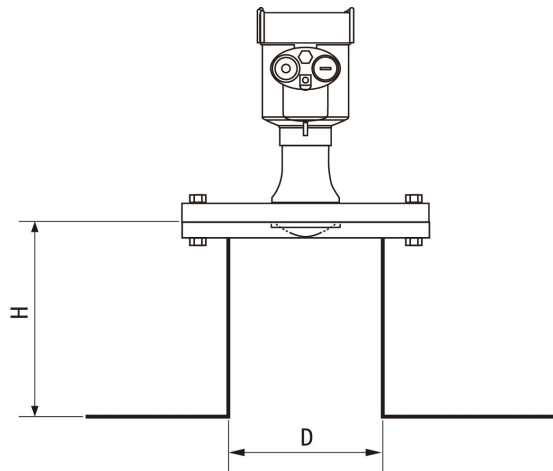
Flange	D	H max
DN40	40mm (1.5")	250mm
DN50	50mm (2")	300mm
DN65	65mm (2.5")	450mm
DN80	80mm (3")	550mm
DN100	100mm(4")	700mm
DN125	125mm(5")	900mm
DN150	150mm(6")	1100mm

➤ **30301-FMW12**



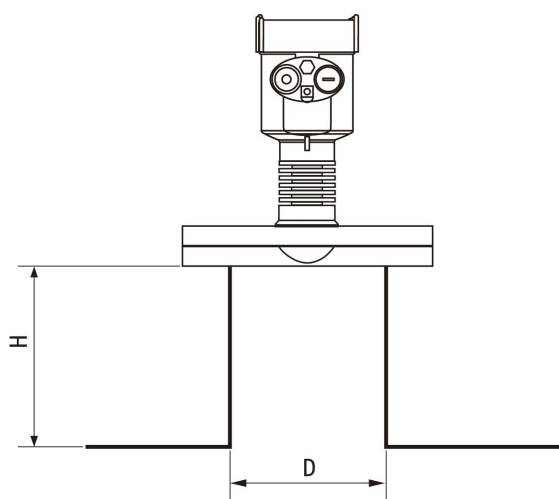
Flange	D	H max
DN40	40mm (1.5")	250mm
DN50	50mm (2")	300mm
DN65	65mm (2.5")	450mm
DN80	80mm (3")	550mm
DN100	100mm(4")	700mm
DN125	125mm(5")	900mm
DN150	150mm(6")	1100mm

➤ **30301-FMW13**



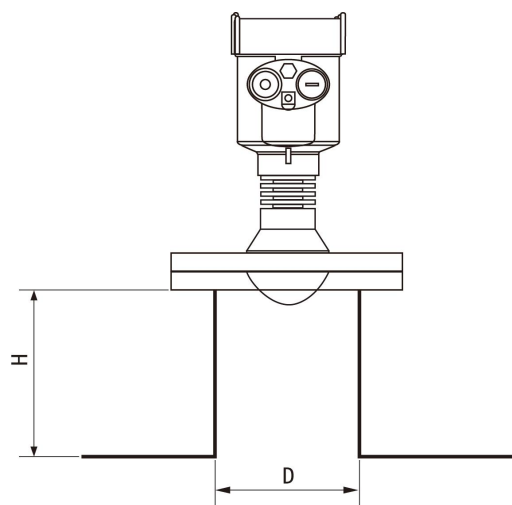
Flange	D	H max
DN80	80mm (3")	1000mm
DN100	100mm (4")	1200mm
DN125	125mm (5")	1500mm
DN150	150mm (6")	2000mm

➤ **30301-FMW14**



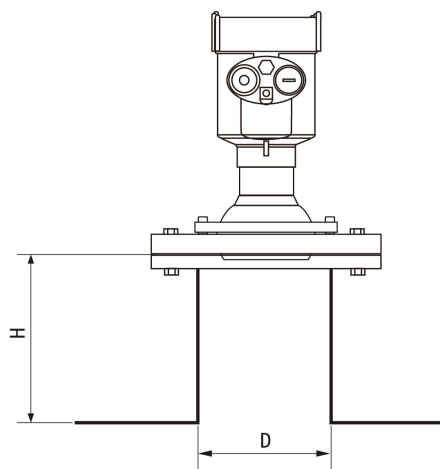
Flange	D	H max
DN50	50mm (2")	400mm
DN80	80mm (3")	650mm
DN100	100mm (4")	900mm
DN125	125mm (5")	1000mm
DN150	150mm (6")	1200mm

➤ **30301-FMW15**



Flange	D	H max
DN80	80mm (3")	1200mm
DN100	100mm (4")	1500mm
DN125	125mm (5")	2000mm
DN150	150mm (6")	2500mm

➤ **30301-FMW21**



Flange	D	H max
DN80	80mm (3")	1000mm
DN100	100mm (4")	1200mm
DN125	125mm (5")	1500mm
DN150	150mm (6")	2000mm

Electrical Connections

● Power Supply

(4~20) mA (2-wire)

The power supply and the output current signal share a two-core shielded cable. See technical data for specific power supply voltage range.

(4~20) mA (4/6-wire)

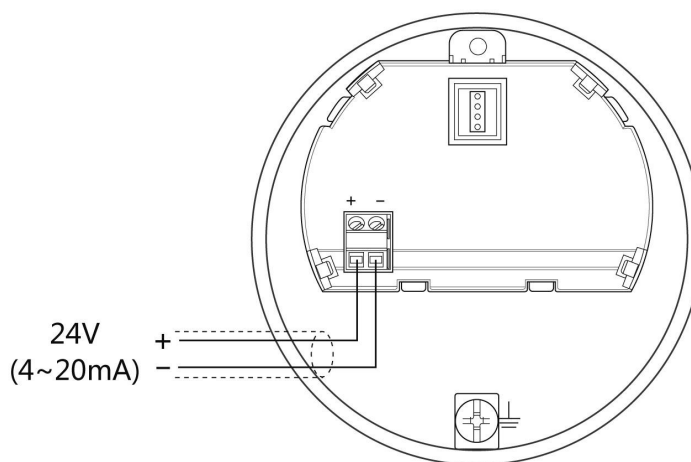
The power supply needs to be supplied separately, and the power supply and the current signal use a four-core shielded cable (the current signal and the RS485 interface can be output at the same time, and the output needs to use a six-core shielded cable).

Modbus-RS485

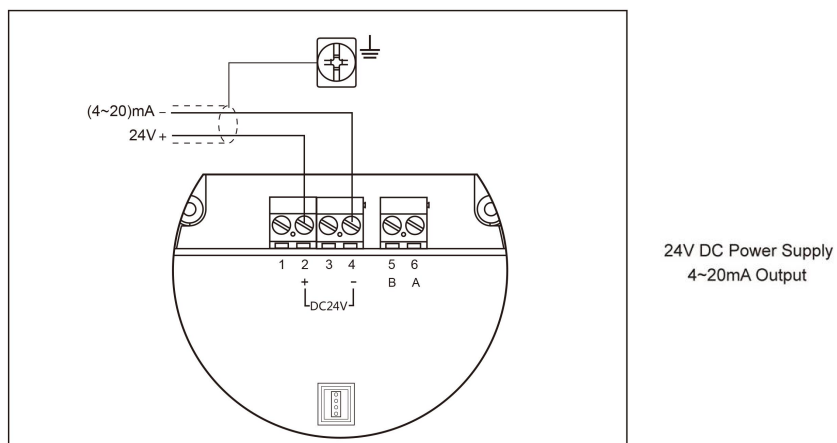
The power supply needs to be supplied separately, and the power supply and the digital use a four-core shielded cable (the current signal and the RS485 interface can be output at the same time, and the output needs to use a six-core shielded cable).

● Connection method

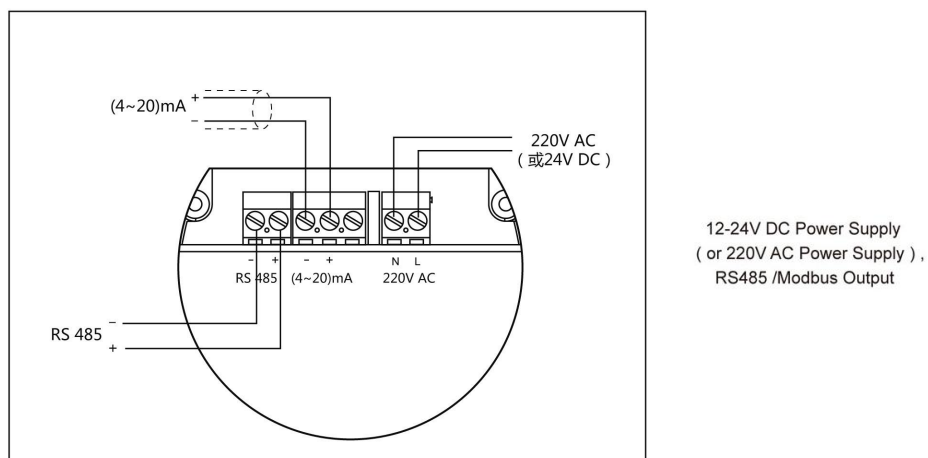
➤ 24V two-wire system wiring diagram is as follows:



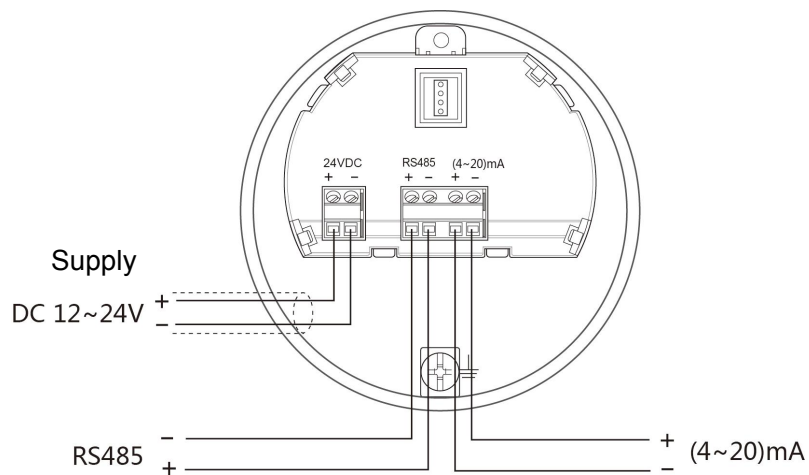
- Two-wire and two-chamber wiring diagram shown on the side is as follows:



- Four-wire, two-room wiring diagram:



six-wire wiring diagram of the four-wire system is as follows:



● Safety guidance

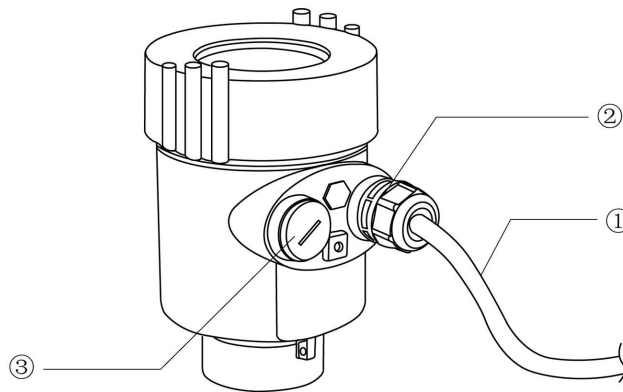
Please observe the requirements of the local electrical installation regulations!

Please observe local regulations regarding the health and safety of personnel. All operations on the electrical components of the instrument must be performed by trained professionals.

Please check the nameplate of the instrument to ensure that the product specifications meet your requirements. Make sure that the supply voltage is the same as that on the instrument nameplate.

● Protection level

This instrument fully meets the requirements of protection grade IP66/67. Please ensure the waterproof performance of the cable gland. As shown below:



How to ensure that the installation meets the requirements of IP67:

Make sure the seal head is not damaged.

Make sure the cable is not damaged.

Make sure that the cable you are using meets the electrical connection specifications.

Before entering the electrical interface, bend the cable down to ensure that water does not flow into the housing, see ①

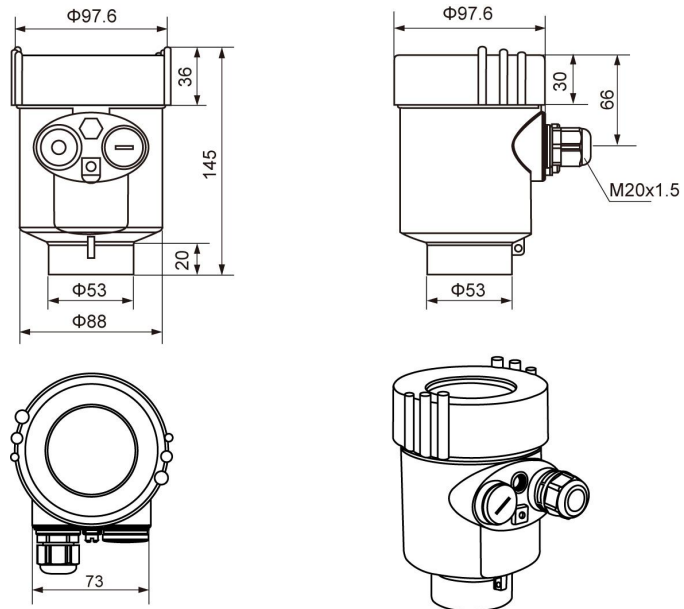
Please tighten the cable gland, see ②

Please block the unused electrical interface with a blind plug, see ③

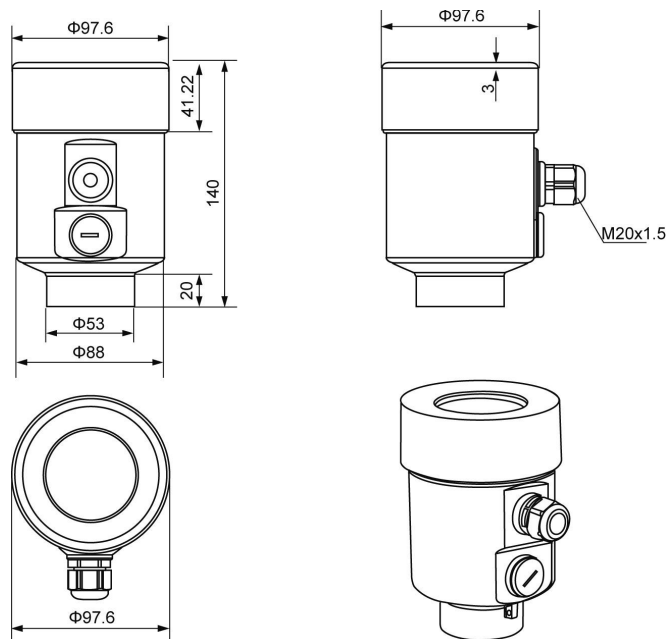
Structure Size:

- **The outer casing size (unit: mm)**

- **Aluminum case:**

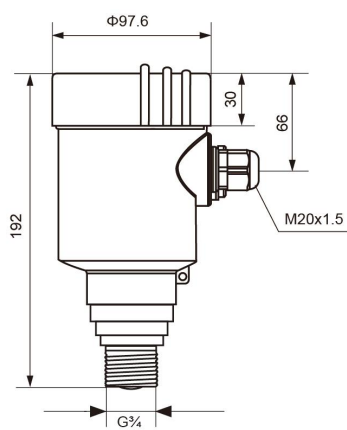
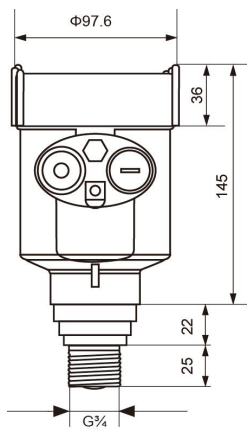


- **Stainless steel case:**

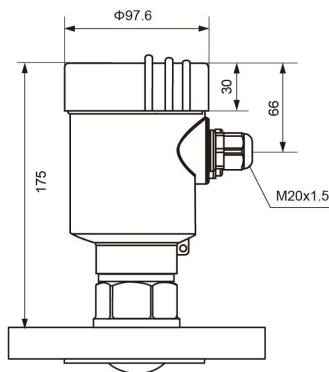
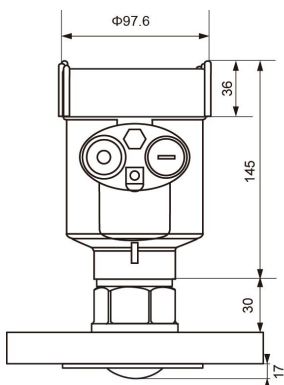
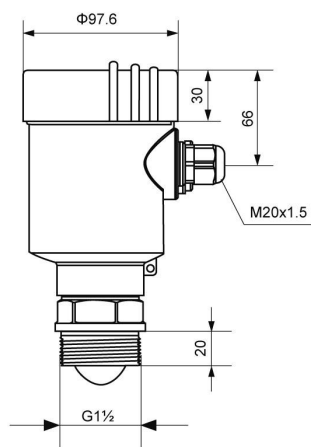
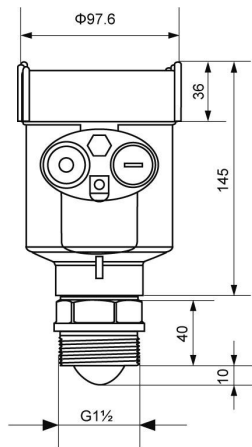


● **Product Size** (unit: mm)

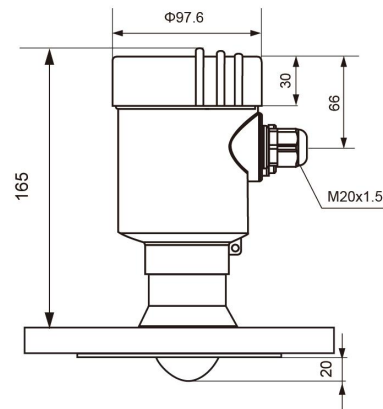
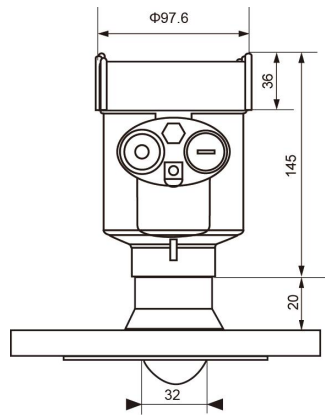
➤ **30301-FMW11S**



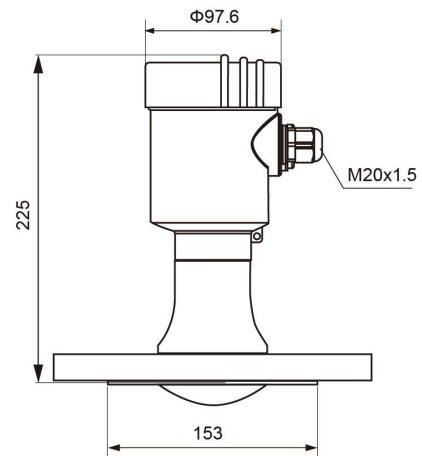
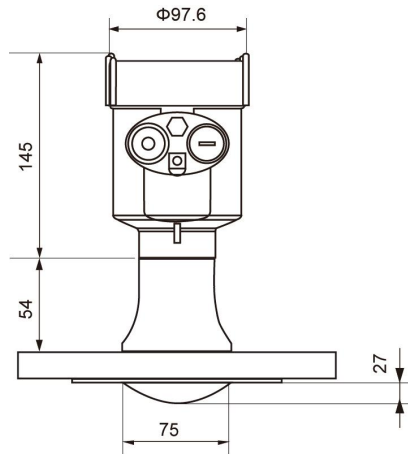
30301-FMW11



30301-FMW12

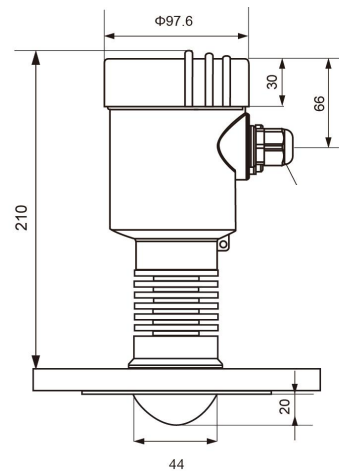
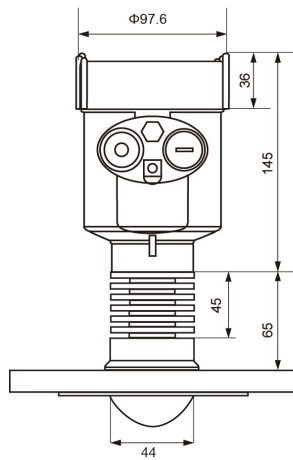


30301-FMW13

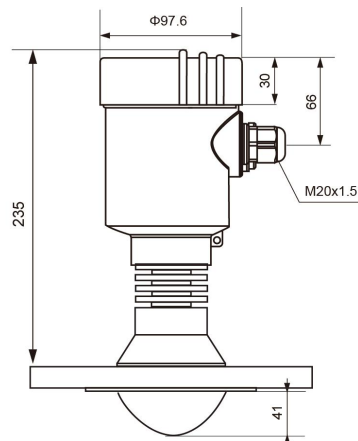
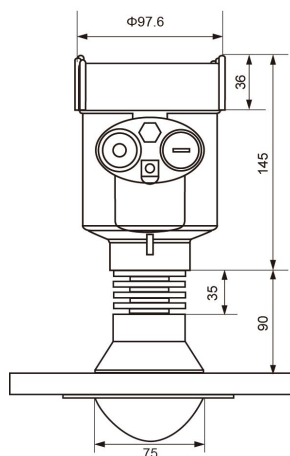


This date varies with flange size

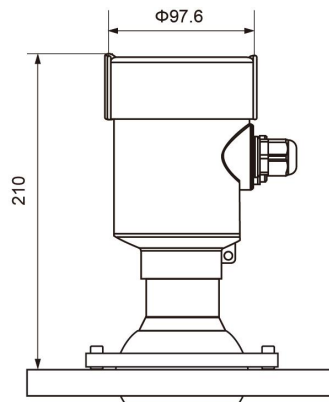
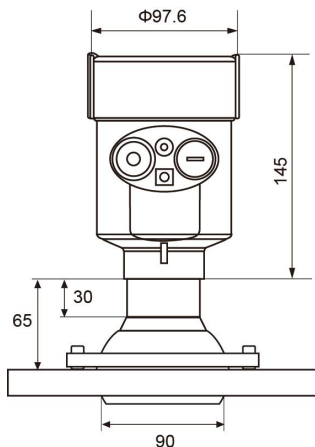
30301-FMW14



30301-FMW15



30301-FMW21



FMW Technical Parameters:

Process Connection

Flange / material PP, PTFE, stainless steel,
stainless steel +PTFE flanging

Antenna Material

PTFE

The outer shell

Cast aluminum / stainless steel / plastic ABS

The seal between the shell and the shell cover

Silicone rubber

Casing window

Polycarbonate

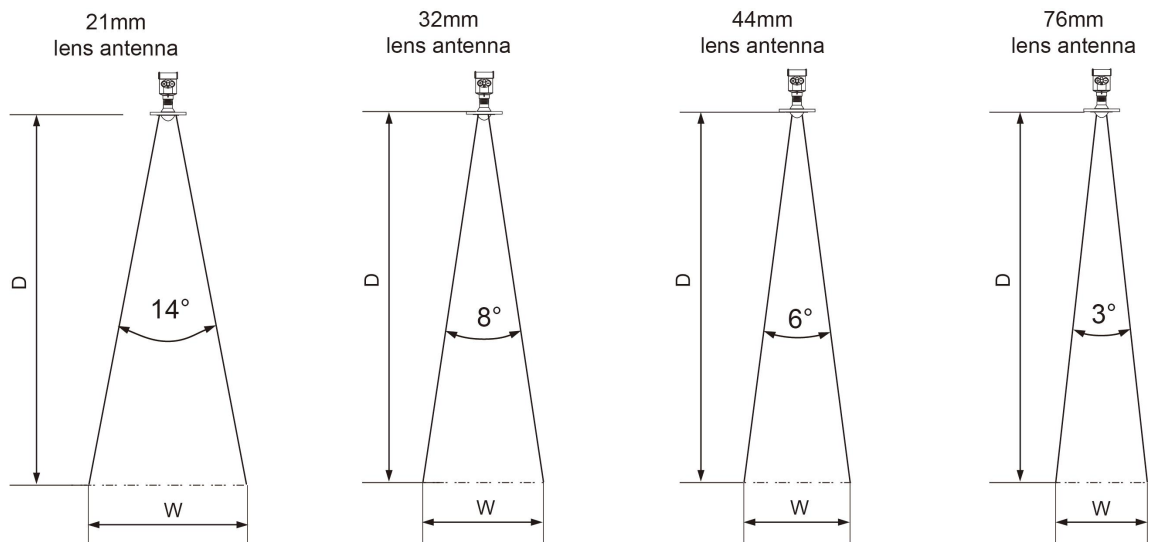
The ground terminal

Stainless steel

Power supply pressure

2-wire system (single cavity/double cavity)

(15-28) V DC



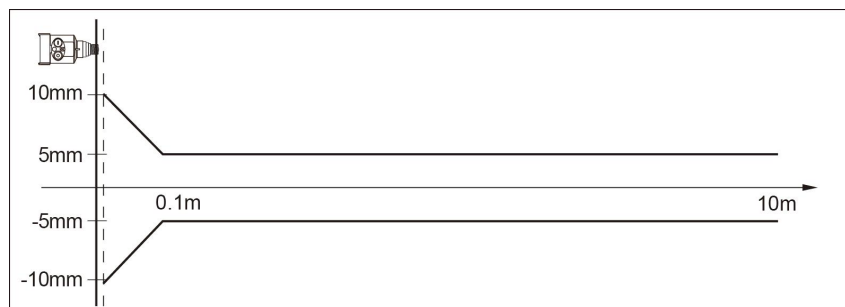
Lens antenna diameter	Φ21mm Lens antenna	Φ32mm Lens antenna	Φ44mm Lens antenna	Φ78mm Lens antenna
Beam angle	14°	8°	6°	3°

The larger the antenna size, the smaller the beam Angle alpha, the less the interference echo will be generated.

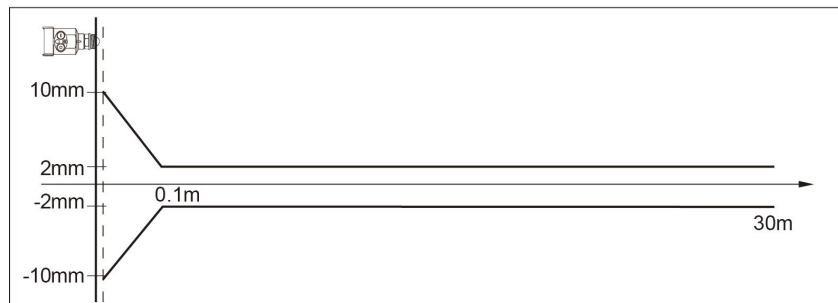
For more accurate measurements, avoid installing any internal devices (such as limit switches, temperature sensors, bases, vacuum rings, heating coils, baffles, etc.) within the signal beam range.

● Gauge linear

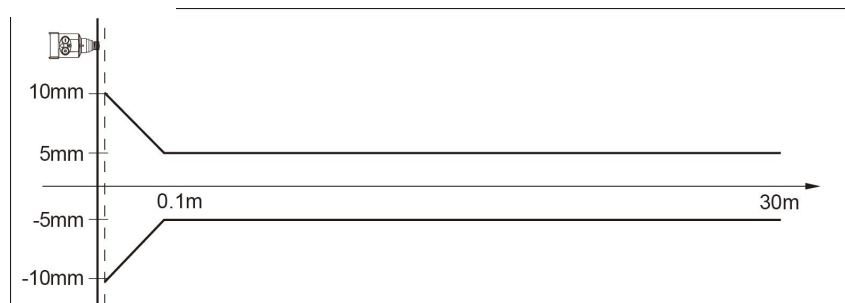
FMW-11S



FMW-11/FMW-12/FWM-13/FWM-14/FMW-15



FMW-21



80G FMW Product Model Selection:

FMW11S

License

- P Standard (Non-explosion-proof)
- I Intrinsically safe (Exia IIC T6 Ga)
- D Intrinsically safe+Flameproof (Exd ia IIC T6 Gb)

Process Connection / Material

- 1 G³/₄Athread / ³/₄NPT

Flange option / material

Specification / Code / Material	PP	PTFE	Stainless steel304	Stainless steel316L
DN25	P1	F2	G1	S1
DN40	P2	F2	G2	S2

DN50	P3	F3	G3	S3	
DN65	P4	F4	G4	S4	

Antenna Type / Material

A 21mm filled lens antenna /PTFE

B 21mm filled lens antenna /PEK

Sealing / process temperature

A FKM/ (-40-100℃)

B PEK/ (-40-150℃)

The Electronic Unit

1 (4~20) mA/HART protocol 24VDC 2-wire

2 (4~20) mA/HART protocol 220VAC 4-wire

3 (4~20) mA+RS485/Modbus protocol 12- 24VDC 6-wire

Shell material/protection grade

A Cast aluminum / Single chamber / IP67

B Cast aluminum / Double chamber / IP67

C Cast aluminum / Double cavity side view / IP67

D Plastic ABS / Single chamber / IP65

E Stainless steel 304 / Single chamber / IP67

Cable Line

M M20×1.5

N ½" NPT

X Special customization

Display programming

A Programming with display

B With display programming
/ Bluetooth communication

C Without

FMW11

License

- P Standard (Non-explosion-proof)
I Intrinsically safe (Exia IIC T6 Ga)
D Intrinsically safe+Flameproof (Exd ia IIC T6 Gb)

Process Connection / Material

- 1 G1½A thread
2 Flange≥DN40 (Stainless steel+PTFE)
X Special customization

Flange option / material

Specification / Code / Material	PP	PTFE	Stainless steel304+PTFE	Stainless steel316L+PTFE
DN40	-	-	G1	S1
DN50	P2	F2	G2	S2
DN65	P3	F3	G3	S3
DN80	P4	F4	G4	S4
DN100	P5	F5	G5	S5
DN125	P6	F6	G6	S6
DN150	P7	F7	G7	S7

Antenna Type / Material

- A 32mm filled lens antenna /PTFE

Sealing / process temperature

- A FKM/ (-40-80℃)
B FKM/ (-40-100℃)

The Electronic Unit

- 1 (4~20) mA/HART protocol 24VDC 2-wire
2 (4~20) mA/HART protocol 220VAC 4-wire
3 (4~20) mA+RS485/Modbus protocol 12- 24VDC 6-wire

Shell material/protection grade

- A Cast aluminum / Single chamber / IP67

- B Cast aluminum / Double chamber / IP67
- C Cast aluminum / Double cavity side view / IP67
- D Plastic ABS / Single chamber / IP65
- E Stainless steel 304 / Single chamber / IP67

Cable Line

- M M20×1.5
- N ½" NPT
- X Special customization

Display programming

- A Programming with display
- B With display programming
/ Bluetooth communication
- C Without

FMW12

License

- P Standard (Non-explosion-proof)
- I Intrinsically safe (Exia IIC T6 Ga)
- D Intrinsically safe+Flameproof (Exd ia IIC T6 Gb)

Process Connection / Material

- 1 G1½A thread/304
- 2 Flange ≥ DN40 (Stainless steel + PTFE)
- X Special customization

Flange option / material

Specification / Code / Material	PP	PTFE	Stainless steel304+PTFE	Stainless steel316L+PTFE
DN40	-	-	G1	S1

DN50	P2	F2	G2	S2
DN65	P3	F3	G3	S3
DN80	P4	F4	G4	S4
DN100	P5	F5	G5	S5
DN125	P6	F6	G6	S6
DN150	P7	F7	G7	S7

Antenna Type / Material

A 32mm filled lens antenna /PTFE

Sealing / process temperature

A FKM/ (-40-100℃)

The Electronic Unit

- 1 (4~20) mA/HART protocol 24VDC 2-wire
- 2 (4~20) mA/HART protocol 220VAC 4-wire
- 3 (4~20) mA+RS485/Modbus protocol 12- 24VDC 6-wire

Shell material/protection grade

- A Cast aluminum / Single chamber / IP67
- B Cast aluminum / Double chamber / IP67
- C Cast aluminum / Double cavity side view / IP67
- D Plastic ABS / Single chamber / IP65
- E Stainless steel 304 / Single chamber / IP67

Cable Line

- M M20×l. 5
- N ½" NPT
- X Special customization

Display programming

- A Programming with display
- B With display programming
/ Bluetooth communication
- C Without

FMW13

License

- P Standard (Non-explosion-proof)
- I Intrinsically safe (Exia IIC T6 Ga)
- D Intrinsically safe+Flameproof (Exd ia IIC T6 Gb)

Process Connection / Material

- 1 G3.5A Thread
- 2 Flange≥DN80 (Stainless steel + PTFE)
- X Special customization

Flange option / material

Specification / Code / Material	PP	PTFE	Stainless steel304+PTFE	Stainless steel316L+PTFE
DN80	P4	F4	G4	S4
DN100	P5	F5	G5	S5
DN125	P6	F6	G6	S6
DN150	P7	F7	G7	S7

Antenna Type / Material

- A 76mm filled lens antenna /PTFE

Sealing / process temperature

- A FKM/ (-40-110℃)
- B EPDM/ (-40-110℃)
- Y Special customization

The Electronic Unit

- 1 (4~20) mA/HART protocol 24VDC 2-wire
- 2 (4~20) mA/HART protocol 220VAC 4-wire
- 3 (4~20) mA+RS485/Modbus protocol 12- 24VDC 6-wire

Shell material/protection grade

- A Cast aluminum / Single chamber / IP67
- B Cast aluminum / Double chamber / IP67

C Cast aluminum / Double cavity side view / IP67

D Plastic ABS / Single chamber / IP65

E Stainless steel 304 / Single chamber / IP67

Cable Line

M M20×I. 5

N ½" NPT

X Special customization

Display programming

A Programming with display

B With display programming
/ Bluetooth communication

C Without

FMW14

License

P Standard (Non-explosion-proof)

I Intrinsically safe (Exia IIC T6 Ga)

D Intrinsically safe+Flameproof (Exd ia IIC T6 Gb)

Process Connection / Material

1 Flange ≥ DN50 (Stainless steel + PTFE)

X Special customization

Flange option / material

Specification / Code / Material	PP	PTFE	Stainless steel304+PTFE	Stainless steel316L+PTFE
DN50	-	-	G2	S2
DN65	-	-	G3	S3
DN80	-	-	G4	S4
DN100	-	-	G5	S5
DN125	-	-	G6	S6
DN150	-	-	G7	S7

Antenna Type / Material

A 44mm filled lens antenna/PTFE

Sealing / process temperature

B FKM/ (-40-200℃)

The Electronic Unit

- 1 (4~20) mA/HART protocol 24VDC 2-wire
- 2 (4~20) mA/HART protocol 220VAC 4-wire
- 3 (4~20) mA+RS485/Modbus protocol 12- 24VDC 6-wire

Shell material/protection grade

- A Cast aluminum / Single chamber / IP67
- B Cast aluminum / Double chamber / IP67
- C Cast aluminum / Double cavity side view / IP67
- D Plastic ABS / Single chamber / IP65
- E Stainless steel 304 / Single chamber / IP67

Cable Line

- M M20×1.5
- N ½" NPT
- X Special customization

Display programming

- A Programming with display
- B With display programming
/ Bluetooth communication
- C Without

FMW15**License**

- P Standard (Non-explosion-proof)
- I Intrinsically safe (Exia IIC T6 Ga)
- D Intrinsically safe+Flameproof (Exd ia IIC T6 Gb)

Process Connection / Material

- 1 G3.5A Thread
- 2 Flange $\geq$ DN80 (Stainless steel + PTFE)
- X Special customization

Flange option / material

Specification / Code / Material	PP	PTFE	Stainless steel304+PTFE	Stainless steel316L+PTFE
DN80	-	-	G4	S4
DN100	-	-	G5	S5
DN125	-	-	G6	S6
DN150	-	-	G7	S7

Antenna Type / Material

A 76mm filled lens antenna/PTFE

Sealing / process temperature

B EPDM/ (-40-200℃)

Y Special customization

The Electronic Unit

- 1 (4~20) mA/HART protocol 24VDC 2-wire
- 2 (4~20) mA/HART protocol 220VAC 4-wire
- 3 (4~20) mA+RS485/Modbus protocol 12- 24VDC 6-wire

Shell material/protection grade

- A Cast aluminum / Single chamber / IP67
- B Cast aluminum / Double chamber / IP67
- C Cast aluminum / Double cavity side view / IP67
- D Plastic ABS / Single chamber / IP65
- E Stainless steel 304 / Single chamber / IP67

Cable Line

- M M20×l. 5
- N ½" NPT
- X Special customization

Display programming

- A Programming with display
- B With display programming
/ Bluetooth communication
- C Without

FMW21

License

- P Standard (Non-explosion-proof)
- I Intrinsically safe (Exia IIC T6 Ga)
- D Intrinsically safe+Flameproof (Exd ia IIC T6 Gb)

Process Connection / Material

- 1 G3.5A Thread
- 2 Flange $\geq$ DN80
- X Special customization

Flange option / material

Specification / Code / Material	PP	PTFE	Stainless steel304+PTFE	Stainless steel316L+PTFE
DN80	P4	F4	G4	S4
DN100	P5	F5	G5	S5
DN125	P6	F6	G6	S6
DN150	P7	F7	G7	S7
DN200	P8	F8	G8	S8

Antenna Type / Material

- A 76mm Lens antenna / With purge port / PE
- B 76mm Lens antenna / With purge port / PTFE

Sealing / process temperature

- A FKM/ (-40-80℃)
- B FKM/ (-40-110℃)
- C FKM/(-40-200℃)

Y Special customization

he Electronic Unit

- 1 (4~20) mA/HART protocol 24VDC 2-wire
- 2 (4~20) mA/HART protocol 220VAC 4-wire
- 3 (4~20) mA+RS485/Modbus protocol 12- 24VDC 6-wire

Shell material/protection grade

- A Cast aluminum / Single chamber / IP67
- B Cast aluminum / Double chamber / IP67
- C Cast aluminum / Double cavity side view / IP67
- D Plastic ABS / Single chamber / IP65
- E Stainless steel 304 / Single chamber / IP67

Cable Line

- M M20×1.5
- N ½" NPT
- X Special customization

Display programming

- A Programming with display
- B With display programming
/ Bluetooth communication
- C Without