Chongqing Chuanyi Automation Co., Ltd.



SIC Level Instrument

Chongqing Silian Measure & Control Technology Co., Ltd.

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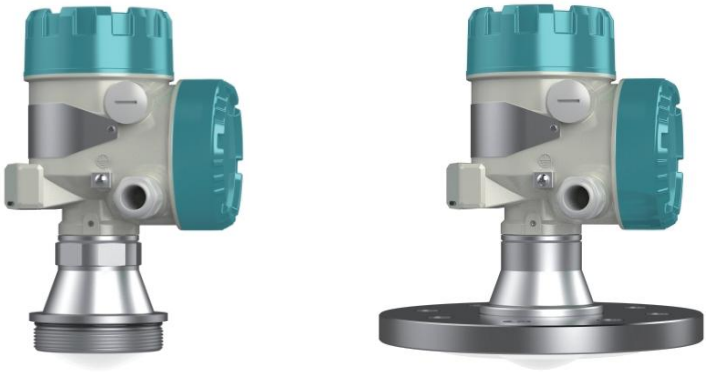
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MPS7000 FMCW Radar Level Transmitter

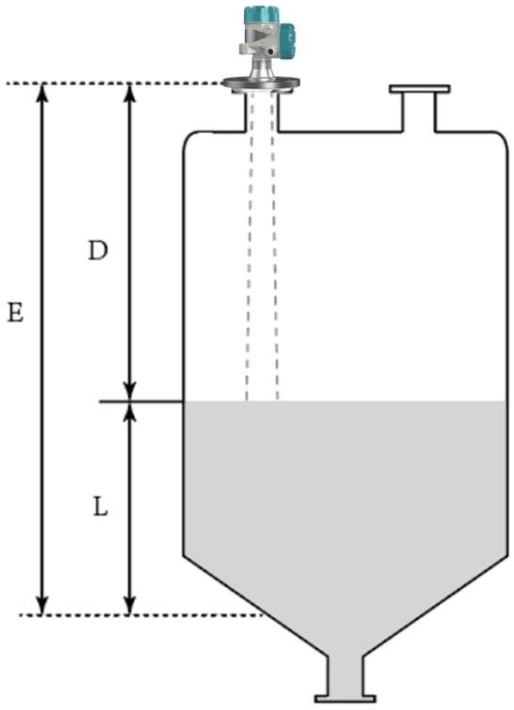


1. Introduction to Product

1.1. Measuring principle

MPS7000 FMCW Radar Level Transmitter is a D-band (120 GHz) FM-CW radar level transmitter, which is suitable for continuous level measurement of various liquid and solid medium, with a maximum measuring span of 120 m.

MPS7000 FMCW Radar Level Transmitter is designed with FM-CW technique. Its antenna emits a 120 GHZ-140 GHz high frequency microwave signal of linear frequency modulation. After the signal reaches the surface of the measured medium, part will be absorbed, while the other part will be reflected. The radar mixes the collected reflected signal with the transmitted signal to get a difference frequency signal. Then the frequency difference is obtained by FFT or DFT transformation and a series of operations. The difference is proportional to the distance from the radar antenna and the surface of the measured medium. The larger the frequency difference is, the farther the material distance is. The distance from the measured medium to the meter flange can be calculated from equation (1).



$$D = \frac{1}{2} \times c \times \frac{\Delta f}{R} \qquad \textbf{(1)}$$

Wherein, D is the distance from the measuring reference surface to the measured medium, C is the propagation speed of light (electromagnetic wave) in vacuum, Δf is the frequency difference between the received signal and the transmitted signal, and R is the change rate of the frequency of the transmitted signal with time.

Then, the level height can be calculated from equation (2) according to the empty material level set by the user.

$$L = E - D \qquad \textbf{(2)}$$

Wherein, E is the distance from the measuring reference surface to the empty material level set by the user, D is the distance from the measuring reference surface to the measured medium, and L is the level height.

1.2. Product advantages

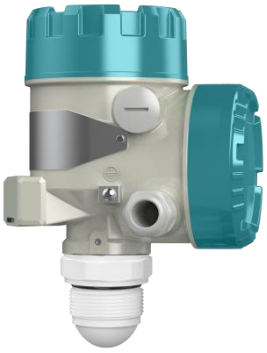
- ◆ Well-focused beam: With extremely narrow beam, the beam angle can be as small as 1°;
- ◆ Intensified energy: It has extremely strong penetrating power and extra-large measuring distance;
- ◆ Small blind zone: There are almost no blind zones at the near-end of the meter, so it can be measured for precise measurement of small containers;
- ◆ Chinese menu: Chinese menu is displayed by default. It is clear, and facilitates user operation.
- ◆ Convenient commissioning: The meter can be commissioned by means of keys, Bluetooth connection, upper computer software, HART data setter, etc.

1.3. Typical application

- ◆ Liquid level measurement in agitator tank, small storage tank, reactor, etc.
- ◆ Level measurement in limited installation space;
- ◆ Level measurement in highly installed standpipe
- ◆ Level measurement in extra-large solid tank, material pile, etc.;
- ◆ Level measurement in working conditions of concentrated dust and steam.

2. Technical characteristics

2.1. MPS7100 technical parameters

Antenna type	Ø50 mm plastic rod antenna	Ø80 mm plastic rod antenna	Ø80 mm plastic horn antenna
Product pictures			
Scope of application	Liquid level measurement in small containers	Level measurement of liquid, lump or powder materials of simple process conditions	Level measurement of liquid, lump or powder materials of simple process conditions
Process materials	PTFE	PP+PTFE	PP+PTFE
Maximum span	30m	120m	120m
Accuracy of the measurements	±2mm		
Process connection	● G1-1/2”A thread ● Flange	● G3”A thread ● Flange	● Hoisting holder ● Flange
Beam angle	Min. 1°		
Power supply and output	● Two-wire DC power supply, 4mA~20mA output, with HART communication: DC16V~30V (intrinsic safety+flameproof type 24V), ripple ≤100mV; ● Four-wire DC power supply, 4mA~20mA output, with HART communication: 18V~36V DC, ripple ≤100mV; ● Four-wire AC power supply, 4mA~20mA output, with HART communication: 90V~260V AC, 50Hz~60Hz.		
Signal frequency	D-band (about 120 GHz)		
Ambient temperature	-40°C~80°C		
Process temperature	-40°C~130°C		
Process pressure	-1 kgf/cm²~2.5 kgf/cm²		
Degree of protection	IP66/IP67		
Electrical interface	● M20×1.5 thread (non-flameproof type: outer diameter of cable limited to 6mm~12mm, flameproof type: outer diameter of cable limited to 8mm~12mm) ● 1/2"NPT thread (non-flameproof type: outer diameter of cable limited to 6mm~12mm, flameproof type: outer diameter of cable limited to 8mm~12mm)		
Safety certificate	● CCRI: Intrinsic safety + gas explosion proof type Ex ia IIC T6/T2 Ga ● CCRI: Intrinsic safety +gas flameproof type Ex db ia [ia Ga] IIC T6/T2 Gb ● CCRI: Intrinsic safety+dust flameproof type Ex ia tb [ia Da] IIIC T80°C/T290°C Db		

2.2. Technical parameters of MPS7101

2.2.1. Plastic single-chamber housing

Antenna type	Ø50 mm compact plastic antenna	Ø80 mm compact plastic antenna	Ø80 mm compact plastic horn antenna
Product pictures			
Scope of application	Liquid level measurement in small containers	Level measurement of liquid, lump or powder materials of simple process conditions	Level measurement of liquid, lump or powder materials of simple process conditions
Process materials	PVDF	PP+PTFE	PP+PTFE
Maximum span	30m		
Accuracy of the measurements	±2mm		
Process connection	● G1-1/2”A thread ● Flange	● G3”A thread ● Flange	● Hoisting holder ● Flange
Beam angle	Min. 1°		
Power supply and output	Two-wire DC power supply, 4mA~20mA output, with HART communication: 16V~30V DC, ripple ≤100mV.		
Signal frequency	D-band (about 120 GHz)		
Ambient temperature	-40°C~80°C		
Process temperature	-40°C~130°C		
Process pressure	-1 kgf/cm²~2.5 kgf/cm²		
Degree of protection	IP66/IP67		
Electrical interface	● M20×1.5 thread (outer diameter of cable limited to 6mm~12mm) ● 1/2"NPT thread (outer diameter of cable limited to 6mm~12mm)		
Safety certificate	● CCRI: Intrinsic safety + gas explosion proof type Ex ia IIC T6 Ga ● CCRI: Intrinsic safety + dust explosion proof type Ex ia IIIC T_{200}80°C Da		

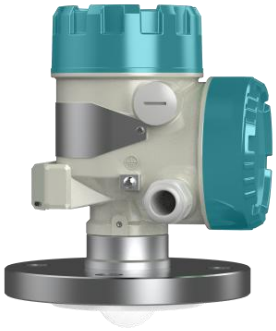
2.2.2. Casting Al single-chamber housing

Antenna type	Ø50mm compacted integrated antenna	Ø80mm compacted integrated antenna
Product pictures		
Scope of application	● Slight corrosive liquid of complex process conditions	● Slight corrosive liquid of complex process conditions ● Level measurement of lump or powder materials of simple process conditions
Process materials	304+PTFE	
Maximum span	30m	
Accuracy of the measurements	±2mm	
Process connection	● G1-1/2”A thread ● Flange	● G3”A thread ● Flange
Beam angle	Min. 1°	
Power supply and output	Two-wire DC power supply, 4mA~20mA output, with HART communication: 16V~30V DC, ripple ≤100mV.	
Signal frequency	D-band (about 120 GHz)	
Ambient temperature	-40°C~80°C	
Process temperature	-40°C~130°C	
Process pressure	-1 kgf/cm²~25 kgf/cm²	
Degree of protection	IP66/IP67	
Electrical interface	● M20×1.5 thread (non-flameproof type: outer diameter of cable limited to 6mm~12mm, flameproof type: outer diameter of cable limited to 8mm~12mm) ● 1/2"NPT thread (non-flameproof type: outer diameter of cable limited to 6mm~12mm, flameproof type: outer diameter of cable limited to 8mm~12mm)	
Safety certificate	● CCRI: Intrinsic safety + gas explosion proof type Ex ia IIC T6 Ga ● CCRI: Intrinsic safety + dust explosion proof type Ex ia IIIC T_{200}80°C Da ● CCRI: gas flameproof type Ex db IIC T6/T2 Gb ● CCRI: Dust flameproof type Ex tb IIIC T80°C/T290°C Db	

2.3. MPS7200 technical parameters

Antenna type	Ø50 mm integrated and sanitary antenna	Ø80 mm integrated and sanitary antenna	Universal antenna
Product pictures			
Scope of application	● Slight corrosive liquid of complex process conditions ● Liquid measurement of food and drug industries (sanitary)	● Slight corrosive liquid of complex process conditions ● Level measurement of lump or powder materials of simple process conditions	● Level measurement of lump or powder materials of simple process conditions
Process materials	304+PTFE	304+PTFE	304+PTFE
Maximum span	30m	120m	120m
Accuracy of the measurements	±2mm		
Process connection	● G1-1/2”A thread ● Flange ● 2” sanitary clamp	● G3”A thread ● Flange ● 3” sanitary clamp	● Flange
Beam angle	Min. 1°		
Power supply and output	● Two-wire DC power supply, 4mA~20mA output, with HART communication: DC16V~30V (intrinsic safety+flameproof type 24V), ripple ≤100mV; ● Four-wire DC power supply, 4mA~20mA output, with HART communication: 18V~36V DC, ripple ≤100mV; ● Four-wire AC power supply, 4mA~20mA output, with HART communication: 90V~260V AC, 50Hz~60Hz.		
Signal frequency	D-band (about 120 GHz)		
Ambient temperature	-40°C~80°C		
Process temperature	-40°C~200°C		
Process pressure	● Hygienic: -1 kgf/cm²~10 kgf/cm² ● Integrated: -1 kgf/cm²~25 kgf/cm² ● Universal: Atm (barometric pressure)		
Degree of protection	IP66/IP67		
Electrical interface	● M20×1.5 thread (non-flameproof type: outer diameter of cable limited to 6mm~12mm, flameproof type: outer diameter of cable limited to 8mm~12mm) ● 1/2"NPT thread (non-flameproof type: outer diameter of cable limited to 6mm~12mm, flameproof type: outer diameter of cable limited to 8mm~12mm)		
Safety certificate	● CCRI: Intrinsic safety + gas explosion proof type Ex ia IIC T6/T2 Ga ● CCRI: Intrinsic safety +gas flameproof type Ex db ia [ia Ga] IIC T6/T2 Gb ● CCRI: Intrinsic safety+dust flameproof type Ex ia tb [ia Da] IIIC T80°C/T290°C Db		

2.4. MPS7300 technical parameters

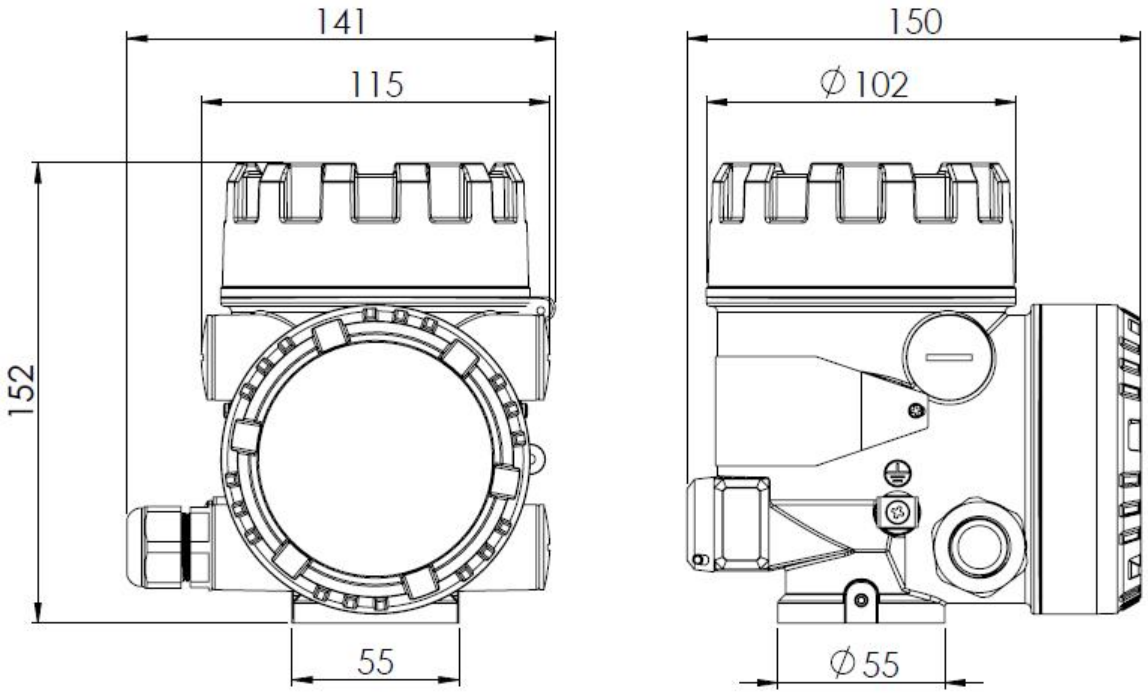
Antenna type	Ø50 mm process seal antenna	Ø80 mm process seal antenna
Product pictures		
Scope of application	Strong corrosive liquid of complex process conditions	Strong corrosive liquid of complex process conditions
Process materials	304+PTFE	304+PTFE
Maximum span	30m	120m
Accuracy of the measurements	±2mm	
Process connection	Flange	
Beam angle	Min. 1°	
Power supply and output	● Two-wire DC power supply, 4mA~20mA output, with HART communication: DC16V~30V (intrinsic safety+flameproof type 24V), ripple ≤100mV; ● Four-wire DC power supply, 4mA~20mA output, with HART communication: 18V~36V DC, ripple ≤100mV; ● Four-wire AC power supply, 4mA~20mA output, with HART communication: 90V~260V AC, 50Hz~60Hz.	
Signal frequency	D-band (about 120 GHz)	
Ambient temperature	-40°C~80°C	
Process temperature	-40°C~200°C	
Process pressure	-1 kgf/cm²~25 kgf/cm²	
Degree of protection	IP66/IP67	
Electrical interface	● M20×1.5 thread (non-flameproof type: outer diameter of cable limited to 6mm~12mm, flameproof type: outer diameter of cable limited to 8mm~12mm) ● 1/2"NPT thread (non-flameproof type: outer diameter of cable limited to 6mm~12mm, flameproof type: outer diameter of cable limited to 8mm~12mm)	
Safety certificate	● CCRI: Intrinsic safety + gas explosion proof type Ex ia IIC T6/T2 Ga ● CCRI: Intrinsic safety +gas flameproof type Ex db ia [ia Ga] IIC T6/T2 Gb ● CCRI: Intrinsic safety+dust flameproof type Ex ia tb [ia Da] IIIC T80°C/T290°C Db	

Note: The actual measuring range and accuracy of the meter are affected by antenna size, medium reflectivity, installation position and possible interference reflection. ±2mm is the highest precision of this series of meters under the standard conditions in the laboratory.

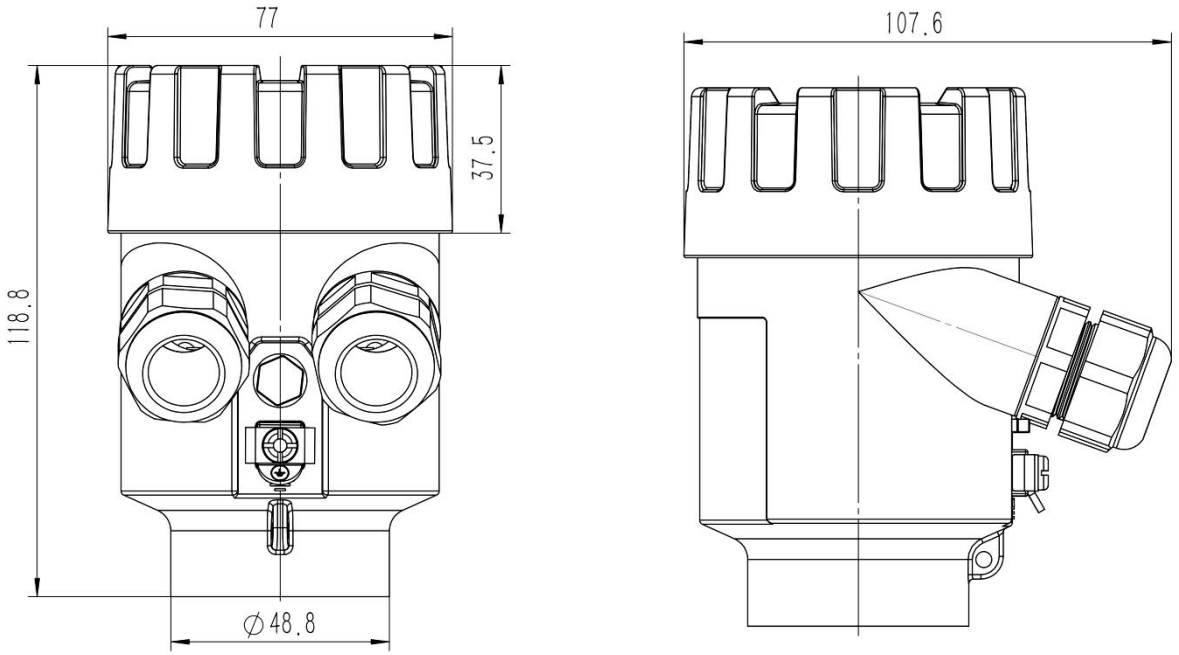
3. Structural size

3.1. Size of meter housing

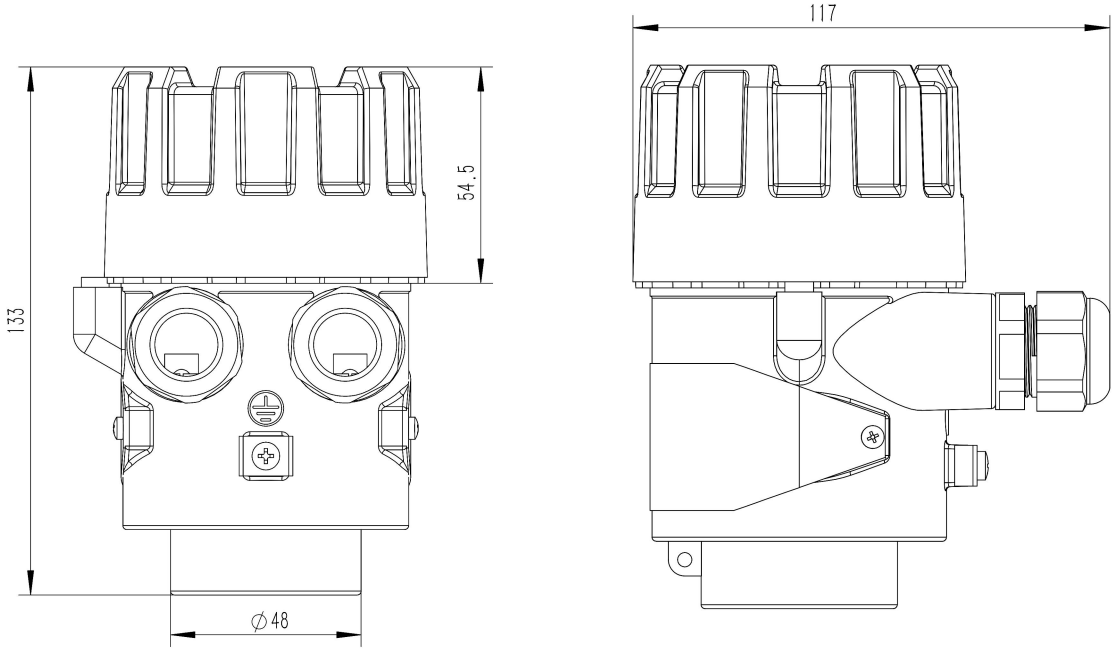
3.1.1. Metallic double-chamber housing



3.1.2. Plastic single-chamber housing

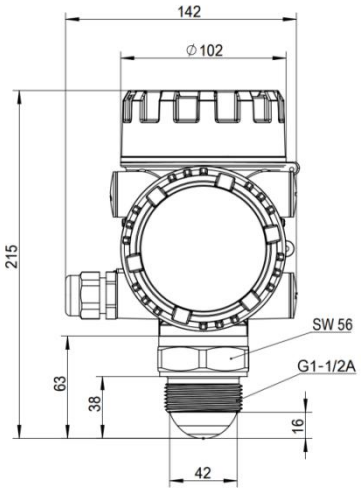


3.1.3. Casting Al single-chamber housing

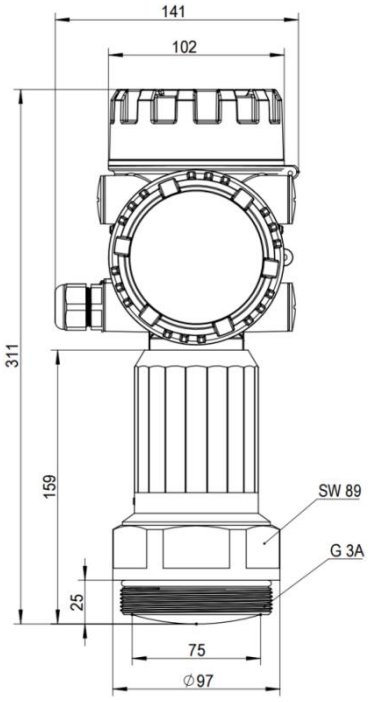


3.2. MPS7100 boundary dimension

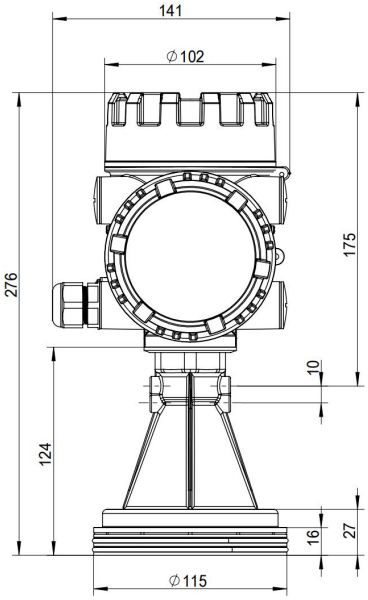
Ø50 mm plastic rod antenna



Ø80 mm plastic rod antenna

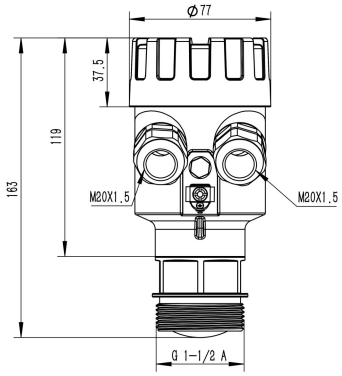


Ø80 mm plastic horn antenna

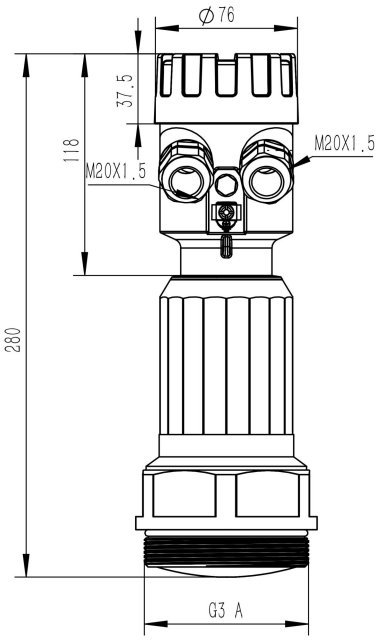


3.3. Boundary dimension of MPS7101

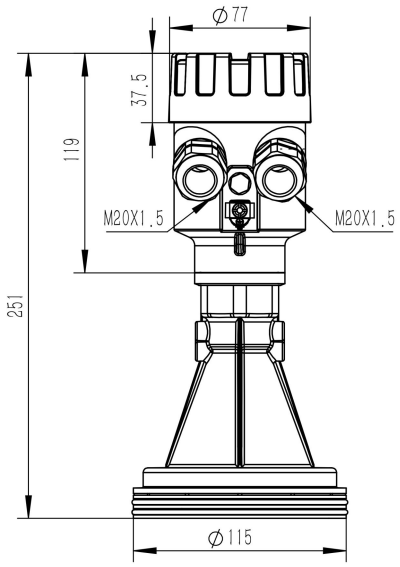
Ø50 mm compact plastic antenna



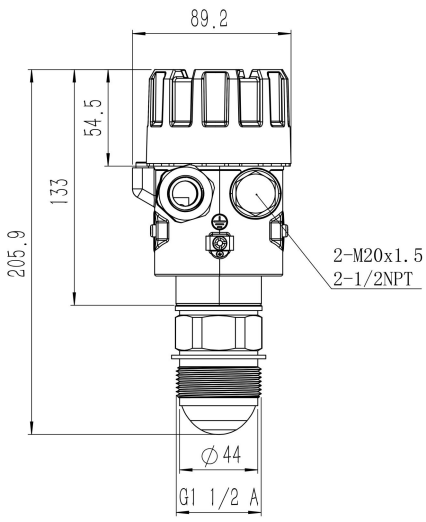
Ø80 mm compact plastic antenna



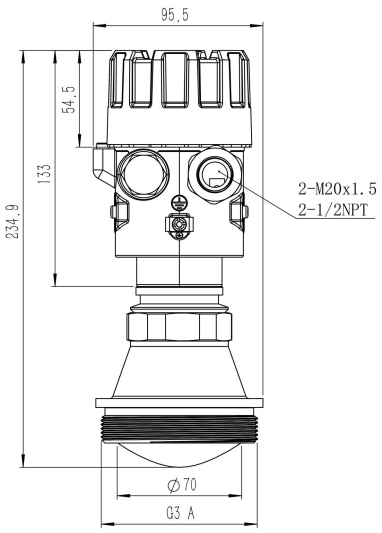
Ø80 mm compact plastic horn antenna



Ø50mm compacted integrated antenna

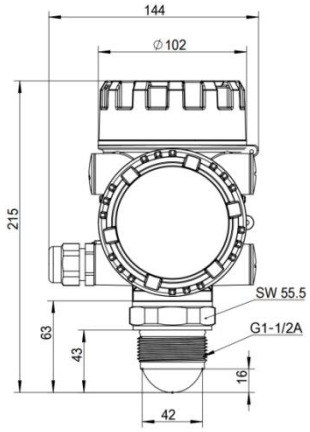


Ø80mm compacted integrated antenna

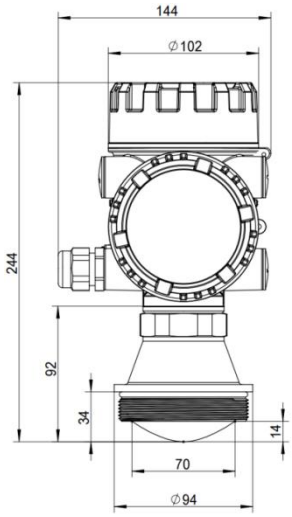


3.4. MPS7200 boundary dimension

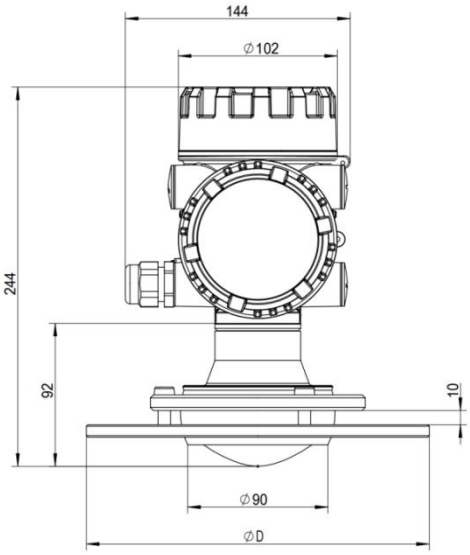
Ø50 mm integrated antenna



Ø80 mm integrated antenna

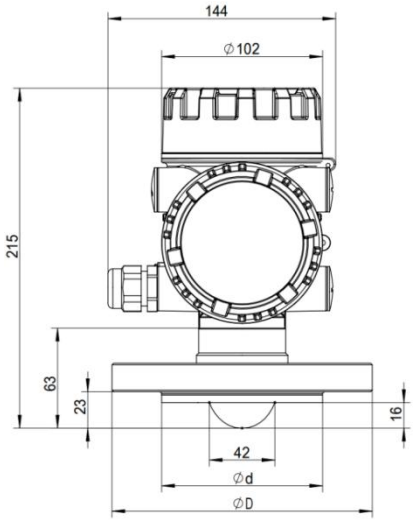


Universal purge type antenna

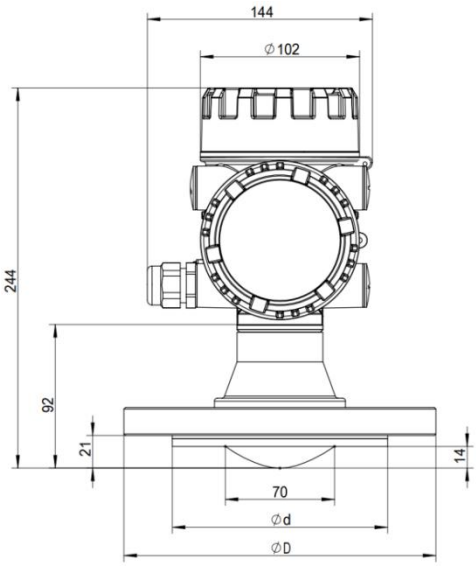


3.5. MPS7300 boundary dimension

Ø50 mm process seal antenna

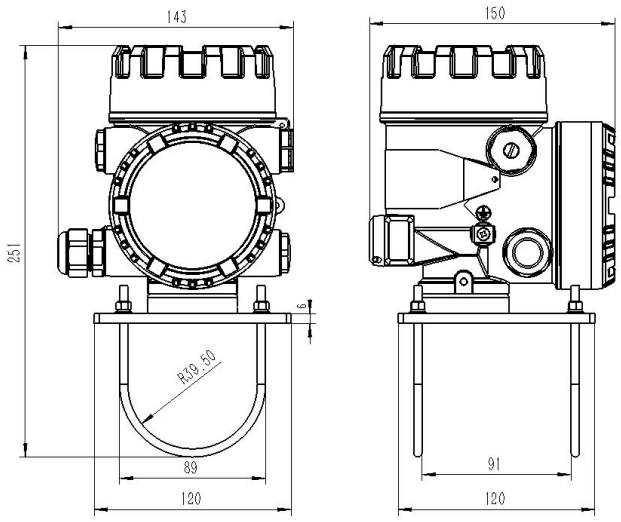


Ø80 mm process seal antenna

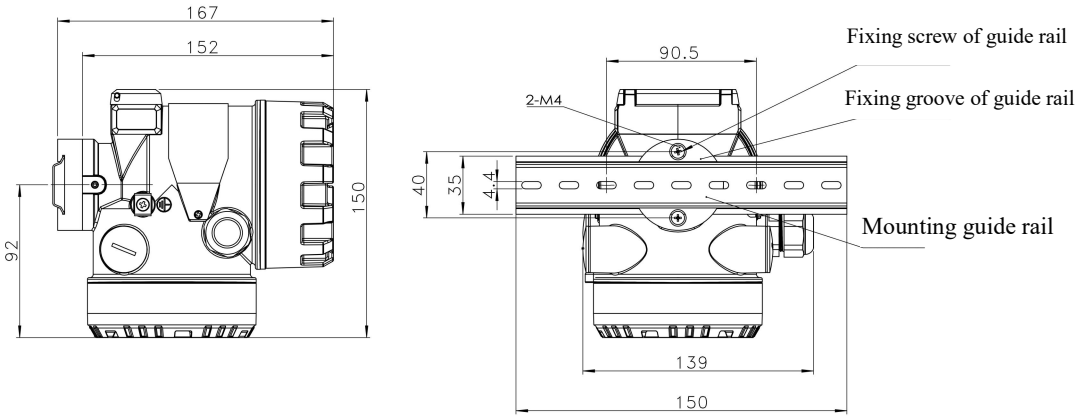


3.6. Boundary dimension of tank-side indicator (optional)

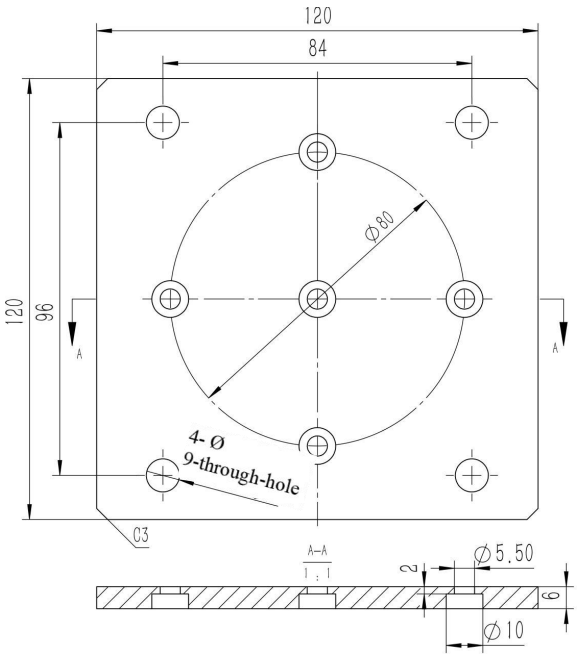
3.6.1. Installation in Ø80 hoop (installation by default)



3.6.2. Installation in DIN35 guide rail



3.6.3. Base plate for tank-side indicator installation



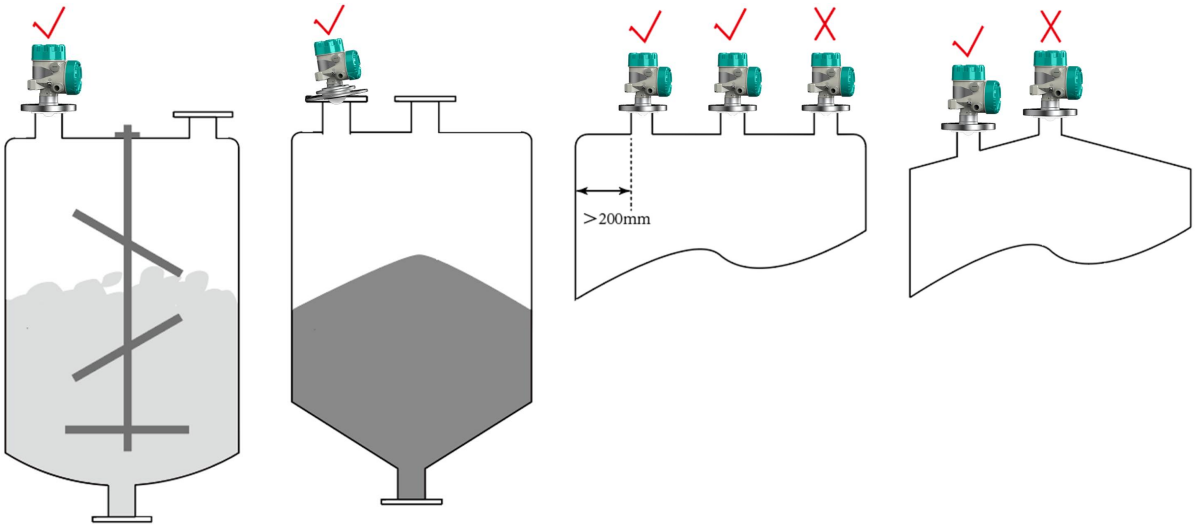
4. Installation guide

4.1. Unpacking and inspection

- The meter is packed in a carton box or wooden box. Rudely loading or unloading is forbidden. It must be very careful with carrying and handling. The storage site should be in compliance with the conditions as follows:
  - Rain-proof and moisture-proof;
  - No mechanical vibration or shock;
  - Temperature range: -10°C~55°C;
  - Relative moisture: no more than 85%;
  - No corrosive gas in the environment.
- Check all the items listed in the packing list, which includes meter model and quantity, accessories, operating manual etc. In case of any mistake, lack of goods or damage, please contact the company or its local agent. Packing boxes are not being taken back.

4.2. Selection of installing position

Recommended mounting position as shown below.

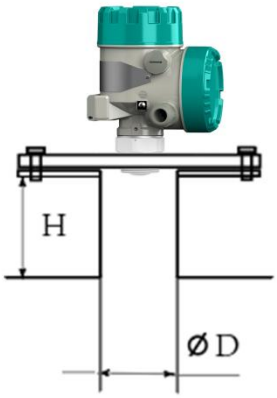


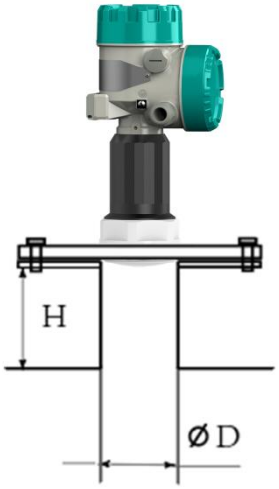
Installation in agitator tanks | Installation in solid tanks | Installation in flat-top tanks | Installation in conical or arched tanks

Precautions:

- Keep the meter far from the feed inlet, and avoid material flow.
- Keep the meter at least 200 mm away from the tank wall.
- For installation in conical, arched tanks, do not install the meter in the dead center.
- For installation in solid tanks, try to make sure that the meter antenna is pointing at the discharge port.
- For installation in agitator tanks, install the meter at 1/2 of the distance between the outer edge of the stirring blade and the tank wall as far as possible.
- It should be installed in a place which is convenient for installation and wiring, so as to promote future disassembly and assembly.
- If the meter is to be installed in an explosion-proof area, national provisions on explosion-proof hazardous areas should be followed.
- The meter should be kept from direct sunlight. Long-term exposure to the sunshine may cause the meter to be overheated or the plastic part aged.
- There should be no blocks in the antenna microwave transmitting beam angle, so the facilities such as ladder, limit switch, heating equipment, bracket, etc. in the tank should be kept away from as much as possible during the installation.
- The maximum level of the measured material should be lower than the measuring blind zone of the meter (usually the end of the antenna, and the blind zone of low dielectric constant or solid material should be properly increased), and the distance between the end of the antenna and the surface of the medium should be at least 50 mm, so as to prevent the antenna from being polluted by the material.

4.3. Installation requirement of liquid measurement

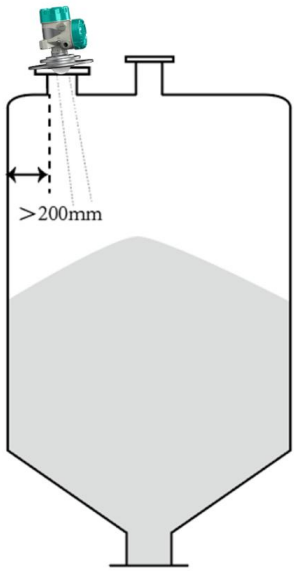




Inner diameter of standpipe ØD	Standpipe height H	Inner diameter of standpipe ØD	Standpipe height H
50mm 2"	<200mm	80mm 3"	<400mm
80mm 3"	<300mm	100mm 4"	<500mm
100mm 4"	<400mm	150mm 6"	<800mm
150mm 6"	<600mm	200mm 8"	<1000mm

- ◆ The meter should be installed vertically.
- ◆ It is advised to be installed from the opening at 1/2 of the tank radius.
- ◆ The smoother the standpipe end, the larger the diameter and the smaller the height, the better the use effect.

4.4. Installation requirement of solid measurement

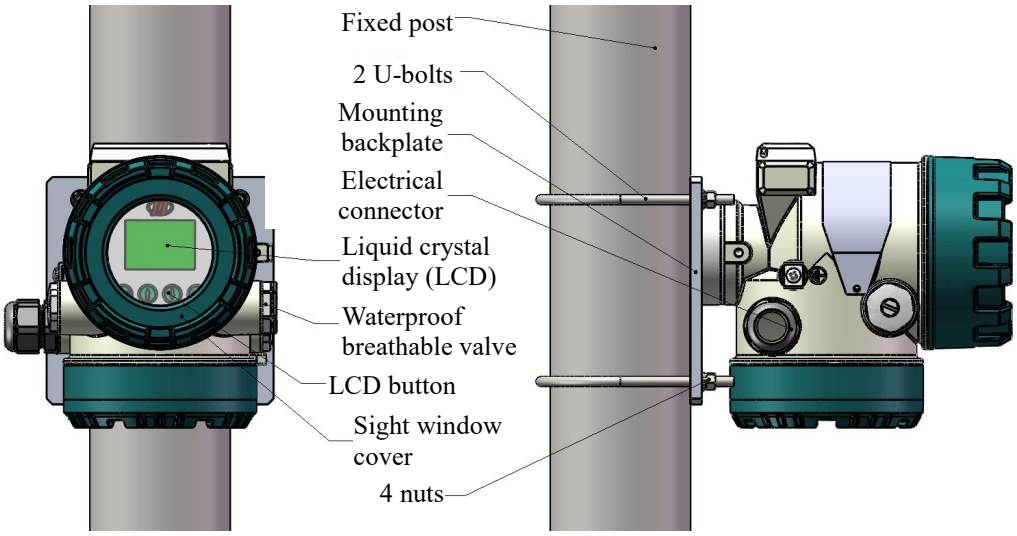


In measurement of solid and powder, the build-up of material may form a tapered surface. Therefore, the angle of the meter should be adjusted properly to achieve the best measurement effect.

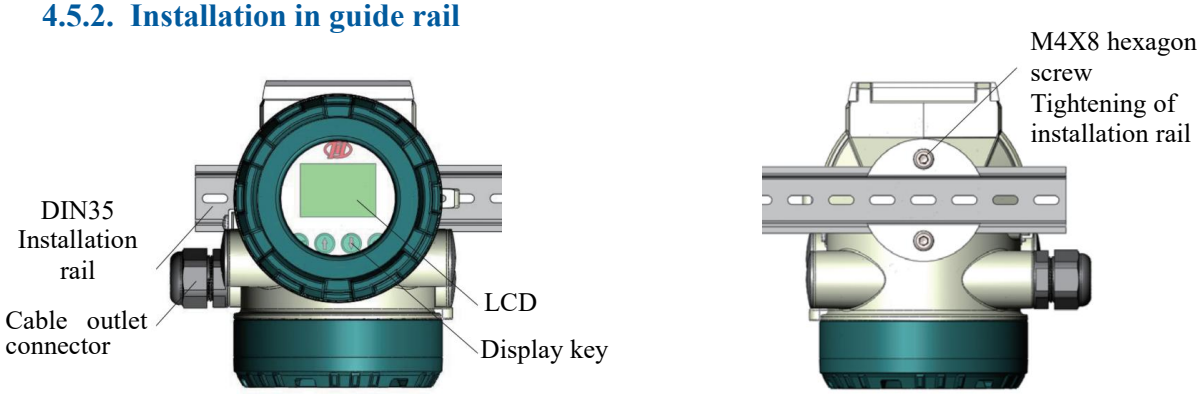
Note: If MPS7200 is equipped with a purge structure, the air source pressure is recommended to be 0.6 MPa~0.8 MPa (the pressure in the tank and the dryness of air source will affect the purging effect). By default, the air source interface has G1/8" female threads and a PC8-01 quick connector.

4.5. Installation in tank side display unit (optional)

4.5.1. Installation in standpipe



4.5.2. Installation in guide rail



4.6. Confirmation of installation

- ◆ Confirm that the meter is grounded correctly;
- ◆ Confirm that the meter enclosure has been screwed tightly;
- ◆ Confirm that the meter measures normally and the output is consistent with the setup in the central control room;
- ◆ Ensure that the outlet of the meter entrance cable is tightened and the unused outlet is sealed by plugging;
- ◆ Make sure that the instrument conduit arranged on site will not cause water accumulation to the meter;
- ◆ Make sure that the cable connector of the meter complies with relevant protection standards and regulations;
- ◆ Make sure that process connection components, such as flange gaskets and bolts, are suitable for the field working conditions;
- ◆ Make sure that the process parameters of the field working conditions do not exceed the maximum process parameters allowed by the meter.

Warning:

- ➢ Improper process connection components may lead to the risk of injury or poisoning!
- ➢ If the meter is not installed correctly, high temperature, toxic, corrosive process media may be released at the connection between the meter and the tank!
- ➢ If the process parameters of the field working conditions exceed the maximum process parameters allowed by the meter, the meter may be damaged and there is a risk of explosion!
- ➢ Untightened or improperly connected cable connectors may have the risk of explosion in a hazardous zone!
- ➢ Do not loose, remove or disassemble the process connection components before the pressure in the tank is released!

5. Table of MPS7100 model

Model parameters	Specification code	Description
Product	MPS7100	120 G FM-CW radar level transmitter (plastic rod type, plastic horn)
Measured medium	S	Solid
	L	Liquid
Maximum span	0	15m
	1	30m
	2	70m
	3	120m
Housing	S	Die casting aluminum (electrical interface M20×1.5)
	B	Die casting aluminum (electrical interface 1/2"NPT)
	G	Stainless steel 316 (electrical interface M20×1.5)
	H	Stainless steel 316 (electrical interface 1/2"NPT)
Electronic module	B	24V DC, 4mA~20mA, HART
	C	24V DC, 4mA~20mA, HART, with blue tooth
	U	220V AC, 4mA~20mA, HART
	V	220V AC, 4mA~20mA, HART, with blue tooth
Output	2	Two-wire system (B and C only for electronic module)
	4	Four-wire system
	6	Wireless remote transmission LoRa
Display module	0	None
	1	Yes
	2	Passive tank-side display (power supply of master, recommended)
	3	Active tank-side display (power supply from tank-side indicator and only for output 2)
Safety certificate	X	No requirement
	A	CCRI: Intrinsic safety + gas explosion proof type Ex ia IIC T6/T2 Ga
	D	CCRI: Intrinsic safety +gas flameproof type Ex db ia [ia Ga] IIC T6/T2 Gb
	N	CCRI: Intrinsic safety+dust flameproof type Ex ia tb [ia Da] IIIC T80°C/T290°C Db
	M	CCRI: complex gas explosion proof+complex dust explosion proof typeEx db ia[ia Ga] IIC T6/T2 Gb; Ex ia tb [ia Da] IIIC T80°C/T290°C Db
Antenna type	2	Ø50mm plastic rod type (flange size limited to be ≥DN50)
	3	Ø80mm plastic rod type (flange size limited to be ≥DN80)
	4	Ø80mm plastic horn type (flange size limited to be ≥DN80)
	5	Universal plastic horn type (flange size ≥DN80, and process pressure M)

Model parameters	Specification code	Description
Information of antenna assistance	X	None
Process temperature (°C)	D	-40°C~80°C (EPDM seal ring)
	P	-40°C~130°C (EPDM seal ring)
	K	-20°C~130°C (FKM seal ring)
Process pressure (kgf/cm²g)	L	-1
	M	Atm (atmosphere)
	A	2.5 (D only for process temperature)
Process connection	GD	G1-1/2"A (2 only for antenna type)
	GM	G3"A (3 only for antenna type)
	LM	Hoisting holder (for antenna type 4)
	FB	Standard flange
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)
Flange size	E	DN50(2")
	C	DN65(2.5")
	F	DN80(3")
	G	DN100(4")
	H	DN125(5")
	J	DN150(6")
	K	DN200(8")
	M	DN250(10")
Pressure rating (kgf/cm²) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	M	Class150
	N	Class300
Flange sealing face type	A	RF (recommended)
	B	FM
	C	M
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	Flat-thin plate flange (8 mm thick, M only for process pressure limited)

Model parameters	Specification code	Description
Material of flange	A	304
	B	316L
	C	Carbon steel (Q235)
	F	C4 steel
	D	PP (20mm thick, M only for process pressure and D only for process temperature)
	E	PTFE (20mm thick, M only for process pressure)
Companion flange (A, B and C options are inherently equipped with 304 bolt , nut, plate washer, flange gasket)	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel (Q235)

Special notes:

- Typical model 1: MPS7100L0SB21D3XDMFB-BGCAAX
- Typical model 2: MPS7100L0SB21D3XDMGM
- Special model: if special selection is required for a certain digit in the model code, fill “Z” in the space of special model in the model code, and “/Z” behind the complete model code; If special accessory is required, please fill "/Z" behind the complete model code. Then, explain all the "digit for special model" and special accessories in words without omission. The text description should be placed in brackets "( )". Before each description, "Zn:" (n = 1, 2, 3, ...) should be used for guidance and each description should be separated by semicolon";". When the specification code has multiple digits, the last digit will be changed to "Z". For example, "FB" will be changed to "FZ".
- Example 1 of special model: MPS7100L0SB21X3XDMFB-BGCAAZ/Z (Z1: equipped with L150/304 standpipe flange)
- Example 2 of special model: MPS7100L0SB21X3XDMFB-BGCAAA/Z (Z1: with L150/304 flange welded pipe)
- Tank-side cable: If tank-side indicator is optional, the standard configuration contains a communication cable of 25 m. Any excess is priced in meters.

6. Table of MPS7101 model

Model parameters	Specification code	Description
Product	MPS7101	120G FM-CW radar level transmitter (compact)
Measured medium	S	Solid
	L	Liquid
Maximum span	0	15m
	1	30m
Housing	P	PBT plastic single-chamber housing (electrical interface M20×1.5)
	S	Die casting Al single-chamber housing (electrical interface M20×1.5)
	B	Die casting Al single-chamber housing (electrical interface 1/2"NPT)
Electronic module	B	24V DC, 4mA~20mA, HART
	C	24V DC, 4mA~20mA, HART, with blue tooth
Output	2	Two-wire system
Display module	0	None
	1	Yes
Safety certificate	X	No requirement
	A	CCRI: Intrinsic safety + gas explosion proof type Ex ia IIC T6 Ga
	B	CCRI: Intrinsic safety + dust explosion proof type Ex ia IIIC T_{200}80°C Da
	C	CCRI: intrinsic safety and gas explosion proof+intrinsic safety and dust explosion proof type Ex ia IIC T6 Ga; Ex ia IIIC T_{200}80°C Da
	D	CCRI: gas flameproof type Ex db IIC T6/T2 Gb (for housing S or B and antenna 6 or 7)
	N	CCRI: Dust flameproof type Ex tb IIIC T80°C/T290°C Db (for housing S or B and antenna 6 or 7)
	M	CCRI: gas flameproof+dust flameproof type Ex db IIC T6/T2 Gb; Ex tb IIIC T80°C/T290°C Db (for housing S or B and antenna 6 or 7)
Antenna type	2	Ø50mm compact plastic antenna (flange size limited to be≥DN50)
	3	Ø80mm compact plastic antenna (flange size limited to be ≥DN80)
	4	Ø80mm compact plastic horn (flange size limited to be ≥DN80)
	5	Compacted universal plastic horn type (flange size ≥DN80, and process pressure M)
	6	Ø50mm compacted integrated antenna (for housing S or B and flange size ≥DN50)
	7	Ø80mm compacted integrated antenna (for housing S or B and flange size ≥DN80)
Information of antenna assistance	X	None
Process temperature (°C)	D	-40°C~80°C (EPDM seal ring)
	P	-40°C~130°C (EPDM seal ring)
	K	-20°C~130°C (FKM seal ring)

Model parameters	Specification code	Description
Process pressure (kgf/cm²g)	L	-1
	M	Atm (atmosphere)
	A	2.5 (process temperature D for antenna type 2, 3 or 4)
	B	6 (for antenna 6 or 7)
	G	10 (for antenna 6 or 7)
	C	16 (for antenna 6 or 7)
	D	25 (for antenna 6 or 7)
Process connection	GD	G1-1/2"A (for antenna 2 or 6)
	GM	G3"A (for antenna 3 or 7)
	LM	Hoisting holder (for antenna type 4)
	FB	Standard flange
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)
Flange size	E	DN50(2")
	C	DN65(2.5")
	F	DN80(3")
	G	DN100(4")
	H	DN125(5")
	J	DN150(6")
	K	DN200(8")
	M	DN250(10")
Flange pressure rating (kgf/cm²) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	M	Class150
	N	Class300
Flange sealing face type	A	RF (recommended)
	B	FM
	C	M
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	Flat-thin plate flange (8 mm thick, M only for process pressure limited)

Model parameters	Specification code	Description
Material of flange	A	304
	B	316L
	C	Carbon steel (Q235)
	F	C4 steel
	D	PP (20mm thick, M only for process pressure and D only for process temperature)
	E	PTFE (20mm thick, M only for process pressure)
Companion flange (A, B and C options are inherently equipped with 304 bolt , nut, plate washer, flange gasket)	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel (Q235)

Special notes:

- Typical model 1: MPS7101L0SB21X3XDMFB-BGCAAX
- Typical model 2: MPS7101L0BB21X3XDMGM
- Special model: if special selection is required for a certain digit in the model code, fill “Z” in the space of special model in the model code, and “/Z” behind the complete model code; If special accessory is required, please fill "/Z" behind the complete model code. Then, explain all the "digit for special model" and special accessories in words without omission. The text description should be placed in brackets "( )". Before each description, "Zn:" (n = 1, 2, 3, ...) should be used for guidance and each description should be separated by semicolon";". When the specification code has multiple digits, the last digit will be changed to "Z". For example, "FB" will be changed to "FZ".
- Example 1 of special model: MPS7101L0PB21X3XDMGM/Z (Z1: equipped with M20×1.5 adapter 1/2" NPT cable connector)
- Example 2 of special model: MPS7101L0PB21X2XDMGD/Z (Z1: equipped with 304 welding seat)

7. Table of MPS7200 model

Model parameters	Specification code	Description
Product	MPS7200	120 G FM-CW radar level transmitter (integrated, sanitary)
Measured medium	S	Solid
	L	Liquid
Maximum span	0	15m
	1	30m
	2	70m
	3	120m
Housing	S	Die casting aluminum (electrical interface M20×1.5)
	B	Die casting aluminum (electrical interface 1/2"NPT)
	G	Stainless steel 316 (electrical interface M20×1.5)
	H	Stainless steel 316 (electrical interface 1/2"NPT)
Electronic module	B	24V DC, 4mA~20mA, HART
	C	24V DC, 4mA~20mA, HART, with blue tooth
	U	220V AC, 4mA~20mA, HART
	V	220V AC, 4mA~20mA, HART, with blue tooth
Output	2	Two-wire system (B and C only for electronic module)
	4	Four-wire system
	6	Wireless remote transmission LoRa
Display module	0	None
	1	Yes
	2	Passive tank-side display (power supply of master, recommended)
	3	Active tank-side display (power supply from tank-side indicator and only for output 2)
Safety certificate	X	No requirement
	A	CCRI: Intrinsic safety + gas explosion proof type Ex ia IIC T6/T2 Ga
	D	CCRI: Intrinsic safety +gas flameproof type Ex db ia [ia Ga] IIC T6/T2 Gb
	N	CCRI: Intrinsic safety+dust flameproof type Ex ia tb [ia Da] IIIC T80°C/T290°C Db
	M	CCRI: complex gas explosion proof+complex dust explosion proof typeEx db ia[ia Ga] IIC T6/T2 Gb; Ex ia tb [ia Da] IIIC T80°C/T290°C Db
Antenna type/process material	2	Ø50mm integrated type/stainless steel 304 (flange size limited to be ≥DN50)
	3	Ø80mm integrated type/stainless steel 304 (flange size limited to be≥DN80)
	4	2" hygienic type/stainless steel 316L (process pressure limited to be ≤10kgf/cm²g)
	5	3" hygienic type/stainless steel 316L (process pressure limited to be≤10kgf/cm²g)

Model parameters	Specification code	Description
Information of antenna assistance	X	None (C only for flange connection)
	A	Universal adjustment (W only for flange connection)
	B	Purging (C only for flange connection)
	C	Universal+purging (W only for flange connection)
Process temperature (°C)	D	-40°C~80°C (EPDM seal ring)
	P	-40°C~130°C (EPDM seal ring)
	K	-20°C~130°C (FKM seal ring)
	N	-20°C~200°C (FKM seal ring)
Process pressure (kgf/cm²g)	L	-1
	M	Atm (atmosphere)
	A	2.5
	B	6
	G	10
	C	16
	D	25
Process connection	GD	G1-1/2"A (2 only for antenna type/process material)
	GM	G3"A (3 only for antenna type/process material)
	T2	2" hygienic clamp (4 only for antenna type/process material)
	T3	3" hygienic clamp (5 only for antenna type/process material)
	FB	Standard flange
Connection mode of flange	C	Direct-insertion type
	W	Universal type (M only for process pressure)
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)
Flange size	E	DN50(2")
	C	DN65(2.5")
	F	DN80(3")
	G	DN100(4")
	H	DN125(5")
	J	DN150(6")
	K	DN200(8")
	M	DN250(10")

Model parameters	Specification code	Description
Pressure rating (kgf/cm²) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	M	Class150
	N	Class300
Flange sealing face type	A	RF (recommended fastening flange)
	B	FM
	C	M
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	Flat-thin plate flange (8mm thick, M only for process pressure and recommended universal flange)
Material of flange	A	304
	B	316L
	C	Carbon steel (Q235)
	F	C4 steel
	D	PP (20mm thick, M only for process pressure, D only for process temperature, and C only for flange connection)
	E	PTFE (20mm thick, M only for process pressure and C only for flange connection)
Companion flange (A, B and C options are inherently equipped with 304 bolt , nut, plate washer, flange gasket)	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel (Q235)

Special notes:

- Typical model 1: MPS7200S0SB21X3CDMFB-WBGCFAX
- Typical model 2: MPS7200L0SB21D3XDMGM
- Special model: if special selection is required for a certain digit in the model code, fill “Z” in the space of special model in the model code, and “/Z” behind the complete model code; If special accessory is required, please fill "/Z" behind the complete model code. Then, explain all the "digit for special model" and special accessories in words without omission. The text description should be placed in brackets "( )". Before each description, "Zn:" (n = 1, 2, 3, ...) should be used for guidance and each description should be separated by semicolon";". When the specification code has multiple digits, the last digit will be changed to "Z". For example, "FB" will be changed to "FZ".
- Example of special model: MPS7200S0SB21X3CNMFB-WBZCFAX/Z (Z1: DN300; Z2: equipped with insulated standpipe)
- Tank-side cable: If tank-side indicator is optional, the standard configuration contains a communication cable of 25 m. Any excess is priced in meters.

8. Table of MPS7300 model

Model parameters	Specification code	Description
Product	MPS7300	120 G FM-CW radar level transmitter (PTFE process seal antenna)
Measured medium	L	Liquid
Maximum span	0	15 m (recommended)
	1	30 m (recommended)
	2	70m
	3	120m
Housing	S	Die casting aluminum (electrical interface M20×1.5)
	B	Die casting aluminum (electrical interface 1/2"NPT)
	G	Stainless steel 316 (electrical interface M20×1.5)
	H	Stainless steel 316 (electrical interface 1/2"NPT)
Electronic module	B	24V DC, 4mA~20mA, HART
	C	24V DC, 4mA~20mA, HART, with blue tooth
	U	220V AC, 4mA~20mA, HART
	V	220V AC, 4mA~20mA, HART, with blue tooth
Output	2	Two-wire system (B and C only for electronic module)
	4	Four-wire system
	6	Wireless remote transmission LoRa
Display module	0	None
	1	Yes
	2	Passive tank-side display (power supply of master, recommended)
	3	Active tank-side display (power supply from tank-side indicator and only for output 2)
Safety certificate	X	No requirement
	A	CCRI: Intrinsic safety + gas explosion proof type Ex ia IIC T6/T2 Ga
	D	CCRI: Intrinsic safety +gas flameproof type Ex db ia [ia Ga] IIC T6/T2 Gb
	N	CCRI: Intrinsic safety+dust flameproof type Ex ia tb [ia Da] IIIC T80°C/T290°C Db
	M	CCRI: complex gas explosion proof+complex dust explosion proof typeEx db ia[ia Ga] IIC T6/T2 Gb; Ex ia tb [ia Da] IIIC T80°C/T290°C Db
Antenna type/process material	2	Ø50 mm process seal antenna/stainless steel 304+PTFE process seal (for flange size E or C)
	3	Ø80 mm process seal antenna/stainless steel 304+PTFE process seal (flange size limited to be≥DN80)
Antenna material	A	PTFE

Model parameters	Specification code	Description
Process temperature (°C)	D	-40°C~80°C (EPDM seal ring)
	P	-40°C~130°C (EPDM seal ring)
	K	-20°C~130°C (FKM seal ring)
	N	-20°C~200°C (FKM seal ring)
Process pressure (kgf/cm²g)	L	-1
	M	Atm (atmosphere)
	A	2.5
	B	6
	G	10
	C	16
	D	25
Process connection	FB	Standard flange
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)
Flange size	E	DN50(2")
	C	DN65(2.5")
	F	DN80(3")
	G	DN100(4")
	H	DN125(5")
	J	DN150(6")
	K	DN200(8")
	M	DN250(10")
Pressure rating (kgf/cm²) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	M	Class150
	N	Class300
Flange sealing face type	A	RF (recommended)
	C	M

Model parameters	Specification code	Description
Material of flange	A	304
	B	316L
Companion flange (A, B and C options are inherently equipped with 304 bolt , nut, plate washer)	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel (Q235)

Special notes:

- Typical model: MPS7300L0SB21X3ADMFB-BGCAAX
- Special model: if special selection is required for a certain digit in the model code, fill “Z” in the space of special model in the model code, and “/Z” behind the complete model code; If special accessory is required, please fill "/Z" behind the complete model code. Then, explain all the "digit for special model" and special accessories in words without omission. The text description should be placed in brackets "( )". Before each description, "Zn:" (n = 1, 2, 3, ...) should be used for guidance and each description should be separated by semicolon";". When the specification code has multiple digits, the last digit will be changed to "Z". For example, "FB" will be changed to "FZ".
- Example of special model: MPS7300L0SB22X3ADGFB-BGCAAX/Z (Z1: equipped with sun shade)
- **Tank-side cable:** If tank-side indicator is optional, the standard configuration contains a communication cable of 25 m. Any excess is priced in meters.

MPS5000 FMCW Radar Level Transmitter



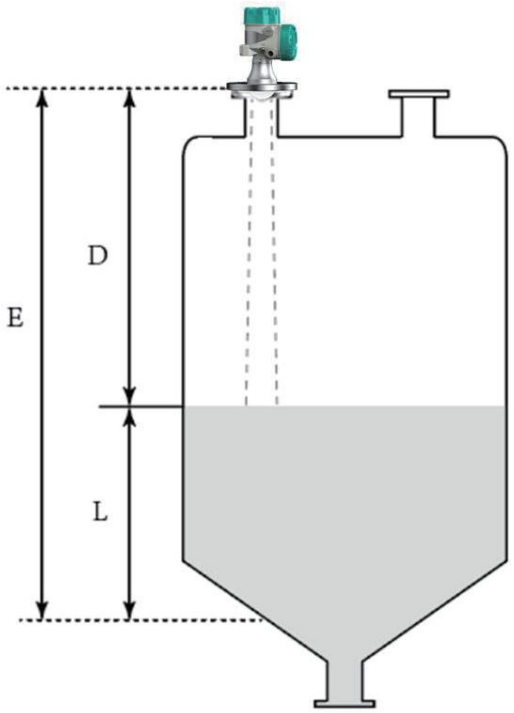


1. Introduction to Product

1.1. Measuring principle

MPS5000 FMCW Radar Level Transmitter is a W-band (80 GHz) FMCW radar level instrument, which is suitable for continuous level measurement of various liquid and solid medium, with a maximum measuring span of 120 m.

MPS5000 FMCW Radar Level Transmitter is an advanced measurement system based on FMCW technology. The FMCW Radar Level Transmitter can emit continuous microwave signals through an antenna sensor, and the frequency of the emitted signals is linearly modulated by sawtooth waves. When continuously emitted microwave signals encounter the surface of the measured medium, some of the energy of the microwave signals is continuously reflected back and received by the lens antenna system due to abrupt changes in dielectric constant.



There is always a difference between the frequency of the received signal and the transmitted signal, and the difference is proportional to the distance from the radar antenna and the surface of the measured medium. The larger the frequency difference is, the farther the material distance is. The distance from the measured medium to the meter flange can be calculated from equation (1).

$$D = \frac{1}{2} \times c \times \frac{\Delta f}{R} \qquad \textbf{(1)}$$

Wherein, D is the distance from the measuring reference surface to the measured medium, C is the propagation speed of light (electromagnetic wave) in vacuum, Δf is the frequency difference between the received signal and the transmitted signal, and R is the change rate of the frequency of the transmitted signal with time.

Then, the level height can be calculated from equation (2) according to the empty material level set by the user.

$$L = E - D \qquad \textbf{(2)}$$

Wherein, E is the distance from the measuring reference surface to the empty material level set by the user, D is the distance from the measuring reference surface to the measured medium, and L is the level height.

1.2. Product advantages

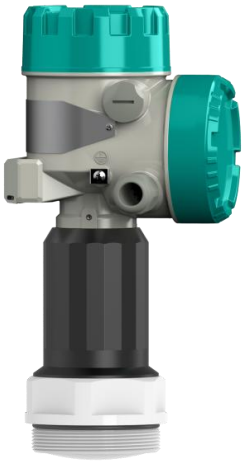
- ◆ Display interface is simple and easy to understand, and the quick setting menu is convenient for users to operate;
- ◆ Local parameters can be set according to the button or the Hart special data setter.
- ◆ Chinese menu is displayed to facilitate user operation;
- ◆ 80 GHz high frequency signal and 3° beam angle make field installation easier;
- ◆ There are almost no blind zones at the near-end of the meter, so it can be measured for precise measurement of small containers.

1.3. Typical application

- ◆ Liquid level measurement in agitator tank, small storage tank, reactor, etc.
- ◆ Level measurement in limited installation space;
- ◆ Level measurement in highly installed standpipe
- ◆ Level measurement in extra-large solid tank, material pile, etc.

2. Technical characteristics

2.1. MPS5100 technical parameters

Antenna type	Ø50 mm plastic rod antenna	Ø80 mm plastic rod antenna	Ø80 mm plastic horn antenna
Product pictures			
Scope of application	Liquid level measurement in small containers	Level measurement of liquid, lump or powder materials of simple process conditions	Level measurement of liquid, lump or powder materials of simple process conditions
Process materials	PTFE	PP+PTFE	PP+PTFE
Maximum span	30m	120m	120m
Accuracy of the measurements	±2mm		
Process connection	● G1-1/2”A thread ● Flange	● G3”A thread ● Flange	● Hoisting holder ● Flange
Beam angle	Min. 7°	Min. 3°	Min. 3°
Power supply and output	● Two-wire DC power supply, 4mA~20mA output, with HART communication: DC16V~30V (intrinsic safety+flameproof type 24V), ripple ≤100mV; ● Four-wire DC power supply, 4mA~20mA output, with HART communication: 18V~36V DC, ripple ≤100mV; ● Four-wire AC power supply, 4mA~20mA output, with HART communication: 90V~260V AC, 50Hz~60Hz.		
Signal frequency	W-band (76GHz-81GHz)		
Ambient temperature	Normal temperature working conditions: -40°C~80°C, low-temperature working conditions: -60°C~80°C and LCD screen:-30°C~80°C (see the Explosion Protection Certificate for ambient temperature of explosion-proof products)		
Process temperature	-40°C~130°C		
Process pressure	-1 kgf/cm²~2.5 kgf/cm²		
Degree of protection	IP66/IP67		
Electrical interface	● M20×1.5 thread (non-flameproof type: outer diameter of cable limited to 6mm~12mm, flameproof type: outer diameter of cable limited to 8mm~12mm) ● 1/2"NPT thread (non-flameproof type: outer diameter of cable limited to 6mm~12mm, flameproof type: outer diameter of cable limited to 8mm~12mm)		
Safety certificate	● CCRI: Intrinsic safety + gas explosion proof type Ex ia IIC T6/T2 Ga ● CCRI: Intrinsic safety +gas flameproof type Ex db ia [ia Ga] IIC T6/T2 Gb ● CCRI: Intrinsic safety+dust flameproof type Ex ia tb [ia Da] IIIC T80°C/T290°C Db ● EAC: Intrinsic safety + gas explosion proof type 0Ex ia IIC T6...T2 Ga X ● EAC: Intrinsic safety + dust explosion proof type Ex ia IIIC T80°C...T290°C Da X ● EAC: Intrinsic safety+gas flameproof type 1Ex db ia IIC T6...T2 Gb X ● EAC: Intrinsic safety + dust flameproof type Ex ia tb IIIC T80°C...T290°C Db X		

2.2. Technical parameters of MPS5101

Antenna type	Ø50 mm compact plastic antenna	Ø80 mm compact plastic antenna	Ø80 mm compact plastic horn antenna
Product pictures			
Scope of application	Level measurement of liquid of simple process conditions	Level measurement of lump or powder materials of simple process conditions	Level measurement of liquid of simple process conditions
Process materials	PP	PP	PP+PTFE
Maximum span	35m	35m	35m
Accuracy of the measurements	±2mm		
Process connection	● G1-1/2”A thread ● Flange ● G1”A thread (hoist)	● G3”A thread ● Flange ● G1”A thread (hoist)	● Hoisting holder ● Flange ● G1-1/2"A thread (hoisted)
Beam angle	Min. 8°	Min. 3°	Min. 3°
Power supply and output	● Two-wire DC power supply, 4mA~20mA output, with HART communication: 16V~30V DC, ripple ≤100mV; ● Four-wire DC power supply, 4mA~20mA output, with HART communication: 18V~36V DC, ripple ≤100mV; ● Four-wire AC power supply, 4mA~20mA output, with HART communication: 90V~260V AC, 50Hz~60Hz; ● Four-wire DC power supply, RS485, output, with Modbus communication: 18V~36V DC, ripple ≤100mV; ● Four-wire AC power supply, RS485, output, with Modbus communication: 90V~260V AC, 50Hz~60Hz.		
Signal frequency	W-band (76GHz~81GHz)		
Ambient temperature	-40°C~80°C		
Process temperature	-40°C~80°C		
Process pressure	-1kgf/cm²~2.5kgf/cm²		
Degree of protection	IP67		

2.3. MPS5200 technical parameters

Antenna type	Ø50 mm integrated and sanitary antenna	Ø80 mm integrated and sanitary antenna	Universal antenna
Product pictures			
Scope of application	● Slight corrosive liquid of complex process conditions ● Liquid measurement of food and drug industries (sanitary)	● Slight corrosive liquid of complex process conditions ● Level measurement of lump or powder materials of simple process conditions	● Level measurement of lump or powder materials of simple process conditions
Process materials	304+PTFE	304+PTFE	304+PTFE
Maximum span	30m	120m	120m
Accuracy of the measurements	±2mm		
Process connection	● G1-1/2”A thread ● Flange ● 2” sanitary clamp	● G3”A thread ● Flange ● 3” sanitary clamp	● Flange
Beam angle	Min. 7°	Min. 3°	Min. 3°
Power supply and output	● Two-wire DC power supply, 4mA~20mA output, with HART communication: DC16V~30V (intrinsic safety+flameproof type 24V), ripple ≤100mV; ● Four-wire DC power supply, 4mA~20mA output, with HART communication: 18V~36V DC, ripple ≤100mV; ● Four-wire AC power supply, 4mA~20mA output, with HART communication: 90V~260V AC, 50Hz~60Hz.		
Signal frequency	W-band (76GHz-81GHz)		
Ambient temperature	Normal temperature working conditions: -40°C~80°C, low-temperature working conditions: -60°C~80°C and LCD screen:-30°C~80°C (see the Explosion Protection Certificate for ambient temperature of explosion-proof products)		
Process temperature	-40°C~200°C		
Process pressure	● Hygienic: -1 kgf/cm²~10 kgf/cm² ● Integrated: -1 kgf/cm²~25 kgf/cm² ● Universal: Atm (barometric pressure)		
Degree of protection	IP66/IP67		
Electrical interface	● M20×1.5 thread (non-flameproof type: outer diameter of cable limited to 6mm~12mm, flameproof type: outer diameter of cable limited to 8mm~12mm) ● 1/2"NPT thread (non-flameproof type: outer diameter of cable limited to 6mm~12mm, flameproof type: outer diameter of cable limited to 8mm~12mm)		
Safety certificate	● CCRI: Intrinsic safety + gas explosion proof type Ex ia IIC T6/T2 Ga ● CCRI: Intrinsic safety +gas flameproof type Ex db ia [ia Ga] IIC T6/T2 Gb ● CCRI: Intrinsic safety+dust flameproof type Ex ia tb [ia Da] IIIC T80°C/T290°C Db ● EAC: Intrinsic safety + gas explosion proof type 0Ex ia IIC T6...T2 Ga X ● EAC: Intrinsic safety + dust explosion proof type Ex ia IIIC T80°C...T290°C Da X ● EAC: Intrinsic safety+gas flameproof type 1Ex db ia IIC T6...T2 Gb X ● EAC: Intrinsic safety + dust flameproof type Ex ia tb IIIC T80°C...T290°C Db X		

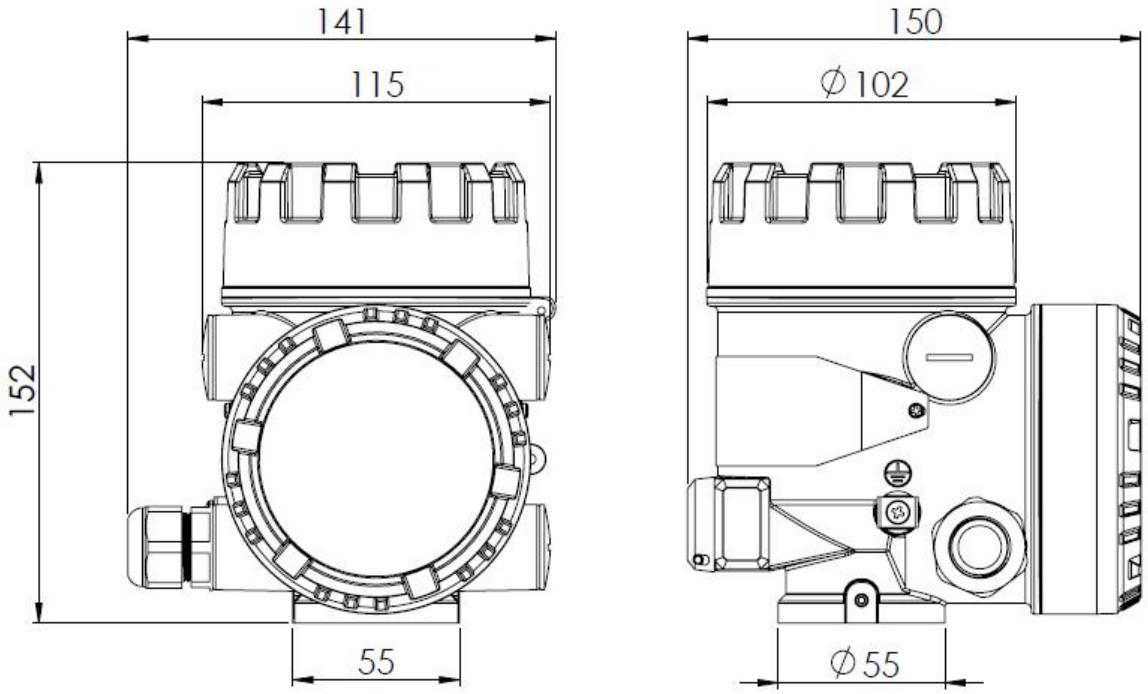
2.4. MPS5300 technical parameters

Antenna type	Ø50 mm process seal antenna	Ø80 mm process seal antenna
Product pictures		
Scope of application	Strong corrosive liquid of complex process conditions	Strong corrosive liquid of complex process conditions
Process materials	304+PTFE	304+PTFE
Maximum span	30m	120m
Accuracy of the measurements	±2mm	
Process connection	Flange	Flange
Beam angle	Min. 7°	Min. 3°
Power supply and output	● Two-wire DC power supply, 4mA~20mA output, with HART communication: DC16V~30V (intrinsic safety+flameproof type 24V), ripple ≤100mV; ● Four-wire DC power supply, 4mA~20mA output, with HART communication: 18V~36V DC, ripple ≤100mV; ● Four-wire AC power supply, 4mA~20mA output, with HART communication: 90V~260V AC, 50Hz~60Hz.	
Signal frequency	W-band (76GHz~81GHz)	
Ambient temperature	Normal temperature working conditions: -40°C~80°C, low-temperature working conditions: -60°C~80°C and LCD screen:-30°C~80°C (see the Explosion Protection Certificate for ambient temperature of explosion-proof products)	
Process temperature	-40°C~200°C	
Process pressure	-1 kgf/cm²~25 kgf/cm²	
Degree of protection	IP66/IP67	
Electrical interface	● M20×1.5 thread (non-flameproof type: outer diameter of cable limited to 6mm~12mm, flameproof type: outer diameter of cable limited to 8mm~12mm) ● 1/2"NPT thread (non-flameproof type: outer diameter of cable limited to 6mm~12mm, flameproof type: outer diameter of cable limited to 8mm~12mm)	
Safety certificate	● CCRI: Intrinsic safety + gas explosion proof type Ex ia IIC T6/T2 Ga ● CCRI: Intrinsic safety +gas flameproof type Ex db ia [ia Ga] IIC T6/T2 Gb ● CCRI: Intrinsic safety+dust flameproof type Ex ia tb [ia Da] IIIC T80°C/T290°C Db ● EAC: Intrinsic safety + gas explosion proof type 0Ex ia IIC T6...T2 Ga X ● EAC: Intrinsic safety + dust explosion proof type Ex ia IIIC T80°C...T290°C Da X ● EAC: Intrinsic safety+gas flameproof type 1Ex db ia IIC T6...T2 Gb X ● EAC: Intrinsic safety + dust flameproof type Ex ia tb IIIC T80°C...T290°C Db X	

Note: The actual measuring range and accuracy of the meter are affected by antenna size, medium reflectivity, installation position and possible interference reflection. ±2mm is the highest precision of this series of meters under the standard conditions in the laboratory.

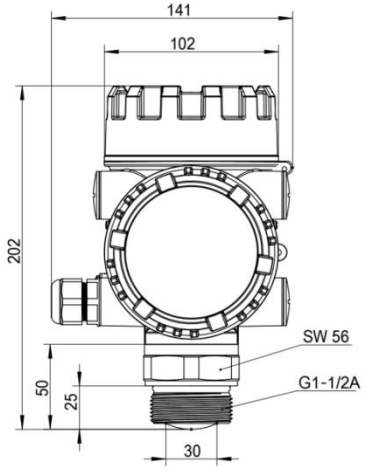
3. Structural size

3.1. Size of meter housing

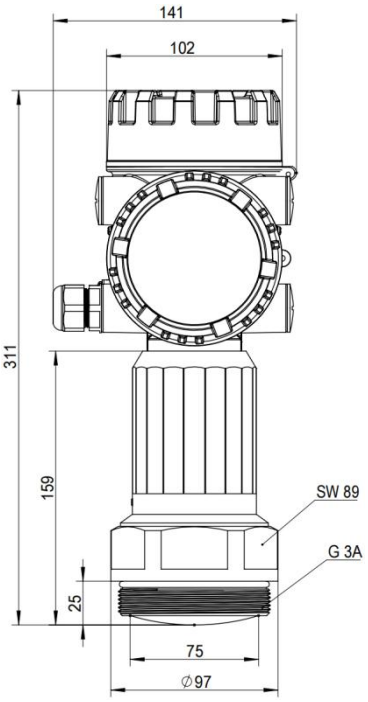


3.2. MPS5100 Boundary dimension

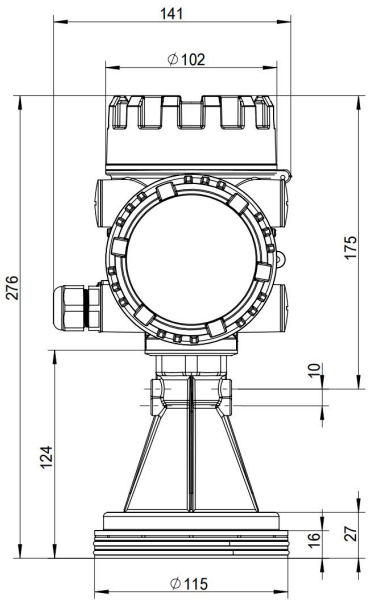
Ø50 mm plastic rod antenna



Ø80 mm plastic rod antenna

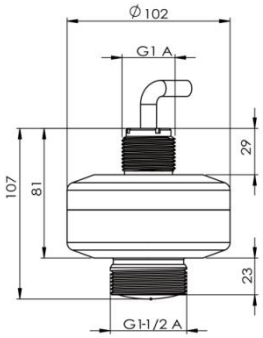


Ø80 mm plastic horn antenna

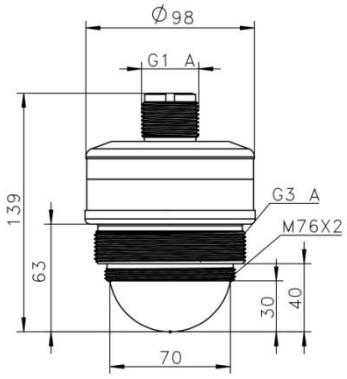


3.3. Boundary dimension of MPS5101

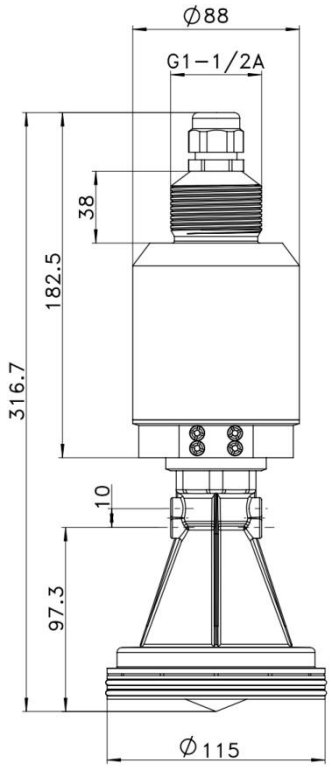
Ø50 mm compact plastic antenna



Ø80 mm compact plastic antenna

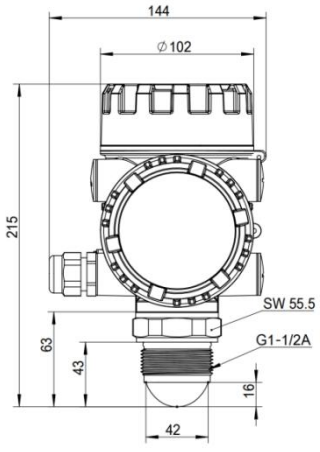


Ø80 mm compact plastic horn antenna

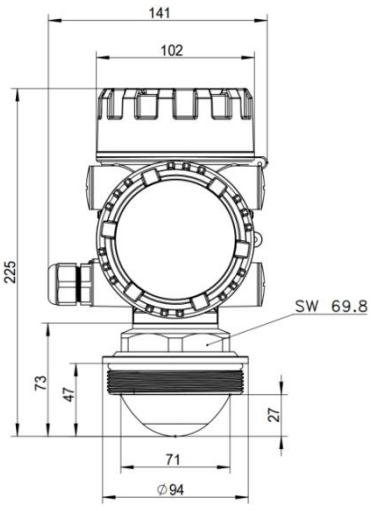


3.4. MPS5200 Boundary dimension

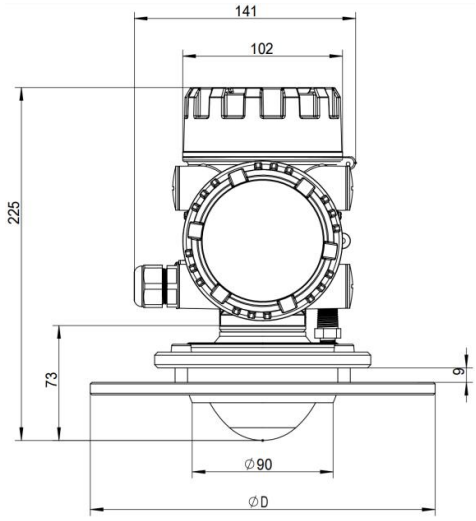
Ø50 mm integrated antenna



Ø80 mm integrated antenna

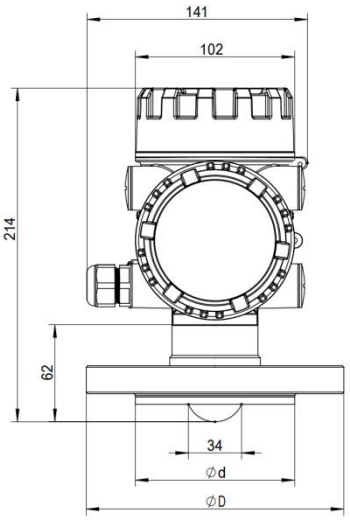


Universal purge type antenna

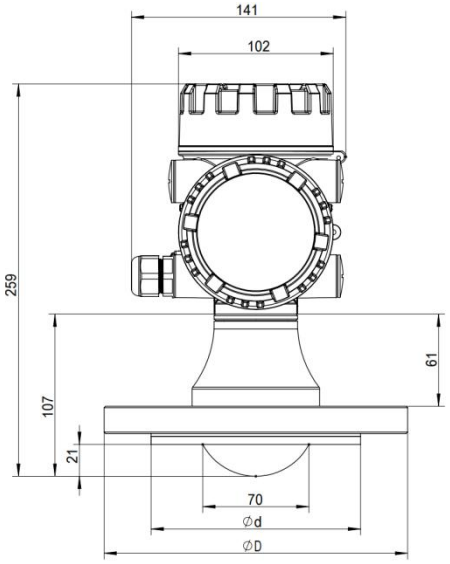


3.5. MPS5300 boundary dimension

Ø50 mm process seal antenna

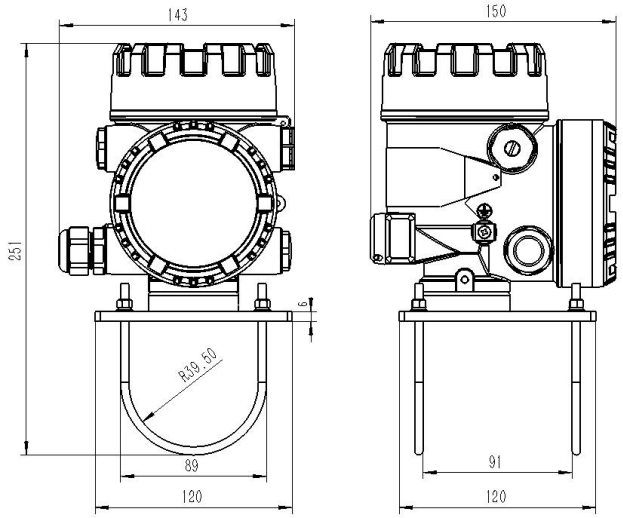


Ø80 mm process seal antenna

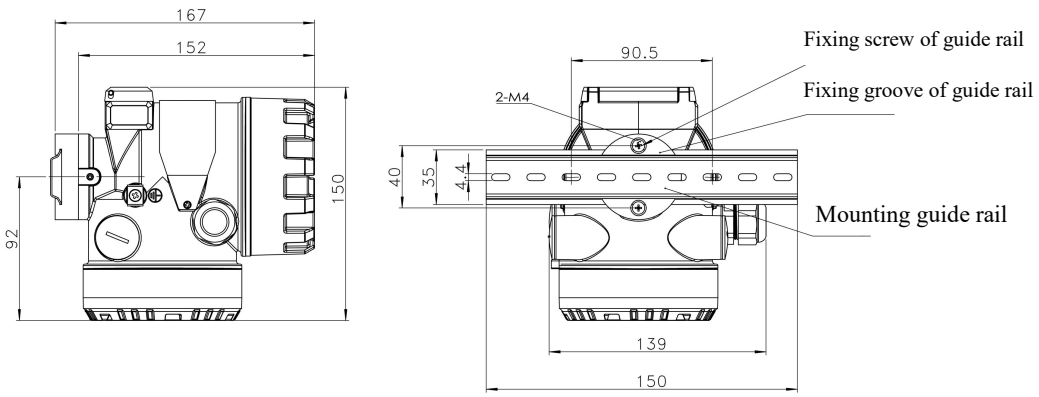


3.6. Boundary dimension of tank-side indicator (optional)

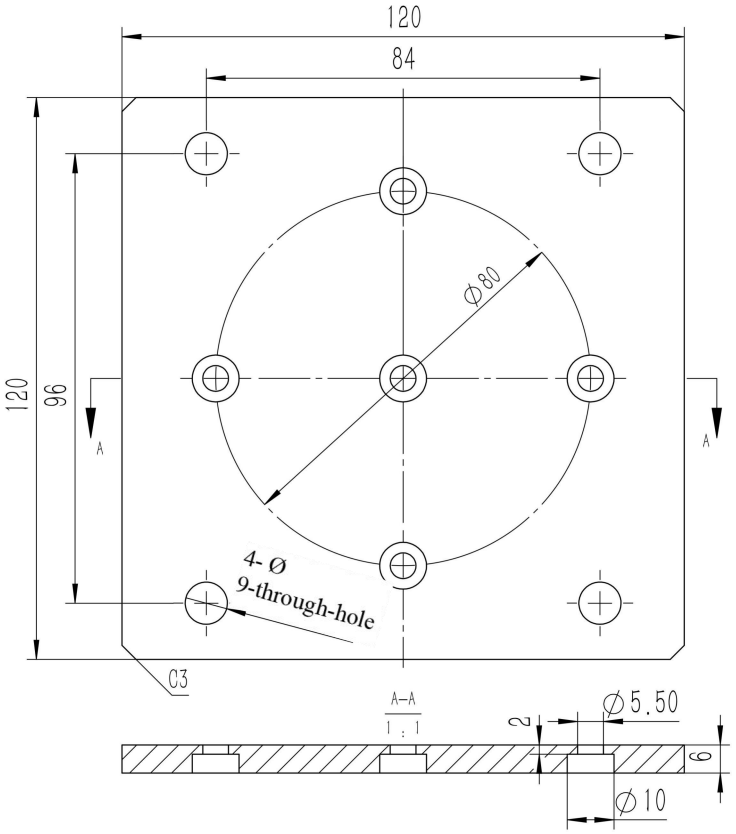
3.6.1. Installation in Ø80 hoop (installation by default)



3.6.2. Installation in DIN35 guide rail



3.6.3. Base plate for tank-side indicator installation



4. Installation guide

4.1. Unpacking and inspection

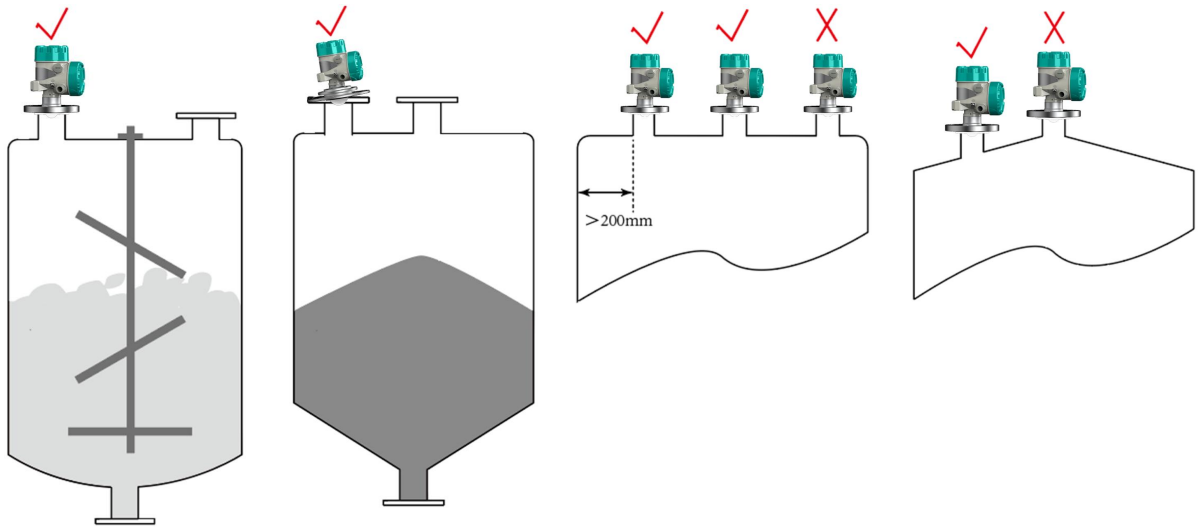
◆ The meter is packed in a carton box or wooden box. Rudely loading or unloading is forbidden. It must be very careful with carrying and handling. The storage site should be in compliance with the conditions as follows:

- Rain-proof and moisture-proof;
- No mechanical vibration or shock;
- Temperature range: -10°C~55°C;
- Relative moisture: no more than 85%;
- No corrosive gas in the environment.

◆ Check all the items listed in the packing list, which includes meter model and quantity, accessories, operating manual etc. In case of any mistake, lack of goods or damage, please contact the company or its local agent. Packing boxes are not being taken back.

4.2. Selection of installing position

Recommended mounting position as shown below.

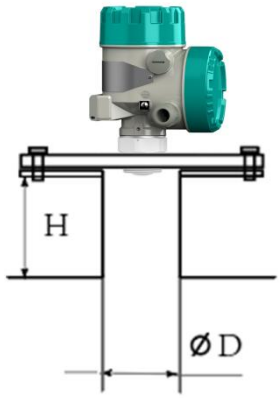


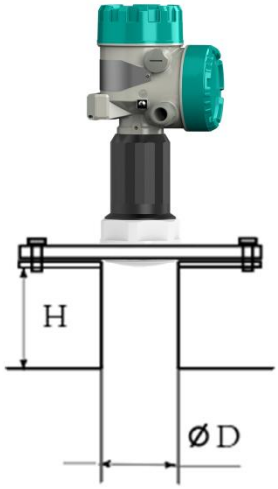
Installation in agitator tanks | Installation in solid tanks | Installation in flat-top tanks | Installation in conical or arched tanks

Precautions:

- ◆ Keep the meter far from the feed inlet, and avoid material flow.
- ◆ Keep the meter at least 200 mm away from the tank wall.
- ◆ For installation in conical, arched tanks, do not install the meter in the dead center.
- ◆ For installation in solid tanks, try to make sure that the meter antenna is pointing at the discharge port.
- ◆ For installation in agitator tanks, install the meter at 1/2 of the distance between the outer edge of the stirring blade and the tank wall as far as possible.
- ◆ It should be installed in a place which is convenient for installation and wiring, so as to promote future disassembly and assembly.
- ◆ If the meter is to be installed in an explosion-proof area, national provisions on explosion-proof hazardous areas should be followed.
- ◆ The meter should be kept from direct sunlight. Long-term exposure to the sunshine may cause the meter to be overheated or the plastic part aged.
- ◆ There should be no blocks in the antenna microwave transmitting beam angle, so the facilities such as ladder, limit switch, heating equipment, bracket, etc. in the tank should be kept away from as much as possible during the installation.
- ◆ The maximum level of the measured material should be lower than the measuring blind zone of the meter (usually the end of the antenna, and the blind zone of low dielectric constant or solid material should be properly increased), and the distance between the end of the antenna and the surface of the medium should be at least 50 mm, so as to prevent the antenna from being polluted by the material.

4.3. Installation requirement of liquid measurement

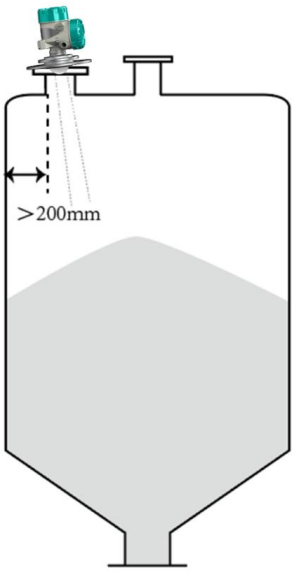




Inner diameter of standpipe ØD	Standpipe height H	Inner diameter of standpipe ØD	Standpipe height H
50mm 2"	<200mm	80mm 3"	<400mm
80mm 3"	<300mm	100mm 4"	<500mm
100mm 4"	<400mm	150mm 6"	<800mm
150mm 6"	<600mm	200mm 8"	<1000mm

- ◆ The meter should be installed vertically.
- ◆ It is advised to be installed from the opening at 1/2 of the tank radius.
- ◆ The smoother the standpipe end, the larger the diameter and the smaller the height, the better the use effect.

4.4. Installation requirement of solid measurement

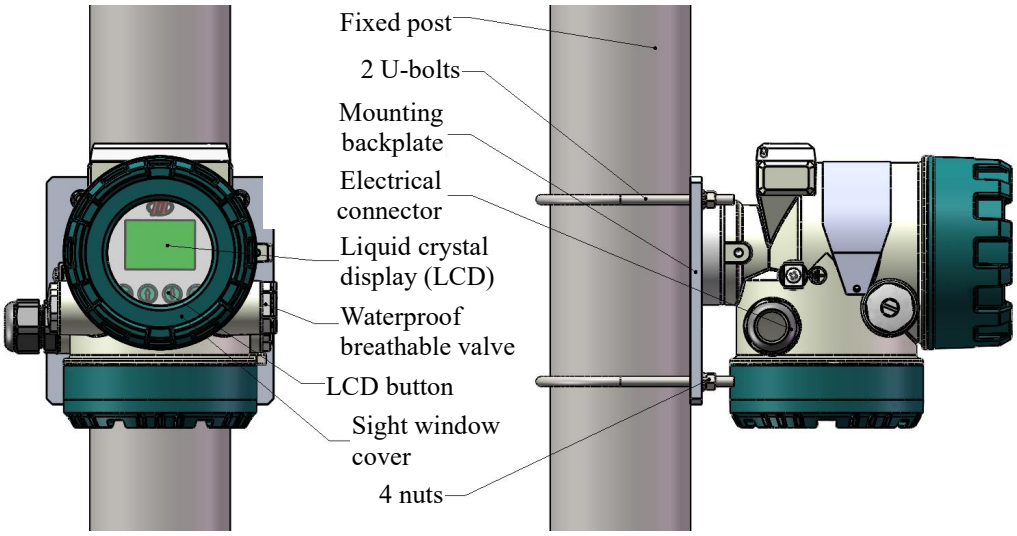


In measurement of solid and powder, the build-up of material may form a tapered surface. Therefore, the angle of the meter should be adjusted properly to achieve the best measurement effect.

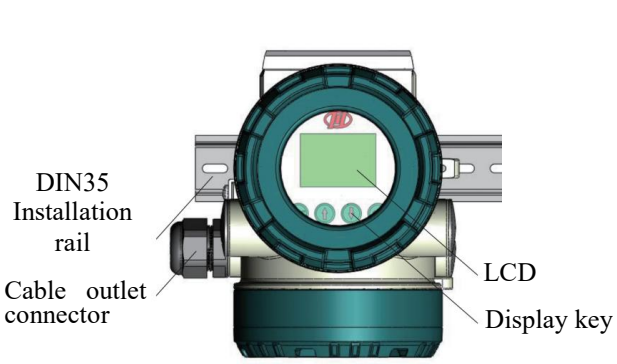
Note: If MPS5200 is equipped with a purge structure, the air source pressure is recommended to be 0.6 MPa~0.8 MPa (the pressure in the tank and the dryness of air source will affect the purging effect). By default, the air source interface has G1/8" female threads and a PC8-01 quick connector.

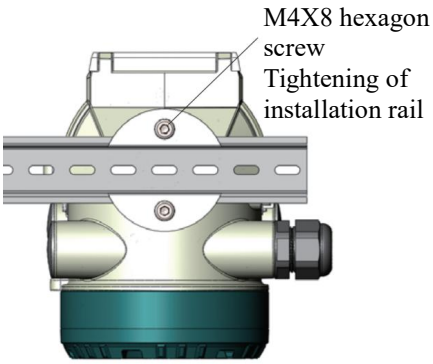
4.5. Installation in tank-side indicator (optional)

4.5.1. Installation in standpipe



4.5.2. Installation in guide rail





4.6. Confirmation of installation

- ◆ Confirm that the meter is grounded correctly;
- ◆ Confirm that the meter enclosure has been screwed tightly;
- ◆ Confirm that the meter measures normally and the output is consistent with the setup in the central control room;
- ◆ Ensure that the outlet of the meter entrance cable is tightened and the unused outlet is sealed by plugging;
- ◆ Make sure that the instrument conduit arranged on site will not cause water accumulation to the meter;
- ◆ Make sure that the cable connector of the meter complies with relevant protection standards and regulations;
- ◆ Make sure that process connection components, such as flange gaskets and bolts, are suitable for the field working conditions;
- ◆ Make sure that the process parameters of the field working conditions do not exceed the maximum process parameters allowed by the meter.

Warning:

- ➢ Improper process connection components may lead to the risk of injury or poisoning!
- ➢ If the meter is not installed correctly, high temperature, toxic, corrosive process media may be released at the connection between the meter and the tank!
- ➢ If the process parameters of the field working conditions exceed the maximum process parameters allowed by the meter, the meter may be damaged and there is a risk of explosion!
- ➢ Untightened or improperly connected cable connectors may have the risk of explosion in a hazardous zone!
- ➢ Do not loose, remove or disassemble the process connection components before the pressure in the tank is released!

5. Table of MPS5100 model

Model parameters	Specification code	Description
Product	MPS5100	80G FM-CW radar level transmitter (plastic rod type, plastic horn)
Measured medium	S	Solid
	L	Liquid
Maximum range	0	15m
	1	30m
	2	70m
	3	120m
Housing	S	Die casting aluminum (electrical interface M20×1.5)
	B	Die casting aluminum (electrical interface 1/2"NPT)
	G	Stainless steel 316 (electrical interface M20×1.5)
	H	Stainless steel 316 (electrical interface 1/2"NPT)
Electronic module	B	24V DC, 4mA~20mA, HART
	C	24V DC, 4mA~20mA, HART, with blue tooth
	U	220V AC, 4mA~20mA, HART
	V	220V AC, 4mA~20mA, HART, with blue tooth
Output	2	Two-wire system (B and C only for electronic module)
	4	Four-wire system
	6	Wireless remote transmission LoRa
Display module	0	None
	1	Yes
	2	Passive tank-side display (power supply of master, recommended)
	3	Active tank-side display (power supply from tank-side indicator and only for output 2)
Safety certificate	X	No requirement
	A	CCRI: Intrinsic safety + gas explosion proof type Ex ia IIC T6/T2 Ga
	D	CCRI: Intrinsic safety +gas flameproof type Ex db ia[ia Ga] IIC T6/T2 Gb
	N	CCRI: Intrinsic safety+dust flameproof type Ex ia tb [ia Da] IIIC T80°C/T290°C Db
	M	CCRI: complex gas explosion proof+complex dust explosion proof typeEx db ia[ia Ga] IIC T6/T2 Gb; Ex ia tb [ia Da] IIIC T80°C/T290°C Db
	E	EAC: Intrinsic safety + gas explosion proof type 0Ex ia IIC T6...T2 Ga X
	F	EAC: Intrinsic safety + dust explosion proof type Ex ia IIIC T80°C...T290°C Da X
	G	EAC: intrinsic safety and gas explosion proof+intrinsic safety and dust explosion proof type 0Ex ia IIC T6...T2 Ga X; Ex ia IIIC T80°C...T290°C Da X
	J	EAC: Intrinsic safety+gas flameproof type 1Ex db ia IIC T6...T2 Gb X
	K	EAC: Intrinsic safety + dust flameproof type Ex ia tb IIIC T80°C...T290°C Db X
	L	EAC: complex gas explosion proof+complex dust explosion proof type 1Ex db ia IIC T6...T2 Gb X; Ex ia tb IIIC T80°C...T290°C Db X

Model parameters	Specification code	Description
Antenna type	2	Ø50mm plastic rod type (flange size limited to be ≥DN50)
	3	Ø80mm plastic rod type (flange size limited to be ≥DN80)
	4	Ø80mm plastic horn type (flange size limited to be ≥DN80)
	5	Universal plastic horn type (flange size ≥DN80, and process pressure M)
Information of antenna assistance	X	None
Process temperature (°C)	D	-40°C~80°C (EPDM seal ring)
	P	-40°C~130°C (EPDM seal ring)
	K	-20°C~130°C (FKM seal ring)
Process pressure (kgf/cm²g)	L	-1
	M	Atm (atmosphere)
	A	2.5 (D only for process temperature)
Process connection	GD	G1-1/2"A (2 only for antenna type)
	GM	G3"A (3 only for antenna type)
	LM	Hoisting holder (for antenna type 4)
	FB	Standard flange
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)
Flange size	E	DN50(2")
	C	DN65(2.5")
	F	DN80(3")
	G	DN100(4")
	H	DN125(5")
	J	DN150(6")
	K	DN200(8")
	M	DN250(10")
Pressure rating (kgf/cm²) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	M	Class150
	N	Class300

Model parameters	Specification code	Description
Flange sealing face type	A	RF (recommended)
	B	FM
	C	M
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	Flat-thin plate flange (8 mm thick, M only for process pressure limited)
Material of flange	A	304
	B	316L
	C	Carbon steel (Q235)
	F	C4 steel
	D	PP (20mm thick, M only for process pressure and D only for process temperature)
	E	PTFE (20mm thick, M only for process pressure)
Companion flange (A, B and C options are inherently equipped with 304 bolt , nut, plate washer, flange gasket)	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel (Q235)

Special notes:

- Typical model 1: MPS5100L0SB21D3XDMFB-BGCAAX
- Typical model 2: MPS5100L0SB21D3XDMGM
- Special model: if special selection is required for a certain digit in the model code, fill “Z” in the space of special model in the model code, and “/Z” behind the complete model code; If special accessory is required, please fill "/Z" behind the complete model code. Then, explain all the "digit for special model" and special accessories in words without omission. The text description should be placed in brackets "( )". Before each description, "Zn:" (n = 1, 2, 3, ...) should be used for guidance and each description should be separated by semicolon";". When the specification code has multiple digits, the last digit will be changed to "Z". For example, "FB" will be changed to "FZ".
- Example 1 of special model: MPS5100L0SB21X3XDMFB-BGCAAX/Z (Z1: content of cooper and zinc in the part receiving liquid <0.5%, and no requirement for content of cooper and zinc in the part not receiving liquid)
- Example 2 of special model: MPS5100L0SB21X3XDMFB-BGCAAX/Z (Z1: content of cooper and zinc in the part receiving liquid <0.5%, and content of cooper and zinc in the part not receiving liquid <1.0%)
- Tank-side cable: If tank-side indicator is optional, the standard configuration contains a communication cable of 25 m. Any excess is priced in meters.

6. Table of MPS5101 model

Model parameters	Specification code	Description
Product	MPS5101	80G FM-CW radar level transmitter (compact)
Measured medium	S	Solid
	L	Liquid
Maximum span	0	8m
	1	15m
	2	35m
Housing material	P	PP plastic
Electronic module	B	24V DC
	C	24V DC, with blue tooth
	U	220V AC
	V	220V AC, with blue tooth
Output	0	RS485, Modbus four-wire system
	2	4mA~20mA, HART two-wire system (for electronic module B or C)
	4	4mA~20mA, HART four-wire system
Display module	0	No (for electronic module B or C and output 0 or 2)
	3	Active tank-side display
Safety certificate	X	No requirement
Antenna type	2	Ø50mm compact plastic antenna (flange size limited to be≥DN50)
	3	Ø80mm compact plastic antenna (flange size limited to be ≥DN80)
	4	Ø80mm compact plastic horn antenna (flange size limited to be ≥DN80)
tank-side/meter cable length (L)	A	5m
	B	10m
	C	15m
	D	20m
	E	25m
Process temperature (°C)	D	-40°C~80°C (EPDM seal ring)
Process pressure (kgf/cm²g)	L	-1
	M	Atm (atmosphere)
	A	2.5
Process connection	GD	G1-1/2"A (2 only for antenna type)
	GM	G3"A (3 only for antenna type)
	LM	Hoisting holder
	FB	Standard flange
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)

Model parameters	Specification code	Description
Flange size	E	DN50(2")
	C	DN65(2.5")
	F	DN80(3")
	G	DN100(4")
	H	DN125(5")
	J	DN150(6")
	K	DN200(8")
	M	DN250(10")
Flange pressure rating (kgf/cm²) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	M	Class150
	N	Class300
Flange sealing face type	A	RF (recommended)
	B	FM
	C	M
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	Flat-thin plate flange (8 mm thick, M only for process pressure limited)
Material of flange	A	304
	B	316L
	C	Carbon steel (Q235)
	F	C4 steel
	D	PP (20mm thick, M only for process pressure)
	E	PTFE (20mm thick, M only for process pressure)
Companion flange (A, B and C options are inherently equipped with 304 bolt , nut, plate washer, flange gasket)	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel (Q235)

Special notes:

- Typical model 1: MPS5101L0PB23X2BDMFB-BECADX
- Typical model 2: MPS5101S0PB23X3CDMLM
- Special model: if special selection is required for a certain digit in the model code, fill “Z” in the space of special model in the model code, and “/Z” behind the complete model code; If special accessory is required, please fill "/Z" behind the complete model code. Then, explain all the "digit for special model" and special accessories in words without omission. The text description should be placed in brackets "( )". Before each description, "Zn:" (n = 1, 2, 3, ...) should be used for guidance and each description should be separated by semicolon";". When the specification code has multiple digits, the last digit will be changed to "Z". For example, "FB" will be changed to "FZ".
- Example of special model: MPS5101L0PB23X2BDMFB-BECADX/Z (Z1: with nameplates and manuals in Chinese and English)

7. Table of MPS5200 model

Model parameters	Specification code	Description
Product	MPS5200	80G FM-CW radar level transmitter (integrated, sanitary)
Measured medium	S	Solid
	L	Liquid
Maximum span	0	15m
	1	30m
	2	70m
	3	120m
Housing	S	Die casting aluminum (electrical interface M20×1.5)
	B	Die casting aluminum (electrical interface 1/2"NPT)
	G	Stainless steel 316 (electrical interface M20×1.5)
	H	Stainless steel 316 (electrical interface 1/2"NPT)
Electronic module	B	24V DC, 4mA~20mA, HART
	C	24V DC, 4mA~20mA, HART, with blue tooth
	U	220V AC, 4mA~20mA, HART
	V	220V AC, 4mA~20mA, HART, with blue tooth
Output	2	Two-wire system (B and C only for electronic module)
	4	Four-wire system
	6	Wireless remote transmission LoRa
Display module	0	None
	1	Yes
	2	Passive tank-side display (power supply of master, recommended)
	3	Active tank-side display (power supply from tank-side indicator and only for output 2)
Safety certificate	X	No requirement
	A	CCRI: Intrinsic safety + gas explosion proof type Ex ia IIC T6/T2 Ga
	D	CCRI: Intrinsic safety +gas flameproof type Ex db ia[ia Ga] IIC T6/T2 Gb
	N	CCRI: Intrinsic safety+dust flameproof type Ex ia tb [ia Da] IIIC T80°C/T290°C Db
	M	CCRI: complex gas explosion proof+complex dust explosion proof typeEx db ia[ia Ga] IIC T6/T2 Gb; Ex ia tb [ia Da] IIIC T80°C/T290°C Db
	E	EAC: Intrinsic safety + gas explosion proof type 0Ex ia IIC T6...T2 Ga X
	F	EAC: Intrinsic safety + dust explosion proof type Ex ia IIIC T80°C...T290°C Da X
	G	EAC: intrinsic safety and gas explosion proof+intrinsic safety and dust explosion proof type 0Ex ia IIC T6...T2 Ga X; Ex ia IIIC T80°C...T290°C Da X
	J	EAC: Intrinsic safety+gas flameproof type 1Ex db ia IIC T6...T2 Gb X
	K	EAC: Intrinsic safety + dust flameproof type Ex ia tb IIIC T80°C...T290°C Db X
	L	EAC: complex gas explosion proof+complex dust explosion proof type 1Ex db ia IIC T6...T2 Gb X; Ex ia tb IIIC T80°C...T290°C Db X

Model parameters	Specification code	Description
Antenna type/process material	2	Ø50mm integrated type/stainless steel 304 (flange size limited to be ≥DN50)
	3	Ø80mm integrated type/stainless steel 304 (flange size limited to be≥DN80)
	4	2" hygienic type/stainless steel 316L (process pressure limited to be ≤10kgf/cm²g)
	5	3" hygienic type/stainless steel 316L (process pressure limited to be≤10kgf/cm²g)
Information of antenna assistance	X	None (C only for flange connection)
	A	Universal adjustment (W only for flange connection)
	B	Purging (C only for flange connection)
	C	Universal+purging (W only for flange connection)
Process temperature (°C)	D	-40°C~80°C (EPDM seal ring)
	P	-40°C~130°C (EPDM seal ring)
	K	-20°C~130°C (FKM seal ring)
	N	-20°C~200°C (FKM seal ring)
Process pressure (kgf/cm²g)	L	-1
	M	Atm (atmosphere)
	A	2.5
	B	6
	G	10
	C	16
	D	25
Process connection	GD	G1-1/2"A (2 only for antenna type/process material)
	GM	G3"A (3 only for antenna type/process material)
	T2	2" hygienic clamp (4 only for antenna type/process material)
	T3	3" hygienic clamp (5 only for antenna type/process material)
	FB	Standard flange
Connection mode of flange	C	Direct-insertion type
	W	Universal type (M only for process pressure)
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)
Flange size	E	DN50(2")
	C	DN65(2.5")
	F	DN80(3")
	G	DN100(4")
	H	DN125(5")
	J	DN150(6")
	K	DN200(8")
	M	DN250(10")

Model parameters	Specification code	Description
Pressure rating (kgf/cm²) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	M	Class150
	N	Class300
Flange sealing face type	A	RF (recommended fastening flange)
	B	FM
	C	M
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	Flat-thin plate flange (8mm thick, M only for process pressure and recommended universal flange)
Material of flange	A	304
	B	316L
	C	Carbon steel (Q235)
	F	C4 steel
	D	PP (20mm thick, M only for process pressure, D only for process temperature, and C only for flange connection)
	E	PTFE (20mm thick, M only for process pressure and C only for flange connection)
Companion flange (A, B and C options are inherently equipped with 304 bolt , nut, plate washer, flange gasket)	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel (Q235)

Special notes:

- Typical model 1: MPS5200S0SB21X3CDMFB-WBGCFAX
- Typical model 2: MPS5200L0SB21D3XDMGM
- Special model: if special selection is required for a certain digit in the model code, fill “Z” in the space of special model in the model code, and “/Z” behind the complete model code; If special accessory is required, please fill "/Z" behind the complete model code. Then, explain all the "digit for special model" and special accessories in words without omission. The text description should be placed in brackets "( )". Before each description, "Zn:" (n = 1, 2, 3, ...) should be used for guidance and each description should be separated by semicolon";". When the specification code has multiple digits, the last digit will be changed to "Z". For example, "FB" will be changed to "FZ".
- Example of special model: MPS5200S1SB21X3CDMFB-WBGCFAX/Z (Z1: separately equipped with stainless steel number plate; Z2: equipped with M20×1.5 adapter 3/4” NPT cable adapter)
- Tank-side cable: If tank-side indicator is optional, the standard configuration contains a communication cable of 25 m. Any excess is priced in meters.

8. Table of MPS5300 model

Model parameters	Specification code	Description
Product	MPS5300	80G FM-CW radar level transmitter (PTFE process seal antenna)
Measured medium	L	Liquid
Maximum span	0	15 m (recommended)
	1	30 m (recommended)
	2	70m
	3	120m
Housing	S	Die casting aluminum (electrical interface M20×1.5)
	B	Die casting aluminum (electrical interface 1/2"NPT)
	G	Stainless steel 316 (electrical interface M20×1.5)
	H	Stainless steel 316 (electrical interface 1/2"NPT)
Electronic module	B	24V DC, 4mA~20mA, HART
	C	24V DC, 4mA~20mA, HART, with blue tooth
	U	220V AC, 4mA~20mA, HART
	V	220V AC, 4mA~20mA, HART, with blue tooth
Output	2	Two-wire system (B and C only for electronic module)
	4	Four-wire system
	6	Wireless remote transmission LoRa
Display module	0	None
	1	Yes
	2	Passive tank-side display (power supply of master, recommended)
	3	Active tank-side display (power supply from tank-side indicator and only for output 2)
Safety certificate	X	No requirement
	A	CCRI: Intrinsic safety + gas explosion proof type Ex ia IIC T6/T2 Ga
	D	CCRI: Intrinsic safety +gas flameproof type Ex db ia[ia Ga] IIC T6/T2 Gb
	N	CCRI: Intrinsic safety+dust flameproof type Ex ia tb [ia Da] IIIC T80°C/T290°C Db
	M	CCRI: complex gas explosion proof+complex dust explosion proof typeEx db ia[ia Ga] IIC T6/T2 Gb; Ex ia tb [ia Da] IIIC T80°C/T290°C Db
	E	EAC: Intrinsic safety + gas explosion proof type 0Ex ia IIC T6...T2 Ga X
	F	EAC: Intrinsic safety + dust explosion proof type Ex ia IIIC T80°C...T290°C Da X
	G	EAC: intrinsic safety and gas explosion proof+intrinsic safety and dust explosion proof type 0Ex ia IIC T6...T2 Ga X; Ex ia IIIC T80°C...T290°C Da X
	J	EAC: Intrinsic safety+gas flameproof type 1Ex db ia IIC T6...T2 Gb X
	K	EAC: Intrinsic safety + dust flameproof type Ex ia tb IIIC T80°C...T290°C Db X
	L	EAC: complex gas explosion proof+complex dust explosion proof type 1Ex db ia IIC T6...T2 Gb X; Ex ia tb IIIC T80°C...T290°C Db X

Model parameters	Specification code	Description
Antenna type/process material	2	Ø50 mm process seal antenna/stainless steel 304+PTFE process seal (for flange size E or C)
	3	Ø80 mm process seal antenna/stainless steel 304+PTFE process seal (flange size limited to be≥DN80)
Antenna material	A	PTFE
Process temperature (°C)	D	-40°C~80°C (EPDM seal ring)
	P	-40°C~130°C (EPDM seal ring)
	K	-20°C~130°C (FKM seal ring)
	N	-20°C~200°C (FKM seal ring)
Process pressure (kgf/cm²g)	L	-1
	M	Atm (atmosphere)
	A	2.5
	B	6
	G	10
	C	16
	D	25
Process connection	FB	Standard flange
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)
Flange size	E	DN50(2")
	C	DN65(2.5")
	F	DN80(3")
	G	DN100(4")
	H	DN125(5")
	J	DN150(6")
	K	DN200(8")
	M	DN250(10")
Pressure rating (kgf/cm²) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	M	Class150
	N	Class300
Flange sealing face type	A	RF (recommended)
	C	M

Model parameters	Specification code	Description
Material of flange	A	304
	B	316L
Companion flange (A, B and C options are inherently equipped with 304 bolt , nut, plate washer)	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel (Q235)

Special notes:

- Typical model : MPS5300L0SB21X3ADMFB-BGCAAX
- Special model: if special selection is required for a certain digit in the model code, fill “Z” in the space of special model in the model code, and “/Z” behind the complete model code; If special accessory is required, please fill "/Z" behind the complete model code. Then, explain all the "digit for special model" and special accessories in words without omission. The text description should be placed in brackets "( )". Before each description, "Zn:" (n = 1, 2, 3, ...) should be used for guidance and each description should be separated by semicolon";". When the specification code has multiple digits, the last digit will be changed to "Z". For example, "FB" will be changed to "FZ".
- Example of special mode: MPS5300L0SB22X3APGFB-BJCAAX/Z (Z1: equipped with 30 m tank-side communication cable)
- Tank-side cable: If tank-side indicator is optional, the standard configuration contains a communication cable of 25 m. Any excess is priced in meters.

MPS3000 Pulse Radar Level Transmitter

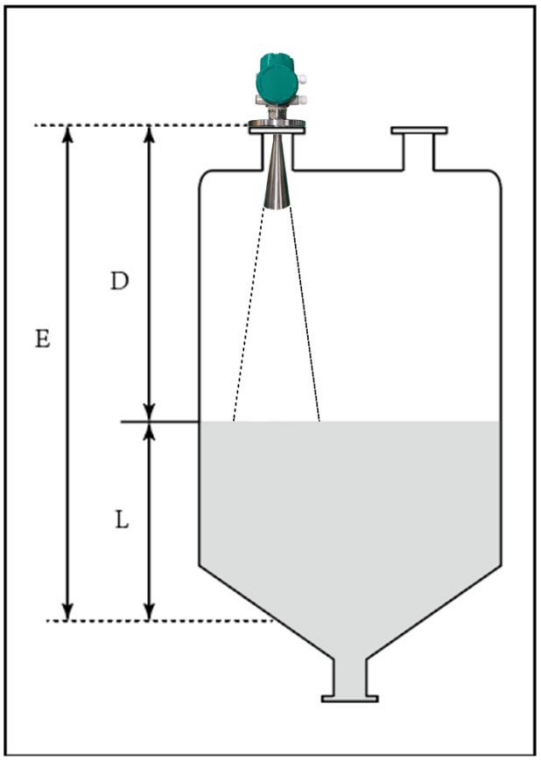




1. Overview

1.1. Measuring principle

Based on the time-travel principle, MPS3000 pulse radar level transmitter is an “emit pulse downward” measurement instrument. It measures the level data by transmitting and receiving micro-power microwave pulses, and its accuracy can reach millimeter level.



When working, it generates a pulse signal superimposed on the 26GHz sine wave signal every 1ns, which is transmitted through the antenna and propagates in space at the speed of light. After the pulse signal touches the surface of the measured medium, part of the energy of the pulse signal will be reflected and then received by the antenna. The microprocessor processes the received signal, and then calculates the level distance based on the principle that the time interval between pulse signal emission and reception is proportional to the distance from the antenna to the surface of the measured medium, that is, Formula (1).

$$D = \frac{1}{2} \times c \times \Delta t \qquad (1)$$

Wherein, D is the distance from the measuring reference surface to the measured medium, C is the propagation speed of light (electromagnetic wave) in vacuum, and Δt is the time interval between pulse signal transmission and reception.

Then, the level height can be calculated from equation (2) according to the empty material level set by the user.

$$L = E - D \qquad (2)$$

Wherein, E is the distance from the measuring reference surface to the empty material level set by the user, D is the distance from the measuring reference surface to the measured medium, and L is the level height.

1.2. Product advantages

- With high accuracy and low power consumption, it is a substitute product for level instruments of differential pressure transmitter, magnetostrictive type, radio frequency admittance and magnetic flip type.
- Free from pressure, vacuum, temperature change, inert gas, smoke, steam and other environmental impacts, reliable measurement results.
- With two CPUs, it has stronger processing ability, more intelligent algorithm and more stable system.
- With double-chamber housing, it has a housing protection class at IP66 and IP 67.
- With special handheld communicator, it can realize remote debugging and diagnosis.
- With inherent anti-surge protector, it meets the level-4 electromagnetic compatibility.
- It can also display the wave type on site and create false echo.
- It is suitable for high-temperature working conditions, and the design temperature can reach 350°C when the high-temperature extended antenna is used to purge the heat sink.
- The optional tank-side indicator can reduce the labor intensity and safety risk of meter inspection in bad working conditions and high-risk areas.
- The preset all Chinese operation menu is provided, which has a friendly interface, further reducing the difficulty of meter commissioning.

1.3. Typical application

- Petrochemical industry (oil field, petrochemical plant, oil extraction plant, oil refinery, chemical plant, coking plant, etc.)
  Media to be measured: crude oil, light oil, natural gas, methanol, ethanol, ammonia, benzene, polystyrene, esters, liquid carbon dioxide, liquid nitrogen, etc.
- Electric power industry (power plant high/low-pressure heater, condenser, etc.)
  Media to be measured: raw coal bin, powder bin, coal ash bin, chemical water, etc.
- Metallurgy industry (steel works)
  Media to be measured: limestone, coke and pulverized coal, cold back to min, raw material bin, powder bin, coal ash bin and chemical water, etc.
- Cement industry (cement plant, etc.)
  Media to be measured: clinker warehouse, powder bin, raw coal bin and chemical water, etc.

2. Technical characteristics

2.1. Technical parameters of MPS3100 and MPS3200

Products	MPS3100	MPS3200
Product pictures		
Scope of application	Measurement of liquid and slurry under simple process conditions	Measurement of liquid and slurry with certain temperature or pressure
Process materials	PP+PTFE	316L
Maximum span	20m	35m
Accuracy of the measurements	±3mm	
Resolution	1mm	
Process connection	● G1-1/2"A thread (Ø50mm antenna) ● M68×2 thread (Ø65mm antenna) ● G3"A thread (Ø80mm antenna) ● Hoisting holder (plastic horn antenna) ● Flange	● G1-1/2”A thread ● Flange
Power supply and output	● Two-wire DC power supply, 4mA~20mA output, with HART communication: DC16V~30V (intrinsic safety+flameproof type 24V), ripple ≤100mV; ● Four-wire DC power supply, 4mA~20mA output, with HART communication: 18V~36V DC, ripple ≤100mV; ● Four-wire AC power supply, 4mA~20mA output, with HART communication: 90V~260V AC, 50Hz~60Hz.	
Signal frequency	K-band (about 26GHz)	
Ambient temperature	-40°C~80°C	
Process temperature	-40°C~150°C	-60°C~350°C
Process pressure	-1 kgf/cm²~2.5 kgf/cm²	-1 kgf/cm²~40 kgf/cm²
Degree of protection	IP66/IP67	
Electrical interface	● M20×1.5 thread (non-flameproof type: outer diameter of cable limited to 6mm~12mm, flameproof type: outer diameter of cable limited to 8mm~12mm) ● 1/2"NPT thread (non-flameproof type: outer diameter of cable limited to 6mm~12mm, flameproof type: outer diameter of cable limited to 8mm~12mm)	
Safety certificate	● CCRI: Intrinsic safety + gas explosion proof type Ex ia IIC T6/T2 Ga ● CCRI: Intrinsic safety +gas flameproof type Ex db ia [ia Ga] IIC T6/T2 Gb ● CCRI: Intrinsic safety+dust flameproof type Ex ia tb [ia Da] IIIC T80°C/T290°C Db	

2.2. Technical parameters of MPS3300, MPS3600 and MPS3700

Products	MPS3300	MPS3600	MPS3700
Product pictures			
Scope of application	Measurement of strong corrosive liquid under complex process conditions	Measurement of blocky, granular and powdery solids	
Process materials	● 304+PTFE	● 316L for horn antenna ● 304 for parabolic antenna	
Maximum span	20m	35m	70m
Accuracy of the measurements	±3mm		
Resolution	1mm		
Process connection	● Flange	● G1-1/2”A thread ● Flange	
Power supply and output	● Two-wire DC power supply, 4mA~20mA output, with HART communication: DC16V~30V (intrinsic safety+flameproof type 24V), ripple ≤100mV; ● Four-wire DC power supply, 4mA~20mA output, with HART communication: 18V~36V DC, ripple ≤100mV; ● Four-wire AC power supply, 4mA~20mA output, with HART communication: 90V~260V AC, 50Hz~60Hz.		
Signal frequency	K-band (about 26GHz)		
Ambient temperature	-40°C~80°C		
Process temperature	-40°C~150°C	-60°C~350°C	-60°C~350°C
Process pressure	● -1 kgf/cm²~25 kgf/cm²	● Direct-insertion type:-1 kgf/cm²~40 kgf/cm² ● Universal: Atm (barometric pressure)	
Degree of protection	IP66/IP67		
Electrical interface	● M20×1.5 thread (non-flameproof type: outer diameter of cable limited to 6mm~12mm, flameproof type: outer diameter of cable limited to 8mm~12mm) ● 1/2"NPT thread (non-flameproof type: outer diameter of cable limited to 6mm~12mm, flameproof type: outer diameter of cable limited to 8mm~12mm)		
Safety certificate	● CCRI: Intrinsic safety + gas explosion proof type Ex ia IIC T6/T2 Ga ● CCRI: Intrinsic safety +gas flameproof type Ex db ia [ia Ga] IIC T6/T2 Gb ● CCRI: Intrinsic safety+dust flameproof type Ex ia tb [ia Da] IIIC T80°C/T290°C Db		

Note: The actual measuring range and accuracy of the meter are affected by antenna size, medium reflectivity, installation position and possible interference reflection. ±3mm is the highest precision of this series of meters under the standard conditions in the laboratory.

2.3. Antenna specification

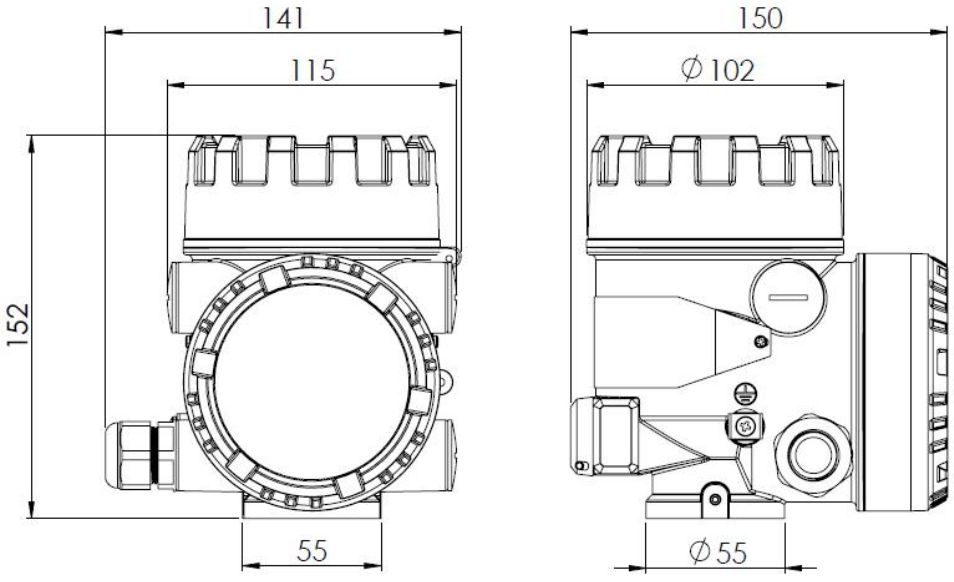
Antenna					
Material	PTFE	316L	304+PTFE	316L	304
Specification	Ø50 Ø65 Ø80	Ø50 Ø80 Ø100 Ø125	Ø50 Ø80	Ø50 Ø80 Ø100 Ø125	Ø200 Ø250
Applicable models	MPS3100	MPS3200 MPS3600 MPS3700	MPS3300	MPS3600 MPS3700	MPS3600 MPS3700
Features	Corrosion resistance	Temperature resistance and pressure resistance	Corrosion resistance and pressure resistance	Adjustable angle	Adjustable angle

2.4. Meter flange

Flange			
Material	PTFE, PP	304, 316L and Q235 (carbon steel)	304, 316L and Q235 (carbon steel)
Features	Corrosion resistance	High temperature and high pressure	High temperature and normal pressure
Sealing surface	RF, FF	RF, FF, M and FM	FF

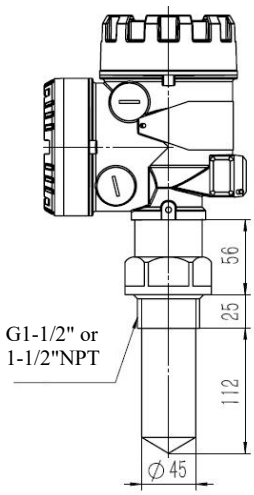
3. Structural size

3.1. Size of meter housing

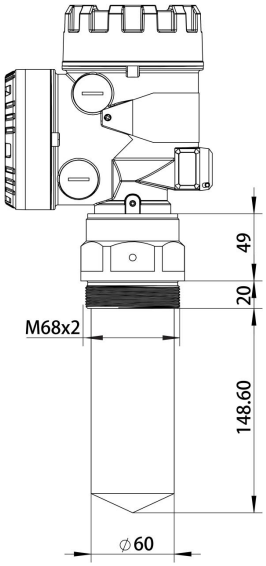


3.2. Boundary dimension of MPS3100

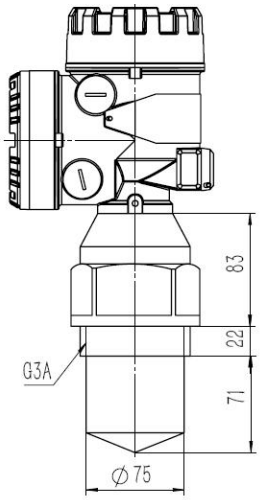
Ø50 mm plastic rod antenna



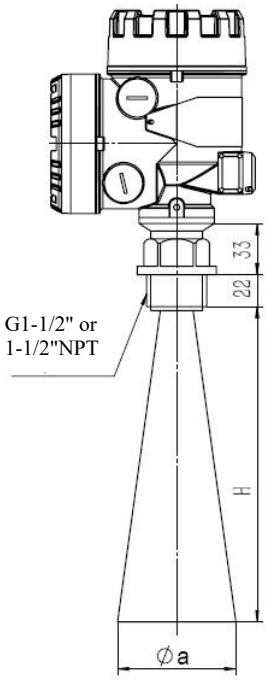
Ø65mm plastic rod antenna



Ø80 mm plastic rod antenna

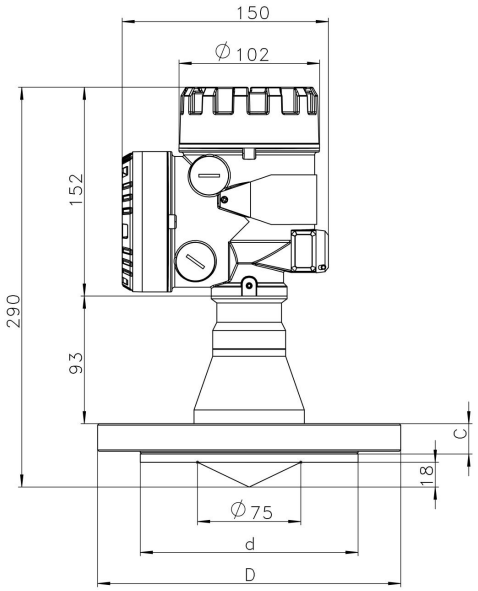


3.3. Boundary dimension of MPS3200



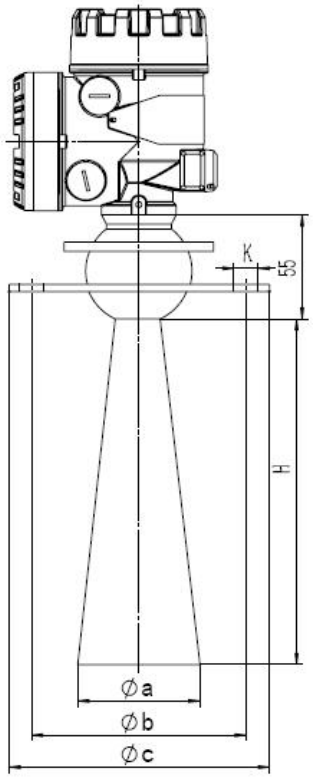
Antenna type	a (mm)	H (mm)
Ø50mm horn	48	190
Ø80mm horn	78	215
Ø100mm horn	98	295
Ø100mm extension horn	98	440
Ø125mm horn	123	610

3.4. Boundary dimension of MPS3300



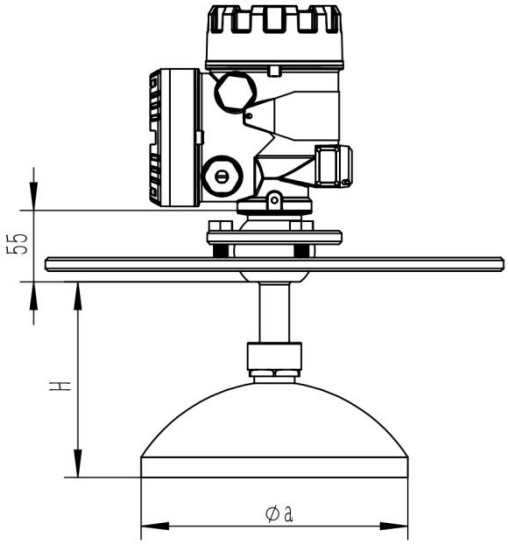
Flange specification	d (mm)	D (mm)	C (mm)
DN80/PN16	138	200	20
DN100/PN16	158	220	22
DN125/PN16	188	250	22
DN150/PN16	212	285	24

3.5. Boundary dimension of MPS3600



Antenna type	a (mm)	H (mm)
Ø50mm horn	48	190
Ø80mm horn	78	215
Ø100mm horn	98	295
Ø100mm extension horn	98	440
Ø125mm horn	123	610

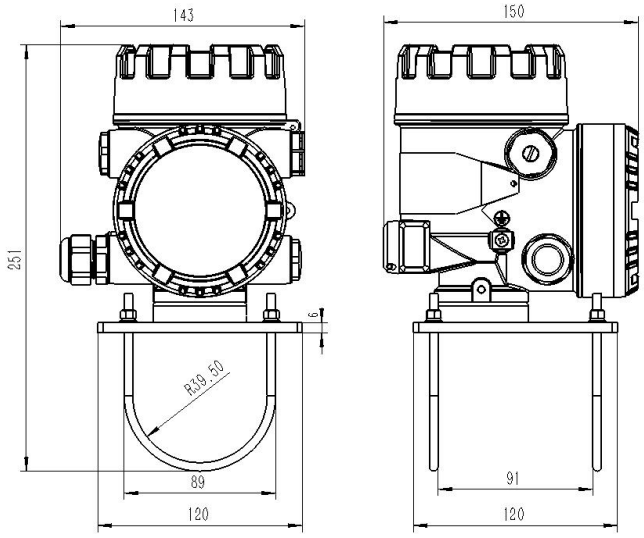
3.6. Boundary dimension of MPS3700



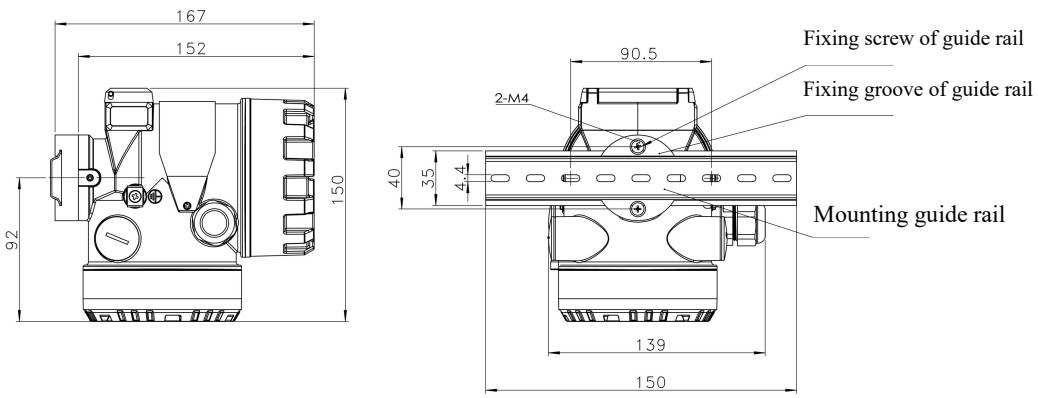
Antenna type	a (mm)	H (mm)
Ø200mm paraboloid	195	143
Ø250mm paraboloid	245	153

3.7. Boundary dimension of tank-side indicator (optional)

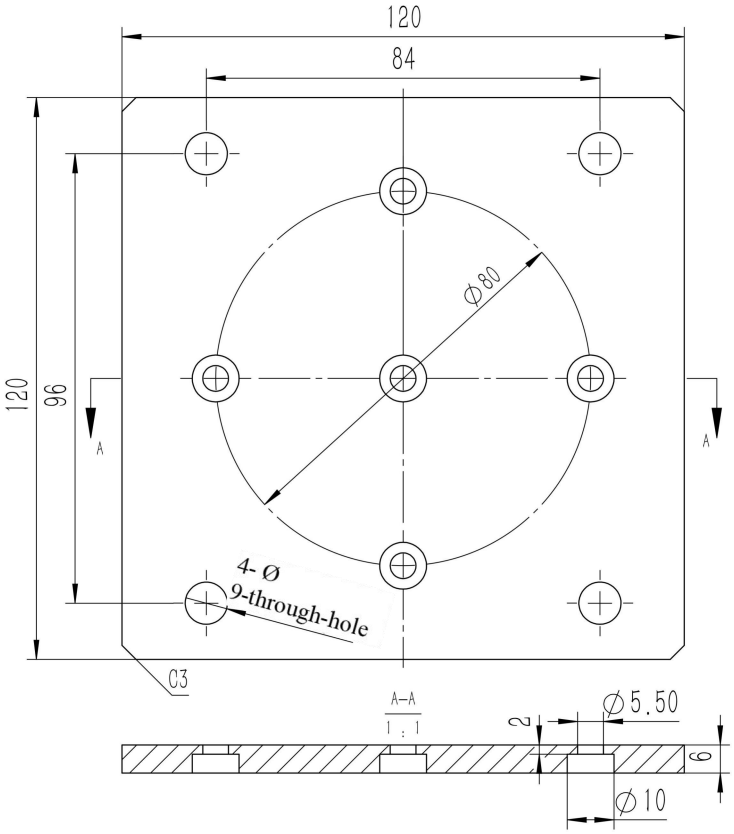
3.7.1. Installation in Ø80 hoop (installation by default)



3.7.2. Installation in DIN35 guide rail



3.7.3. Base plate for tank-side indicator installation



4. Guide for Selection

MPS3000 pulse radar level transmitter can be used for continuous level measurement of liquid, slurry and solid. The actual measuring range is determined by the antenna size, medium reflectivity, installation position, possible noisy reflection and other factors.

4.1. Medium classification

4.1.1. Liquid

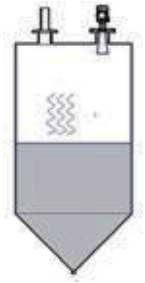
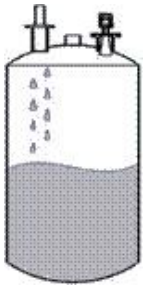
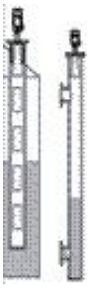
Medium classification	Dielectric constant (ε_r)	Example
A	1.4~1.9	Non-conductive liquid, e.g. liquefied gas
B	1.9~4	Non-conductive liquid, e.g. benzene, oil, and toluene
C	4~10	Concentrated acid, organic solution, vinegar, aniline, alcohol and acetone
D	>10	Conductive liquid, e.g. aqueous solution, gadoleic acid and alkali

4.1.2. Solid

Medium classification	Particle size	Example
A	<1mm	Lime powder, flour, cement, dolomite dust
B	1mm~10mm	Broken coal, coke, metal rock fine
C	>10mm	Raw coal, limestone

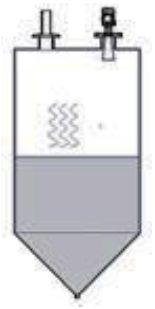
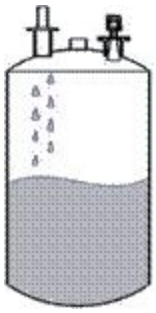
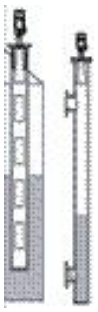
4.2. Measuring range

MPS3100 plastic rod antenna pulse radar is mainly used to measure corrosive liquid, slurry and other media in storage or process tanks, such as water and liquid tanks, acid and alkali tanks and slurry tanks.

<table>
<tr><td colspan="3">Rod pulse radar</td><td colspan="5">MPS3100</td></tr>
<tr><td colspan="3" rowspan="3">Typical application conditions</td><td rowspan="3">Antenna size (mm)</td><td colspan="4">Type of measured medium</td></tr>
<tr><td>A</td><td>B</td><td>C</td><td>D</td></tr>
<tr><td colspan="4">Range (m)</td></tr>
<tr><td rowspan="2">Storage tank</td><td rowspan="2"></td><td rowspan="2">Surface of static medium (for example: intermittent feeding, bottom feeding, immersion tube)</td><td>Ø50</td><td>-</td><td>0~3</td><td>0~5</td><td>0~10</td></tr>
<tr><td>Ø80</td><td>0~3</td><td>0~5</td><td>0~10</td><td>0~20</td></tr>
<tr><td rowspan="2">Buffer tank</td><td rowspan="2"></td><td rowspan="2">Fluctuating surface (for example: continuous feeding, top feeding and mixture injection)</td><td>Ø50</td><td>-</td><td>-</td><td>0~3</td><td>0~5</td></tr>
<tr><td>Ø80</td><td>-</td><td>0~3</td><td>0~5</td><td>0~10</td></tr>
<tr><td rowspan="2">Process tank with agitator</td><td rowspan="2"></td><td rowspan="2">Disturbing surface Single-stage stirring <60U/min</td><td>Ø50</td><td>-</td><td>-</td><td>0~2</td><td>0~3</td></tr>
<tr><td>Ø80</td><td>-</td><td>0~3</td><td>0~5</td><td>0~10</td></tr>
<tr><td rowspan="2">Waveguide pipe and by-pass pipe</td><td colspan="2" rowspan="2"></td><td>Ø50</td><td colspan="4">0~10</td></tr>
<tr><td>Ø80</td><td colspan="4">0~20</td></tr>
</table>

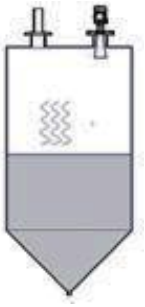
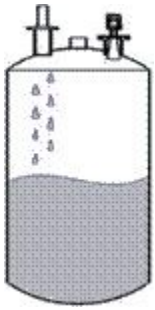
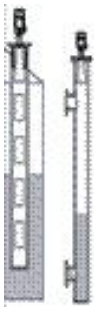
Note: For media of categories A and B, please select wave guide pipe or bypass chamber.

MPS3200 horn antenna pulse radar can be widely used to measure the level of storage or process tanks, liquids with certain temperature and pressure, slurry, etc. according to the different sizes of antenna openings. For example: crude oil and light oil tanks, volatile liquid tanks, slurry tanks, etc.

Horn pulse radar			MPS3200				
Typical application conditions			Antenna size (mm)	Type of measured medium			
				A	B	C	D
				Range (m)			
Storage tank		Surface of static medium (for example: intermittent feeding, bottom feeding, immersion tube)	Ø50	-	0~4	0~8	0~15
			Ø80	0~3	0~10	0~15	0~20
			Ø100	0~10	0~15	0~20	0~30
			Ø125	0~15	0~20	0~40	0~75
Buffer tank		Fluctuating surface (for example: continuous feeding, top feeding and mixture injection)	Ø50	-	-	0~4	0~7
			Ø80	0~3	0~4	0~7	0~12
			Ø100	0~5	0~7.5	0~10	0~15
			Ø125	0~7.5	0~10	0~20	0~30
Process tank with agitator		Disturbing surface Single-stage stirring <60U/min	Ø50	-	-	0~2	0~3.5
			Ø80	-	0~2	0~3	0~5
			Ø100	0~3	0~4	0~7	0~10
			Ø125	0~4	0~6	0~15	0~25
Waveguide pipe and by-pass pipe			Ø50	0~10			
			Ø80	0~20			
			Ø100	0~30			
			Ø125	0~60			

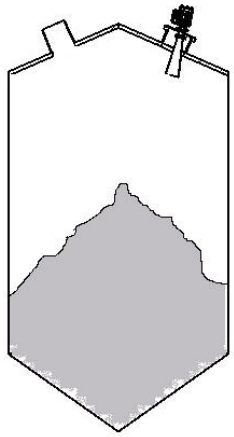
Note: For media of categories A and B, please select wave guide pipe or bypass chamber.

According to the different sizes of antennas, the MPS3300 process seal antenna pulse radar can be widely used to measure the liquid and slurry with strong corrosiveness and complicated working conditions in storage or process tanks, such as water and liquid tanks, acid and alkali tanks and slurry tanks.

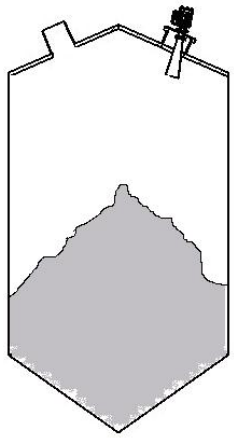
Process seal pulse radar			MPS3300				
Typical application conditions			Antenna size (mm)	Type of measured medium			
				A	B	C	D
				Range (m)			
Storage tank		Surface of static medium (for example: intermittent feeding, bottom feeding, immersion tube)	Ø50	-	0~5	0~10	0~15
			Ø80	-	0~10	0~15	0~20
			Ø100	-	0~15	0~20	0~20
Buffer tank		Fluctuating surface (for example: continuous feeding, top feeding and mixture injection)	Ø50	-	0~2.5	0~5	0~7.5
			Ø80	-	0~8	0~7.5	0~10
			Ø100	-	0~7.5	0~10	0~12.5
Process tank with agitator		Disturbing surface Single-stage stirring <60U/min	Ø50	-	0~1.5	0~2	0~3
			Ø80	-	0~2	0~3	0~5
			Ø100	-	0~3	0~5	0~7
Waveguide pipe and by-pass pipe			Ø50	0~20			
			Ø80				
			Ø100				

Note: For media of categories A and B, please select wave guide pipe or bypass chamber.

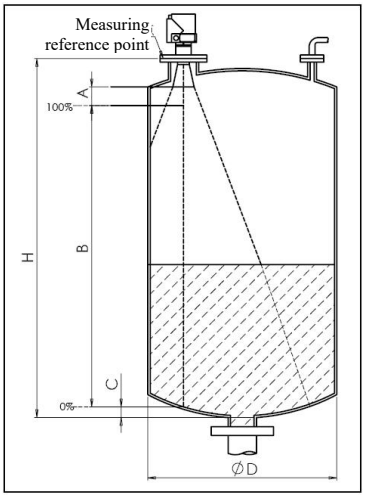
MPS3600 pulse radar can be widely used to measure the level of solid in process tanks in a large span according to the different sizes of antenna openings. For example, tanks of blocky, powdery and granular materials.

Horn pulse radar	MPS3600			
Typical application conditions	Antenna size (mm)	Type and span of measured medium (m)		
		A	B	C
	Ø80 horn	-	5	10
	Ø100 horn	5	8	15
	Ø125 horn	7	12	20
	Ø200 paraboloid	10	17	30
	Ø250 paraboloid	15	20	35

MPS3700 pulse radar can be widely used to measure the level of solid in process tanks in a large span according to the different sizes of antenna openings. For example, coke level, slurry tank, solid particles, etc.

Horn pulse radar	MPS3700			
Typical application conditions	Antenna size (mm)	Type and span of measured medium (m)		
		A	B	C
	Ø80 horn	-	8	18
	Ø100 horn	9	15	28
	Ø125 horn	12	20	35
	Ø200 paraboloid	18	30	55
	Ø250 paraboloid	30	40	70

4.3. Measuring conditions



The measuring range begins when the beam touches the tank bottom. Especially when the tank has a disc bottom or adopts a conical discharge port the level below this point cannot be measured.

For the medium with low dielectric constant (categories A and B), if the medium is at a low level (in Fig.C on the right), the tank bottom is visible. The measurement in this range will reduce the accuracy, so it is suggested to set the measurement zero point at a distance C from the tank bottom (as shown in the figure).

In theory, the measurement range can reach the terminal of the antenna. In consideration of the influence of corrosion and adhesion, the distance of measuring range should be at least A (as shown in the figure) from terminal to top of antenna. Please pay attention to the phenomenon of condensation especially.

Minimum measuring range B is associated with chosen antenna type (as listed below).

The tank diameter should be greater than D (as shown in the following table) and the tank height should be at least H (as shown in the following table).

Type of meter	A[mm]	B[m]	C[mm]	D[m]	H[m]
MPS3100	50	>0.2	50~250	>0.2	>0.3
MPS3200	150	>0.2	50~250	>0.2	>0.3
MPS3300	50	>0.2	50~250	>0.2	>0.3
MPS3700 Ø200 paraboloid	300	>1	50~250	>1	>1.3
MPS3700 Ø250 paraboloid	300	>1	50~250	>1	>1.3

4.4. Impact of gaseous phase

When there is steam on the liquid surface, high pressure will slow down the signal transmission speed, which is related to the type of steam, especially in low temperature environment. When the distance between the measurement zero point (at the flange) and the surface of the material increases, the measurement error caused by this effect increases. The measurement error caused by this effect is as shown in the following table.

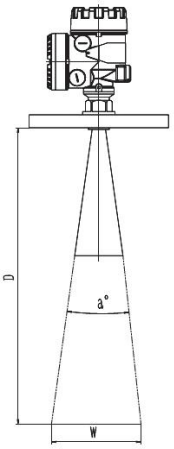
Gaseous phase	Temperature		Pressure				
	°C	°F	1kgf/cm² (14.5psi)	10kgf/cm² (145psi)	50kgf/cm² (725psi)	100kgf/cm² (1450psi)	160kgf/cm² (2320psi)
Nitrogen	20	68	0.00%	0.22%	1.2%	2.4%	3.89%
	200	392	-0.01%	0.13%	0.74%	1.5%	2.42%
	400	752	-0.02%	0.08%	0.52%	1.1%	1.70%
Hydrogen	20	68	-0.01%	0.10%	0.61%	1.2%	2.00%
	200	392	-0.02%	0.05%	0.37%	0.76%	1.23%
	400	752	-0.02%	0.03%	0.25%	0.53%	0.86%
Water (saturated steam)	100	212	0.20%	-	-	-	-
	180	356		2.1%	-	-	-
	263	505.4			8.6%	-	-
	310	590				22%	-
	364	687.2					41.8%

Tips! When the pressure is known and constant, the measurement error can be compensated by methods such as linearization.

4.5. Beam angle

Beam angle means that energy density of radar wave reaches the half of maximum value (3db). The microwave not only can scatter to the area beyond beam angle, but also can be reflected by interference. The diameter of Beam width (W) is antenna type (beam angle α) and the function of measuring distance (D).

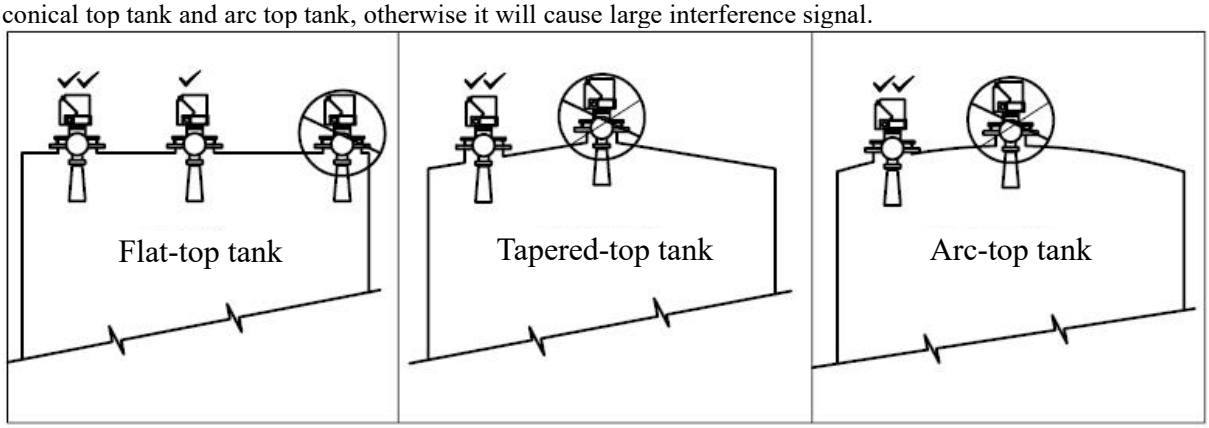
Antenna type	Horn antenna				Parabolic antenna		Rod antenna	
Antenna size	Ø50	Ø80	Ø100	Ø125	Ø200	Ø250	Ø50	Ø80
Beam angle α	18º	12º	8º	6º	5º	4º	20º	15º
Measuring distance (D)	Beam width diameter (W)							
3m	0.95	0.63	0.42	0.31	0.26	0.21	1.06	0.79
6m	1.90	1.26	0.84	0.62	0.52	0.42	2.12	1.58
9m	2.85	1.89	1.26	0.93	0.79	0.63	3.18	2.37
12m	3.80	2.52	1.68	1.24	1.05	0.84	4.24	3.16
15m	4.75	3.15	2.10	1.55	1.31	1.05	5.30	3.95
20m	-	4.20	2.80	2.07	1.75	1.40	7.07	5.27
25m	-	-	3.50	2.58	2.18	1.75	-	-
30m	-	-	4.20	3.10	2.62	2.10	-	-
35m	-	-	-	3.62	3.06	2.44	-	-
40m	-	-	-	-	-	2.79	-	-
45m	-	-	-	-	-	3.14	-	-



5. Installation guide

5.1. Selection of installing position

Recommended installation position is as shown below. Do not install the meter in the center of the top of conical top tank and arc top tank, otherwise it will cause large interference signal.

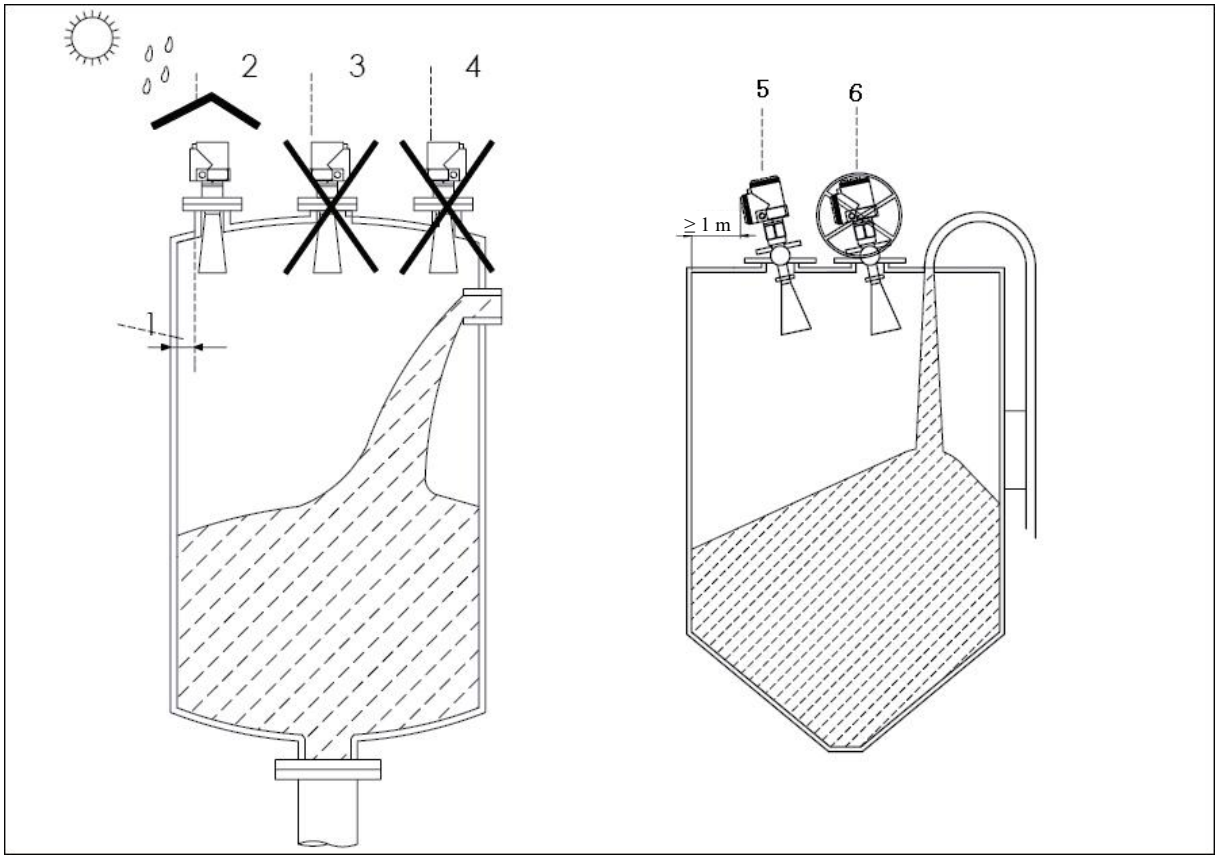


Please do not install it above the feed inlet as shown in "Fig.4" below.

As shown in Fig.1 below, the distance from the tank wall to the outer wall of the mounting standpipe is about 1/4 of the tank diameter. For the meter with plastic rod antenna, it is suggested that the installation distance should not be less than 30cm; For the meter with horn antenna, the installation distance should not be less than 15cm.

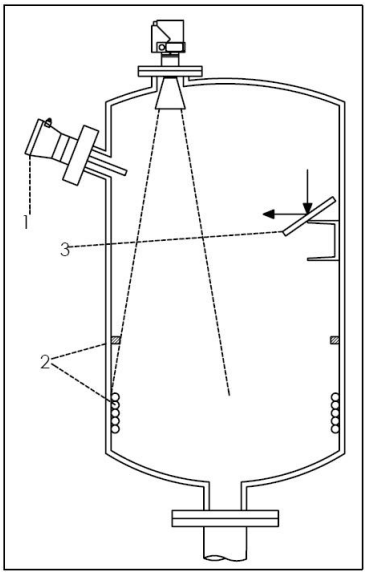
It is recommended to install a protective cover as shown in "Fig.2" below to prevent the meter from direct sunlight and rain.

During solid measurement, the emission angle of the meter should be adjusted to ensure that the axis of the meter is perpendicular to the inclined plane of the material as far as possible, as shown in "Fig.5" below.



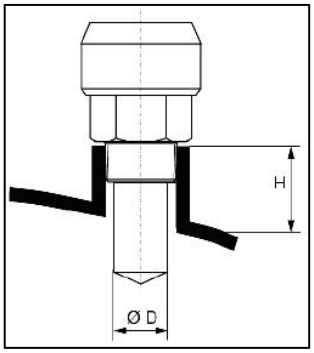
5.2. Installation of rod antenna radar on the tank

- ◆ Do not install devices such as limit switches and temperature sensors within the signal beam angle.
- ◆ Heating coils, vacuum rings, baffles and other devices within the signal beam angle may interfere with the measurement, as shown in the figure on the right.
- ◆ Pay attention to the following requirements during installation:
  - ➢ Antenna size: the larger the antenna size, the smaller the beam angle and the weaker the disturbing echo.
  - ➢ False echo curve: the interference wave can be shielded by false echo curve, so as to achieve the best measurement effect.
  - ➢ Waveguide pipe: usually, the waveguide pipe is used to avoid signal interference.
  - ➢ The metal-shield net on the slant (as shown in Fig."3" on the right) can emit radar wave signal, which could reduce disturbing echo.
  - ➢ After installation, the housing can rotate for 350°, which is convenient for operation display and terminal wiring.



◆ The end of the rod antenna must extend out of the mounting tube.
◆ The rod antenna should be installed vertically.

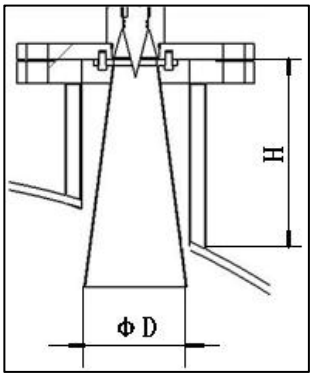
Antenna size	Ø50mm	Ø80mm
D[mm]	45	75
H[mm]	<100	<100



5.3. Installation of horn antenna radar on the tank

5.3.1. Conventional installation

◆ It is suitable for the level measurement of medium with dielectric constant ε r ≥1.9.
◆ After installation, the housing can rotate for 350°, which is convenient for operation display and terminal wiring.
◆ The horn antenna must extend out of the mounting tube to obtain the best measurement results.
◆ The antenna with an extension tube longer than 100mm can be selected.
◆ When the antenna horn cannot extend out of the mounting tube due to the mechanical structure, the mounting tube with a length of less than 500mm can be selected.
◆ The horn antenna should be installed vertically.

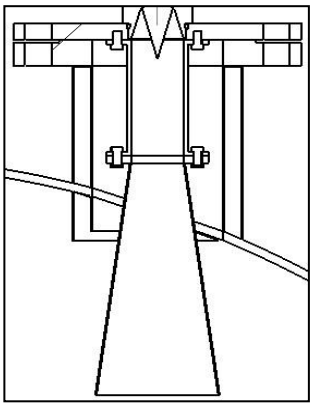


Antenna size	Ø50mm	Ø80mm	Ø100mm	Ø125mm
D[mm]	48	75	95	123
H[mm]	<115	<210	<280	<520

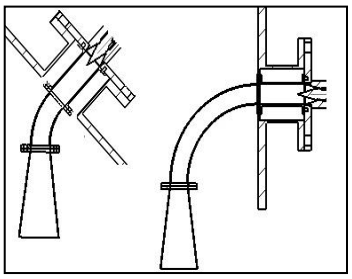
Attention:
◆ Please contact the manufacture, if you need to use the mounting tube longer than or equal to 500 mm.
◆ If the horn antenna is not installed vertically, the maximum span may be reduced.

5.3.2. With antenna extension tube

◆ In order to ensure the horn antenna can stretch out the mounting tube, it should choose antenna extension tube, when the mounting tube is longer than the others.
◆ If the diameter of the horn mouth of the antenna is larger than the nominal width of the mounting tube, the antenna and its extension tube should be installed in reverse from the inside of the tank. Then, they should be lifted up and fastened with bolts from the outside. An extension tube that enables the antenna to be lifted by at least 100 mm should be selected.
◆ Recommendation torque is 10 Nm.

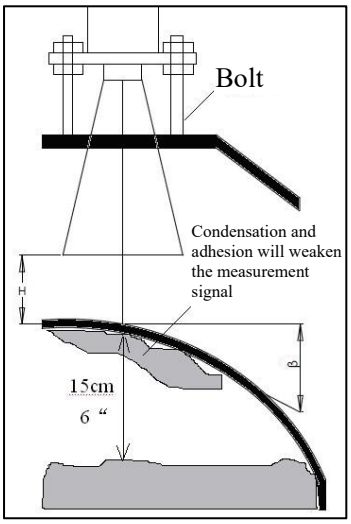


5.3.3. Special extension tube



- If the antenna should be installed on the tank wall inclined and vertical, it should choose the antenna extension tube with angle 45°or 90°.
- The minimum radius of curvature of extension bend tube (R) is 300mm.

5.4. Measurement through the plastic tank wall from the outside



- Dielectric constant of medium ε_r >10.
- The distance is 15cm (6") at least between the high level and the tank top.
- The distance (H) should be greater than 100mm (4").
- It is recommended to use the mounting bracket to adjust to the desired distance H.
- Avoid installing units in the environment with condensation and adhesion phenomenon as far as possible. Mounting in the open air, the clearance should be taken protective measure between the antenna and the vessel.
- The optimal angle β should be between 15° and 20°.
- Please select DN250 (10") antenna as far as possible.
- In the beam angle, please don't mount any device that may cause the interference outside the tank (such as pipes).
- Please choose the tank material with low dielectric constant and suitable tank wall thickness. Please do not use electrically conductive plastic (refer to the following table).

Penetration material	PE (Polyethylene)	PTFE (Teflon)	PP (Polypropylene)	Perspex (Plastics)
DK/ε_r	2.3	2.1	2.3	3.1
Optional thickness (mm)	15.7	16.4	15.7	13.5

Note: Other possible thickness values are integral multiples of the values listed in the table (for example, PE: 31.4 mm, 47.1mm...).

5.5. Installation of MPS3200 in waveguide pipe

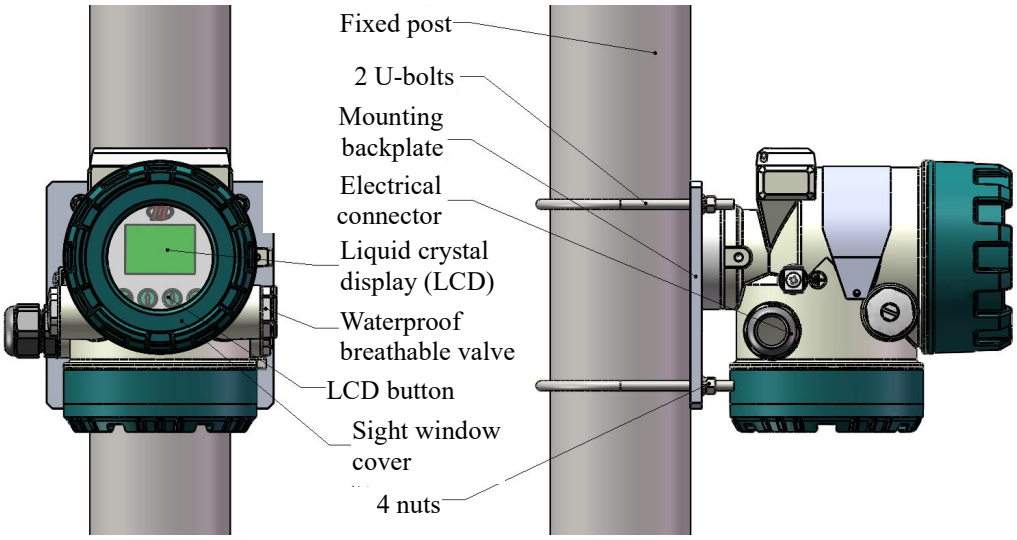
- It is suitable for the level measurement of medium with dielectric constant ε r ≥1.4.
- After the meter is installed, its housing can rotate for 350°, which is convenient for operation and wiring.
- The radar antenna should be installed perpendicular to the surface of the measured medium and parallel to the wall of the measuring tank.
- The measurement can be carried out by a full-bore ball valve.

5.5.1. Suggestions on wave guide pipe

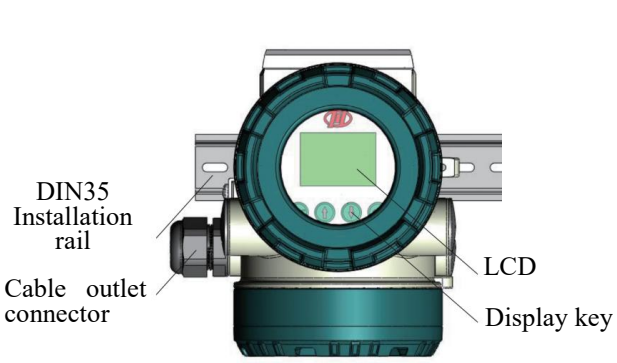
- Choose a horn antenna with the largest diameter as much as possible.
- The diameter of the inner wall of the wave guide pipe should be consistent, and the inner wall should always be smooth.
- The measurement accuracy will be reduced at ±20cm of the tank connecting pipe.
- The wave guide pipe must be made of metal, which cannot be coated with enamel or plastic, and can be parallel or seamless welded stainless steel pipe.
- If the two sides of the wave guide pipe need to be drilled, the positions of the holes should be symmetrical (the included angle is 180°), and burrs should be removed from the holes.
- When the wave guide pipe needs to be extended, it can be achieved by welding the flange or sleeve, but the joint must not have a gap of more than 1 mm.

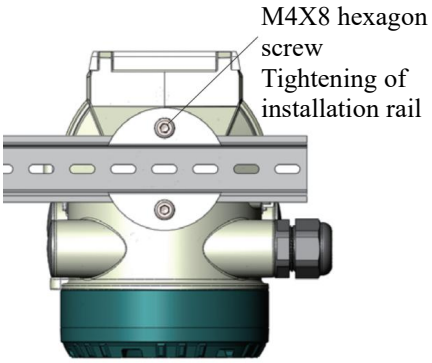
5.6. Installation in tank-side indicator (optional)

5.6.1. Installation in standpipe



5.6.2. Installation in guide rail





5.7. Confirmation of installation

- ◆ Confirm that the meter is grounded correctly;
- ◆ Confirm that the meter enclosure has been screwed tightly;
- ◆ Confirm that the meter measures normally and the output is consistent with the setup in the central control room;
- ◆ Ensure that the outlet of the meter entrance cable is tightened and the unused outlet is sealed by plugging;
- ◆ Make sure that the instrument conduit arranged on site will not cause water accumulation to the meter;
- ◆ Make sure that the cable connector of the meter complies with relevant protection standards and regulations;
- ◆ Make sure that process connection components, such as flange gaskets and bolts, are suitable for the field working conditions;
- ◆ Make sure that the process parameters of the field working conditions do not exceed the maximum process parameters allowed by the meter.

Warning:

- ➢ Improper process connection components may lead to the risk of injury or poisoning!
- ➢ If the meter is not installed correctly, high temperature, toxic, corrosive process media may be released at the connection between the meter and the tank!
- ➢ If the process parameters of the field working conditions exceed the maximum process parameters allowed by the meter, the meter may be damaged and there is a risk of explosion!
- ➢ Untightened or improperly connected cable connectors may have the risk of explosion in a hazardous zone!
- ➢ Do not loose, remove or disassemble the process connection components before the pressure in the tank is released!

6. Table of MPS3100 model

Model parameters	Specification code	Description
Product	MPS3100	26G pulse radar level transmitter (plastic rod type, plastic horn)
Housing	S	Die casting aluminum (electrical interface M20×1.5)
	B	Die casting aluminum (electrical interface 1/2"NPT)
	G	Stainless steel 316 (electrical interface M20×1.5)
	H	Stainless steel 316 (electrical interface 1/2"NPT)
Power supply and output	B2	24V DC, 4mA~20mA, HART, two-wire system
	B4	24V DC, 4mA~20mA, HART, four-wire system
	U4	220V AC, 4mA~20mA, HART, four-wire system
	R2	24V DC, 4mA~20mA, HART, two-wire system (equipped with passive tank-side indicator)
	R4	24V DC, 4mA~20mA, HART, four-wire system (equipped with passive tank-side indicator)
	A4	220V AC, 4mA~20mA, HART, four-wire system (equipped with passive tank-side indicator)
Safety certificate	X	No requirement
	I	CCRI: Intrinsic safety + gas explosion proof type Ex ia IIC T6/T2 Ga
	O	CCRI: Intrinsic safety +gas flameproof type Ex db ia [ia Ga] IIC T6/T2 Gb
	N	CCRI: Intrinsic safety+dust flameproof type Ex ia tb [ia Da] IIIC T80°C/T290°C Db
	M	CCRI: complex gas explosion proof+complex dust explosion proof typeEx db ia[ia Ga] IIC T6/T2 Gb; Ex ia tb [ia Da] IIIC T80°C/T290°C Db
Antenna type	2	Ø50mm plastic rod type (flange size limited to be ≥DN50)
	5	Ø65mm plastic rod type (flange size limited to be ≥DN65)
	3	Ø80mm plastic rod type (flange size limited to be ≥DN80)
	4	Ø80mm plastic horn type (flange size limited to be ≥DN80)
Information of antenna assistance	X	None
Process temperature (°C)	D	-40°C~80°C (EPDM seal ring)
	E	-20°C~150°C (FKM seal ring)
Process pressure (kgf/cm²g)	L	-1
	M	Atm (atmosphere)
	A	2.5 (D only for process temperature)
Process connection	GD	G1-1/2"A (2 only for antenna type)
	T4	M68×2 (5 only for antenna type)
	GM	G3"A (3 only for antenna type)
	LM	Hoisting holder (for antenna type 4)
	FB	Standard flange
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)

Model parameters	Specification code	Description
Flange size	E	DN50(2")
	C	DN65(2.5")
	F	DN80(3")
	G	DN100(4")
	H	DN125(5")
	J	DN150(6")
	K	DN200(8")
	M	DN250(10")
Pressure rating (kgf/cm^2) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	M	Class150
	N	Class300
Flange sealing face type	A	RF (recommended)
	B	FM
	C	M
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	Flat-thin plate flange (8 mm thick, M only for process pressure limited)
Material of flange	A	304
	B	316L
	C	Carbon steel (Q235)
	F	C4 steel
	D	PP (20mm thick, M only for process pressure and D only for process temperature)
	E	PTFE (20mm thick, M only for process pressure)
Companion flange (A, B and C options are inherently equipped with 304 bolt , nut, plate washer, flange gasket)	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel (Q235)

Special notes:

- Typical model 1: MPS3100SB2X3XDMFB-BGCAAX
- Typical model 2: MPS3100SB2X3XDMGM
- Special model: if special selection is required for a certain digit in the model code, fill “Z” in the space of special model in the model code, and “/Z” behind the complete model code; If special accessory is required, please fill "/Z" behind the complete model code. Then, explain all the "digit for special model" and special accessories in words without omission. The text description should be placed in brackets "( )". Before each description, "Zn:" (n = 1, 2, 3, ...) should be used for guidance and each description should be separated by semicolon";". When the specification code has multiple digits, the last digit will be changed to "Z". For example, "FB" will be changed to "FZ".
- Example 1 of special model: MPS3100SB2X3XDMGM/Z (Z1: equipped with 304 thread installation bracket)
- Example 2 of special model: MPS3100SB2X3XDMFB-BGCAAX/Z (Z1: with 304 flange installation bracket).
- Tank-side cable: If tank-side indicator is optional, the standard configuration contains a communication

cable of 25 m. Any excess is priced in meters.

7. Table of MPS3200 model

Model parameters	Specification code	Description
Product	MPS3200	26G pulse radar level transmitter (horn antenna)
Housing	S	Die casting aluminum (electrical interface M20×1.5)
	B	Die casting aluminum (electrical interface 1/2"NPT)
	G	Stainless steel 316 (electrical interface M20×1.5)
	H	Stainless steel 316 (electrical interface 1/2"NPT)
Power supply and output	B2	24V DC, 4mA~20mA, HART, two-wire system
	B4	24V DC, 4mA~20mA, HART, four-wire system
	U4	220V AC, 4mA~20mA, HART, four-wire system
	R2	24V DC, 4mA~20mA, HART, two-wire system (equipped with passive tank-side indicator)
	R4	24V DC, 4mA~20mA, HART, four-wire system (equipped with passive tank-side indicator)
	A4	220V AC, 4mA~20mA, HART, four-wire system (equipped with passive tank-side indicator)
Safety certificate	X	No requirement
	I	CCRI: Intrinsic safety + gas explosion proof type Ex ia IIC T6/T2 Ga
	O	CCRI: Intrinsic safety +gas flameproof type Ex db ia [ia Ga] IIC T6/T2 Gb
	N	CCRI: Intrinsic safety+dust flameproof type Ex ia tb [ia Da] IIIC T80°C/T290°C Db
	M	CCRI: complex gas explosion proof+complex dust explosion proof typeEx db ia[ia Ga] IIC T6/T2 Gb; Ex ia tb [ia Da] IIIC T80°C/T290°C Db
Antenna type/process material	1	Ø50mm horn/stainless steel 316 (flange size limited to be ≥DN50)
	2	Ø80mm horn/stainless steel 316 (flange size limited to be ≥DN80)
	3	Ø100mm horn/stainless steel 316 (flange size limited to be ≥DN100)
	4	Ø100mm extension horn/stainless steel 316 (flange size limited to be ≥DN100)
	5	Ø125mm horn/stainless steel 316 (flange size limited to be ≥DN125)
Antenna protection	X	No requirement
	A	With PTFE protective cover (antenna type/4 and 5 only for process material)
	B	With purging function
Process temperature	D	-40°C~80°C (EPDM seal ring)
	E	-20°C~150°C (FKM seal ring)
	G	-20°C~250°C (FFKM seal ring)
	H	-60°C~350°C (for antenna protection B)
Process pressure (kgf/cm²g)	L	-1
	M	Atm (atmosphere)
	A	2.5
	B	6
	G	10
	C	16
	D	25
	E	40
Process connection	GD	G1-1/2"A (recommended)
	TN	1-1/2"NPT
	FB	Standard flange
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)

Model parameters	Specification code	Description
Flange size	E	DN50(2")
	C	DN65(2.5")
	F	DN80(3")
	G	DN100(4")
	H	DN125(5")
	J	DN150(6")
	K	DN200(8")
	M	DN250(10")
Pressure rating (kgf/cm^2) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	M	Class150
	N	Class300
Flange sealing face type	A	RF (recommended)
	B	FM
	C	M
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	Flat-thin plate flange (8 mm thick, M only for process pressure limited)
Material of flange	A	304
	B	316L
	C	Carbon steel (Q235)
	F	C4 steel
	D	PP (20mm thick, M only for process pressure and D only for process temperature)
	E	PTFE (20mm thick, M only for process pressure)
Companion flange (A, B and C options are inherently equipped with 304 bolt , nut, plate washer, flange gasket)	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel (Q235)

Special notes:

- Typical model 1: MPS3200SB2X3XDMFB-BGCAAX
- Typical model 2: MPS3200SB2X3XDMGD
- Special model: if special selection is required for a certain digit in the model code, fill “Z” in the space of special model in the model code, and “/Z” behind the complete model code; If special accessory is required, please fill "/Z" behind the complete model code. Then, explain all the "digit for special model" and special accessories in words without omission. The text description should be placed in brackets "( )". Before each description, "Zn:" (n = 1, 2, 3, ...) should be used for guidance and each description should be separated by semicolon";". When the specification code has multiple digits, the last digit will be changed to "Z". For example, "FB" will be changed to "FZ".
- Example of special model: MPS3200SB2X3XDFFB-BGZAAX/Z (Z1: PN63)
- Tank-side cable: If tank-side indicator is optional, the standard configuration contains a communication cable of 25 m. Any excess is priced in meters.

8. Table of MPS3300 model

Model parameters	Specification code	Description
Product	MPS3300	26G pulse radar level transmitter (PTFE process seal antenna)
Housing	S	Die casting aluminum (electrical interface M20×1.5)
	B	Die casting aluminum (electrical interface 1/2"NPT)
	G	Stainless steel 316 (electrical interface M20×1.5)
	H	Stainless steel 316 (electrical interface 1/2"NPT)
Power supply and output	B2	24V DC, 4mA~20mA, HART, two-wire system
	B4	24V DC, 4mA~20mA, HART, four-wire system
	U4	220V AC, 4mA~20mA, HART, four-wire system
	R2	24V DC, 4mA~20mA, HART, two-wire system (equipped with passive tank-side indicator)
	R4	24V DC, 4mA~20mA, HART, four-wire system (equipped with passive tank-side indicator)
	A4	220V AC, 4mA~20mA, HART, four-wire system (equipped with passive tank-side indicator)
Safety certificate	X	No requirement
	I	CCRI: Intrinsic safety + gas explosion proof type Ex ia IIC T6/T2 Ga
	O	CCRI: Intrinsic safety +gas flameproof type Ex db ia [ia Ga] IIC T6/T2 Gb
	N	CCRI: Intrinsic safety+dust flameproof type Ex ia tb [ia Da] IIIC T80°C/T290°C Db
	M	CCRI: complex gas explosion proof+complex dust explosion proof typeEx db ia[ia Ga] IIC T6/T2 Gb; Ex ia tb [ia Da] IIIC T80°C/T290°C Db
Antenna type/process material	2	Ø50 mm process seal antenna/stainless steel 304+PTFE process seal (for flange size E or C)
	3	Ø80 mm process seal antenna/stainless steel 304+PTFE process seal (flange size limited to be ≥DN80, recommended)
Antenna protection	A	PTFE process seal
Process temperature	D	-40°C~80°C (EPDM seal ring)
	E	-20°C~150°C (FKM seal ring)
Process pressure (kgf/cm²g)	L	-1
	M	Atm (atmosphere)
	A	2.5
	B	6
	G	10
	C	16
	D	25
Process connection	FB	Standard flange
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)

Model parameters	Specification code	Description
Flange size	E	DN50(2")
	C	DN65(2.5")
	F	DN80(3")
	G	DN100(4")
	H	DN125(5")
	J	DN150(6")
	K	DN200(8")
	M	DN250(10")
Pressure rating (kgf/cm^2) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	M	Class150
	N	Class300
Flange sealing face type	A	RF (recommended)
	C	M
Material of flange	A	304
	B	316L
Companion flange (A, B and C options are inherently equipped with 304 bolt , nut, plate washer)	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel (Q235)

Special notes:

- Typical model : MPS3300SB2X3ADMFB-BGCAAX
- Special model: if special selection is required for a certain digit in the model code, fill “Z” in the space of special model in the model code, and “/Z” behind the complete model code; If special accessory is required, please fill "/Z" behind the complete model code. Then, explain all the "digit for special model" and special accessories in words without omission. The text description should be placed in brackets "( )". Before each description, "Zn:" (n = 1, 2, 3, ...) should be used for guidance and each description should be separated by semicolon";". When the specification code has multiple digits, the last digit will be changed to "Z". For example, "FB" will be changed to "FZ".
- Example of special model: MPS3300SB2X3ADMFB-BGCAAX/Z (Z1: housing is coated with anti-corrosive paint)
- Tank-side cable: If tank-side indicator is optional, the standard configuration contains a communication cable of 25 m. Any excess is priced in meters.

9. Table of MPS3600 model

Model parameters	Specification code	Description
Product	MPS3600	26G pulse radar level transmitter (horn antenna and parabolic antenna)
Housing	S	Die casting aluminum (electrical interface M20×1.5)
	B	Die casting aluminum (electrical interface 1/2"NPT)
	G	Stainless steel 316 (electrical interface M20×1.5)
	H	Stainless steel 316 (electrical interface 1/2"NPT)
Power supply and output	B2	24V DC, 4mA~20mA, HART, two-wire system
	B4	24V DC, 4mA~20mA, HART, four-wire system
	U4	220V AC, 4mA~20mA, HART, four-wire system
	R2	24V DC, 4mA~20mA, HART, two-wire system (equipped with passive tank-side indicator)
	R4	24V DC, 4mA~20mA, HART, four-wire system (equipped with passive tank-side indicator)
	A4	220V AC, 4mA~20mA, HART, four-wire system (equipped with passive tank-side indicator)
Safety certificate	X	No requirement
	I	CCRI: Intrinsic safety + gas explosion proof type Ex ia IIC T6/T2 Ga
	O	CCRI: Intrinsic safety +gas flameproof type Ex db ia [ia Ga] IIC T6/T2 Gb
	N	CCRI: Intrinsic safety+dust flameproof type Ex ia tb [ia Da] IIIC T80°C/T290°C Db
	M	CCRI: complex gas explosion proof+complex dust explosion proof typeEx db ia[ia Ga] IIC T6/T2 Gb; Ex ia tb [ia Da] IIIC T80°C/T290°C Db
Antenna type/process material	1	Ø50mm horn/stainless steel 316 (flange size limited to be ≥DN50)
	2	Ø80mm horn/stainless steel 316 (flange size limited to be ≥DN80)
	3	Ø100mm horn/stainless steel 316 (flange size limited to be ≥DN100)
	4	Ø100mm extension horn/stainless steel 316 (flange size limited to be ≥DN100)
	5	Ø125mm horn/stainless steel 316 (flange size limited to be ≥DN125)
	6	Ø200mm paraboloid/stainless steel 304 (flange size limited to be≥DN200)
	7	Ø250mm paraboloid/stainless steel 304 (flange size limited to be≥DN250)
Antenna protection	X	No requirement
	A	With PTFE protective cover (antenna type/4 and 5 only for process material)
	B	With purging function
Process temperature	D	-40°C~80°C (EPDM seal ring)
	E	-20°C~150°C (FKM seal ring)
	G	-20°C~250°C (FFKM seal ring)
	H	-60°C~350°C (for antenna protection B)

Model parameters	Specification code	Description
Process pressure (kgf/cm²g)	L	-1
	M	Atm (atmosphere)
	A	2.5
	B	6
	G	10
	C	16
	D	25
	E	40
Process connection	GD	G1-1/2"A (recommended)
	TN	1-1/2"NPT
	FB	Standard flange
Connection mode of flange	C	Direct-insertion type
	W	Universal type (M only for process pressure)
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)
Flange size	E	DN50(2")
	C	DN65(2.5")
	F	DN80(3")
	G	DN100(4")
	H	DN125(5")
	J	DN150(6")
	K	DN200(8")
	M	DN250(10")
Pressure rating (kgf/cm²) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	M	Class150
	N	Class300

Model parameters	Specification code	Description
Flange sealing face type	A	RF (recommended fastening flange)
	B	FM
	C	M
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	Flat-thin plate flange (8mm thick, M only for process pressure and recommended universal flange)
Material of flange	A	304
	B	316L
	C	Carbon steel (Q235)
	F	C4 steel
	D	PP (20mm thick, M only for process pressure, D only for process temperature, and C only for flange connection)
	E	PTFE (20mm thick, M only for process pressure and C only for flange connection)
Companion flange (A, B and C options are inherently equipped with 304 bolt , nut, plate washer, flange gasket)	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel (Q235)

Special notes:

- Typical model 1: MPS3600SB2X5BDMFB-WBHCFAX
- Typical model 2: MPS3600SB2X5BDMGD
- Special model: if special selection is required for a certain digit in the model code, fill “Z” in the space of special model in the model code, and “/Z” behind the complete model code; If special accessory is required, please fill "/Z" behind the complete model code. Then, explain all the "digit for special model" and special accessories in words without omission. The text description should be placed in brackets "( )". Before each description, "Zn:" (n = 1, 2, 3, ...) should be used for guidance and each description should be separated by semicolon";". When the specification code has multiple digits, the last digit will be changed to "Z". For example, "FB" will be changed to "FZ".
- Example of special model: MPS3600SRZX5BDMFB-WBHCFAX/Z (Z1: equipped with 24V active tank-side indicator; Z2: equipped with flange gasket and fastener)
- Tank-side cable: If tank-side indicator is optional, the standard configuration contains a communication cable of 25 m. Any excess is priced in meters.

10. Table of MPS3700 model

Model parameters	Specification code	Description
Product	MPS3700	26G pulse radar level transmitter (horn antenna and parabolic antenna)
Housing	S	Die casting aluminum (electrical interface M20×1.5)
	B	Die casting aluminum (electrical interface 1/2"NPT)
	G	Stainless steel 316 (electrical interface M20×1.5)
	H	Stainless steel 316 (electrical interface 1/2"NPT)
Power supply and output	B2	24V DC, 4mA~20mA, HART, two-wire system
	B4	24V DC, 4mA~20mA, HART, four-wire system
	U4	220V AC, 4mA~20mA, HART, four-wire system
	R2	24V DC, 4mA~20mA, HART, two-wire system (equipped with passive tank-side indicator)
	R4	24V DC, 4mA~20mA, HART, four-wire system (equipped with passive tank-side indicator)
	A4	220V DC, 4mA~20mA, HART, four-wire system (equipped with passive tank-side indicator)
Safety certificate	X	No requirement
	I	CCRI: Intrinsic safety + gas explosion proof type Ex ia IIC T6/T2 Ga
	O	CCRI: Intrinsic safety +gas flameproof type Ex db ia [ia Ga] IIC T6/T2 Gb
	N	CCRI: Intrinsic safety+dust flameproof type Ex ia tb [ia Da] IIIC T80°C/T290°C Db
	M	CCRI: complex gas explosion proof+complex dust explosion proof typeEx db ia[ia Ga] IIC T6/T2 Gb; Ex ia tb [ia Da] IIIC T80°C/T290°C Db
Antenna type/process material	1	Ø50mm horn/stainless steel 316 (flange size limited to be ≥DN50)
	2	Ø80mm horn/stainless steel 316 (flange size limited to be ≥DN80)
	3	Ø100mm horn/stainless steel 316 (flange size limited to be ≥DN100)
	4	Ø100mm extension horn/stainless steel 316 (flange size limited to be ≥DN100)
	5	Ø125mm horn/stainless steel 316 (flange size limited to be ≥DN125)
	6	Ø200mm paraboloid/stainless steel 304 (flange size limited to be≥DN200)
	7	Ø250mm paraboloid/stainless steel 304 (flange size limited to be≥DN250)
Antenna protection	X	None
	B	With purging function
Process temperature	D	-40°C~80°C (EPDM seal ring)
	E	-20°C~150°C (FKM seal ring)
	G	-20°C-250°C (FFKM seal ring)
	H	-60°C~350°C (for antenna protection B)

Model parameters	Specification code	Description
Process pressure (kgf/cm²g)	L	-1
	M	Atm (atmosphere)
	A	2.5
	B	6
	G	10
	C	16
	D	25
	E	40
Process connection	GD	G1-1/2"A (recommended)
	TN	1-1/2"NPT
	FB	Standard flange
Connection mode of flange	C	Direct-insertion type
	W	Universal type (M only for process pressure)
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)
Flange size	E	DN50(2")
	C	DN65(2.5")
	F	DN80(3")
	G	DN100(4")
	H	DN125(5")
	J	DN150(6")
	K	DN200(8")
	M	DN250(10")
Pressure rating (kgf/cm²) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	M	Class150
	N	Class300

Model parameters	Specification code	Description
Flange sealing face type	A	RF (recommended fastening flange)
	B	FM
	C	M
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	Flat-thin plate flange (8mm thick, M only for process pressure and recommended universal flange)
Material of flange	A	304
	B	316L
	C	Carbon steel (Q235)
	F	C4 steel
	D	PP (20mm thick, M only for process pressure and C only for flange connection)
	E	PTFE (20mm thick, M only for process pressure and C only for flange connection)
Companion flange (A, B and C options are inherently equipped with 304 bolt , nut, plate washer, flange gasket)	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel (Q235)

Special notes:

- Typical model 1: MPS3700SB2X7XDMFB-WBMCFAX
- Typical model 2: MPS3700SB2X7XDMGD
- Special model: if special selection is required for a certain digit in the model code, fill “Z” in the space of special model in the model code, and “/Z” behind the complete model code; If special accessory is required, please fill "/Z" behind the complete model code. Then, explain all the "digit for special model" and special accessories in words without omission. The text description should be placed in brackets "( )". Before each description, "Zn:" (n = 1, 2, 3, ...) should be used for guidance and each description should be separated by semicolon";". When the specification code has multiple digits, the last digit will be changed to "Z". For example, "FB" will be changed to "FZ".
- Example of special model: MPS3700SB2X7XDMFB-WZMCFAX/Z (Z1: GB/T9119-2010)
- Tank-side cable: If tank-side indicator is optional, the standard configuration contains a communication cable of 25 m. Any excess is priced in meters.

MPS3101 Pulse Radar Water Level Transmitter

1. Typical application

◆ MPS3101 pulse radar water level transmitter is suitable for level measurement at normal temperature and pressure under the condition free from steam, foam and stirring (for example, it is used to measure the level of circulating water, fire water and tap water).

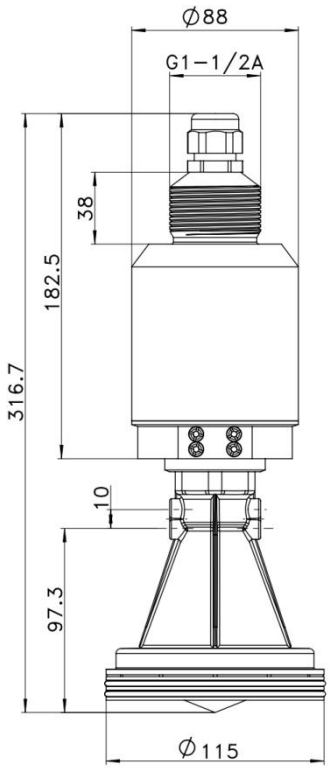
2. Technical parameters

Product Model	MPS3101
Product pictures	
Scope of application	Level measurement of urban pipe network water and treatment water
Housing material	PP
Process materials	PP+PTFE
Maximum span	15m
Blind zone	0.3m
Process connection	● Hoisting holder ● Flange ● G1-1/2"A thread (hoisted)

Power supply and output	● Two-wire DC power supply, 4mA~20mA output, with HART communication: 16V~30V DC, ripple ≤100mV; ● Four-wire DC power supply, 4mA~20mA output, with HART communication: 18V~36V DC, ripple ≤100mV; ● Four-wire AC power supply, 4mA~20mA output, with HART communication: 90V~260V AC, 50Hz~60Hz; ● Four-wire DC power supply, RS485, output, with Modbus communication: 18V~36V DC, ripple ≤100mV; ● Four-wire AC power supply, RS485, output, with Modbus communication: 90V~260V AC, 50Hz~60Hz.
Accuracy of the measurements	±3mm
Signal frequency	K-band (about 26GHz)
Ambient temperature	-40°C-80°C
Ambient humidity	<95%
Process temperature	-40°C~80°C
Process pressure	atm (atmosphere)
Degree of protection	IP67
Cable specifications	6-core shielded wire, 0.3mm²

Note: The actual measuring range and accuracy of the meter are affected by antenna size, medium reflectivity, installation position and possible interference reflection. ±3mm is the highest precision of this series of meters under the standard conditions in the laboratory.

3. Overall dimensions



4. Table of MPS3101 model

Model parameters	Specification code	Description
Product	MPS3101	Pulse radar water level transmitter
Power supply and output	B2	24V DC, 4mA~20mA, HART, two-wire system
	B4	24V DC, 4mA~20mA, HART, four-wire system
	M4	24V DC, RS485, Modbus, four-wire system
	U4	220V AC, 4mA~20mA, HART, four-wire system
	W4	220V AC, RS485, Modbus, four-wire system
Safety certificate	X	No requirement
Process temperature	D	-40°C~80°C
Process pressure (kgf/cm²g)	M	Atm (atmosphere)
Maximum span	1	5m
	2	10m
	3	15m
Process connection	GD	G1-1/2"A (hoisted)
	LM	Hoisting holder
	FB	Flange (HG/T20592-2009 DN100 PN16, FF face, PP, thickness: 20mm)
Display module	P	Active tank-side display
	X	No (for power supply and output B2 or M4)
tank-side/meter cable length (L)	XX	(unit: m, range: 5m~25m, minimum step: 5m)
Companion flange (A, B and C options are inherently equipped with 304 bolt , nut, plate washer, flange gasket)	X	Without companion flange
	A	304 (for process connection FB)
	B	316L (for process connection FB)
	C	Carbon steel (Q235) (for process connection FB)

Special notes:

- Typical model: MPS3101B2XDM1GDP05X
- Special model: if special selection is required for a certain digit in the model code, fill “Z” in the space of special model in the model code, and “/Z” behind the complete model code; If special accessory is required, please fill "/Z" behind the complete model code. Then, explain all the "digit for special model" and special accessories in words without omission. The text description should be placed in brackets "( )". Before each description, "Zn:" (n = 1, 2, 3, ...) should be used for guidance and each description should be separated by semicolon";". When the specification code has multiple digits, the last digit will be changed to "Z". For example, "FB" will be changed to "FZ".
- Example of special model: MPS3101B2XDM1GDP05X/Z (Z1: with nameplates and manuals in Chinese and English)
- Length of tank-side/meter cable: if it is less than 10m, the first digit is 0, for example, 05 for 5m.

MPS370x High Temperature Radar Probe

1. Introduction to Product

High temperature radar probe is a radar measuring meter specially designed according to on-site working conditions, which can realize the measurement and monitoring in extremely high temperature environment.

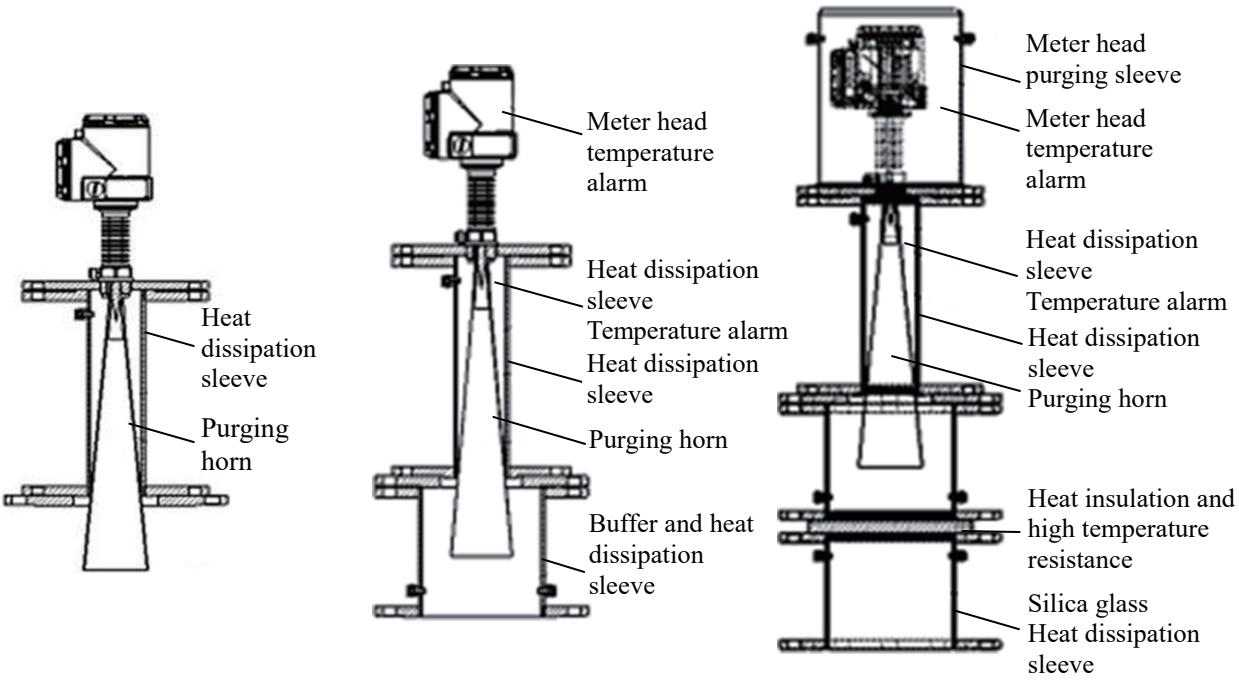
2. Technical parameters

Product Model	MPS3701	MPS3702	MPS3703
Schematic diagram			
Scope of application	Detection of high temperature material level in metal sintering	Detection of material level in blast furnace and dry quenching coke oven	Detection of material level in calcium carbide furnace and electric arc heating furnace
Process seal	Graphite+alumina		
Maximum span	70m		
Accuracy of the measurements	±3mm		
Resolution	1mm		
Process connection	Flanges of DN200 and above (customized according to on-site working conditions)		
Power supply	● Two-wire 16V~30V DC, ripple ≤100mV; ● Four-wire 18V~36V DC, ripple ≤100mV; ● Four-wire 90V~260V AC, 50Hz~60Hz.		
Signal output	● 4mA~20mA+HART	● Level signal: 4mA~20mA+HART ● Temperature signal: 4mA~20mA or SPDT	
Process temperature	800°C	1200°C	1600°C
Process pressure	Atm (atmosphere)		
Degree of protection	IP67		

Note: The actual measuring range and accuracy of the meter are affected by antenna size, medium reflectivity, installation position and possible interference reflection. ±3mm is the highest precision of this series of meters under the standard conditions in the laboratory.

3. Outline structure

MPS3701 MPS3702 MPS3703



Special notes:

- Typical model 1: MPS3701/Z
- Typical model 2: MPS3702/Z
- Typical model 3: MPS3703/Z
- Special model: Please consult our technicians to determine the specific scheme before selecting the model. High temperature radar probe is a radar measuring meter specially designed according to on-site working conditions. Therefore, it is necessary to fill "/Z" behind the model and explain all the "special requirements" and special accessories in words without omission. The text description should be placed in brackets "( )". Before each description, "Zn:" (n = 1, 2, 3, ...) should be used for guidance and each description should be separated by semicolon";".

MGS Series Guided Microwave Radar Level Transmitter



1. Introduction to Product

1.1. Measuring principle

The MGS Guided Microwave Radar Transmitter is designed with time domain reflectometry (TDR). The high-frequency pulse emitted by the meter propagates along the rod (cable). After encountering the measured medium, part of the high-frequency pulse energy is reflected due to the sudden change of the dielectric constant, and the reflected pulse returns to the meter along the rod (cable).

By measuring the time difference between pulse signal transmission and reflection, the distance from the measured medium to the meter flange can be calculated according to the following formula.

2D=C×t

C: Light speed

T: Time difference between transmitted pulse and reflected pulse

D: Distance of measured medium (as shown in the right figure)

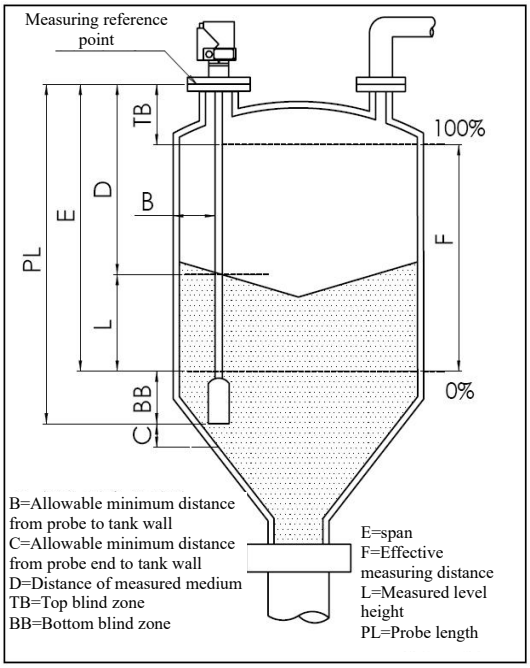
Then, according to the set positions of full tank and empty tank, the material height can be calculated by the following formula and 4mA~20 mA current can be output.

Level height: L=E-D

Output current: I_o =4+L×16/E

L: Level height (as shown in the right figure)

E: Span (as shown in the right figure)



1.2. Product advantages

- The measurement is not affected by liquid density, porosity of solid materials, temperature, dust, steam and other factors;
- The foam on the liquid surface has no effect on measurement.
- The Chinese menu is easy and intuitive to operate;
- The measurement with the coaxial rod probe is completely independent of the internal structure of the tank and the mounting standpipe.
- Rod and cable probes are convenient for replacement

1.3. Application industries

◆ Petrochemical industry (oil field, petrochemical plant, oil extraction plant, oil refinery, chemical plant, coking plant, etc.)
Media to be measured: crude oil, light oil, natural gas, methanol, ethanol, ammonia, benzene, polystyrene, esters, liquid carbon dioxide, liquid nitrogen, etc.

◆ Electric power industry (power plant high/low-pressure heater, condenser, etc.)
Media to be measured: raw coal bin, powder bin, coal ash bin, chemical water, etc.

◆ Metallurgy industry (steel works)
Media to be measured: limestone, coke and pulverized coal, cold back to min, raw material bin, powder bin, coal ash bin and chemical water, etc.

◆ Cement industry (cement plant, etc.)
Media to be measured: clinker warehouse, powder bin, raw coal bin and chemical water, etc.

2. Technical characteristics

❖ Technical indicator
- Working frequency: 100MHz~1.8GHz
- Measuring range: cable type 0.3~20m; rod type 0.3~4m; coaxial type 0.1~4m
- Resolution: 1mm
- Output signal: 4mA~20mA
- Accuracy: ±3mm

❖ Communication protocol
- HART communication protocol

❖ Process connection
- G3/4"A, G1-1/2"A, 1-1/2"NPT or flange

❖ Process temperature
- -196°C~440°C

❖ Process pressure
- -1.0 kgf/cm²~40 kgf/cm². Please consult the manufacturer before ordering for special pressure type.

❖ Power supply
- Two-wire DC power supply, 4mA~20mA output, with HART communication:
  14V~30V DC (intrinsic safety type: 28V, intrinsic safety+flameproof type: 24V), ripple≤100mV;
- Four-wire DC power supply, 4mA~20mA output, with HART communication:
  18V~36V DC, ripple≤100mV;
- Four-wire AC power supply, 4mA~20mA output, with HART communication:
  90V~260V AC, 50Hz~60Hz.

❖ Environmental condition
- Normal temperature working conditions: -30°C~70°C, Low temperature working conditions -60°C~80°C, LCD screen: -30°C~80°C (see the Explosion Protection Certificate for ambient temperature of explosion-proof products)

❖ Degree of protection
- IP66/IP67

❖ Safety certificate
- Intrinsic safety+gas explosion proof type
- Intrinsic safety +gas flameproof type
- Intrinsic safety +dust flameproof type
- EAC: Intrinsic safety+gas explosion proof type
- EAC: Intrinsic safety+dust explosion proof
- EAC: Gas flameproof type
- EAC: Dust flameproof type

❖ Electrical interface
- M20×1.5 thread (non-flameproof type: outer diameter of cable limited to 6mm~12mm, flameproof type: outer diameter of cable limited to 8mm~12mm)
- 1/2"NPT thread (non-flameproof type: outer diameter of cable limited to 6mm~12mm, flameproof type: outer diameter of cable limited to 8mm~12mm)

3. Guide for Selection

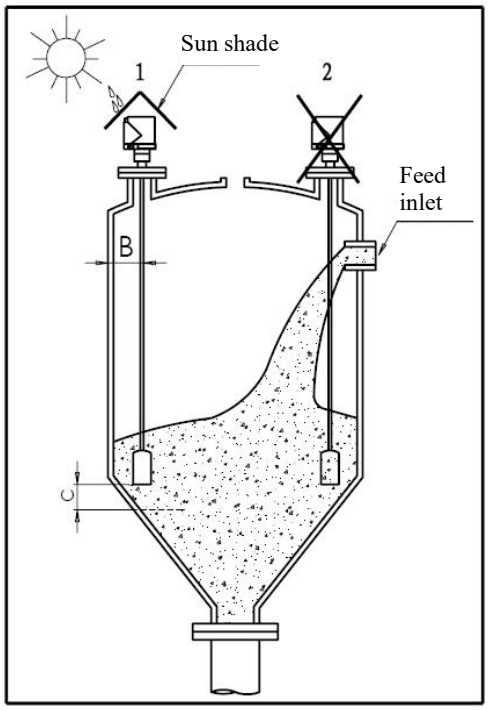
Product Model	MGS2100		MGS2200		MGS2500	
Product pictures						
Probe size	Ø4mm Cable type	Ø8mm Cable type	Ø10mm Rod	Ø20mm Rod	Ø22mm Coaxial type	Ø42mm Coaxial type
Tensile strength	12kN~16kN	30kN~35kN	Irrelevant		Irrelevant	
Lateral load	Irrelevant		10Nm	30Nm	300Nm	
Scope of application	Liquid	Environment with solid particulates and large dust	Liquid and powder	Solid particulates	Liquid	
Maximum span	20m		4m		4m	
Measuring medium	• Liquid medium with dielectric constant ≥1.6 • Viscous liquid medium	• Any medium with dielectric constant ≥1.6	• Any medium with dielectric constant ≥1.6 • Medium with viscosity ≤500cst • Measurement is not affected due to strong capability of inhibiting steam and foam		• Any medium with dielectric constant ≥1.4 and viscosity ≤500cst • Measurement is independent of the conductivity of the medium	
Description	• Usually, cable probe is used to measure solid particulates, while rod probe is only suitable for measuring light solid particulates with good fluidity and small measuring span (about 4m); • Usually, rod or coaxial rod probe is used to measure the liquid with small measuring span. Cable probe is used for measuring liquids with measuring span larger than 4m or when rigid probe cannot be installed on the top. • Coaxial rod probe can measure the liquid with viscosity up to 500cst and the liquefied gas and the internal structure of nozzle and material tank has no influence on the measurement; • When used for measuring the material level of large tank, the cable probe should be equipped with plastic sheath to keep the seal so as to prevent the cable from breaking due to lateral pressure; • For corrosive medium, anti-corrosion option should be selected; • When measured medium is very loose, it can be classified as a kind with lower dielectric constant; • The maximum span of the meter will be reduced due to the effect of working conditions, such as: very loose substances, adhesion caused by moist medium, etc.					

4. Blind zone and measuring distance

MGS series guided microwave radar	Effective measuring distance F[m]		Top blind zone TB [m] min	Bottom blind zone BB[m] min
	min	max		
MGS2100 cable probe	0.8	20	0.3	0.25
MGS2200 rod probe	0.5	4	0.3	0.05
MGS2500 coaxial probe	0.5	4	0.1	0.05
Description	• Top blind zone refers to the minimum distance between the allowable highest material surface and the measuring reference point; • Bottom blind zone refers to the section of the end of the probe within which material level cannot be accurately measured; • Effective measuring distance refers to the distance between the top blind zone and the bottom blind zone. Only within this distance can the material be reliably measured.			

5. Installation guide

5.1. Installation position



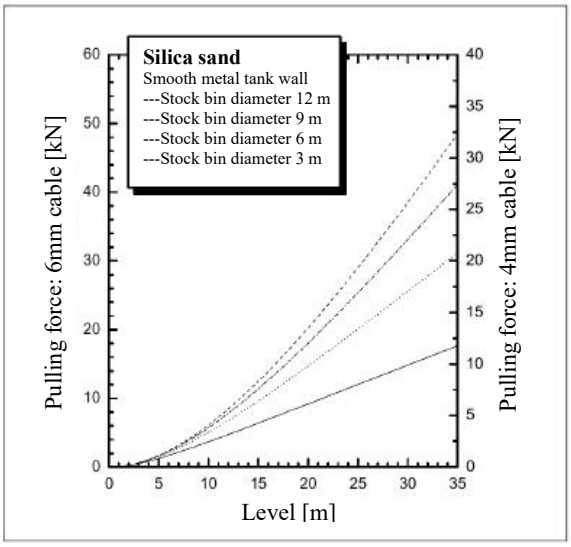
- ◆ Rod probes and cable probes should be installed as far away as possible from the feed inlet;
- ◆ Rod probe and cable probe should be kept at a proper distance "B" from the tank wall. In case material adheres to the tank wall, the distance between the probe and the tank wall should be ≥ 300 mm;
- ◆ Rod probe and cable probe should be installed as far away as possible from the installed equipment (such as tuning fork and holder), with a distance ≥ 300 mm;
- ◆ When rod probe and cable probe are used in plastic tanks, the distance between the metal parts outside the tank and the probe should be ≥ 300 mm;
- ◆ Rod probe and cable probe cannot contact the metal tank wall and bottom;
- ◆ Ensure that the cable does not come into contact with the internal obstacles in the whole span, and fix the cable to the tank bottom if necessary;
- ◆ Minimum distance "C" between the probe end and the tank bottom:
  - ➢ Cable probe: 150 mm
  - ➢ Rod probe: 50 mm
  - ➢ Coaxial rod probe: 10 mm
- ◆ For outdoor installation, protective measures are recommended;
- ◆ Select the appropriate installation position to prevent the bent cable probe deviating during installation or operation (e.g. pull the probe toward the tank wall when materials move).

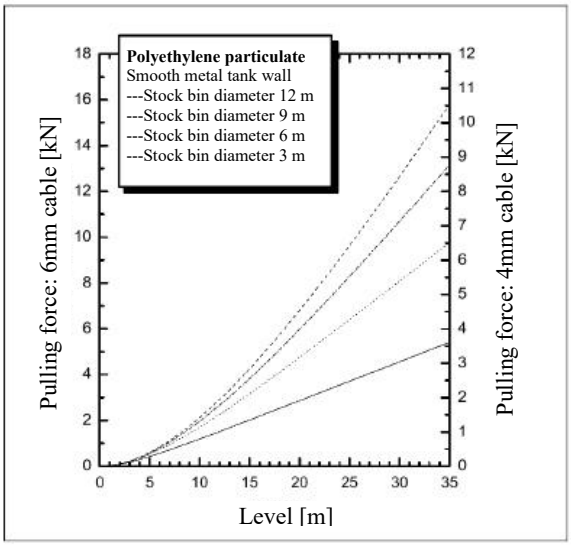
5.2. Measurement of solid particles

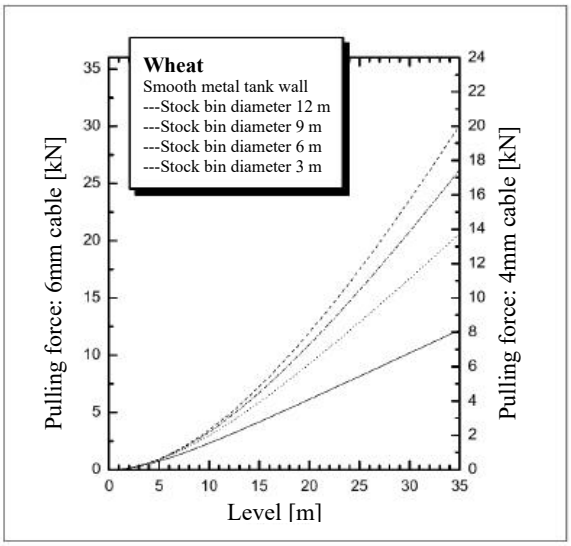
- ◆ For measurement of solid particulates, the probe should be installed as far away as possible from the feed inlet to avoid impact and abrasion;
- ◆ In the concrete bin, as shown in the above figure, the optimal distance B between the probe and the cement tank wall should be ≥ 1 m and at least ≥ 0.5 m;
- ◆ The cable probe must be installed carefully. If possible, it should be installed when the tank is empty;
- ◆ Solid particulates produce pulling force on the cable probe, and the pulling force depends on the following factors:
  - ➢ Probe length
  - ➢ Material density
  - ➢ Tank diameter
  - ➢ Probe diameter

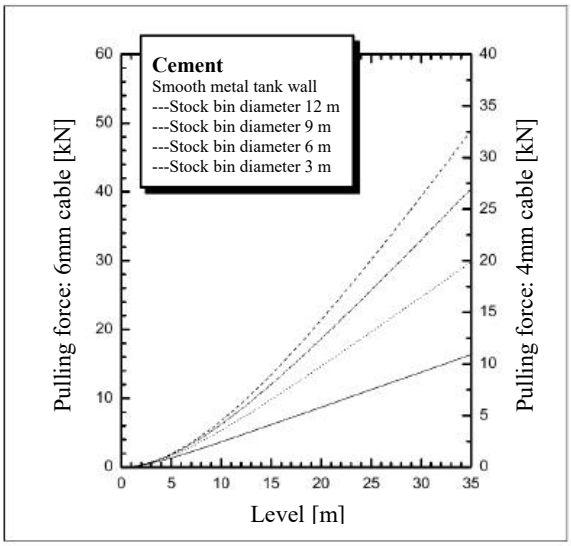
◆ Typical loads of common solid particulates are shown in the following figure. They can be used as reference for calculation under the following conditions:

- ➢ Free overhang probe (probe end not fixed);
- ➢ Free pouring solid
- ➢ Safety factor 2 is adopted to compensate for the normal fluctuation of solid bulk materials.









5.3. Measurement of corrosive medium

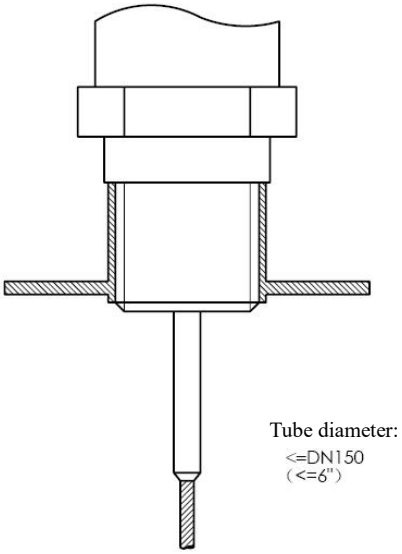
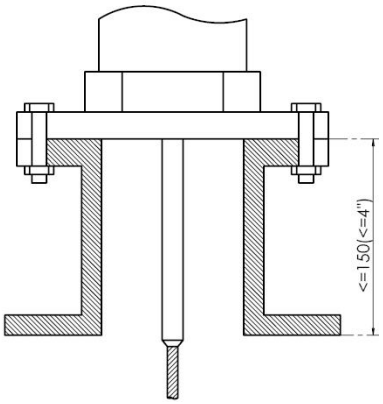
When using the meter to measure the corrosive liquid, please select the "anti-corrosion" option in the table of model.

When used for measuring the liquid level in the plastic tank, it can be installed on the outer wall of the tank, so that the meter can measure the liquid level across the plastic tank wall, or the probe can be installed in a closed plastic pipe. The size of the plastic pipe can reach 50 mm so that the meter can measure the liquid level across the plastic pipe.

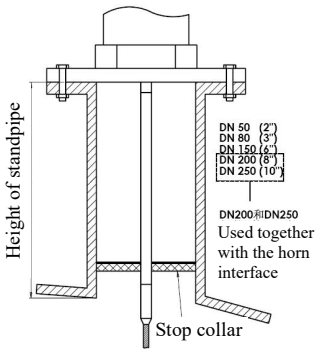
5.4. Installation

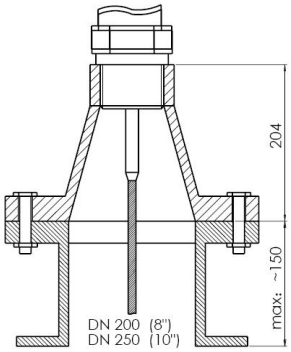
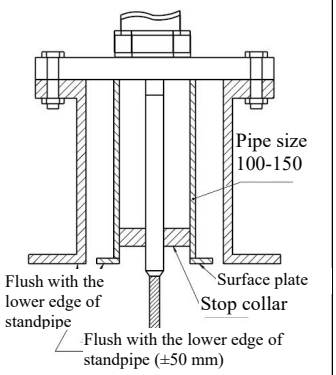
5.4.1. Basic installation requirement

- The meter should be connected by thread or flange.
- During installation, if the probe end contacts the tank bottom or tapered tank wall due to movement, it can be shortened or fixed by fixing the cable probe to the thread joint inside the tank bottom.
- It's ideal to install the meter with an internally welded thread joint flush with the tank top (as shown in the left figure below).
- When the meter is installed with a standpipe, the size of the standpipe should be DN50~150 and its height should be less than 150mm (as shown in the right figure below)

Installation flush with the tank top	Installation in standpipe
	

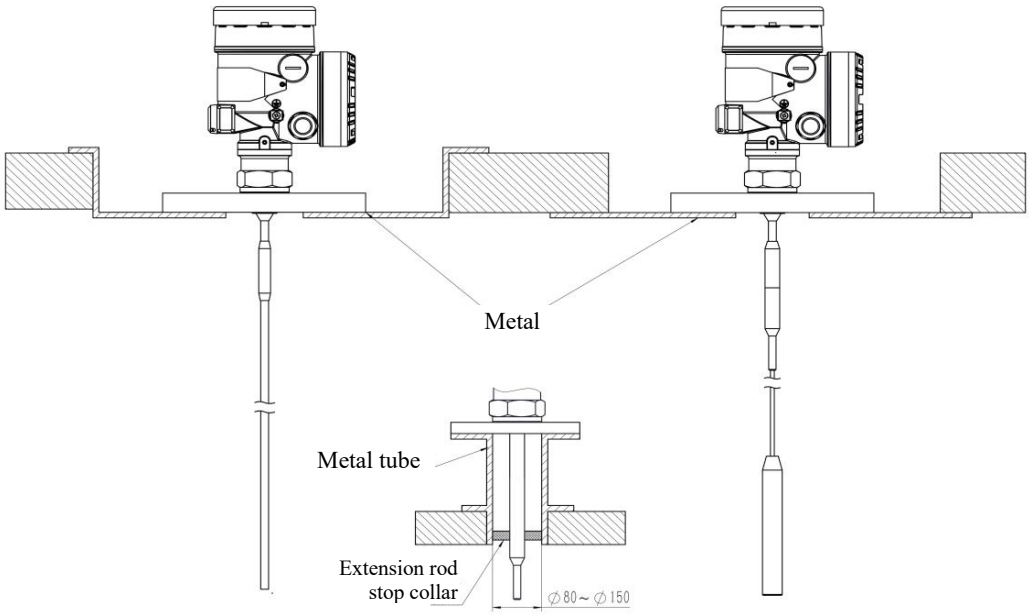
5.4.2. Installation in standpipe

Standpipe specification	Installation requirements	Schematic diagram for installation
Installation in DN40~DN250 standpipes with height exceeding 150mm	• If the probe is installed in a standpipe with a size of DN40~250 and height >150mm, the probe may contact the standpipe end due to the flow of medium in the tank. Therefore, it is recommended to select the extension rod probe with stop collar. • If the standpipe is too small or is used for measuring solid granules, a stop collar should be installed. Stop collar should be ordered separately; Stop collars should be ordered separately; • When the size of the standpipe is DN40/50 and the stop collar needs to be installed, it should be ensured that the materials will not accumulate in the standpipe.	

<table>
<tr><th>Standpipe specification</th><th>Installation requirements</th><th>Schematic diagram for installation</th></tr>
<tr><td>Installation in DN200 and DN250 standpipes</td><td>• When the meter is installed in a standpipe with a size of DN 200 ~DN 250, the echo generated on the inner wall of the standpipe will cause measurement error when the dielectric constant of the medium is low. Therefore, it is necessary to select a special flange with "horn interface", and select "horn interface type" in the "flange connection mode" option in the table of model.
• If cable probe is prone to deflection, extension rod and stop collar are recommended.</td><td>
</td></tr>
<tr><td>Installation in standpipes with a size >DN250</td><td>• If the size of the standpipe is >DN250, the straight standpipe flange as shown in the right figure should be installed and it can be selected in the spectrum.
<table>
<tr><th>Size of standpipe</th><th>Flat diameter (mm)</th></tr>
<tr><td>DN300</td><td>Ø280</td></tr>
<tr><td>≥DN400</td><td>≥Ø350</td></tr>
</table></td><td>
</td></tr>
<tr><td>Remarks</td><td colspan="2">• The probe should be prevented from being installed in a standpipe with a size larger than DN250. When the size of the standpipe is larger, please select coaxial rod probe.</td></tr>
</table>

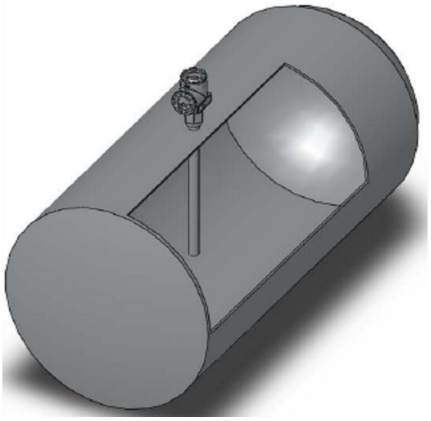
5.4.3. Installation in the concrete bin

As shown in the following figure, when an instrument is installed in the thick-walled concrete bin, line a metal plate at the lower edge of the opening or insert a standpipe into the opening. Note that the standpipe should keep the shortest length flush with the lower edge of the bin top. When the inner diameter of the standpipe is less than Ø 150 mm, accessories like extension rods and stop collars should be selected (as shown in the right figure below).



5.4.4. Installation in the horizontal tank, vertical tank and embedded tank

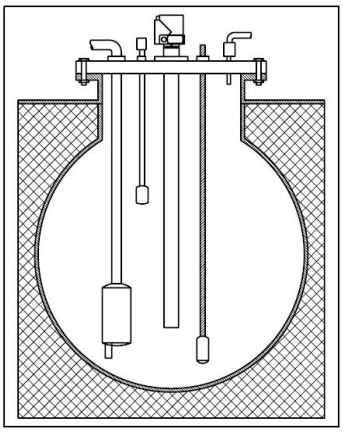
- The measuring range of the coaxial rod probe and rod probe can reach 4 m. For tanks with measuring range exceeding 4 m, cable probes can be selected;
- Installation and fixing methods are the same as those for measurement of solid tanks;
- If there are many obstacles in the tank or the obstacles are close to the probe, please select the coaxial rod probe;
- When used in a curved roof metal tank, rod probes or cable probes should not be installed in the center of the tank, while coaxial probes can be installed in any position of the tank, without impairing its performance.



Installation in the horizontal tank



Installation in the vertical tank



Installation in the embedded tank

5.4.5. Installation in the wave guide pipe or bypass chamber

- The rod probes can be installed in conduits with diameter 40~100 mm;
- When the rod probe is installed in a metal conduit with diameter ≤100, its measurement effect is equivalent to that of the coaxial rod probe.
- The inner wall of the conduit should be smooth as far as possible, and the height of the weld crater should be less than 5 mm.



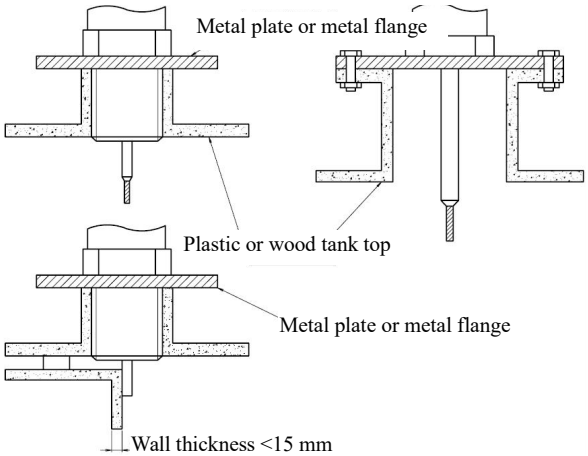
Installation in the wave guide pipe



Installation in the bypass chamber

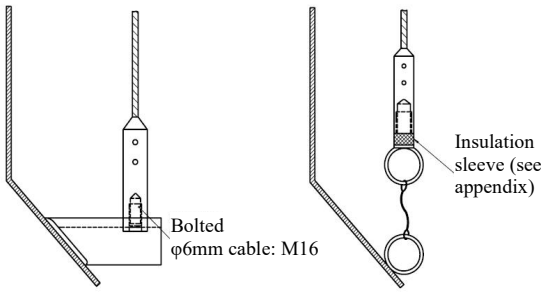
5.4.6. Installation in the plastic tank

- When measuring the level with the guided microwave radar, a metal plate is needed at the process connection;
- When a rod probe or a cable probe is installed in a plastic tank, if the tank roof is made of plastics or timber, the probe should be installed with a metal flange with diameter ≥DN80. If it is installed with threads, a metal plate with a diameter >200 mm should be equipped;
- When measuring aqueous solution, the probe can be installed on the outer wall of the tank, across the tank wall non-contact measurement can be implemented. If there are people near the installation position of the probe, a plastic semi-circular baffle or other protective parts with diameter about 200 mm should be fixed outside the probe so as not to affect the measurement.
  - There should be no metal fixing ring in the tank;
  - The thickness of the tank wall should be less than 15 mm when the tank wall is made of enhanced glass fiber;
  - There should be no gap between the tank wall and the probe;



5.4.7. End of fixed cable probe

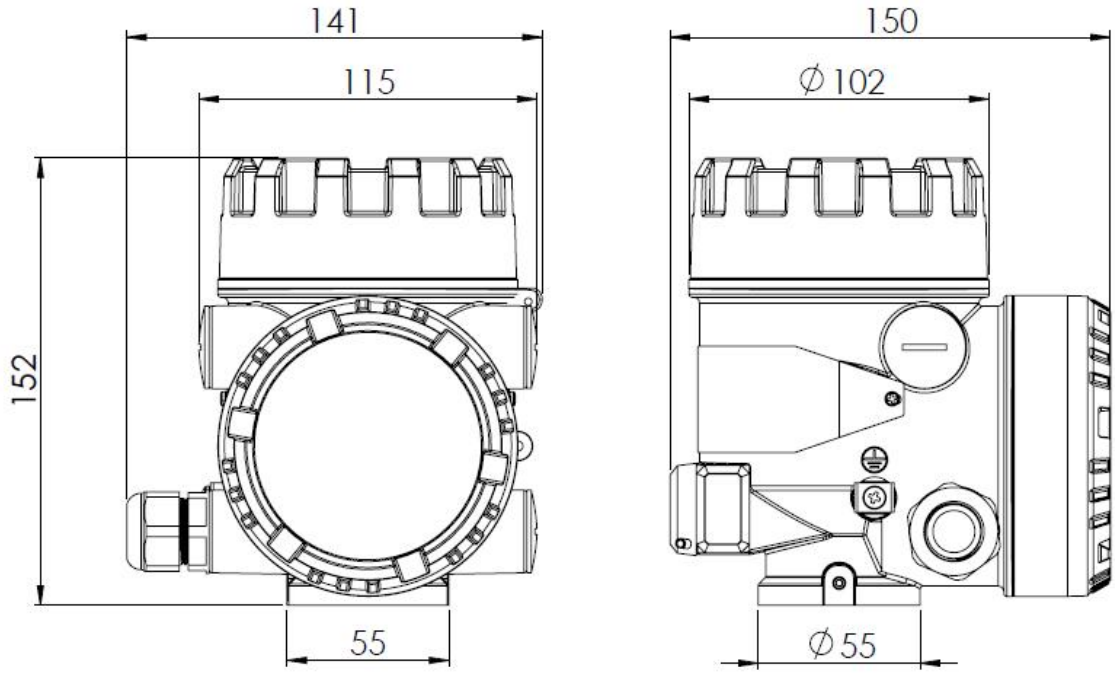
- If the cable probe is likely to contact the tank wall, the tapered tank bottom or other parts, or if the distance between the probe and the tank wall in the concrete tank is less than 0.5 m or the probe is not vertically installed, the probe end needs to be fixed;
  - The probe end with threads can be used for fixation:
  - The 8 mm cable has M16 thread at the end.
- When the cable needs to be fixed, please select an 8 mm cable with high tensile strength;
- When fixed, the cable should be reliably grounded or insulated;
- To prevent the cable from being broken due to excessive stress during feeding, the cable should be kept loose as much as possible. It is recommended that the length of the selected cable should be longer than the actual measuring range to ensure looseness >1 cm/m in the center of the cable;
- If the probe end needs to be fixed, there are two ways to fix it:
  - Insulation fixation: When the dielectric constant of the measured medium is low and the cable is fixed at the bottom of the metal tank, insulation fixation is required (as shown in the figure below).
  - Non-insulation fixation: Used when the dielectric constant of the measured medium is very high, and the tank is made of non-metallic material or material with very low dielectric constant or material with dielectric constant very close to that of the measured medium (as shown in the figure below).



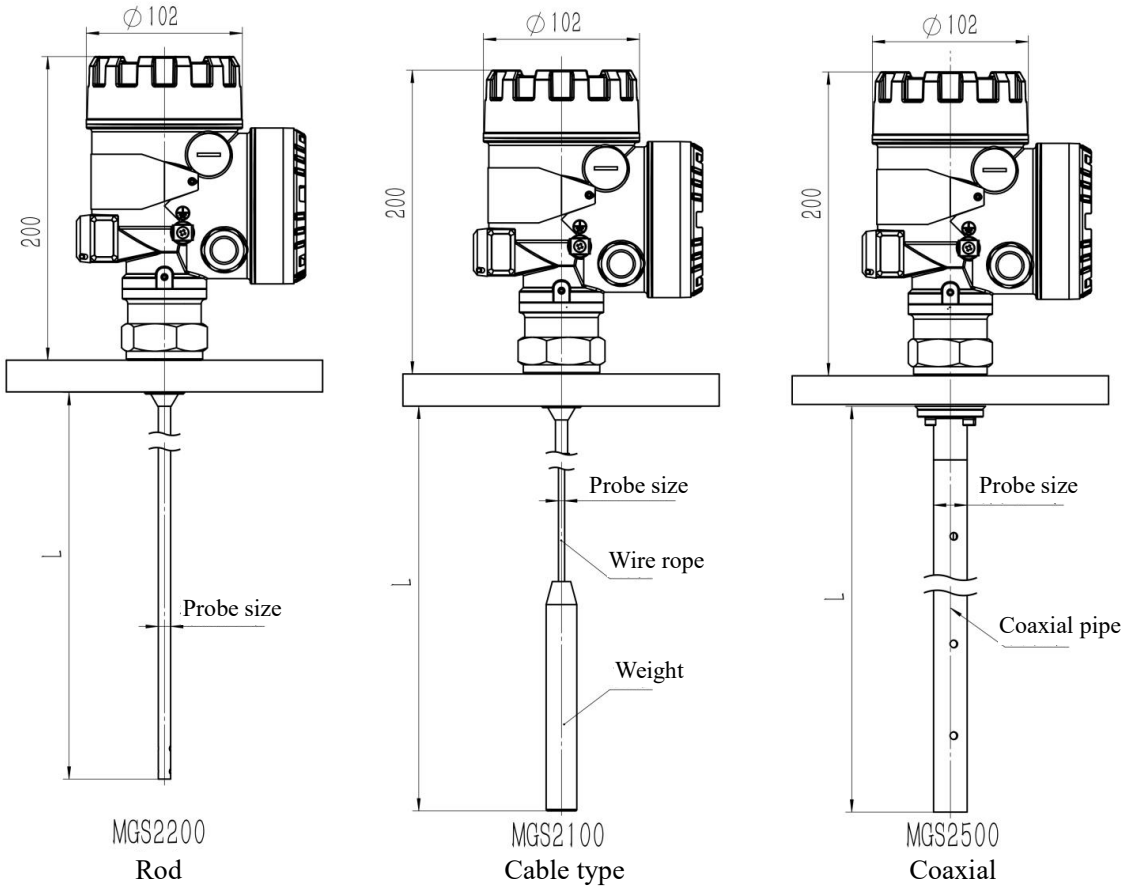
Reliable grounding installation　　Reliable insulating installation

6. Structural size

6.1. Size of meter housing



6.2. Boundary dimension of meter



7. MGS type selection

Model parameters	Specification code	Description
Products	MGS	Guided Microwave Radar Level transmitter
Type of probe	2100	Single-cable probe (limit of probe length≤20m)
	2200	Single-rod probe (limit of probe length ≤4m)
	2500	Coaxial probe (probe length ≤4m; recommended if dielectric constant is <2)
Measured medium	L	Liquid
	S	Solid
Housing	S	Die casting aluminum (electrical interface M20×1.5)
	B	Die casting aluminum (electrical interface 1/2"NPT)
	G	Stainless steel 316 (electrical interface M20×1.5)
	H	Stainless steel 316 (electrical interface 1/2"NPT)
Power supply and output	B2	24V DC, 4mA~20mA, HART, two-wire system
	B4	24V DC, 4mA~20mA, HART, four-wire system
	U4	220V AC, 4mA~20mA, HART, four-wire system
	R2	24V DC, 4mA~20mA, HART, two-wire system (equipped with passive tank-side indicator)
	R4	24V DC, 4mA~20mA, HART, four-wire system (equipped with passive tank-side indicator)
	A4	220V AC, 4mA~20mA, HART, four-wire system (equipped with passive tank-side indicator)
Safety certificate	X	No requirement
	I	Intrinsic safety+gas explosion proof type
	O	Intrinsic safety +gas flameproof type
	N	Intrinsic safety +dust flameproof type
	M	Complex gas explosion proof+complex dust explosion proof
	E	EAC: Intrinsic safety+gas explosion proof type
	F	EAC: Intrinsic safety+dust explosion proof
	G	EAC: Intrinsic safety and gas explosion proof type+intrinsic safety and dust explosion proof type
	J	EAC: Gas flameproof type
	K	EAC: Dust flameproof type
	L	EAC: Gas flameproof +dust flameproof
Material of probe	A	304
	B	316L
Probe size	K	Ø2mm (cable type for liquid, recommended if wave guide pipe is used on site)
	A	Ø4mm (cable type for liquid)
	B	Ø8mm (cable type for solid)
	D	Ø10mm (single-rod type for liquid)
	F	Ø20mm (single-rod type for solid)
	G	Ø22mm (coaxial rod type for liquid)
	H	Ø 42 mm (coaxial rod type for liquid)
Probe protection	X	No requirement
	A	Anti-corrosion type (for probe type 2100 or 2200)

Model parameters	Specification code	Description
Probe length (L)	XXXX	(unit: cm, range: 80cm~2,000cm, minimum step: 1cm)
Extension rod/ stop collar	X	No requirement
	A	Only with extension rod (2100 only for probe type; standpipe height is limited to be >150mm)
	B	Stop collar+extension rod (for probe type 2100, recommended when probe is easy to touch the pipe wall)
	C	Only with stop collar (for probe type2100 or 2200, recommended when probe is easy to touch the pipe wall)
Process temperature	D	-40°C~80°C (EPDM seal ring)
	J	-40°C~150°C (EPDM seal ring)
	P	-40°C~150°C (sintered glass seal) (for probe size G, recommended for liquid ammonia conditions)
	E	-20°C~150°C (FKM seal ring)
	K	-20°C~200°C (FKM seal ring)
	G	-20°C~250°C (FFKM seal ring)
	L	-196°C~280°C (graphite + ceramic seal)
	H	-196°C~440°C (graphite + ceramic seal)
Process pressure (kgf/cm²g)	L	-1
	M	Atm (atmosphere)
	A	2.5
	B	6
	G	10
	C	16
	D	25
	E	40
Process connection	GA	G3/4"A (for probe size A or K)
	GD	G1-1/2"A
	TN	1-1/2"NPT
	FB	Standard flange
Connection mode of flange	X	Standard
	A	Horn-interface
	B	Straight short pipe
Flange standard	A	HG/T206152009 (Class series)
	B	HG/T205922009 (PN series)
Flange size	E	DN50(2")
	C	DN65(2.5")
	F	DN80(3")
	G	DN100(4")
	H	DN125(5")
	J	DN150(6")
	K	DN200(8")
	M	DN250(10")

Model parameters	Specification code	Description
Pressure rating (kgf/cm²) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	M	Class150
	N	Class300
Flange sealing face type	A	RF (recommended)
	B	FM (X only for probe protection)
	C	M convex (X only for probe protection)
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	Flat-thin plate flange (8 mm thick, M only for process pressure limited)
Material of flange	A	304
	B	316L
	C	Carbon steel (Q235)
Companion flange (A, B and C options are inherently equipped with 304 bolt , nut, plate washer, flange gasket)	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel (Q235)

Special notes:

- Typical model 1: MGS2500LSB2XBHX0150XEMFB-XBFCAAX
- Typical model 2: MGS2200LSB2XADX0130XDMTN
- Special model: if special selection is required for a certain digit in the model code, fill “Z” in the space of special model in the model code, and “/Z” behind the complete model code; If special accessory is required, please fill "/Z" behind the complete model code. Then, explain all the "digit for special model" and special accessories in words without omission. The text description should be placed in brackets "( )". Before each description, "Zn:" (n = 1, 2, 3, ...) should be used for guidance and each description should be separated by semicolon";". When the specification code has multiple digits, the last digit will be changed to "Z". For example, "FB" will be changed to "FZ".
- Example of special model: MGS2500LSB2XBHX0145XEMFB-XBFCAAX/Z (Z1: equipped with 304 measuring cylinder. Specification of branch flange HG/T20592-2009 DN25 PN16 RF, total length of measuring cylinder: 150cm, center distance of upper and lower branch pipes: 100 cm)
- When selecting the measuring cylinder, firstly determine the measuring range according to the working conditions, and then calculate the probe length, the total length of the measuring cylinder and the center distance between the upper and lower branches of the measuring cylinder according to the measuring range. See the following table for the calculation formula:

Non-graphite ceramic sensor	Graphite ceramic sensor
Probe length=measuring range+45cm	Probe length=measuring range+65cm
Total length of measuring cylinder=measuring range+50cm	Total length of measuring cylinder=measuring range+70cm
Center distance between the upper and lower branches of the measuring cylinder=measuring range	

- Tank-side cable: If tank-side indicator is optional, the standard configuration contains a communication cable of 25 m. Any excess is priced in meters.
- Split guided microwave radar: "Split" means that the sensor and the case (electronic unit) are separated from each other and connected by a high-frequency coaxial cable. For guided microwave radars with tank-side indicator, its sensor and case (electronic unit) are still a whole, but the display module is led out for tank side display. If a split guided microwave radar is needed, consult our technical staff to determine the specific program.

MCS Series RF Admittance Level Transmitter



1. Basic information

MCS intelligent radio frequency admittance level transmitter is a kind of level transmitter which realizes intelligence fundamentally. It is a high-end product designed based on the principle of radio frequency admittance, and inherits the advantages of high stability and wide application of capacitive level transmitter.

Compared with the traditional capacitive level transmitter, MCS adopts modular design and is equipped with LCD debugging module, which can automatically obtain and display the current value of the measured level without any peripheral auxiliary equipment, and provide users with more reliable measurement data. The LCD debugging module has dual functions of debugging and displaying, which enables users to read the required data concisely and intuitively, which is convenient for debugging.

2. Measuring principle

For the traditional capactive level transmitter, the increase of the material level and the material covering the probe, the capacitance between the probe and the medium in the circuit (in the case of conductive material) or between the probe and the pipe wall (in the case of insulating material) also increases. Since the change of material level leads to the imbalance of capacitance bridge, the change of capacitance value depends on the dielectric constant of the measured material, and then the corresponding signal is output by detecting and amplifying the signal. However, the capacitive level instrument has some shortcomings, especially when the probe is adhered with materials, which will seriously affect the measurement results.

Radio frequency admittance measurement technology is a level measurement technology with unique advantages, which can realize independent measurement of impedance and capacitive reactance. According to the calculation based on physical laws, the impedance and capacitive reactance of any adhered materials are equal, so the effect caused by adhered materials can be measured and eliminated from the total output through the phase shift of the oscillating circuit.

The radio frequency admittance technology has high accuracy and is not affected by the adhered materials of the probe, so it is the most widely used measurement technology at present.

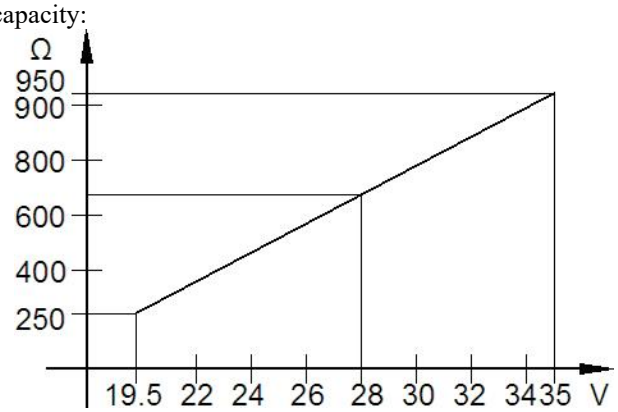
3. Product features

◆ Resistance to adhesion of materials	The unique design of individually measuring impedance and capacitive reactance improves the resistance to adhesion of materials.
◆ Strong adaptability	Service temperature range of probe: -100°C~500°C
◆ Span	The minimum span can reach 10cm. The maximum span can reach 2200cm
◆ High stability	Stable and reliable output and resistance to fly ash, blanking, moisture and crystallization
◆ Maintenance free	No moving parts or quick-wear parts and no need for frequent cleaning, maintenance and debugging

4. Technical parameters

4.1. Power

- Power supply: 14V~35V DC (standard)
- Maximum allowable ripple of power supply: < 100Hz Uss<1V
  100Hz~10kHz Uss<10mV
- Power consumption: 770mW(Max.)
- Load capacity:



4.2. Input

- Measurement variable: continuously measure the capacitance between probe rod and tank wall or grounding pipe.
- Measuring range: 0pF~47000pF
- Frequency: 100kHz

4.3. Output

- Current output: 4mA~20mA DC/20mA~4mA DC
- Minimum current: 3.5mA
- Maximum current: 22mA
- Delay: 0s~99s
- Startup stability time: 1.5s
- Measurement response time: <0.5s
- HART communication: optional

4.4. Accuracy and stability

- Linearity: 0.5%
- Repeatability: 0.1%
- Temperature drift: <0.01%/°C (within full span)

4.5. Housing protection

- Housing protection level: IP67

4.6. Safety certificate

- PCEC: Intrinsic safety type Ex ia IIC T6 Ga
- PCEC: Flameproof type Ex db IIC T6 Gb

4.7. Environment

- Ambient temperature: -40°C~70°C
- Storage temperature: -20°C~65°C
- Ambient humidity: <90%

5. Scope of application

- ◆ Power plant — Coal pile, raw coal bunker, fuel bunker, reservoir, waste gas purification tank, bunker pump, ash storage, fuel tank, etc.
- ◆ Chemical — Crude oil distillation tower, raw material and intermediate silo, reaction tank, ammonia tank, toxic liquid tanks, solid tank, separator, etc.
- ◆ Petrochemical industry — Oil pipeline, distillation tower, concentration tank, liquefied gas tank, ammonia tank, steam drum, oil depot in oil refinery, electrodeionization interface, asphalt tank, etc.
- ◆ Water and water treatment — Water tank, sewage pool, water treatment tank, clarifier, digestion tower, gas pipeline, deep well, drinking water network, etc.
- ◆ Cement — Stone silo, raw material silo, cement silo, pulverized coal bunker, slag storage silo, etc.
- ◆ Metallurgical industry — Ore bin, ore crusher, raw material bin, auxiliary material bin, blast furnace, alumina powder bin, electrolytic cell buffer tank, etc.
- ◆ Oil field — Crude oil or refined oil tank, three-phase separator, settling tank, sewage tank (pool), oil-water interface, drilling mud tank, etc.
- ◆ Papermaking — Raw material bin, storage tower, drying drum, etc.
- ◆ Others — Quarry, food, pharmaceutical, environmental protection, shipbuilding industries

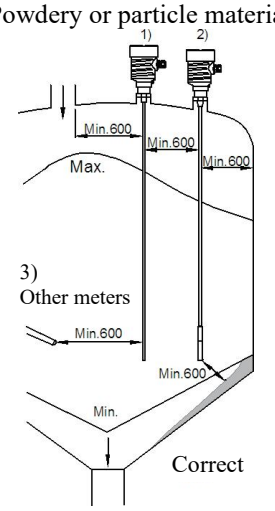
6. Parameters

Probe	Insulating rod type	Insulating cable type	Cable type
Process seal	PTFE/FEP	PTFE+PVDF	PTFE
Probe diameter	Ø12mm insulating rod type	Ø8mm insulating cable type	Ø8mm cable type
Process pressure	-0.1MPa~4.0MPa	-0.1MPa~4.0MPa	-0.1MPa~6.3MPa
Process temperature	-100°C~260°C	-40°C~150°C	-100°C~260°C
Probe length	0.1m~4m(3.94"~157.5")	0.1m~22m(3.94"~866.1")	0.1m~22m(3.94"~866.1")
Maximum tensile resistance of cable type	10kN	5kN	30kN

Probe	Insulating double-rod type	High-temperature cable type	Coaxial insulating rod type
Process seal	FEP	Mica	PTFE
Probe diameter	Ø12 mm double-insulating rod	Ø8mm cable type	Ø38 mm coaxial insulating rod
Process pressure	-0.1MPa~2.5MPa	-0.1MPa~1.6MPa	-0.1MPa~6.3MPa
Process temperature	-100°C~200°C	-50°C~500°C	-100°C~260°C
Probe length	0.1m~4m(3.94"~157.5")	0.1m~22m(3.94"~866.1")	0.1~2.5m(3.94"~98.4")
Maximum tensile resistance of cable type		30kN	

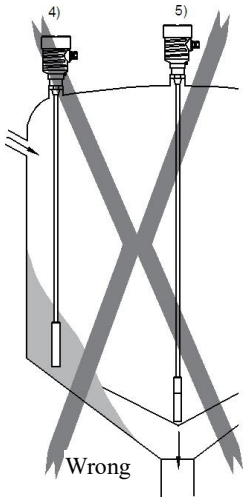
7. Installation requirements of probe

Powdery or particle materials are taken as examples.



Remarks:

- There should be enough spacing between the meter probe and other probes, which is recommended to be greater than 600 mm. See Fig.1), Fig.2) and Fig.3).
- There should be enough distance between the meter probe and the feed inlet. It is recommended to be greater than 600 mm. See Fig.1).
- It is necessary to ensure that there is enough distance between the silo wall and the materials adhered to the wall. It is recommended to be greater than 600 mm. See Fig.2)

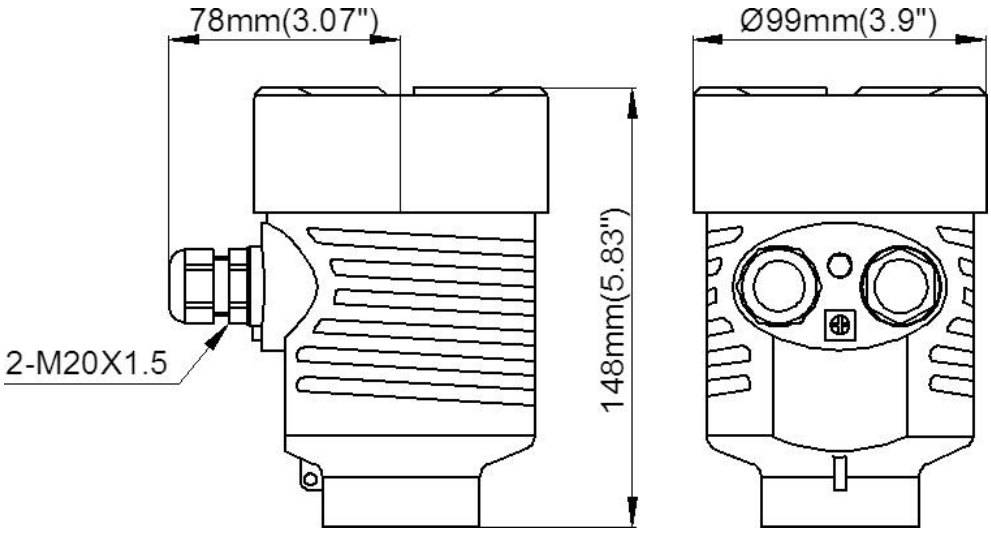


Remarks:

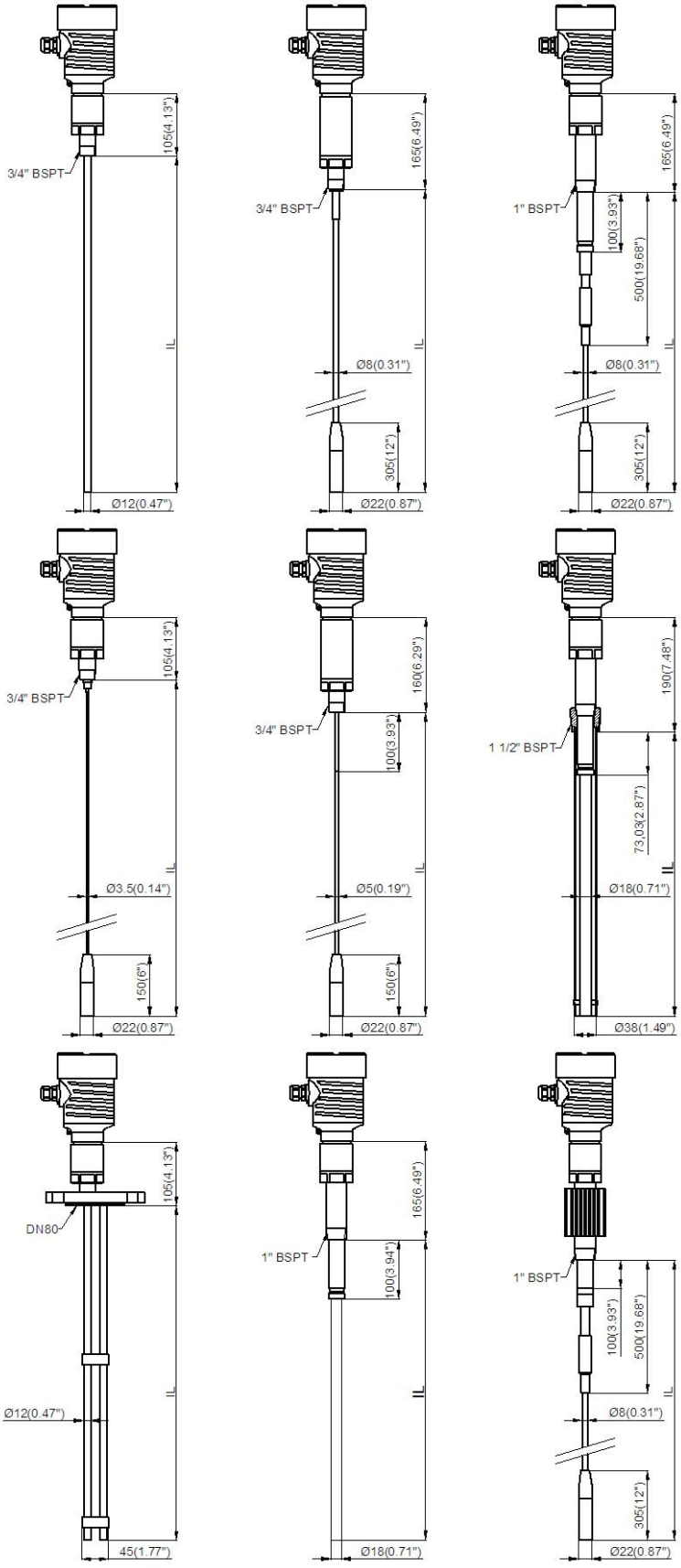
- The lowest end of the probe should enter the conical range of the conical discharge port.
- See Fig.5), if it is installed like this, the tensile force generated in this position is likely to damage the probe or the tank roof.
- The probe should not come into contact with the tank bottom or the material adhered to the tank bottom.
- As shown in 4) of the figure, the long probe in the figure must be shortened, otherwise the meter will always give an alarm.
- Ensure that there is enough distance between the probe and tank wall as well as the materials adhered to the tank wall.
- As shown in 4) of the figure, if it is too close to the tank wall, the probe will come into contact with the tank wall or material adhered to the tank wall even if slight swinging of the probe, it is likely to cause false alarm.
- The probe can't be installed at the feed port or groove and other locations where the material flows directly.
- See Fig.4), if it is installed like this, the meter may alarm falsely.

8. Structural size

8.1. Housing size



8.2. Overall size



Unit of length: mm

9. Table of MCS models

Model parameters	Specification code	Description
Product	MCS22	RF Admittance Level transmitter
Measured medium	L	Liquid
	S	Solid
Housing	S	Die casting aluminum (electrical interface M20×1.5)
	B	Die casting aluminum (electrical interface 1/2"NPT)
Power supply and output	B2	24V DC two-wire system, HART
	B4	24V DC four-wire system, HART
	U4	220V AC four-wire system, HART
Safety certificate	X	None
	I	PCEC: Intrinsic safety type Ex ia IIC T6 Ga
	D	PCEC: Flameproof type Ex db IIC T6 Gb
Material of rod probe	A	304
	B	316L
	C	316L+PFA
	D	316L+PTFE
Type of probe	C	Cable type
	P	Rod
Length of shielded pole	A	9cm (A, B only for probe material)
	B	25cm (A, B only for probe material)
	D	0 (C, D only for probe material)
Probe length	XXXX	Unit: cm, range: 0010~2200cm
Process temperature (°C)	D	-40°C~80°C
	F	-40°C~230°C
	G	-40°C~400°C
Process pressure (kgf/cm^2g)	L	-1
	A	10
	C	16
	D	20
Process connection	TA	3/4"NPT
	TN	1-1/4"NPT
	TC	G1-1/2"
	HS	304 welding seat
	HC	Carbon steel welding seat
	FB	Flange
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)
	C	ANSI

Model parameters	Specification code	Description
Flange size	E	DN50(2")
	F	DN80(3")
	G	DN100(4")
	H	DN125(5")
	J	DN150(6")
	K	DN200(8")
	M	DN250(10")
Pressure rating (kgf/cm^2) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	M	Class150
	N	Class300
Flange sealing face type	A	RF (recommended)
	B	FM
	C	M
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	Flat-thin plate flange (thickness 8 mm, only applicable to atmosphere)
Material of flange	A	304
	B	316L
	C	Carbon steel
	D	PP (thickness: 20 mm, D only for process temperature, for atmosphere only)
	E	PTFE (thickness 20mm, only applicable to atmosphere (ATM))
Companion flange (A, B and C options are inherently equipped with 304 bolt , nut, plate washer, flange gasket)	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel

- Typical model 1: MCS22LSB2XAPB1500DATA
- Typical model 2: MCS22LSB2XAPB1200DAFB-BFCAAX

HS-AW Ultrasonic Level Transmitter



1. Measuring principle

The ultrasonic probe transmits high-power acoustic pulses to the target to be measured. When the acoustic waves meet obstacles (or obvious interfaces) in transmission, part of the energy will be reflected back. The reflected signals are recognized by the probe and processed by the electronic unit, thus realizing the measurement of the spatial distance from the probe surface to the material interface. The level height can be obtained through "operating mode-level mode" in the meter.

2. Product features

- ◆ Solid and stable sensor, suitable for severe industrial working conditions;
- ◆ Built-in temperature transducer for automatic temperature compensation;
- ◆ Two-wire, three-wire and four-wire output, with relay and NPN output;
- ◆ HART, GPRS, RS485 and other optional communication methods;
- ◆ Integrated type and remote display-type (optional);

3. Application industries

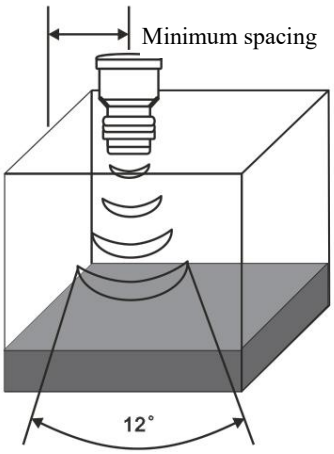
- ◆ Utility: open pipe, pump station, water tower, dike, etc.;
- ◆ Power: boiler ash powder bin, raw coal bin, fly ash bin, lime bin, etc.;
- ◆ Chemical: crude oil, light oil, chemical raw material, etc.;
- ◆ Food: winery, granary, food material can, etc.;

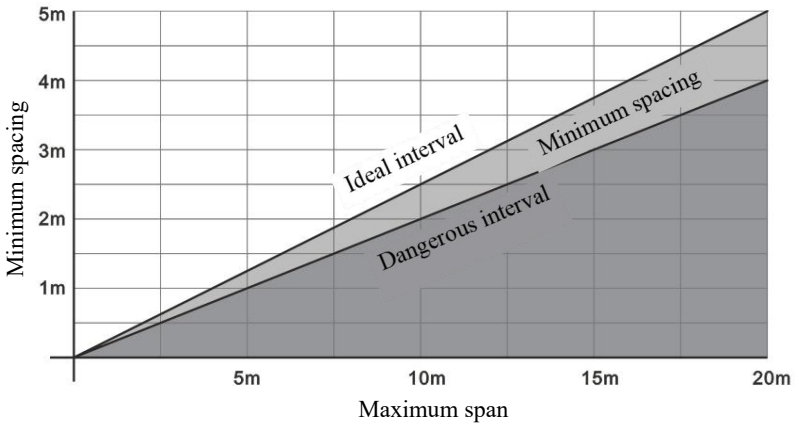
4. Technical characteristics

❖ Power supply	• 12V~28V DC; 18V~32V DC; 3.7V DC; 220V AC;
	• Built-in battery power supply; solar cell power supply.
❖ Power consumption	• <1.5W
❖ Range	• 1m~40m
❖ Frequency	• 20kHz~2000kHz
❖ Precision	• ±0.5%FS
❖ Blind zone	• <0.5m
❖ Display	• OLED
❖ Safety certificate	• SIL2
	• Intrinsic safety type Ex ia IIC T4 Ga
❖ Ambient temperature	• -20°C~60°C
❖ Process temperature	• -40°C~110°C
❖ Analog Output	• 4mA~20mA; 1V~5V DC; 1V~10V DC
❖ Switch output	• Relay: NPN
❖ Communication mode	• HART; RS485; 4G; GPS; NB; LORA;

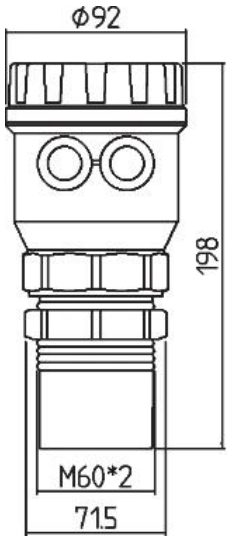
5. Installation guide

- ◆ The bottom of the probe should be extruded from the bottom of the process interface;
- ◆ To be installed on conical or spherical tank top, it should be installed 1/3 of the tank wall from the center feed inlet of the tank wall.
- ◆ If far away from the feed inlet, the probe should be installed at a position where there is no obstacle between the transmitting surface of the probe and the medium to be measured;
- ◆ Installation of the probe should ensure that the acoustic channel and the container wall are kept within the "ideal spacing" shown in the figure below. If the installation distance is smaller than the ideal spacing, the probe should be installed within the area of "min. spacing". If the installation distance is below the "min. spacing" line, the transmitter might be unable to measure the target correctly.





6. Structural size



Note: corresponding relation between blank zone and span

Blank zone (mm)	Span (m)
60	Span 1m
100	Span 1m for remote display-type
150	Span 2m
200	Span 2m for remote display-type
250	Span 3m
300	Span 5m, span 3m for remote display-type
400	Span 5m
500	Span 10m is recommended, and span 5m for remote display-type
600	Span 15m, and span 10m for remote display-type
800	Span 15m for remote display-type
1000	Span 20m, and span 20m for remote display-type
1500	Span 30m, and span 30m for remote display-type
2000	Span 40m, and span 40m for remote display-type

7. Table of HS-AW model

Model parameters	Specification code	Description
Product	HS-AW	Ultrasonic Level transmitter
Measured medium	L	Liquid/slurry (for span exceeding 15 m, G3-1/2 thread is used for process connection)
	S	Solid (for span exceeding 5 m, G3-1/2 thread is used for process connection)
Max. span (m)	XX	Rang 00m~40m, progressive increase 1m, E.g.: 5m for 05
Signal strength	R	Conventional
	E	Enhanced
	F	Anti-sweat
Housing/cable inlet	A	Die casting Al (2×M20×1.5)
	B	Die casting Al (2×1/2"NPT)
	C	Plastic ABS (2×M20×1.5) (recommended)
	G	Die casting Al (4×M20×1.5) (remote display-type)
	H	Die casting Al (4×1/2"NPT) (remote display-type)
	J	Plastic ABS (5×M16×1.5) (remote display-type)
Power supply	B	12V~28V DC
	C	18V~32V DC (recommended)
	D	3.7V DC
	U	220V AC
	E	Built-in battery power supply
	F	Solar cell power supply
Output of analog quantity	2	4mA~20mA two-wire system (recommended)
	3	4mA~20mA three-wire system
	4	4mA~20mA four-wire system
	5	1V~5V DC three-wire system
	6	1V~10V DC three-wire system
Switch output	X	None
	K	One-way SPST relay, with 2 optional channels
	L	Tow-way SPST relay (supplied with remote display-type), with 4 optional channels
	M	One-way NPN
	N	Two-way NPN
	P	Three-way NPN
Communication mode	X	None
	H	HART protocol
	R	RS485
	G	4G
	P	GPS satellite positioning
	N	NB
	L	LORA
	J	HART+RS485
	K	HART+4G
	S	RS485+4G
	Q	NB+RS485
	M	LORA+RS485

Model parameters	Specification code	Description
Safety certificate	X	No requirement
	I	Intrinsic safety type Ex ia IIC T4 Ga
Degree of protection	A	IP60 (applicable to remote display-type)
	B	IP65 (recommended)
	C	IP67
	D	IP68
Probe cable length (m)	00	Integrated type
	XX	Remote display-type (standard configuration:10m)
Material of probe housing	S	ABS
	P	PP (recommended)
	F	PVDF
	E	PTFE
	A	304
	B	316
Process temperature	C	-20°C~45°C (recommended)
	D	-40°C~70°C
	E	-40°C~110°C
Process pressure (kgf/cm²g)	L	-0.7
	M	1 (recommended)
	A	3
	B	10
Process connection	A	G1-1/2"A (range 2m~5m)
	B	G2"A (range 5m~15m) (recommended)
	C	G3-1/2"A (range 15m~40m)
	D	M30×1.5 (range 1m~2m)
	E	M60×2 (range 5m~15m)
	F	Flange (see the table for type selection of flange)
	G	Bracket (stainless steel)
	H	2"NPT (range 0m~15m)
	I	M65×2 (range 0m~10m)
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)
Flange size	E	DN50(2")
	C	DN65(2.5")
	F	DN80(3")
	G	DN100(4")
	H	DN125(5")
	J	DN150(6")
	K	DN200(8")
	M	DN250(10")

Model parameters	Specification code	Description
Pressure rating (kgf/cm²) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	M	Class150
	N	Class300
Flange sealing face type	A	RF (recommended)
	B	FM
	C	M
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	Flat-thin plate flange (8 mm thick, M only for process pressure limited)
Material of flange	A	304
	B	316L
	C	Carbon steel
	D	PP (for atmosphere only, 10mm for those within DN100, and 15mm for those above DN100)
	E	PTFE (for atmosphere only, 10mm for those within DN100, and 15mm for those above DN100)
Companion flange (A, B and C options are inherently equipped with 304 bolt , nut, plate washer, flange gasket)	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel

- Typical model 1: HS-AWL13RJU4LXXA10PCME
- Typical model 2: HS-AWL05RCC2XXXB00PCMF-BFCADX

MB Magnetic Flip Level Gauge



1. Working principle

MB magnetic flip level gauge is designed with the theory of communicating vessels. It is connected with the container through the gas phase and liquid connection flange. According to the principles of buoyancy and magnetic coupling, the magnetic float in the measuring cylinder (i.e. the connector) drives the double-color magnetic flip panel on the external display of the measuring cylinder to turn over with the rise (fall) of the measured liquid level. When the liquid level rises, the magnetic float drives the flip column to rotate by 180 degrees, displaying red or green; when the liquid level drops, the magnetic float drives the flip column to rotate by 180 degrees in reverse, displaying white. The height of the red strip (or green strip) is the height of the measured liquid level, achieving the target of measuring and displaying the measured liquid level.

Each magnetic flip panel has a two-color axial symmetrical structure. The spacing between the two magnetic flip panels is 10mm, indicating the gas phase part and the liquid phase part with white and red (green), respectively. The junction of red (or green) and white is the boundary of the liquid phase and the gas phase. This level gauge can measure both the liquid level and the interface of two media of different density;

2. Scope of application

MB magnetic flip level gauge can be widely used for measuring and displaying the liquid level and interface of two different mediums compatible with 304, 321, 316L, 304+PTFE, PVC, PP and other materials for liquid storage tank, liquid ammonia storage tank, storage reservoir, reaction tank, fermentation tank, liquid ammonia storage separator, boiler steam drum, deaerator, drain tank, return tank, high and low pressure heater, condenser, evaporator and other pressure vessels in industries such as petroleum, chemical industry, oil field, medicine, food and wine industry, etc. There are several installation forms for installation to adapt for requirements of different occasions and environments.

MB magnetic flip level gauge can be used to reliably measure the liquid level of high temperature, low temperature, high pressure, strong corrosion, highly toxic, dangerous environment.

3. Product features

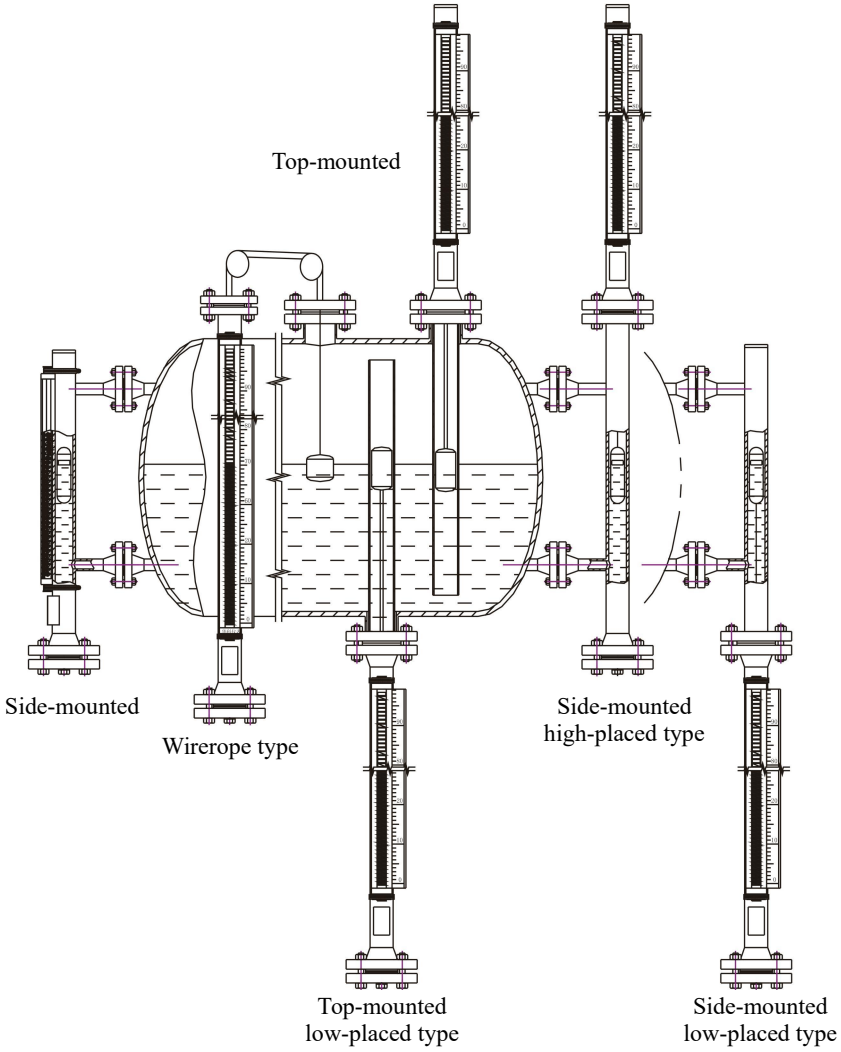
Parts of MB flip column level gauge are made of 304, 321, 316L, 1Cr18Ni9Ti, 00Cr17Ni14Mo2, 0Cr18Ni9, 304 or 0Cr18Ni9 lined PTFE (polytetrafluoroethylene), PVC, PP and other material as well as imported high quality electronic elements. The product has high reliability, good stability, long durability and strong corrosion resistance. Its features are very distinctive:

- ◆ It has the advantages of simple structure, firmness, reliability and durability. Almost no maintenance is required. It can be installed and used outdoors for a long time;
- ◆ The measured medium is completely isolated from the display part, liquid level transmitter and magnetic level controller;
- ◆ Its operating pressure range is wide, and the pressure resistance is from vacuum to 42 MPa;
- ◆ Range of operating temperature, applicable to -190°C-425°C;
- ◆ No influence by the physical and chemical state of the measured medium. Such as: Influence of medium

conductivity, dielectric constant, foam, pressure, temperature, evaporation, boiling, bubble, etc.; It is widely used to measure various strong and weak corrosive, flammable, explosive, toxic, highly radioactive, agitated, muddy liquid surfaces and interfaces.

- ◆ Single-pole single-throw (SPST) and single-pole double-throw (SPDT) passive bistable magnetic level controllers can be selected to realize high and low liquid level, interface control or alarm. The number of magnetic level controllers is not limited.
- ◆ Reed pipe level transmitter or capacitance level sensor, magnetostrictive level transmitter and two-wire 4mA-20mA (or with HART protocol) output signal can be selected to realize remote centralized measurement and control.
- ◆ The two-wire liquid level transmitter can be provided with LED digital display to be convenient for observation at night.

4. Schematic diagram for installation

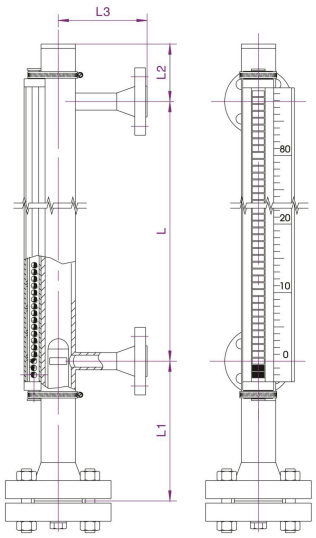
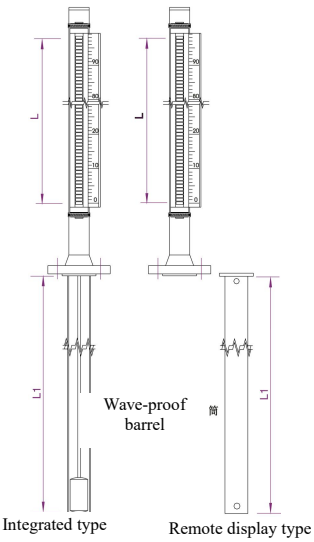


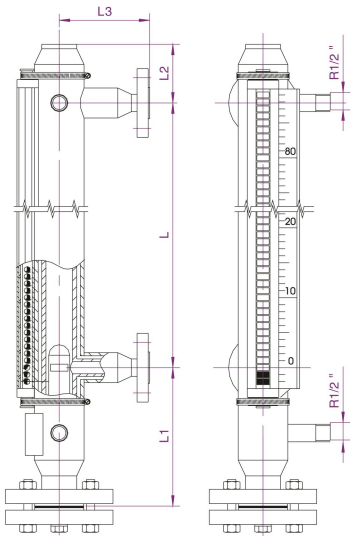
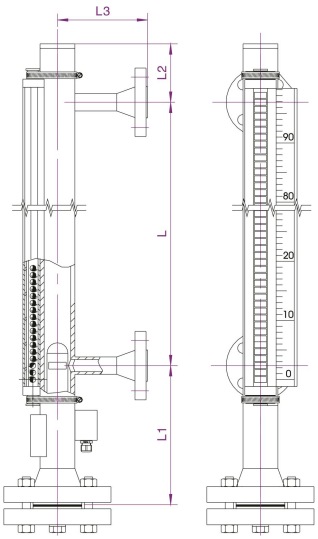
5. Additional functions

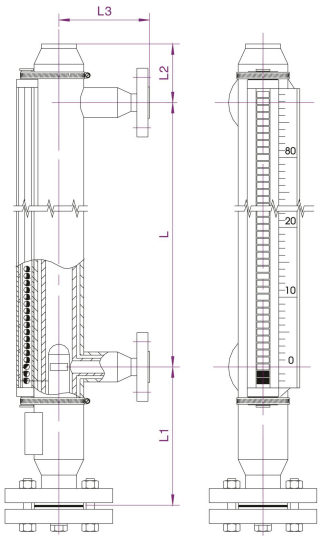
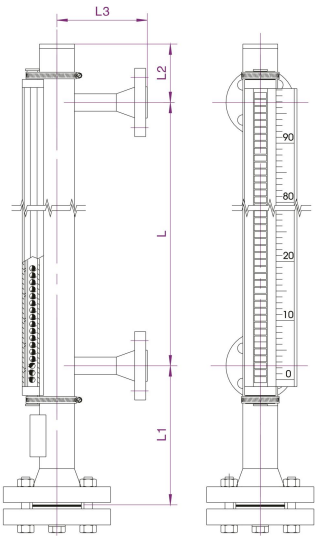
To meet the needs of different occasions, environments and functions, the MB magnetic flip level gauge can be supplied with the following options:

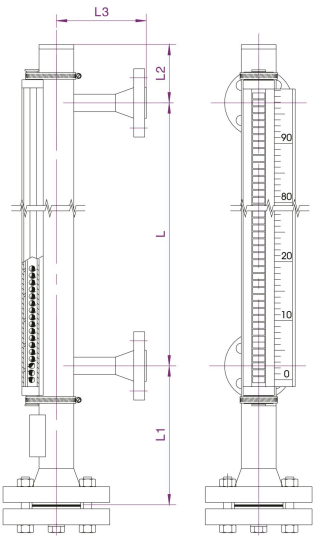
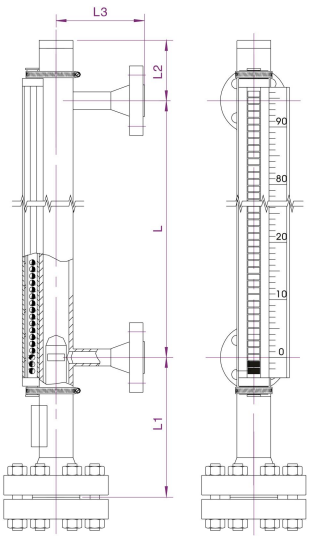
- ◆ Single-pole single-throw (SPST) and single-pole double-throw (SPDT) passive bistable magnetic level controllers can be selected to realize high and low liquid level, interface control or alarm. The number of magnetic level controllers are not limited.
- ◆ Two-wire magnetic level transmitter and 4mA~20mA output signal might be provided to achieve remote measurement and control.
- ◆ Two-wire magnetostrictive or capacitance transmitter and 4mA~20mA output can be selected to realize high precision and continuous measurement and control.
- ◆ Output 4mA~20mA, HART protocol might be supplied

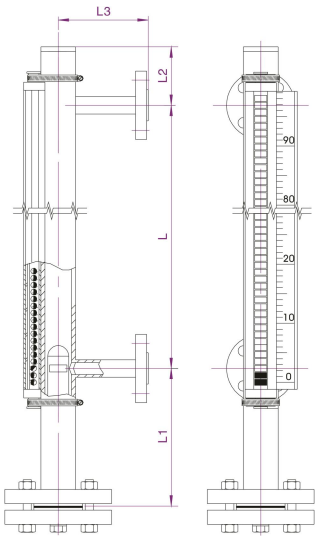
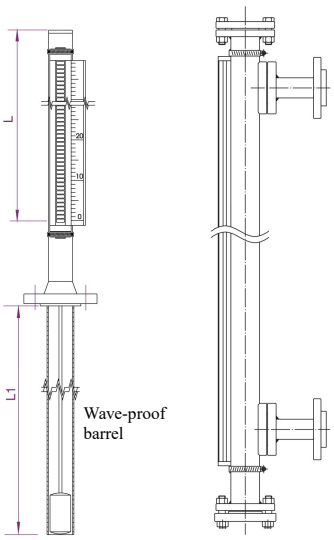
6. Technical characteristics

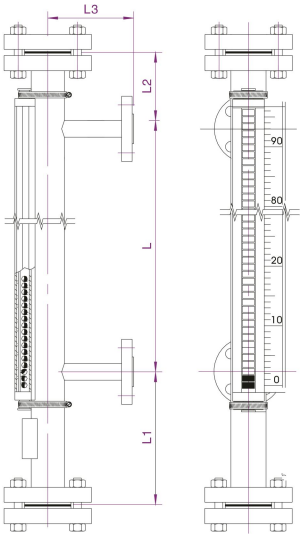
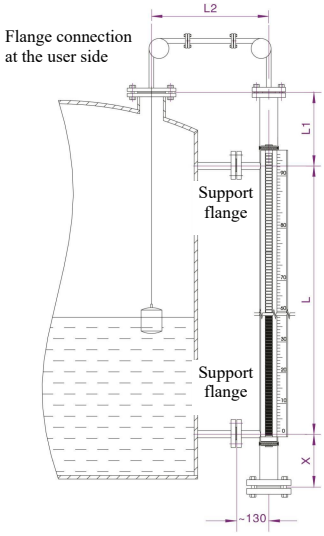
Structure type	Side-mounted basic type		Top-mounted basic type
Instrument dimension			
	L: center distance for installation L1: float length+10 L2: ~100 L3: ~120		L: measurement range L1: insertion depth
Center distance for installation	150mm~6,000mm (negotiable for longer than 6m)		150mm~6,000mm (negotiable for longer than 6m)
Medium density	Greater than 0.5g/cm³		Greater than 0.5g/cm³
Nominal pressure	PN2.5~PN40(×0.1MPa) segmented selection (ordinary basic type)	PN63~PN420(×0.1 MPa) segmented selection (high pressure basic type)	PN2.5~PN160 (×0.1MPa) segmented selection
Material of level gauge	304, 316L, 321, titanium alloy and so on		304, 316L, 321, titanium alloy and so on
Working temperature	-190°C~425°C		-190°C~425°C
Ambient temperature	Normal temperature working conditions-40°C~80°C, low-temperature working conditions -60°C~80°C (see the Explosion Protection Certificate for ambient temperature of explosion-proof products)		
Form of installation interface	DN20/RF flat welding flanges are adopted by default.		DN80/RF~DN250/RF flat welding flanges might be selected
Top structure of main pipe	Weld caps are supplied by default (see the attached figure for structure)		Weld caps are supplied by default (see the attached figure for structure)
Bottom structure of main pipe	Flange caps are supplied by default (see the attached figure for structure)		——
Dimension of wave-proof barrel	——		If the outer diameter is less than the flange size, a certain height should be reserved at the bottom of L1 and the container, so as to prevent silting up.
Magnetic flip panel display	Type A: Aluminum alloy, high-strength plastic flip panel Type C: 316L sheath, PC pipe+magnetic flip panel Type D: 316L sheath, glass pipe+magnetic flip panel Type E/F: Aluminum alloy, LED display G/H 316L sheath, LED display		Type A: Aluminum alloy, high-strength plastic flip panel Type C: 316L sheath, PC pipe+magnetic flip panel Type D: 316L sheath, glass pipe+magnetic flip panel Type E/F: Aluminum alloy, LED display G/H 316L sheath, LED display
Degree of protection	IP65		IP65
Options of auxiliary functional piece	Can be used with MB-CB level transmitter (refer to 14.MB-CB level transmitter) or MB-HB magnetic level controller (refer to 18. MB-HB magnetic level controller)		

Structure type	Side-mounted and top-mounted steam tracing type	Side-mounted and top-mounted electrical tracing types
Instrument dimension		
	L: center distance for installation L1: float length+10 L2: ~100 L3: ~120	L: center distance for installation L1: float length+10 L2: ~100 L3: ~120
Center distance for installation	150mm~6,000mm (negotiable for longer than 6m)	150mm~6,000mm (negotiable for longer than 6m)
Medium density	Greater than 0.5g/cm³	Greater than 0.5g/cm³
Nominal pressure	PN6~PN320(×0.1MPa) segmented selection	PN6~PN320(×0.1MPa) segmented selection
Material of level gauge	304, 316L, 321, titanium alloy and so on	304, 316L, 321, titanium alloy and so on
Working temperature	-190°C~425°C	-190°C~425°C
Ambient temperature	Normal temperature working conditions-40°C~80°C, low-temperature working conditions -60°C~80°C (see the Explosion Protection Certificate for ambient temperature of explosion-proof products)	
Form of installation interface	For side-mounted, DN20/RF flat welding flanges are adopted by default; for top-mounted, DN80/RF flat welding flanges are adopted by default.	
Top structure of main pipe	Weld caps are supplied by default (see the attached figure for structure)	Weld caps are supplied by default (see the attached figure for structure)
Bottom structure of main pipe	Flange caps are supplied by default (see the attached figure for structure)	Flange caps are supplied by default (see the attached figure for structure)
Heating parameters	Tracing steam pressure ≤0.6 MPa (it should be indicated in case of >0.6 MPa); R1/2“ male thread, or specified by the user	The user should indicate the working power supply, the lowest ambient temperature, the insulation temperature of the heater and whether it is flameproof or not.
Magnetic flip panel display	Type A: Aluminum alloy, high-strength plastic flip panel Type C: 316L sheath, PC pipe+magnetic flip panel Type D: 316L sheath, glass pipe+magnetic flip panel Type E/F: Aluminum alloy, LED display G/H 316L sheath, LED display	Type A: Aluminum alloy, high-strength plastic flip panel Type C: 316L sheath, PC pipe+magnetic flip panel Type D: 316L sheath, glass pipe+magnetic flip panel Type E/F: Aluminum alloy, LED display G/H 316L sheath, LED display
Degree of protection	IP65	IP65
Options of auxiliary functional piece	Can be used with MB-CB level transmitter (refer to 14.MB-CB level transmitter) or MB-HB magnetic level controller (refer to 18. MB-HB magnetic level controller)	

Structure type	Side-mounted and top-mounted frost prevention types	Special type for liquefied gas
Instrument dimension		
	L: center distance for installation L1: float length+10 L2: ~100 L3: ~120	L: center distance for installation L1: float length+10 L2: ~100 L3: ~120
Center distance for installation	150mm~6,000mm (negotiable for longer than 6m)	150mm~6,000mm (negotiable for longer than 6m)
Medium density	Greater than 0.5g/cm³	Greater than 0.5g/cm³
Nominal pressure	PN6~PN320(×0.1MPa) segmented selection	PN6~PN63(×0.1MPa) segmented selection
Material of level gauge	304, 316L, 321, titanium alloy and so on	304, 316L, 321, titanium alloy and so on
Working temperature	-190°C~425°C	<80°C
Ambient temperature	Normal temperature working conditions-40°C~80°C, low-temperature working conditions -60°C~80°C (see the Explosion Protection Certificate for ambient temperature of explosion-proof products)	
Form of installation interface	For side-mounted, DN20/RF flat welding flanges are adopted by default For top-mounted, DN80/RF flat welding flanges are adopted by default	For side-mounted, DN20/RF flat welding flanges are adopted by default
Top structure of main pipe	Weld caps are supplied by default (see the attached figure for structure)	Weld caps are supplied by default (see the attached figure for structure)
Bottom structure of main pipe	Flange caps are supplied by default (see the attached figure for structure)	Flange caps are supplied by default (see the attached figure for structure)
Magnetic flip panel display	Type A: Aluminum alloy, high-strength plastic flip panel Type C: 316L sheath, PC pipe+magnetic flip panel Type D: 316L sheath, glass pipe+magnetic flip panel Type E/F: Aluminum alloy, LED display G/H 316L sheath, LED display	Type A: Aluminum alloy, high-strength plastic flip panel Type C: 316L sheath, PC pipe+magnetic flip panel Type D: 316L sheath, glass pipe+magnetic flip panel Type E/F: Aluminum alloy, LED display G/H 316L sheath, LED display
Degree of protection	IP65	IP65
Options of auxiliary functional piece	Can be used with MB-CB level transmitter (refer to 14.MB-CB level transmitter) or MB-HB magnetic level controller (refer to 18. MB-HB magnetic level controller)	

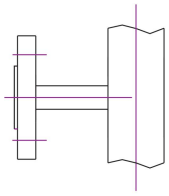
Structure type	Special type for liquid ammonia tank and ammonia separator	Special type for boiler drum and HPs
Instrument dimension		
	L: center distance for installation L1: float length+10 L2: ~100 L3: ~120	L: center distance for installation L1: float length+10 L2: ~100 L3: ~120
Center distance for installation	150mm~6,000mm (negotiable for longer than 6m)	150mm~6,000mm (negotiable for longer than 6m)
Medium density	Greater than 0.5g/cm³	Greater than 0.5g/cm³
Nominal pressure	PN16~PN320(×0.1MPa) segmented selection	PN20~PN250(×0.1 MPa) segmented selection
Material of level gauge	304, 316L, 321, titanium alloy and so on	304, 316L, 321, titanium alloy and so on
Working temperature	≤80°C	-190°C~425°C
Ambient temperature	Normal temperature working conditions-40°C~80°C, low-temperature working conditions -60°C~80°C (see the Explosion Protection Certificate for ambient temperature of explosion-proof products)	
Form of installation interface	For side-mounted, DN20/RF flat welding flanges are adopted by default	For side-mounted, DN20/RF flat welding flanges are adopted by default
Top structure of main pipe	Weld caps are supplied by default (see the attached figure for structure)	Weld caps are supplied by default (see the attached figure for structure)
Bottom structure of main pipe	Flange caps are supplied by default (see the attached figure for structure)	Flange caps are supplied by default (see the attached figure for structure)
Magnetic flip panel display	Type A: Aluminum alloy, high-strength plastic flip panel Type C: 316L sheath, PC pipe+magnetic flip panel Type D: 316L sheath, glass pipe+magnetic flip panel Type E/F: Aluminum alloy, LED display G/H 316L sheath, LED display	Type A: Aluminum alloy, high-strength plastic flip panel Type C: 316L sheath, PC pipe+magnetic flip panel Type D: 316L sheath, glass pipe+magnetic flip panel Type E/F: Aluminum alloy, LED display G/H 316L sheath, LED display
Degree of protection	IP65	IP65
Options of auxiliary functional piece	Can be used with MB-CB level transmitter (refer to 14.MB-CB level transmitter) or MB-HB magnetic level controller (refer to 18. MB-HB magnetic level controller)	

Structure type	Anti-corrosion polypropylene (PP)	Anti-corrosion type, side-mounted and top-mounted type 304 lined PTFE
Instrument dimension		
	L: center distance for installation L1: float length+10 L2: ~100 L3: ~120	L: center distance for installation L1: float length+10 L2: ~100 L3: ~120
Center distance for installation	150mm~6,000mm (negotiable for longer than 6m)	150mm~6,000mm (negotiable for longer than 6m)
Medium density	Greater than 0.5g/cm³	Greater than 0.5g/cm³
Nominal pressure	PP: PN2.5~PN16(×0.1 MPa) segmented selection	PN2.5~PN40(×0.1MPa) segmented selection
Material of level gauge	PP	304 or 0Cr18Ni9 lined polytetrafluoroethylene (PTFE)
Working temperature	PP: ≤80°C (up to 100°C at normal pressure)	-20°C~180°C
Ambient temperature	Normal temperature working conditions-40°C~80°C, low-temperature working conditions -60°C~80°C (see the Explosion Protection Certificate for ambient temperature of explosion-proof products)	
Form of installation interface	For side-mounted, DN20/RF flat welding flanges are adopted by default	For side-mounted, DN20/RF flat welding flanges are adopted by default
Top structure of main pipe	Weld caps are supplied by default (see the attached figure for structure)	Weld caps are supplied by default (see the attached figure for structure) (please otherwise specify if PTFE valves are required)
Bottom structure of main pipe	Flange caps are supplied by default (see the attached figure for structure)	Flange caps are supplied by default (see the attached figure for structure) (please otherwise specify if PTFE valves are required)
Magnetic flip panel display	Type A: Aluminum alloy, high-strength plastic flip panel Type C: 316L sheath, PC pipe+magnetic flip panel Type D: 316L sheath, glass pipe+magnetic flip panel Type E/F: Aluminum alloy, LED display G/H 316L sheath, LED display	Type A: Aluminum alloy, high-strength plastic flip panel Type C: 316L sheath, PC pipe+magnetic flip panel Type D: 316L sheath, glass pipe+magnetic flip panel Type E/F: Aluminum alloy, LED display G/H 316L sheath, LED display
Degree of protection	IP65	IP65
Options of auxiliary functional piece	Can be used with MB-CB level transmitter (refer to 14.MB-CB level transmitter) or MB-HB magnetic level controller (refer to 18. MB-HB magnetic level controller)	

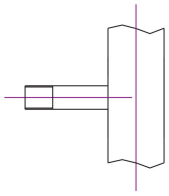
Structure type	Anti-corrosion poly(perfluoropropene) (F46)	Wirerope type
Instrument dimension		
	L: center distance for installation L1: float length+10 L2: ~100 L3: ~120	L: center distance for installation L1: float length+10 L2: ~100 L3: ~120
Center distance for installation	150mm~6,000mm (negotiable for longer than 6m)	1,000~10,000mm (negotiable for super-long center distance)
Medium density	Greater than 0.5g/cm³	Greater than 0.5g/cm³
Nominal pressure	PN2.5~PN40(×0.1MPa) segmented selection	PN2.5~PN25(×0.1MPa) segmented selection
Material of level gauge	Poly(perfluoropropene) (F46)	304, 316L, 321, titanium alloy and so on
Working temperature	-20°C~180°C	-190°C~425°C
Ambient temperature	Normal temperature working conditions-40°C~80°C, low-temperature working conditions -60°C~80°C (see the Explosion Protection Certificate for ambient temperature of explosion-proof products)	
Form of installation interface	For side-mounted, DN20/RF flat welding flanges are adopted by default	For side-mounted, DN20/RF flat welding flanges are adopted by default
Top structure of main pipe	Flange caps are supplied by default	——
Bottom structure of main pipe	Flange caps are supplied by default	Flange caps are supplied by default
Magnetic flip panel display	Type A: Aluminum alloy, high-strength plastic flip panel Type C: 316L sheath, PC pipe+magnetic flip panel Type D: 316L sheath, glass pipe+magnetic flip panel Type E/F: Aluminum alloy, LED display G/H 316L sheath, LED display	Type A: Aluminum alloy, high-strength plastic flip panel Type C: 316L sheath, PC pipe+magnetic flip panel Type D: 316L sheath, glass pipe+magnetic flip panel Type E/F: Aluminum alloy, LED display G/H 316L sheath, LED display
Degree of protection	IP65	IP65
Options of auxiliary functional piece	Can be used with MB-CB level transmitter (refer to 14.MB-CB level transmitter) or MB-HB magnetic level controller (refer to 18. MB-HB magnetic level controller)	

7. Installation process interface

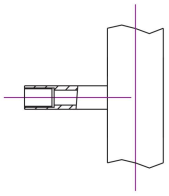
Welded flange



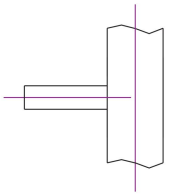
Male thread



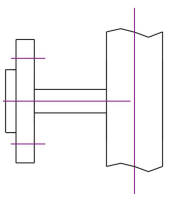
Female thread



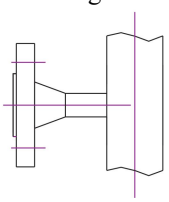
Welded pipe



Lap joint flange

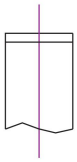


Butt welded flange

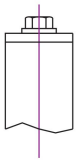


8. Top structure of main pipe

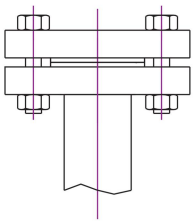
Weld cap



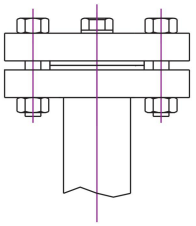
Weld cap and M14×1.5 screw plug



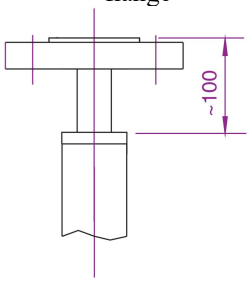
Flange



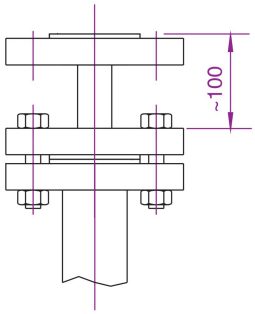
Flange and M14×1.5 screw plug



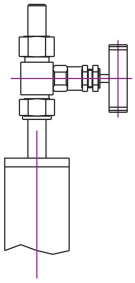
Weld cap and DN20 flange



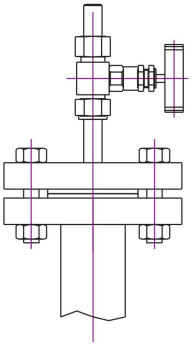
Flange with DN20 flange



Weld cap and exhaust valve

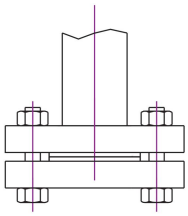


Flange with exhaust valve

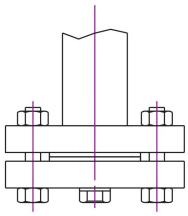


9. Bottom structure of main pipe

Flange cap

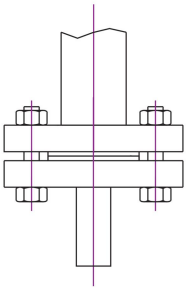


Flange with H drain plug

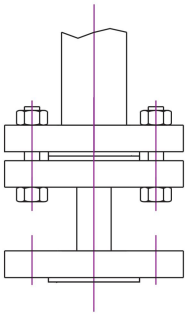


M14×1.5 drain plug

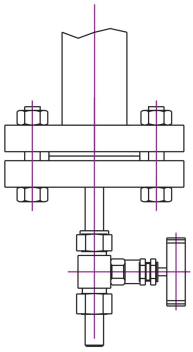
Flange with DN20 welded pipe



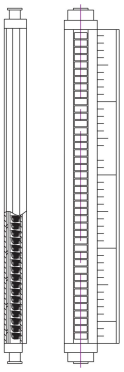
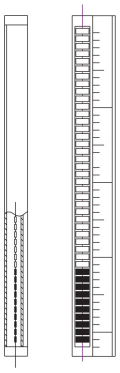
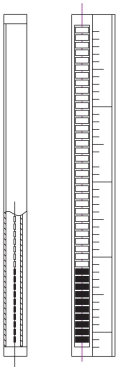
With DN20 flange

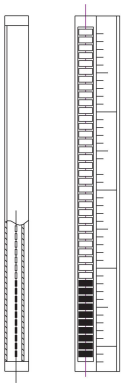
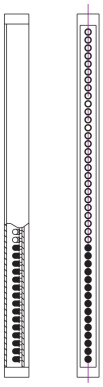
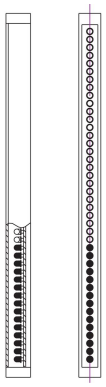


With needle type blow-down valve or ball valve



10. Technical parameters of displayer

Structure type	Aluminum alloy, high-strength plastic flip panel	Aluminum alloy, ceramic flip panel (high temperature type)	316L sheath, PC pipe+magnetic flip panel
Dimensions of flip panel			
Display rack	Anodized surface of aluminum alloy	Anodized surface of aluminum alloy	316L
Display mode	Magnetic flip column	Magnetic flip column	Magnetic flip column
Raw materials of display	Red and white high-strength engineering plastics	Red and white ceramic	Yellow and brown magnetic flip panel
Display resolution	10mm	10mm	10mm
Display hood	High-strength bullet-proof glass	Glass	High-strength PC pipe
Display scale	PET or stainless steel	Aluminum alloy or stainless steel	PET or stainless steel
Maximum working temperature	150°C	350°C	120°C
Model code of the display	A	C	D

Structure type	316L sleeve glass pipe+magnetic flip panel	Aluminum alloy, LED display		316L sheath, LED display	
Dimensions of flip panel					
Display rack	316L	316L or anodized aluminum alloy		316L or anodized aluminum alloy	
Display mode	Magnetic flip column	High brightness LED band		High brightness LED band	
Raw materials of display	Yellow and brown magnetic flip panel	Red and green LEDs		Red and green LEDs	
Display resolution	10mm	10mm		10mm	
Display hood	High borosilicate glass pipe	PC pipe		High borosilicate glass pipe	
Maximum working temperature	180°C	120°C		350°C	
Working power supply		24V DC	220V AC	24V DC	220V AC
Model code of the display	E	F	G	H	J

11. Table of MBS Model

Model parameters	Specification code	Description
Product	MBS	Side-mounted magnetic flip level gauge
Installation form	A	Side-mounted
	B	Side-mounted low-placed type
	C	Side-mounted high-placed type
Structure type	A	Basic
	B	Corrosion resistant (process pressure of PP material: PN2.5~PN16, working temperature≤80°C; process pressure of 304 lined PTFE PN2.5~PN40,working temperature -20°C~180°C; process pressure of poly (perfluoropropene): PN2.5~PN40, working temperature -20°C~180°C)
	C	Steam tracing type
	D	Electrical tracing type (lap joint flange should not be used as process flange)
	E	Frost-proof insulating type (lap joint flange should not be used as process flange)
	F	Special type for liquid ammonia (process pressure is PN16~PN320; and working temperature is <80 °C)
	G	Liquefied gas type (process pressure is PN6~PN63 and working temperature is <80 °C)
	H	Special type for boiler drum and HPs (the process pressure is PN20~PN250; medium density is greater than 0.5g/cm³; lap joint flange should not be used as process flange)
Material code (Main pipe material; the float material is consistent with that of the main pipe)	A	304
	B	316L
	C	321
	D	PP
	E	304+PTFE
Type of interface on top of main pipe	A	Weld cap
	B	Weld cap and M14×1.5 screw plug
	C	Flange
	D	Flange with M14×1.5 screw plug
	E	Weld cap and DN20 flange
	F	Flange with DN20 flange
	G	Weld cap and exhaust valve
	H	Flange with exhaust valve
Type of interface at bottom of main pipe	A	Flange cap
	B	Flange with H drain plug
	C	Flange with DN20 welded pipe
	D	With DN20 flange
	E	With needle type blow-down valve or ball valve
Span	XXXX	Center distance L, unit: mm

Model parameters	Specification code	Description
Type of flip column display	A	Aluminum alloy+high-strength plastic flip column (process temperature≤150 °C)
	C	Aluminum alloy+ceramic flip panel (process temperature≤350 °C)
	D	PVC+high-strength plastic flip column (process temperature≤120 °C)
	E	Anti-corrosion polypropylene+high-strength plastic flip column (process temperature≤180 °C)
	F	24V DC LED (120°C) (process temperature≤120°C)
	G	220V AC LED (120°C) (process temperature≤120°C)
	H	24V DC LED (350°C) (process temperature≤350°C)
	J	220V AC LED (350°C) (process temperature≤350°C)
Process temperature	D	20°C~80°C
	E	20°C~150°C
	F	20°C~250°C
	G	20°C~350°C
	H	20°C~425°C
	I	-40°C~20°C
	J	-70°C~20°C
	K	-150°C~20°C
	L	-190°C~20°C
Process pressure (kgf/cm²g)	A	2.5
	B	6.0
	C	16
	D	25
	E	40
	F	63
	G	100
	H	160
	J	220
	K	320
Process connection	A	G1/2” internal thread
	B	M20×1.5 male thread
	C	Outer diameter Ø25× (wall thickness) 3 mm welded pipe
	D	Standard flange
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)
Flange type	A	Welded flange (process pressure≤40 kgf/cm2)
	B	Lap joint flange (process pressure≤40 kgf/cm2)
	C	Butt welded flange

Model parameters	Specification code	Description
Flange size	A	DN15
	B	DN20
	C	DN25
	D	DN32
	N	DN40
	E	DN50
	F	DN80
Pressure rating (kgf/cm²) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	H	PN63
	J	PN100
	K	PN160
	M	Class150
	N	Class300
Flange sealing face type	A	RF
	B	FM
	C	M
	D	T tongue face
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	RJ ring joint face
Material of flange	A	304
	B	316L
	C	PP
	E	304＋PTFE
Companion flange	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel
Connection accessories	X	Without bolt group and flange gasket
	A	304 bolt group+flange gasket

- Typical model 1: MBSAEAAE1000CGEC
- Typical model 2: MBSAEAGE1100ADAD-BACCAAXX

12. Table of MBT Model

Model parameters	Specification code	Description
Product	MBT	Top-mounted magnetic flip level gauge
Installation form	A	Top-mounted
	B	Top-mounted low-placed type
Structure type	A	Basic type (process pressure is PN16~PN160)
	B	Anti-corrosion type (only 304 lined PTFE is allowed. The process pressure is PN2.5-PN40 and working temperature is -190°C~200°C)
	C	Steam tracing type
	D	Electrical tracing type
	E	Frost-proof insulating type
Material code	A	304
	B	316L
	C	321
	F	304+PTFE
Type of interface on top of main pipe	A	Weld cap
	B	Weld cap and M14×1.5 screw plug
	C	Flange
	D	Flange with M14×1.5 screw plug
	E	Weld cap and DN20 flange
	F	Flange with DN20 flange
	G	Weld cap and exhaust valve
	H	Flange with exhaust valve
Span	XXXX/XXXX	Center distance L,/insertion depth L1, unit mm
Type of flip column display	A	Aluminum alloy+high-strength plastic flip column (process temperature≤150 °C)
	C	Aluminum alloy+ceramic flip panel (process temperature≤350 °C)
	D	PVC+high-strength plastic flip column (process temperature≤120 °C)
	E	Anti-corrosion polypropylene+high-strength plastic flip column (process temperature≤180 °C)
	F	24V DC LED (120°C) (process temperature≤120°C)
	G	220V AC LED (120°C) (process temperature≤120°C)
	H	24V DC LED (350°C) (process temperature≤350°C)
	J	220V AC LED (350°C) (process temperature≤350°C)

Model parameters	Specification code	Description
Process temperature	D	20°C~80°C
	E	20°C~150°C
	F	20°C~250°C
	G	20°C~350°C
	H	20°C~425°C
	J	-40°C~20°C
	K	-70°C~20°C
	M	-150°C~20°C
	N	-190°C~20°C
Process pressure (kgf/cm²g)	A	2.5
	B	6.0
	C	16
	D	25
	E	40
	F	63
	G	100
	H	160
Process connection	D	Standard flange
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)
Flange size	F	DN80
	G	DN100
	H	DN125
	J	DN150
	K	DN200
	M	DN250
Pressure rating (kgf/cm²) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	H	PN63
	J	PN100
	K	PN160
	M	Class150
	N	Class300

Model parameters	Specification code	Description
Flange sealing face type	A	RF
	B	FM
	C	M
	D	T tongue face
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	RJ ring joint face
Material of flange	A	304
	B	316L
	C	321
	F	304＋PTFE
Companion flange	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel
Connection accessories	X	Without bolt group and flange gasket
	A	304 bolt group+flange gasket

- Typical model 1: MBTAAAB1800/2220ADAD-BFCAAXX
- Typical model 2: MBTABFA1550/1800ADAD-BGCAFXX

13. Table of MBG Model

Model parameters	Specification code	Description
Product	MBG	Cable-type magnetic flip level gauge
Structure type	A	Basic
Material code	A	304
	B	316L
	C	321
Type of interface at bottom of main pipe	A	Flange cap (recommended)
	B	Flange with H drain plug
	C	Flange with DN20 welded pipe
	D	With DN20 flange
	E	With needle type blow-down valve or ball valve
Span	XXXX/XXXX/XXXX	L/L1/L2, unit mm, L, L1, L2, refer to 6. Technical Characteristic
Type of flip column display	A	Aluminum alloy+high-strength plastic flip column (process temperature≤150 °C)
	C	Aluminum alloy+ceramic flip panel (process temperature≤350 °C)
	D	PVC+high-strength plastic flip column (process temperature≤120 °C)
	E	Anti-corrosion polypropylene+high-strength plastic flip column (process temperature≤180 °C)
	F	24V DC LED (process temperature≤120°C)
	G	220V AC LED (process temperature≤120°C)
	H	24V DC LED (process temperature≤350°C)
	J	220V AC LED (process temperature ≤350°C)
Process temperature	D	20°C~80°C
	E	20°C~150°C
	F	20°C~250°C
	G	20°C~350°C
	H	20°C~425°C
	J	-40°C~20°C
	K	-70°C~20°C
	M	-150°C~20°C
	N	-190°C~20°C
Process pressure (kgf/cm²g)	A	2.5
	B	6.0
	C	16
	D	25

Model parameters	Specification code	Description
Installation with support flange	A	HG/T 20592-2009/DN20/PN10/RF flat welding flange
Process connection	D	Standard flange
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)
Flange size	F	DN80
	G	DN100
	H	DN125
	J	DN150
	K	DN200
	M	DN250
Pressure rating (kgf/cm²) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	M	Class150
Flange sealing face type	A	RF
	B	FM
	C	M
	D	T tongue face
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	RJ ring joint face
Material of flange	A	304
	B	316L
Companion flange	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel
Connection accessories	X	Without bolt group and flange gasket
	A	304 bolt group+flange gasket

- Typical model 1: MBGABA9700/0500/1100ADCAD-BGBABXX
- Typical model 2: MBGABA2800/0800/1350ADAAD-BFCAAXX

14. MB-CB level transmitter

The level transmitter is divided into magnetic level transmitter, magnetostrictive level transmitter and capacitance level transmitter. The level transmitter and the magnetic flip level gauge are used together to measure and control the liquid level signal remotely and centrally.

MB-CBY series refer to magnetic level transmitter composed of imported reed pipe, precision resistor and amplified converting circuit. When the magnetic line of the magnetic float in the magnetic flip level gauge acts on the reed pipe at a position, the reed pipe closes to enable the three-wire potentiometer to output the resistance value corresponding to the liquid level. The resistance value of three-wire potentiometer is proportional to the liquid level change. The amplified converting circuit converts the level change into 4mA~20mA signal and outputs it to detect and transmit the liquid level signal.

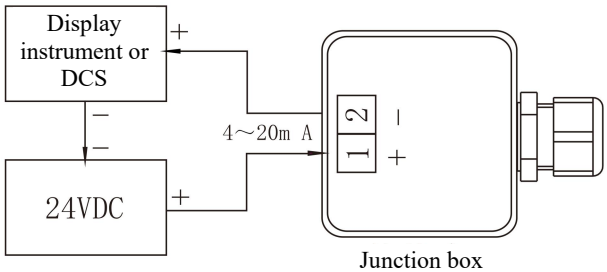
MB-CBC series refer to capacitance level transmitter, composed of measuring pole and capacitance converting circuit. The measuring pole is installed in the bypass pipe of the magnetic flip level gauge. The pole detects the liquid level change and outputs a 4mA~20mA signal proportional to the liquid level change across the capacitance converting circuit. The output signal is not affected by the float position of the magnetic flip level gauge. As long as there is liquid level, the 4mA~20mA signal corresponding to the liquid level can be outputted, further improving the reliability. In the meantime, it is featured by resistance to corrosion, high working temperature and continuous output signal.

MB-CBS series refer to magnetostrictive level transmitter. Developed based on the magnetostrictive principle, the magnetostrictive level transmitter is a new generation of level transmitter with high measurement accuracy. With stable performance, the product will not be affected by the change of gas, temperature and pressure in the tank. It can provide two-wire 4mA~20mA (with HART), ModBus and other signal outputs.

14.1. Technical parameters

MB-CBY magnetic level transmitter	MB-CBC capacitance level transmitter	MB-CBS magnetostrictive level transmitter
• Output current: 4mA~20 mA (two-wire) • Resolution: 10mm (common), 5mm • Load resistance: 500Ω (24V DC power supply and without digital display case) • Transmission distance: >1,000m • Working temperature: ≤80°C; ≤150°C (high temperature); ≤350°C (ultra-high temperature) • Ambient temperature: Normal temperature working conditions -40°C~80°C Low temperature working conditions -60°C~80°C LCD screen -30°C~80°C (see the Explosion Protection Certificate for ambient temperature of explosion-proof products) • Operating power supply: 18V~28V DC • Outer tube of transmitter: stainless steel seamless tube • Transmitter housing: die casting Al plastic-sprayed surface • Ingress protection: IP65 • Explosion-proof level: CNEX intrinsic safety type Ex ia IIC T6 Ga; CNEX flameproof type Ex d IIC T6 Gb; EAC intrinsic safety type 0Ex ia IIC T6 Ga X	• Output current: 4mA~20mA • Accuracy class: class 0.5, 1.0 and 1.5 • Load resistance: 500Ω (24V DC power supply and without digital display case) • Transmission distance: >1,000m • Working temperature: -150°C~150°C • Ambient temperature: Normal temperature working conditions -40°C~80°C Low temperature working conditions -60°C~80°C LCD screen -30°C~80°C (see the Explosion Protection Certificate for ambient temperature of explosion-proof products) • Operating pressure: -0.1MPa~32MPa • Operating power supply: 24V DC • Bypass pipe of transmitter: DN20 or DN25 • Transmitter housing: die casting Al plastic-sprayed surface • Ingress protection: IP65	• Operating power supply: 18V~30V DC • Load resistance: 500Ω (24V DC power supply and without digital display case) • Output signal: two-wire 4mA~20mA (with HART available), ModBus • Operating temperature: -40°C~85°C • Ambient temperature: Normal temperature working conditions -40°C~80°C Low temperature working conditions -60°C~80°C LCD screen -30°C~80°C (see the Explosion Protection Certificate for ambient temperature of explosion-proof products) • Non-linear error: < ±0.05% F.S • Repeatability: < ±0.02% F.S • Resolution: 16bitD/A conversion, 4μm • Material of measuring rod and meter housing: 304 • Ingress protection: electronic bin IP65, measuring rod IP68 • Explosion-proof sign: NEPSI flameproof type Ex db IIC T4 Gb EAC flameproof type 1Ex db IIC T4 Gb X

14.2. Wiring diagram of transmitter



Two-wire 4-20mADC

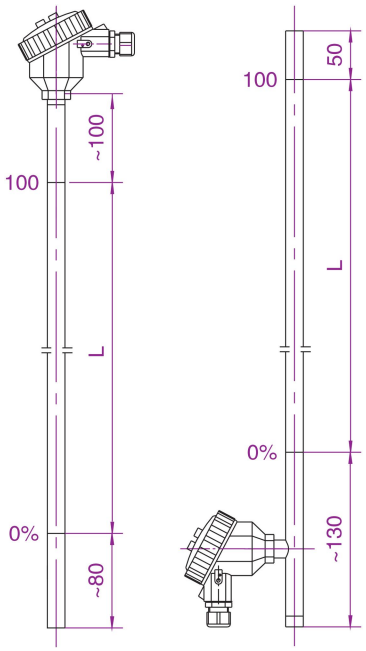
14.3. Accuracy of transmitter

$$\text{Accuracy} = \frac{\text{Resolution (mm)}}{\text{Measuring span (mm)}} \times 100\%$$

- Note: For the same resolution, the wider the measurement range is, the higher the measurement accuracy is.
- For example, when resolution is 10 mm and measurement range is 1000 mm, the measurement accuracy is 1%; when resolution is 10 mm and measurement range is 2000 mm, the measurement accuracy is 0.5%.

14.4. Outline structure of transmitter

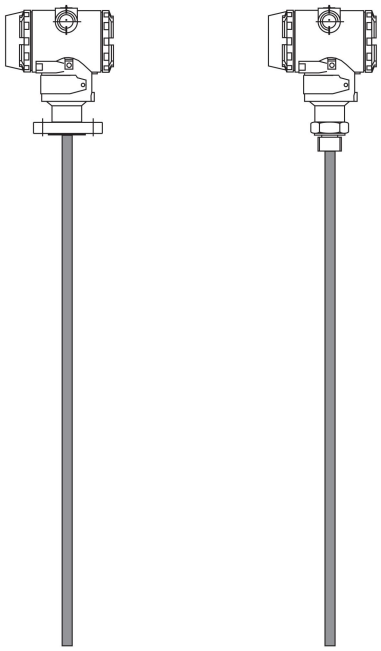
MB-CBY magnetic level transmitter



MB-CBS magnetostrictive level transmitter

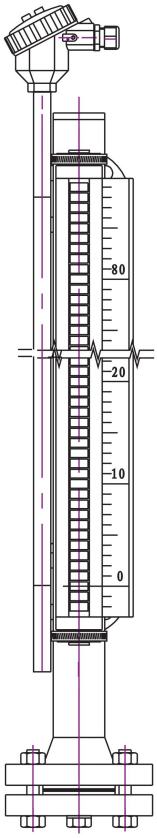


MB-CBC capacitance level transmitter

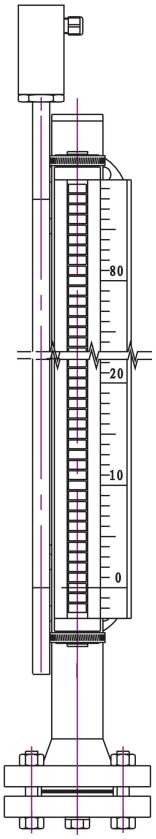


14.5. Installation mode of transmitter

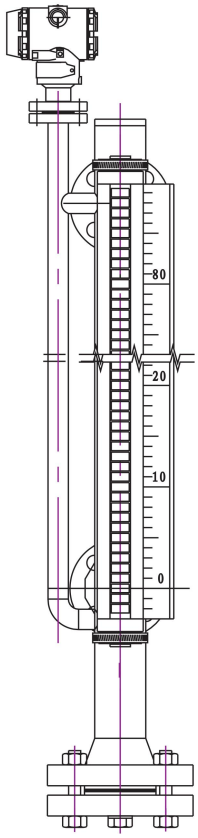
MB-CBY magnetic level transmitter



MB-CBS magnetostrictive level transmitter



MB-CBC capacitance level transmitter



15. Table of MB-CBY models

Model parameters	Specification code	Description
Product	MB-CBY	Magnetic level transmitter
Housing/cable inlet	S	Die casting Al M20×1.5
	B	Die casting Al 1/2"NPT
Resolution	A	5mm
	B	10mm
Safety certificate	X	No requirement
	I	CNEX: Intrinsic safety type Ex ia IIC T6 Ga
	O	CNEX: Flameproof type Ex d IIC T6 Gb
	E	EAC: Intrinsic safety type 0Ex ia IIC T6 Ga X
Display code	X	No display
	A	LCD display with HART protocol
	B	LED display
Measuring range	XXXX	Unit: mm, fill with a 0 in the front for those less than four digits, E.G.: 0800
Working temperature	D	-40°C~80°C
	E	-40°C~150°C

■ Typical model: MBSAAAAE1500ADAD-BCDCAAXX-CBYSBOX1500D

16. Table of MB-CBS models

Model parameters	Specification code	Description
Product	MB-CBS	Magnetostrictive level transmitter
Housing/cable inlet	S	304 housing M20×1.5
	B	304 housing 1/2"NPT
Output	A	4mA~20mA
	B	4mA~20mA (with HART)
	C	ModBus
Safety certificate	X	No requirement
	O	NEPSI: Flameproof type Ex db IIC T4 Gb
	J	EAC: Flameproof type 1Ex db IIC T4 Gb X
Display code	X	No display
	B	LED display
Measuring range	XXXX	Unit: mm, flameproof type≤1350 mm, fill with a 0 in the front for those less than four digits
Working temperature	A	-40°C~20°C
	B	20°C~85°C

■ Typical model: MBSAAAAE1500ADAD-BCDCAAXX-CBSSBOX1500B

17. Table of MB-CBC models

Model parameters	Specification code	Description
Product	MB-CBC	Capacitance level transmitter
Housing/cable inlet	S	Die casting Al M20×1.5
	B	Die casting Al 1/2"NPT
Accuracy class	A	0.5 class
	B	Class 1.0
	C	Class 1.5
Safety certificate	X	No requirement
Display code	X	No display
	A	LCD display with HART protocol
	B	LCD display
Measuring range	XXXX	Unit: mm, fill with a 0 in the front for those less than four digits, E.G.: 0800
Working temperature	D	20°C~80°C
	E	20°C~180°C
	J	-40°C~20°C
	K	-70°C~20°C
	M	-150°C~20°C

■ Typical model: MBSAAAAE1500ADAD-BCDCAAXX-CBCSBXX1500D

18. MB-HB magnetic level controller

The magnetic level controller and magnetic flip panel are used together and widely applied to alarm or automatic control of various liquid level (interface).

18.1. Measuring principle

The magnetic level controller adopts the imported high-quality reed pipe. There are two kinds of switch contact, i.e. single-pole double-throw (SPDT) and single-pole single-throw (SPST). When the magnetic float passes by the midpoint of the magnetic switch, the magnetic switch contact switches to and remains a stable state. When the magnetic float reversely passes by the midpoint of the magnetic switch, the magnetic switch contact switches to the original stable state and remains.

The two stable states of the magnetic level controller are only switched by the magnetic float. No external operating power supply is required.

18.2. Technical parameters

- Type of magnetic level controller: reed pipe
- Switch contact state: bistable state (passive)
- Switch contact type: 1 SPDT (single-pole double-throw) or 1 SPST (single-pole single-throw)
- Maximum switching voltage: 230V AC, 250V AC (resistive load)
- Maximum switching power supply: 0.5A, 1.0A, 2.0A (resistive load)
- Maximum switching power: 20W, 60W, 200W (resistive load)
- Maximum switching frequency: $\leq 1\times10^{9}$ times
- Switching error: $\leq \pm 8^{\pm 2}$ mm
- Working temperature: ≤80°C; ≤150°C; ≤350°C
- Ambient temperature: Normal temperature working conditions-40°C~80°C, low-temperature working conditions -60°C~80°C (see the Explosion Protection Certificate for ambient temperature of explosion-proof products)
- Installation method: installed by guide rail or hoop; the switching position can be adjusted
- Electrical interface: non flameproof type: provided with 0.3m outgoing line
- Flameproof type: M20×1.5 female thread or 1/2"NPT female thread
- Ingress protection: IP65
- Explosion-proof level: CNEX Flameproof type Ex db IIC T6 Gb; EAC Flameproof type 1Ex db IIC T6 Gb X

18.3. State definition

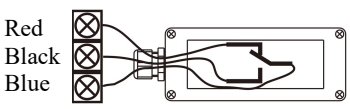
The states of switch contact in the magnetic level controller include "normally open", "normally closed" and "switching type", defined as

- Normally open type: The float closes when passing by the switch contact from above or under the normal liquid level.
- Normally closed type: The float is disconnected when passing by the switch contact from above or under the normal liquid level.
- Switching type: The state switches when the float passes by the switch contact from above or under the normal liquid level.

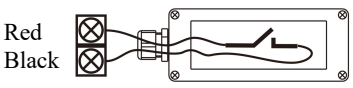
18.4. Wiring diagram of magnetic level controller

18.4.1. Non flameproof type

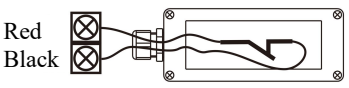
Switching type



Normally open type

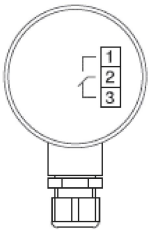


Normally closed type

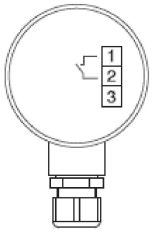


18.4.2. Explosion-proof type

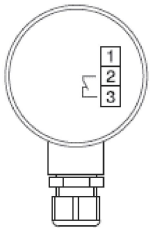
Switching type



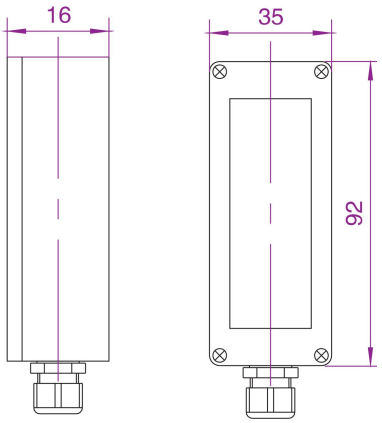
Normally open type



Normally closed type



18.5. Housing structure of liquid control

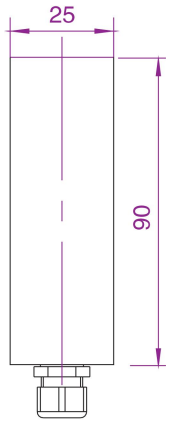


Provided with 0.3m outgoing line

Non explosion-proof die casting Al housing

For switch codes:

A, B, C, D, E, F

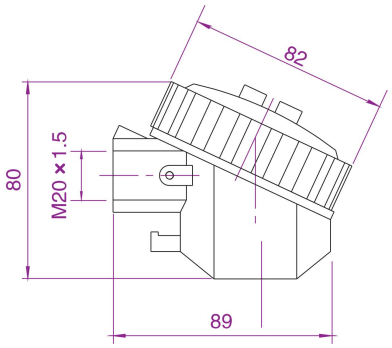


Provided with 0.3m outgoing line

Non explosion-proof 304 housing

For switch codes:

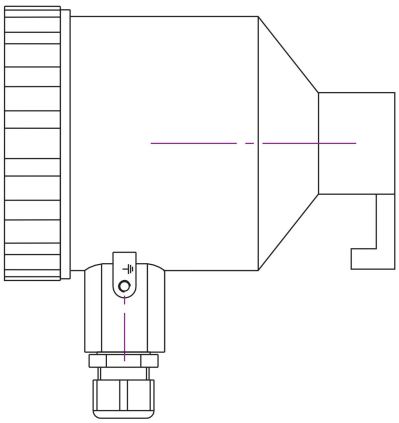
A, B, C, D, E, F



Explosion-proof type die casting Al housing

For switch codes:

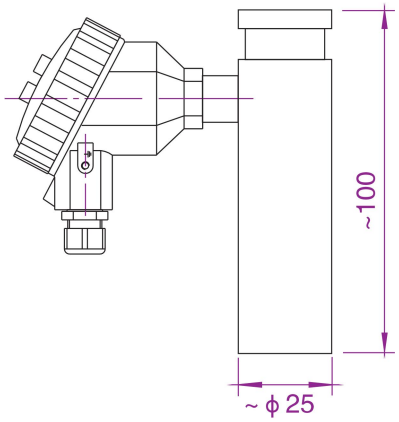
A, E, F



350°C high-temperature explosion-proof type

Die casting Al or 304 housing

For switch code: G



Explosion-proof type stainless steel housing+die casting Al junction box

For switch codes:

A, B, C, D, E, F

19. Table of MB-HB Model

Model parameters	Specification code	Description
Product	MB-HB	Magnetic level controller
Housing/cable inlet	A	Die casting Al with outgoing line 0.3m (non explosion-proof) A, B, C, D, E, F only for switch types, D, E only for ambient temperature)
	B	304 with outgoing line 0.3m (non explosion-proof) A, B, C, D, E, F only for switch types, D, E only for ambient temperature)
	C	Die casting Al M20×1.5 (explosion-proof) (A, E, F only for switch types, D, E for ambient temperature)
	D	Die casting Al 1/2"NPT (explosion-proof) (A, E, F only for switch types, D, E for ambient temperature)
	E	Die casting Al M20×1.5 (high-temperature explosion-proof) (G only for switch types G, F only for ambient temperature)
	F	Die casting Al 1/2"NPT (high-temperature explosion-proof) (G only for switch types G, F only for ambient temperature)
	G	304 housing M20×1.5 (high-temperature explosion-proof) (G only for switch types G, F only for ambient temperature)
	H	304 housing 1/2"NPT (high-temperature explosion-proof) (G only for switch types, F only for ambient temperature)
	J	Stainless steel housing+die casting Al junction box M20×1.5 (can be used for explosion proofing) (For switch types A, B, C, D, E, F; D, E only for ambient temperature)
	K	Stainless steel housing+die casting Al junction box 1/2"NPT (can be used for explosion proofing) (For switch types A, B, C, D, E, F; D, E only for ambient temperature)
Type of switches	A	Switching type (1 SPDT, 250V AC voltage, 0.5A current, 20W power)
	B	Switching type (1 SPDT, 250V AC voltage, 1.0A current, 60W power)
	C	Normally open type (1 SPST, 250V AC voltage, 20A current, 200W power)
	D	Normally closed type (1 SPST, 250V AC voltage, 20A current, 200W power)
	E	Normally open type (1 SPST, 250V AC voltage, 0.5A current, 20W power)
	F	Normally closed type (1 SPST, 250V AC voltage, 0.5A current, 20W power)
	G	Switching type (1 SPDT, 250V AC voltage, 3.0A current, 500W power)
Safety certificate	X	No requirement
	O	CNEX: Flameproof type Ex db IIC T6 Gb
	J	EAC: Flameproof type 1Ex db IIC T6 Gb X
Ambient temperature	D	≤80°C
	E	≤150°C
	F	≤350°C
Qty	XX	Unit: no, fill with a 0 in the front for those less than two digits, E.G.: 02

- Typical model 1: MBSAAAAE1500ADAD-BCDCAAXX-HBJBOD02
- Typical model 2: MBSAAAAE1500ADAD-BCDCAAXX-CBYSBOX1500D-HBJBOD02

MBQ Magnetic Float Gauge



1. Measuring principle

MBQ magnetic float gauge is composed of reed pipe, precision resistor and amplified converting circuit. When the magnetic line of the magnetic float acts on one position of the liquid level sensor, the reed pipe at such position closes and the magnetic float varies with the liquid level (interface). The amplified converting circuit converts the liquid level (interface) change into linear 4mA~20mA signal and outputs it to detect and transmit the liquid level (interface) signal.

With imported high-quality sensor components and signal converters, MBQ magnetic float gauge has excellent long-term stability and reliability.

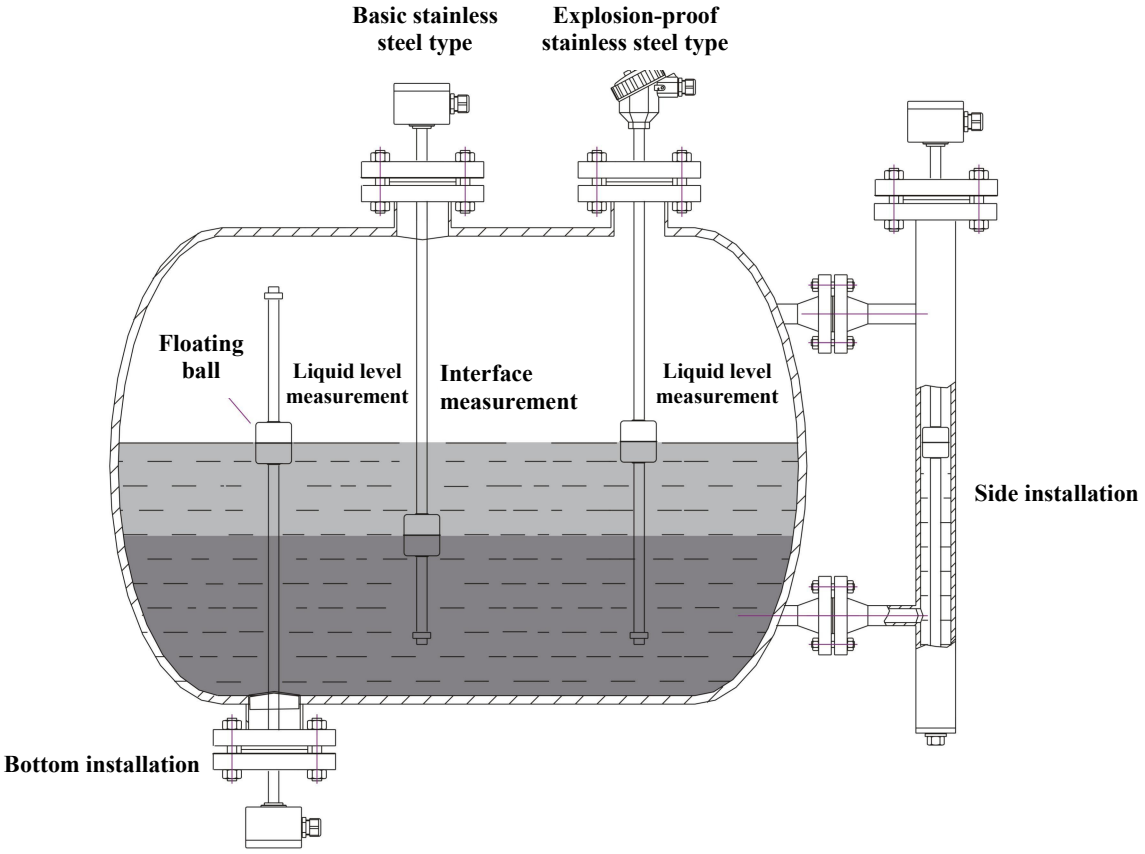
2. Application industries

MBQ magnetic float gauge is widely used to measure, transmit and display the liquid level of the medium or the interface of two media of different density (liquid, oils and strong and weak acid-base solution) in various kinds of vessels, such as liquid storage tank, storage tank, storage reservoir, reaction tank and fermentation tank used in the industries related to oil, chemicals, pharmaceuticals and food.

3. Product features

- ◆ Simple structure, good stability and reliability, excellent repeatability;
- ◆ No influence by the physical and chemical state of the measured medium. Such as: Influence of conductivity, dielectric constant, foam, pressure, temperature, evaporation, bubble, etc.;
- ◆ Made of different materials and used in all kinds of strong and weak, flammable and explosive, toxic, radioactive and muddy media;
- ◆ Measuring the liquid level or the interface of two media of different density;
- ◆ Explosion-proof structure design for explosive environment;
- ◆ Two-wire 4mA~20mA current output, with 0.56" LED digital display, convenient for the long-distance observation at night.

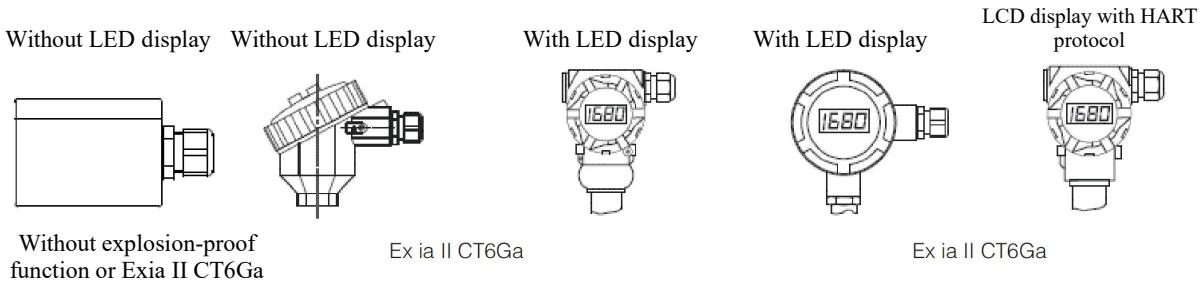
4. Schematic diagram for installation



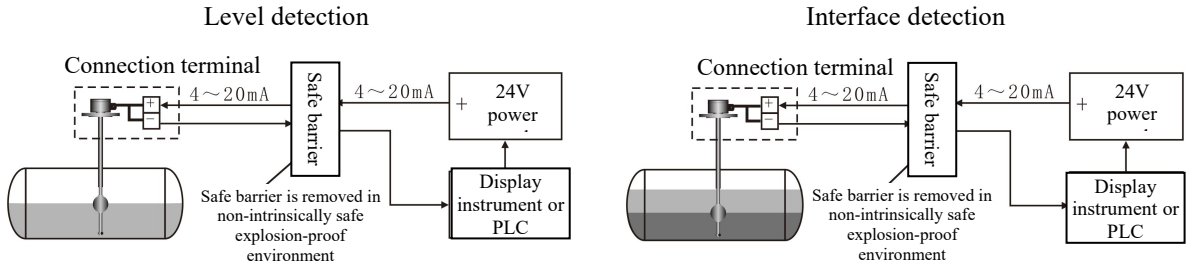
5. Technical characteristics

- ◆ Measurement range: 200mm~6,000mm (special order if greater than 6m)
- ◆ Resolution: 10mm (common), 5mm, 20mm
- ◆ Output signal: 4mA~20mA (two-wire)
- ◆ Linear resistance, 200 Ω/m (1/2", 3/8" thread installation method)
- ◆ Load resistance: 500Ω (24V DC power supply and without digital display case)
- ◆ Transmission distance: >1,000m
- ◆ Ambient temperature: Normal temperature working conditions-40°C~80°C, low-temperature working conditions -60°C~80°C (see the Explosion Protection Certificate for ambient temperature of explosion-proof products)
- ◆ Process temperature: -40°C~80°C; -20°C~120°C
- ◆ Operating power supply: 16V~30V DC
- ◆ Medium density: ≥0.5g/cm³ (special order is available if <0.5g/cm³)
- ◆ Nominal pressure: PN2.5~PN160 (kgf/cm²)(up to PN320 kgf/cm² in special cases)
- ◆ Float diameter: Ø45~Ø120 (determined by pressure and density)
- ◆ Installation flange: DN50~DN150 (HG/T 20592-2009)
- ◆ Electrical interface: M20×1.5 female thread or 1/2"NPT female thread
- ◆ Nonperpendicularity of installation: ≤±25°
- ◆ Ingress protection: IP65
- ◆ Explosion proof level: intrinsic safety type Ex ia IIC T6 Ga, flameproof type Ex db IIC T6 Gb

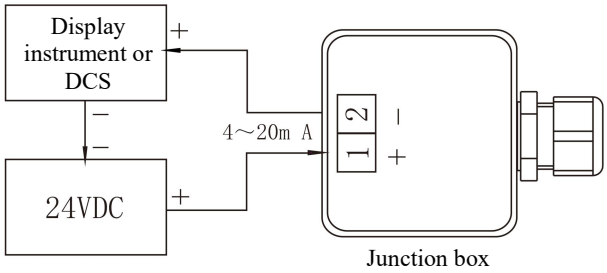
6. Type of junction box



7. Diagram of wiring



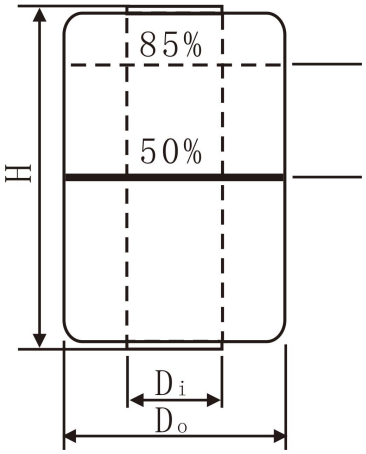
8. Wiring diagram in junction box



Two-wire 4-20mADC

9. Float parameters

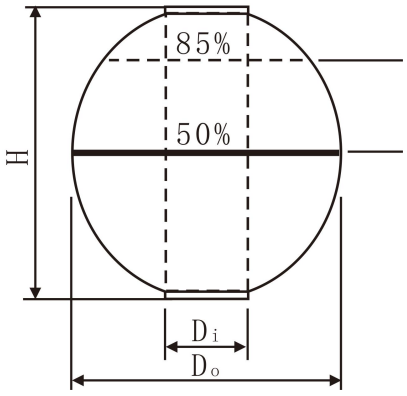
9.1. Cylindrical float



Critical medium density when 85% (volume) float is soaked in the medium (minimum medium density)

Standard medium density when 50% (volume) float is soaked in the medium

9.2. Spherical float



Critical medium density when 85% (volume) float is soaked in the medium (minimum medium density)

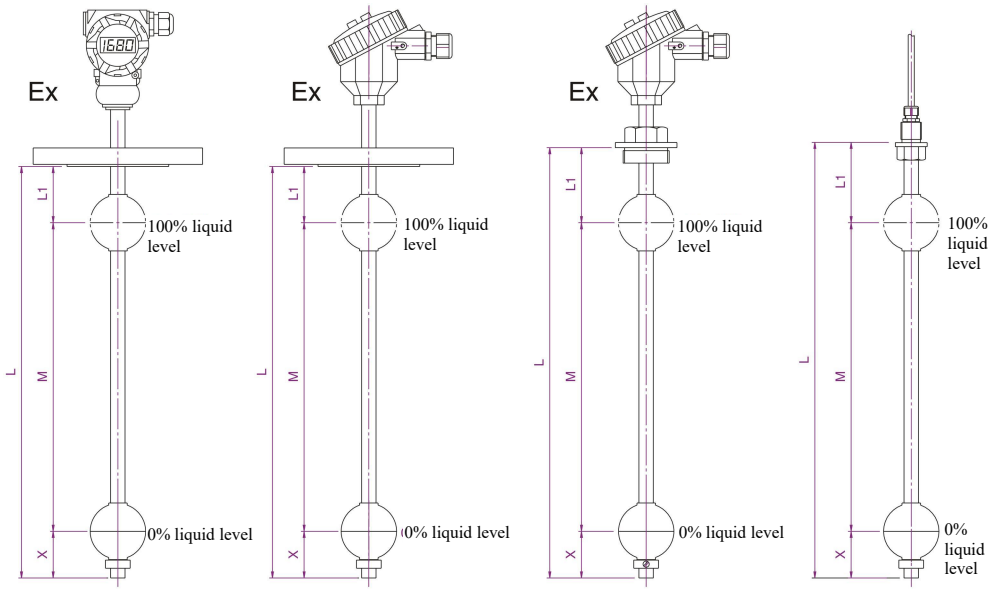
Standard medium density when 50% (volume) float is soaked in the medium

9.3. Table of parameters

Float material	Float code	Di(mm)	Do(mm)	H(mm)	Maximum operating pressure (PN)	Working temperature (°C)	Standard density g/cm³	Critical density g/cm³
1Cr18Ni9Ti 316L	V24	9	24	24	10~16	150	1.0	0.8
	V28	9	24	28	10~16	150	1.0	0.78
	V38	9	38	27	10~16	150	1.0	0.55
	V45	16	45	50	10~16	150	1.0	0.6
	V51	16	51	60	10~16	150	1.0	0.5
	V75	16	75	75	25	150	1.0	0.55
	V125	22	125	125	25	150	1.0	0.55
	V110	16	110	110~180	40~63	150	1.0	0.8
Titanium alloy	T95	16~22	95	110~180	40~160	150	1.0	0.5
	T110	16~22	110	110~180	40~160	150	1.0	0.5
Teflon	F48	22	48	70~100	6~16	150	1.0	0.7
Polypropylene (PP)	P48	24.5	48	60~120	6~20	≤80	1.0	0.8
	P58	24.5	58	60~120	6~20	≤80	1.0	0.6
	P76	24.5	76	70~120	6~16	≤80	1.0	0.5

Notes: 1. Float specifications can be specially ordered according to actual conditions. If the medium density is less than 0.5 g/cm³, special orders can be placed;
2. Titanium alloy, polytetrafluoroethylene and polypropylene floats are all cylindrical floats, while the others are cylindrical or spherical floats;
3. The data in the above-mentioned table are for reference only. Manufacturers are allowed to change the structural type and size of floats according to the difference of operating pressure and medium density.

10. Technical parameters

Instrument dimension					
Installation	Flange DN50~DN150 sealing face RF (HG/T20592-2009)		Thread G2" Installation from the top down	DIN clip-type components Size≥DN50	Thread G1/2" or G3/8" Installation from the bottom up
Conduit diameter	20mm	14mm	20mm	14mm	14mm
Maximum installation depth	6000mm	2000mm	6000mm	2000mm	2000mm
Transmission resolution	10mm (recommended), 20mm and 5mm (optional)				
Float type and diameter	See the introduction of floats (determined by the manufacturers according to the operating pressure, medium density and installation method, or designated by the user)				
Process temperature	304 and 304+PTFE: -40°C~120°C; polypropylene≤80°C; PVC≤60°C				
Process pressure	304 and 304+PTFE: ≤16 MPa, polypropylene and PVC: ≤1.6 MPa				
Perpendicularity of installation	≤ ± 25°				
Medium density	≥0.5g/cm³				
Degree of protection	IP65				
Explosion-proof certification	Ex ia II C T6 Ga or Ex db IIC T6 Gb				
Cable entry	M20×1.5 or 1/2”NPT				Three-core shaded conductor (0.5m)
Typical medium	Media compatible with 304, 316L, PTFE, polypropylene and PVC				

11. Table of MBQ model

Model parameters	Specification code	Description
Product	MBQ	Magnetic float level gauge
Housing/cable inlet	X	0.5 m conductor (for upward installation)
	S	Die casting Al M20×1.5
	B	Die casting Al 1/2"NPT
Output type	A	4mA~20mA
	B	4mA~20mA, with HART protocol
	C	0~20mA
	D	0~10mA
Resolution	A	5mm
	B	10mm
	D	20mm
Safety certificate	X	No requirement
	I	Intrinsic safety type Ex ia IIC T6 Ga
	O	Explosion-proof type Ex db IIC T6 Gb
Conduit material	A	304
	B	316L
	E	PP
	F	304+PTFE (C only for conduit diameter)
Conduit diameter (unit: mm)	A	14 (process pressure limited to≤16kgf/cm²; installation depth limited to ≤2m)
	B	16
	C	20
Float material	A	304
	B	316L
	E	PP
	F	304+PTFE
Span(unit: mm)	XXXX/XXXX	Installation depth L/span M, Max. span≤installation depth-float height-30
Case display type	X	No display head
	A	LED head
	B	LCD case (with HART protocol)
	C	0.56" LED display
Process temperature	D	-20°C~80°C (for upward installation)
	E	-40°C~80°C
	F	-20°C~120°C
Process pressure (kgf/cm²g)	A	2.5
	B	6
	C	16
	D	25
	E	40
	F	63
	G	100
	H	160

Model parameters	Specification code	Description
Process connection	A	G2" thread (downward installation)
	B	G3/8" thread (for upward installation)
	C	G1/2" thread (for upward installation)
	K	Sanitary DIN bayonet
	D	Standard flange (see Table of Flange Model)
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)
Flange size	E	DN50
	F	DN80
	G	DN100
	H	DN125
	J	DN150
Pressure rating (kgf/cm^2) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	H	PN63
	J	PN100
	K	PN160
	M	Class150
	N	Class300
Flange sealing face type	A	RF
	B	FM
	C	M
	D	T tongue face
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	RJ ring joint face
Material of flange	A	304
	B	316L
	C	321
	D	PP
	E	304+PTFE
Companion flange	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel
Connection accessories	X	Without bolt group and flange gasket
	A	304 bolt group+flange gasket

- Typical model 1: MBQSABXAAA0750/0600XDBA
- Typical model 2: MBQSABOBAB2500/2300ADCD-BGCABXX

MFT Displacer Level Gauge



1. Measuring principle

MFT intelligent displacer (interface) level gauge is an (interface) level gauge developed based on foreign techniques. It consists of intelligent processing unit, measuring chamber, inner displacer, and torque tube assembly. The change of the liquid level of the measured medium causes the buoyancy of the inner displacer to change, which changes the resultant force of the torque tube and transmits it to the torque tube assembly, so that the torque tube and the spindle deflect synchronously. By measuring the displacement of the deflection, the intelligent processing unit converts the displacement into a signal of 4mA~20mA for output. The intelligent processing unit can detect the change of ambient temperature and compensate the output signal linearly, and can also compensate the change of liquid density caused by the change of process temperature.

MFT intelligent (interface) level gauges provide standard 4mA~20mA current signal output, on-site LCD, and can provide communication functions such as HART.

2. Product features

- ◆ Torque tube type, high sensitivity, little drift and high accuracy;
- ◆ High stability and high disturbance resistance;
- ◆ Output 4~20mA, HART protocol can be superimposed;
- ◆ LCD;
- ◆ Convenient debugging. It can be debugged through the buttons on the case at site;

3. Application industries

◆ Power plant	Water tank, waste gas purification tank, oil tank, etc.
◆ Oil field	Crude oil or refined oil tank, three-phase separator, settling tank, sewage tank (pool), etc.
◆ Petrochemical industry	Oil pipeline, liquefied gas tank, ammonia tank, oil refinery depot, gas station storage tank, etc.
◆ Chemical	Distillation tower, ammonia tank, toxic liquid tank, etc.
◆ Water and water treatment	Water tank, sewage pool, water treatment tank, clarifier, digestion tower, etc.
◆ Others	Food, pharmaceutical, environmental protection, paper making and other industries

4. Technical characteristics

Product Model	MFT Displacer Level Gauge
Appearance	
Measuring range	300 mm~3,000 mm(>3,000 mm negotiated supply)
Accuracy of the measurements	0.5%FS, 1.0%FS
Nominal pressure	≤42.0MPa
Medium density	≥0.45g/cm³
Density difference	≥0.1g/cm³
Output signal	4mA~20mA (HART protocol might be supplied)
Load resistance	500Ω (at 24V DC)
Working temperature	-70°C~450°C (>450°C negotiated supply)
Ambient temperature	Normal temperature working conditions: -40°C~80°C, Low temperature working conditions -60°C~80°C, LCD screen: -30°C~80°C (see the Explosion Protection Certificate for ambient temperature of explosion-proof products)
Material of torque tube	Incorel 600
Liquid receiving material	Carbon steel, 304, 316K or as per user requirements
Flange standard	HG/T20592-2009, HG/T20615-2009 or as per user requirements
Electrical interface	M20×1.5 or 1/2NPT (female thread)
Outer casing tracing	Bouy type steam tracing or electrical tracing tape
Tracing pressure	≤0.6MPa
Working power supply	18V~30V DC
Degree of protection	IP65, IP67(other protection levels might be negotiated for supply)
Explosion-proof sign	CNEX: Intrinsic safety type Ex ia IIC T6 Ga CNEX: Flameproof type Ex db IIC T6 Gb EAC: Intrinsic safety type 0Ex ia IIC T6...T1 Ga X EAC: Flameproof type 1Ex db IIC T6...T1 Gb X

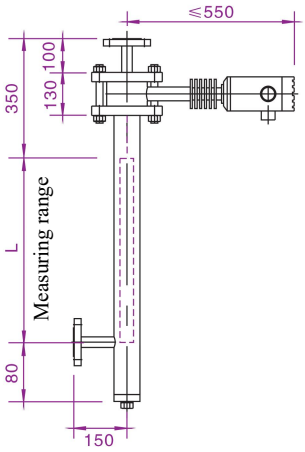
5. Definition of case installation direction

◆ If the case is installed on the right side of the displacer measuring chamber, it is right-mounted. The torque tube rotates clockwise when the liquid level rises.

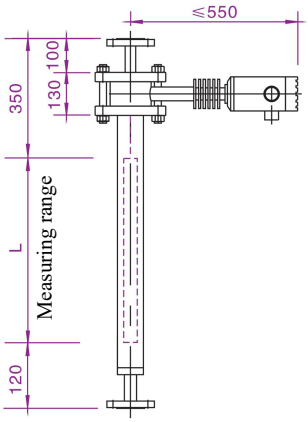
◆ If the case is installed on the left side of the displacer measuring chamber, it is left-mounted. The torque tube rotates counterclockwise when the liquid level rises.

6. Structural size

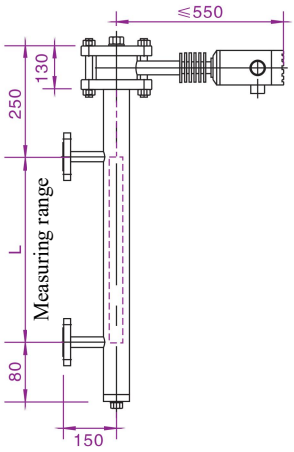
A: side-top mounted



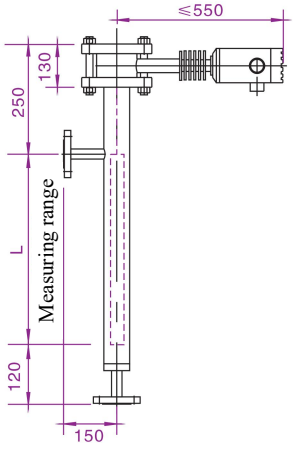
B: top-bottom mounted



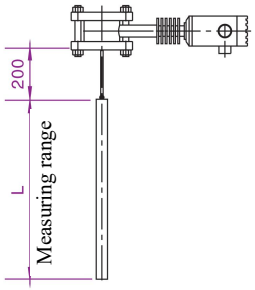
C: side-side mounted



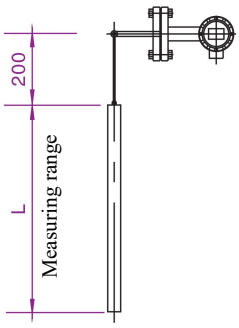
D: bottom-side mounted



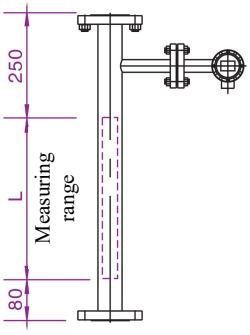
E: top-mounted



F: inverted



S: top-bottom mounted



7. Table of MFT model

Model parameters	Specification code	Description
Product	MFT31	0.5% accuracy
	MFT32	1.0% accuracy
Measuring type	L	Liquid level
	B	Interface level
	P	Density
Output	B1	4mA~20mA
	B2	4mA~20mA, HART
Housing	S	Die casting Al, 2×M20×1.5
	B	Die casting Al, 2×1/2"NPT
Case position	L	Installed on the left
	R	Installed on the right
Installation	A	Top-side mounted
	B	Top-bottom mounted
	C	Side-side mounted
	D	Bottom-side mounted
	E	Top-mounted
	F	Inverted
	S	Top-bottom mounted
Safety certificate	X	No requirement
	A	CNEX: Flameproof type Ex ia IIC T6 Ga
	D	CNEX: Flameproof type Ex db IIC T6 Gb
	E	EAC: Intrinsic safety type 0Ex ia IIC T6...T1 Ga X
	J	EAC: Flameproof type 1Ex db IIC T6...T1 Gb X
Material of outer displacer	A	304
	B	316L
	C	Carbon steel
	D	321
	E	Carbon steel+PTFE
	F	304+PTFE
	T	Titanium alloy
Material of inner displacer	A	304
	B	316L
	D	321
	E	Carbon steel+PTFE
	F	304+PTFE
	T	Titanium alloy

Model parameters	Specification code	Description
Outer casing tracing	X	No tracing
	A	Steam tracing, flange DN15/PN16/RF
	B	Steam tracing, thread R1/2
	D	Electrical tracing tape, 220V AC power supply
Span	XXXX	0300-3000 (Unit mm)
Process temperature	D	-40°C~80°C
	E	-40°C~150°C
	F	-40°C~250°C
	G	-40°C~425°C
Process pressure (unit Mpa)	1	2.5
	2	4.0
	3	6.3
	4	10.0
	5	16.0
	6	26.0
	7	42.0
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)
Flange size	A	DN25(1")
	B	DN32(1.25")
	D	DN40(1.5")
	E	DN50(2")
	C	DN65(2.5")
	F	DN80(3")
Flange size	G	DN100(4")
	H	DN125(5")
	J	DN150(6")
Pressure rating (kgf/cm^2) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	M	Class150
	N	Class300

Model parameters	Specification code	Description
Flange sealing face type	A	RF (recommended)
	B	FM
	C	M
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	Flat-thin plate flange (8 mm thick, M only for process pressure limited)
Material of flange	A	304
	B	316L
	C	Carbon steel
Companion flange (A, B and C options are inherently equipped with 304 bolt , nut, plate washer, flange gasket)	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel

- Typical model 1: MFT31LB2BLCDABX2000G1-AENAAX
- Typical model 2: MFT32LB2BLCDBBX1800E1-BECABX

MGP Glass Plate Level Gauge



1. Measuring principle

MGP glass plate level gauge has transparent type, reflective type and sight glass type. The level gauge mainly consists of liquid level gauge, steam side valve, liquid side valve, blow-down valve (or drain plug), exhaust valve (or drain plug), safety steel ball, etc. When the glass plate breaks suddenly, if the steam-liquid side pressure is not lower than 0.3 MPa, the steel ball in the valve would be automatically closed to prevent the medium from spraying out (slow dripping is allowed), so as to be convenient for manually disconnection of the root valve of the level gauge for treatment. The level gauge has the advantages of firm structure, reliable sealing, simple installation, available LED light source and convenient observation. It is an ideal meter for observing the liquid level in various high, medium and low pressure containers.

The steam-liquid side connecting flanges of the level gauge are respectively connected with the steam-liquid side flanges of the container to form a communicating vessel to observe the liquid level directly.

MGP glass plate level gauges are manufactured according to HG 21588-95.

2. Product features

- ◆ Simple structure and easy installation;
- ◆ Automatic protection, safe and reliable;
- ◆ LED display, convenient for observation;
- ◆ Debugging-free.

3. Application industries

◆ Power plant	Water tank, waste gas purification tank, oil tank, etc.
◆ Oil field	Crude oil or refined oil tank, three-phase separator, settling tank, sewage tank (pool), etc.
◆ Chemical	Distillation tower, ammonia tank, toxic liquid tank, etc.
◆ Water and water treatment	Water tank, sewage pool, water treatment tank, clarifier, digestion tower, etc.
◆ Others	Food, pharmaceutical, environmental protection, paper making and other industries

4. Technical parameters

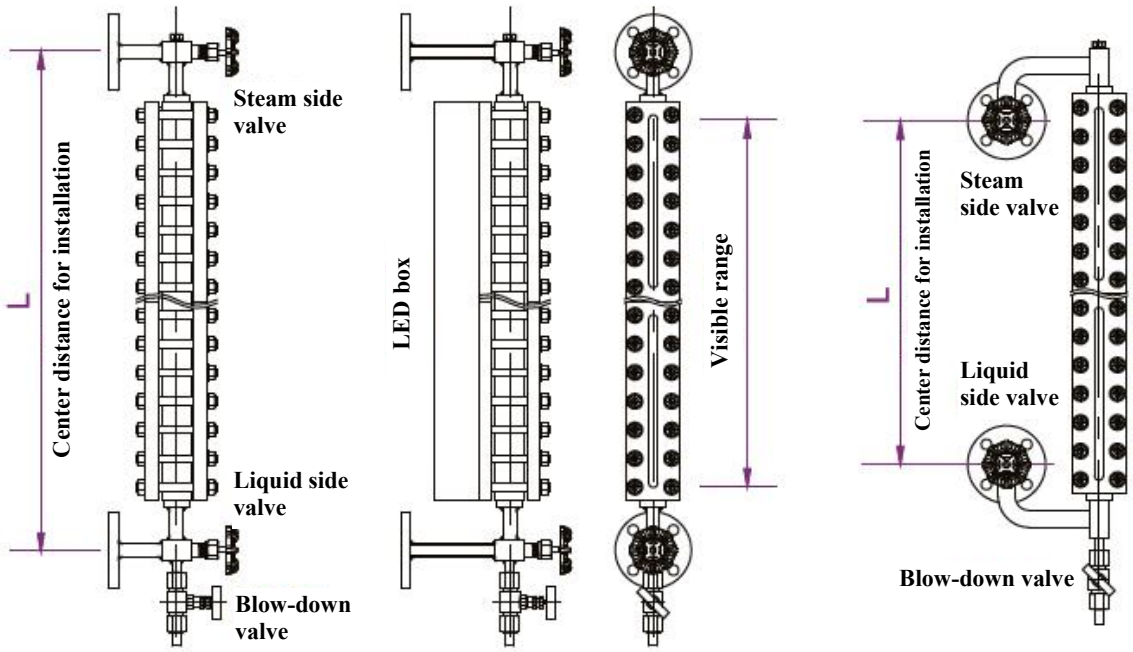
Product Model	MGP glass plate level gauge
Appearance	
Center distance L	500mm, 550mm, 800mm, 850mm, 1100mm, 1150mm, 1400mm, 1450mm, 1700mm, 1750mm
Visible range	260mm, 560mm, 860mm, 1160mm, 1460mm
Center distance L	580mm, 920mm, 1260mm, 1600mm, 1940mm
Visible range	300mm, 642mm, 984mm, 1326mm, 1668mm; (other center distance can be negotiated at ordering)
Material	Carbon steel, 304, 316K
Pressure grade	1.6MPa, 2.5MPa, 4MPa, 6.4MPa, 10MPa, 16MPa, 20MPa, 26MPa
Working temperature	≤450°C (in section, indicate the working temperature at ordering)
Connecting flange	DN20 GB/T 9112-2010 (default)
Tracing pipe joint	RC1/4 female thread
Tracing steam pressure	≤1.0MPa
Safety protection	When the glass plate breaks suddenly, if the steam-liquid side pressure is not lower than 0.3 MPa, the steel ball in the valve would be automatically closed.
Light source	High light LED lamp
Power consumption	20 W/m (for non explosion-proof environment)
Power of light source	24V DC (recommended), 220V AC, solar power (negotiated)

Note: The medium density should be indicated for model selection.

5. Outline structure

5.1. Transparent type, reflective type glass plate level gauges

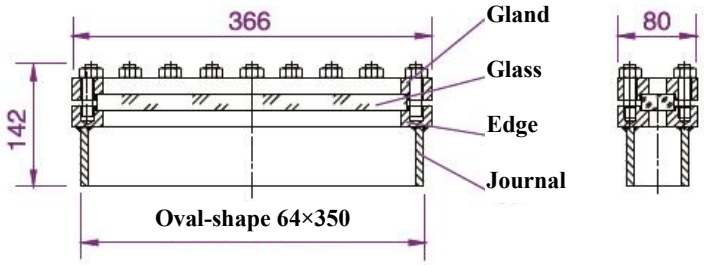
Basic　　With light source　　Without blind zone



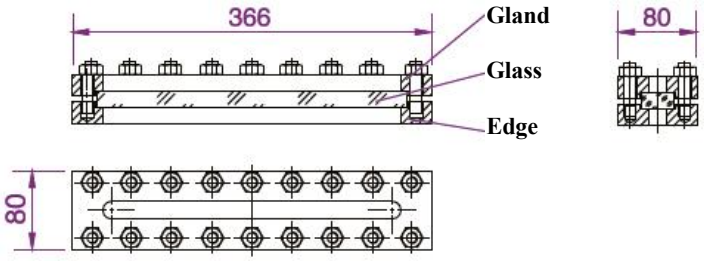
Note: The transparent type level gauges can be supplied with LED light sources to be convenient to observation of liquid level at night.
Transparent type (T): The level gauge has a transparent glass and a gland before and after, so that light can pass through.
Reflective (R): The level gauge has a transparent glass and a gland before, and a closed back, so that the light cannot pass through.

5.2. Sight glass plate level gauge

Hubbed type



Embedded type



Note: The length of the level gauge can be made according to user requirements.

6. Table for models of MGP transparent type and reflective type

Model parameters	Specification code	Description
Product	MGP	Glass plate level gauge
Flange type	A	Raised face flange (RF), HGJ50
	B	Male flange (M), HGJ50
	C	Raised face (RF), ANSI B16.5
Type	T	Transparent type
	R	Reflective type
Nominal pressure (MPa)	X.X	E.g. 1.6 means 1.6 MPa
Material code	I	Carbon steel
	II	304
	V	316L
Structure	X	Common type
	W	Tracing type
	F	Frost-proof type
	N	Without blind zone
Nominal length (mm)	XXXX	
Drain outlet	V	Sewage outfall equipped with needle valve
	P	Sewage outfall equipped with plug screw
LED light source	X	Without LED
	B	24V DC
	U	220V AC
	T	Solar supply

■ Typical model: MGPBT6.3IIN0600VX

7. Table for models of MGP sight glasses

Model parameters	Specification code	Description
Product	MGP	Glass plate level gauge
Type	S	Type of sight glasses
Nominal pressure (MPa)	X.X	E.g. 1.6 means 1.6 MPa
Material code	I	Carbon steel
	II	304
	III	Lined carbon steel
	V	316L
Structure	J	Hubbed type
	Q	Embedded connected type

■ Typical model: MGPS1.6IIJ

MS Magnetostrictive Level Transmitter



1. Measuring principle

Substances expand when heated and contract when cooled Except for heating, magnetic fields and electric fields can also lead to the size elongation or shortening of objects. The size of ferromagnetic substance is extended (or shortened) under the action of an external magnetic field and restores to its original length after the external magnetic field is removed. This phenomenon is called magnetostrictive phenomenon (or effect).

Based on the magnetostrictive principle, a magnetostrictive wire with one end connected with a sensor is installed in the nonmagnetic probe. The main electronic control unit sends an electromagnetic narrow pulse to the magnetostrictive line. The electromagnetic pulse is conducted along the magnetostrictive line. When the magnetic field generated by the pulse interacts with the magnetic field generated by the magnet in the float of the marked liquid level/interface, a torsional stress wave is generated on the magnetostrictive line, which will return to the above sensor along the magnetostrictive line. The sensor will capture the return wave and convert it into an electronic pulse signal and send it back to the main electronic control unit. The main electronic control unit accurately measures the time interval between the transmitted pulse and the return pulse through the precision circuit, and calculates the position of the float, that is, the height of the liquid level or interface.

2. Product features

◆ Multifunction	The liquid level and interface position can be measured independently or simultaneously.
◆ High accuracy	The measuring accuracy can reach ±1mm to the minimum.
◆ Wide range of application	Flexible and diversified installation methods
◆ Output mode	Support field indication and remote electrical output
◆ Split installation	Support split installation

3. Application industries

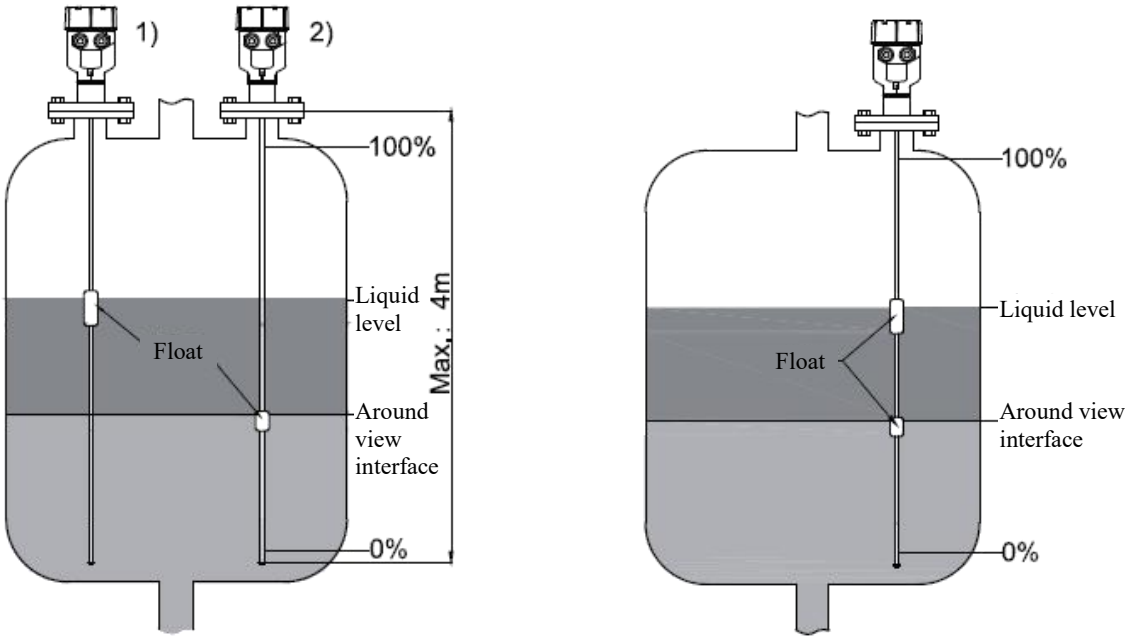
◆ Power plant	Water tank, waste gas purification tank, oil tank, etc.
◆ Oil field	Crude oil or refined oil tank, three-phase separator, settling tank, sewage tank (pool), etc.
◆ Petrochemical industry	Oil pipeline, liquefied gas tank, ammonia tank, oil refinery depot, gas station storage tank, etc.
◆ Chemical	Distillation tower, ammonia tank, toxic liquid tank, etc.
◆ Water and water treatment	Water tank, sewage pool, water treatment tank, clarifier, digestion tower, etc.
◆ Others	Food, pharmaceutical, environmental protection, paper making and other industries

4. Technical characteristics

Product name	MS magnetostrictive level transmitter
Appearance	
Operating voltage	• 16V~35V DC (ripple less than 100mVp-p) • 30V~250V AC (50Hz/60HZ)
Power consumption	• <770 mW (two-wire) • <1.5 W (four-wire)
Input	• Measuring variable: change of float position for change of level • Medium density: ≥0.38g/cm³ • Medium density different: ≥0.2 g/cm³ • Medium viscosity ≤1.5 Pas (1,500 cp)
Output	• Current output : 4mA~20mA • Min. current: 3.8 mA • Maximum current: 22mA • Resolution: 1.6 uA • Display output: meter optional • HART communication: meter optional • Relay output (switch output): SPDT(3A/250V AC)×3
Delay	• 0~40S
Resolution	• 0.254mm
Precision	• ±1mm or ±0.1%FS of the maximum
Max. process pressure	• 6.3MPa
Process temperature	• -196°C~450°C
Process connection	• 3/4"NPT or flange
Ambient temperature	• Normal temperature working conditions: -40°C~80°C, Low temperature working conditions -60°C~80°C, LCD screen: -30°C~80°C (see the Explosion Protection Certificate for ambient temperature of explosion-proof products)
Case protection class	• IP67
Safety certification information	• PCEC: intrinsic safety and gas flameproof Ex ia IIC T5/T6 Ga
	• PCEC: gas flameproof Ex db IIC T6 Gb
	• PCEC: dust flameproof type Ex tb IIIC T80°C Db
Cable entry	• 2 M20×1.5 or 1/2"NPT (cable diameter 9mm~13mm)

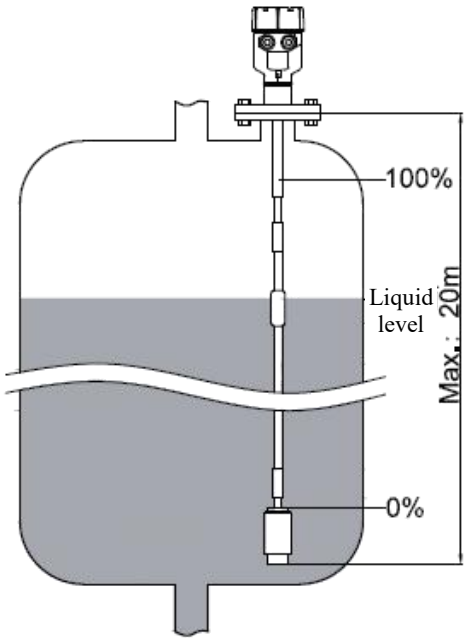
5. Installation guide

5.1. Rod probe



Rod probes with different floats can be used to measure liquid level or interface, with a maximum length of 4 m. Double floats can be used to measure liquid level and interface at the same time.

6. Cable probe



Cable probes with different floats can be used to measure liquid level or interface, with a maximum length of 20 m.

7. Table of MS model

Model parameters	Specification code	Description
Product	MS22	0.1% accuracy
	MS13	0.5% accuracy
Type of probe	P	Rod type(limit of probe length≤4m)
	C	Cable type (limit of probe length≤20m)
Housing	S	Die casting Al, 2×M20×1.5
	B	Die casting Al, 2×1/2"NPT
Power supply and output	B2	24V DC two-wire system, HART
	B4	24V DC four-wire system, HART
	U4	220V AC four-wire system, HART
Safety certificate	X	None
	I	PCEC: intrinsic safety and gas flameproof Ex ia IIC T5/T6 Ga
	D	PCEC: gas flameproof Ex db IIC T6 Gb
	N	PCEC: dust flameproof type Ex tb IIIC T80°C Db
Float quantity	0	No float
	1	Single float
	2	Double floats
Number of temperature detection points	0	No temperature detection point
	1	Single temperature detection point
	2	Double temperature detection points
Material of rod probe	A	304
	B	316L
	C	316+PFA
	D	316+ECTFE
	E	Titanium alloy
	F	Hastelloy
Probe length	XXXX	0000cm~2,000cm (Unit cm)
Process temperature	C	-196°C~80°C
	D	-40°C~120°C
	E	-40°C~150°C
	F	-40°C~260°C
	G	-40°C~450°C
Process pressure (kgf/cm²g)	L	-1
	M	1
	A	2.5
	B	6
	C	16
	D	25
	E	63

Model parameters	Specification code	Description
Process connection	TA	3/4"NPT
	FB	Flange
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)
Flange size	E	DN50(2")
	F	DN80(3")
	G	DN100(4")
	H	DN125(5")
	J	DN150(6")
	K	DN200(8")
	M	DN250(10")
Pressure rating (kgf/cm^2) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	M	Class150
	N	Class300
Flange sealing face type	A	RF (recommended)
	B	FM
	C	M
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	Flat-thin plate flange (8 mm thick, M only for process pressure limited)
Material of flange	A	304
	B	316L
	C	Carbon steel
	D	PP (thickness 20mm, only applicable to atmosphere (ATM))
	E	PTFE (thickness 20mm, only applicable to atmosphere (ATM))
Companion flange (A, B and C options are inherently equipped with 304 bolt , nut, plate washer, flange gasket)	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel

Special notes:

- Typical model 1: MS13CBB2X10B1200DATA
- Typical model 2: MS22PBB2D10B0200CCFB-AEMABX
- Note: The medium density shall be indicated after model selection.

MTP Input Hydrostatic Level Transmitter



1. Measuring principle

MTP input hydrostatic level transmitter converts the change of material (liquid) level into linear 4mA-20mA DC standard signal based on the linear change rule of liquid level, density and pressure and output the signal. With imported high stability sensors and integrating temperature compensation and correction technology, the level transmitter has good anti-disturbance property, reliability and excellent stability.

2. Application of product

MTP input hydrostatic level transmitter can be widely used for liquid level measurement of media under normal pressure in the industries related to oil, steel, metallurgy, oil fields, chemicals, thermal power plants, light industry, sewage treatment, dam water level, deep well, etc.

3. Product features

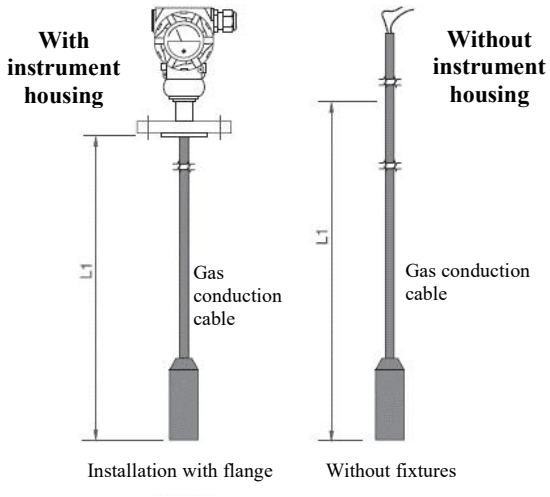
- ◆ Strong anti-disturbance property, stable and reliable running;
- ◆ Lightning protection design;
- ◆ Special application design can be provided.

4. Technical characteristics

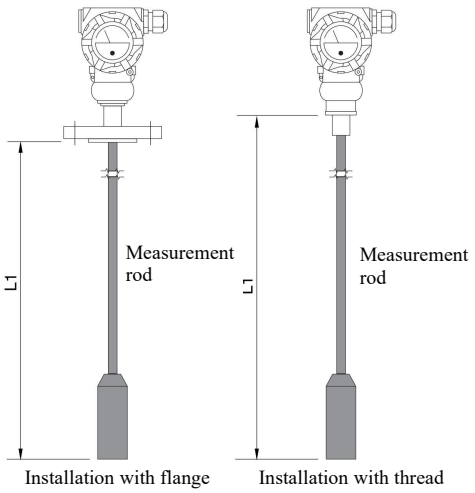
- ◆ Measurement range: 0m~200m (cable type), 0m~5m (rod type)
- ◆ Measurement accuracy: class 0.5
- ◆ Output signal: 4mA~20mA
- ◆ Load resistance: 0Ω~500Ω;
- ◆ Transmission distance: 1,000 mm
- ◆ Operating power supply: 24V DC
- ◆ Working temperature: -50°C~80°C, -50°C~150°C (for static rod type only)
- ◆ Ambient temperature: Normal temperature working conditions: -40°C~50°C, low-temperature working conditions: -60°C~80°C and LCD screen :-30°C~80°C (see the Explosion Protection Certificate for ambient temperature of explosion-proof products)
- ◆ Relative moisture: ≤85% Materials of wet parts: stainless steel, polypropylene, PTFE
- ◆ Installation method: 1. Installation with flange: Min. flange size DN32 (HG/T 20592-2009)
  2. Threaded mounting: G2" thread
- ◆ Safety certificate: CNEX intrinsic safety type Ex ia IIC T6 Ga; EAC intrinsic safety type 0Ex ia IIC T6...T1 Ga X

5. Instrument dimension

Cable type

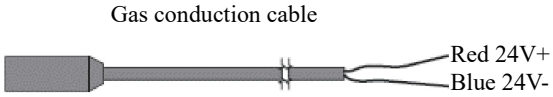


Rod

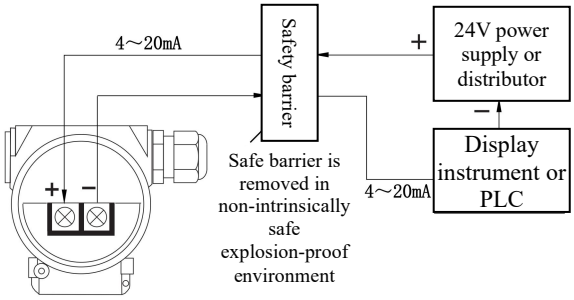


6. Wiring mode

Without wiring of instrument housing

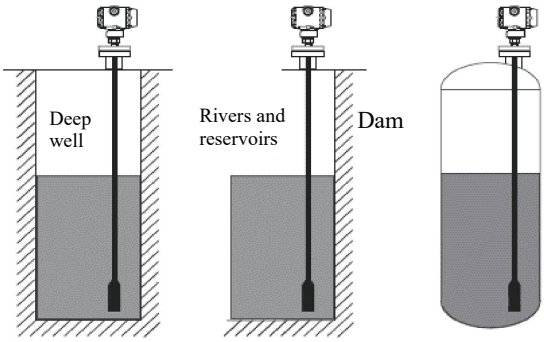


With wiring of instrument housing

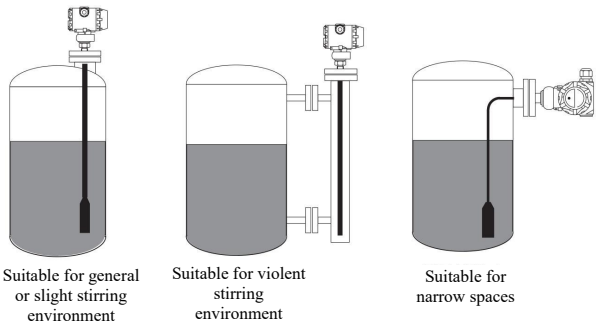


7. Schematic diagram for installation

Cable type



Rod



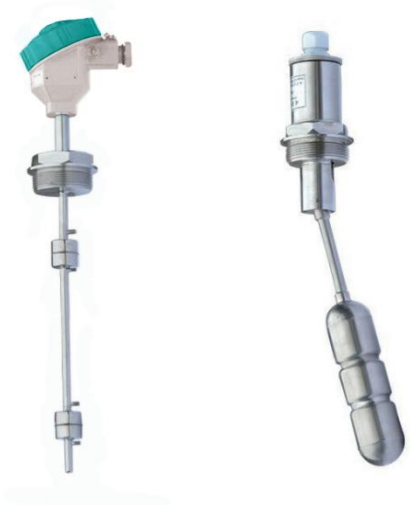
8. Table of MTP model

Model parameters	Specification code	Description
Product	MTP	Input Hydrostatic Level transmitter
Type of probe	A	Cable limit (range 0m~200m)
	B	Rod type (range 0m~005m)
Housing/cable inlet	S	Die casting Al M20×1.5
	B	Die casting Al 1/2"NPT
	X	No housing
Output signal	A	4mA~20mA
	B	0mA~20mA
Safety certificate	X	No requirement
	I	CNEX: Intrinsic safety type Ex ia IIC T6 Ga
	E	EAC: Intrinsic safety type 0Ex ia IIC T6...T1 Ga X
With display head	A	No display head
	B	LED head
	D	LCD head
Span	XXX	Unit: m, range: cable type ≤200m, rod type ≤005m
Liquid receiving material	A	304
	B	316L
	C	Titanium alloy
	D	PTFE (D only for process temperature)
	E	PP (D only for process temperature, and process temperature ≥ -20°C)
Process temperature	D	-50°C~80°C
	E	-50°C~450°C (for probe type B)
Process connection	A	G2" thread
	D	Standard flange
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)
Flange size	D	DN32
	N	DN40
	E	DN50
	F	DN80
	G	DN100
	H	DN125
	J	DN150

Model parameters	Specification code	Description
Pressure rating (kgf/cm^2) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	H	PN63
	J	PN100
	K	PN160
	M	Class150
	N	Class300
Flange sealing face type	A	RF (recommended)
	B	FM
	C	M
	D	T tongue face
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	RJ ring joint face
Material of flange	A	304
	B	316L
	C	321
Companion flange	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel
Connection accessories	X	Without bolt group and flange gasket
	A	304 bolt group+flange gasket

- Typical model 1: MTPABAXB007BDA
- Typical model 2: MTPASAXC020ADD-BDCAAAA

MBK Magnetic Float and Displacer Level Controller



1. Measuring principle

MBK magnetic float and displacer level controller is composed of reed pipe and magnetic float. Based on the principle of buoyancy, the floating ball with a magnetic component is used to drive the reed pipe of each corresponding position in the measuring cylinder to close or open along with the rise and fall of the liquid level, thus detecting and controlling the states of the liquid level. This series is mainly classified into: MBKS basic top-mounted type, MBKL basic side-mounted type, MBKT displacer type, MBKC direct-insertion type magnetic float level controller.

MBK magnetic float and displacer level controller can be equipped with 8 switches at most for the detection of 8 points. The magnetic float level controller is not in direct contact with the medium to be measured during operation. The contacts have no mechanical abrasion, and can work without external power supply.

2. Product features

- ◆ External power supply is not required and the output contacts are passive;
- ◆ Featured with long service life, stable and reliable running and easy installation, it is almost maintenance-free;
- ◆ No influence by the physical and chemical state of the measured medium. Such as: Influence of conductivity, dielectric constant, foam, pressure, temperature, evaporation, bubble, etc.;
- ◆ Meters of corresponding materials can be used in all kinds of adverse environments with medium density≥0.5 g/cm³;
- ◆ Interface measurement with two media of different density;
- ◆ Explosion-proof structure design for explosive environment;
- ◆ Special application design can be provided.

3. Technical characteristics

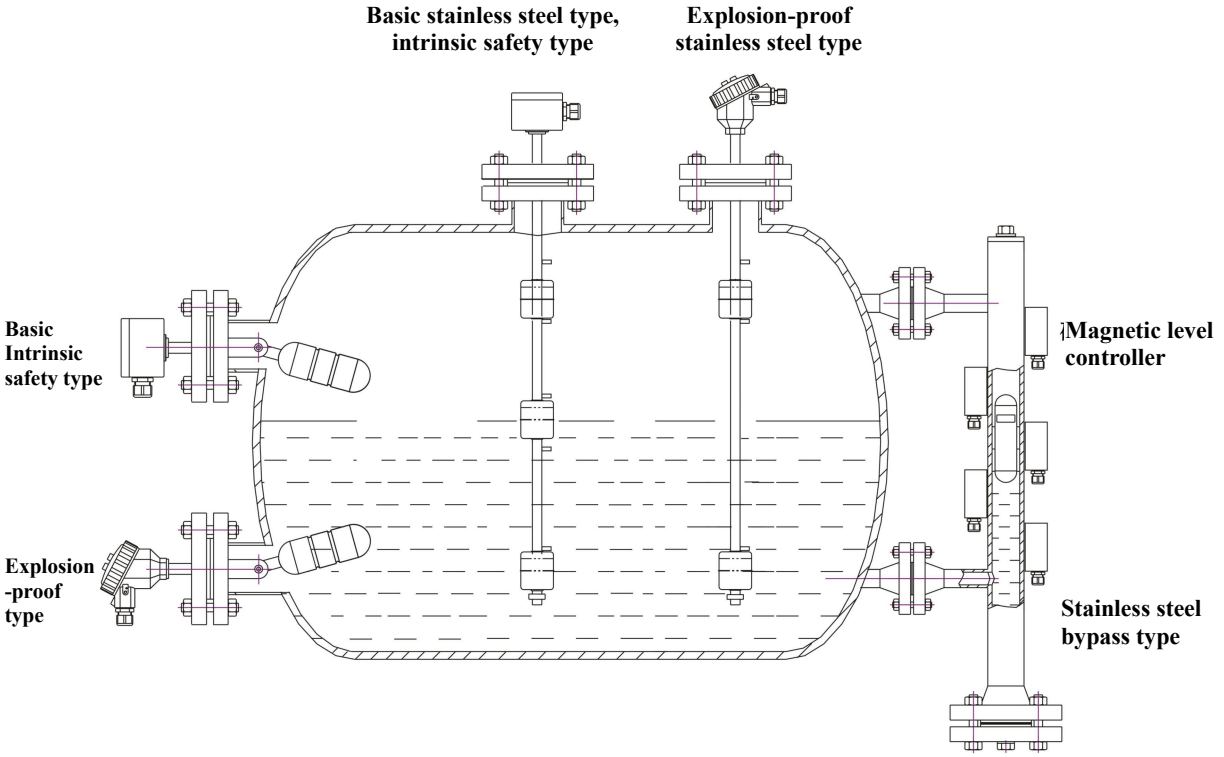
◆ Contact type: AO --- normally open type (250V AC, 0.5A, 20W, resistive)
AC --- normally closed type (250V AC, 0.5A, 20W, resistive)
BO --- normally open type (250V AC, 2.0A, 200W, resistive)
BC --- normally closed type (250V AC, 2.0A, 200W, resistive)
C --- switching type (250V AC, 1.0A, 60W, resistive)

Note: The above-mentioned voltage, current and power are all their maximum values. The product of

switching voltage and switching current should be less than the switching power.

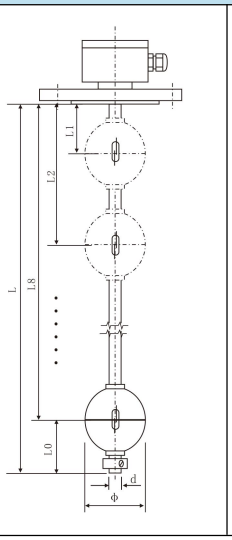
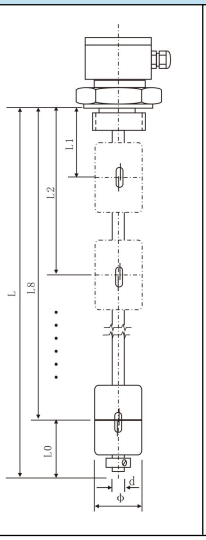
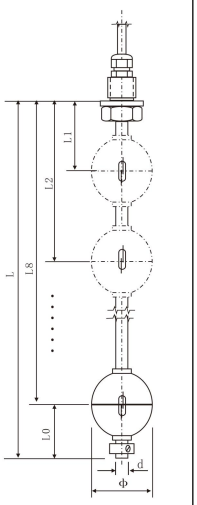
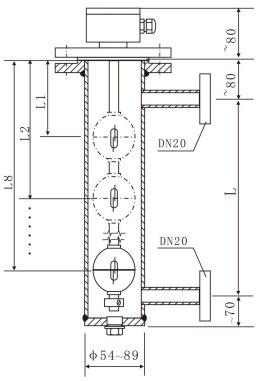
- ◆ Maximum switching frequency: ≤1×10^9 times
- ◆ Switching error: ≤±10mm
- ◆ Minimum distance between switches: 50mm
- ◆ Transmission distance: >2,000m
- ◆ Operating power supply: requiring no external power supply
- ◆ Working temperature: ≤80°C; ≤120°C; ≤150°C
- ◆ Ambient temperature: Normal temperature working conditions-40°C~85°C, low-temperature working conditions -60°C~80°C (see the Explosion Protection Certificate for ambient temperature of explosion-proof products)
- ◆ Medium density: ≥0.5g/cm³
- ◆ Nominal pressure: PN2.5-PN160(kgf/cm²) (up to PN320kgf/cm² in special cases)
- ◆ Float diameter: Ø28mm-Ø120mm (determined by pressure and density)
- ◆ Installation method: flange: DN32-DN150 (HG/T 20592-2009)
  G3/8" thread (upward installation)
  G1/2" thread (upward installation)
  G1-1/2" thread (downward installation)
  G2" thread (downward installation)
- ◆ Electrical interface: M20×1.5 female thread or 1/2"NPT female thread
- ◆ Nonperpendicularity of installation: ≤±25°
- ◆ Ingress protection: IP65
- ◆ Explosion proof: CNEX flameproof type Ex db IIC T6 Gb
  EAC flameproof type 1Ex db IIC T6 Gb X

4. Schematic diagram for installation

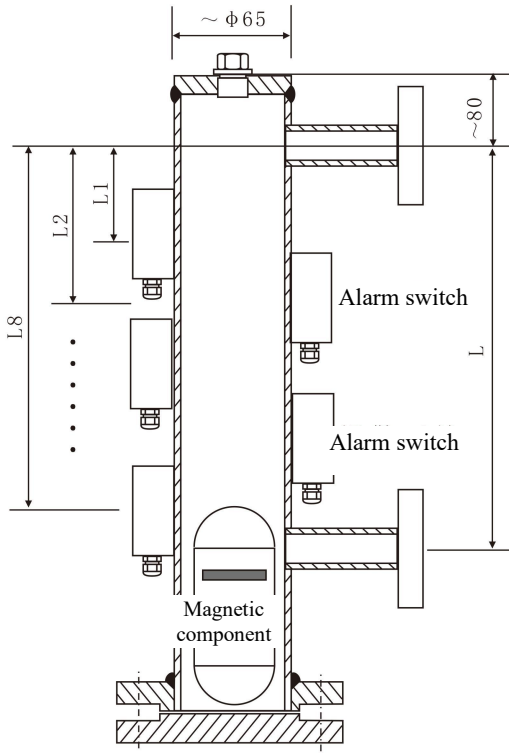


5. Technical parameters

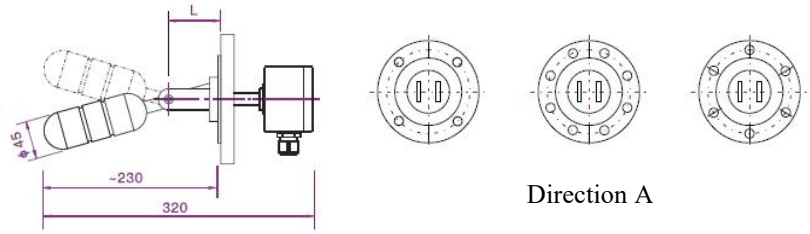
5.1. MBKS, MBKL magnetic float basic level controller

Optional materials	Stainless steel, stainless steel+PTFE, polypropylene, PVC			304, 316L, titanium alloy
Product appearance				
Type of mounting	MBKS top-mounted type			MBKL side-mounted type
Installation	Flange DN50-DN150 Sealing face RF (HG/T 20592-2009)	Thread G2" or G1-1/2" Installation from the top down	Thread G1/2" or G3/8" Installation from the bottom up	Flange DN20-DN25 (HG/T 20592-2009)
Conduit diameter	14mm (recommended), 16mm, 20mm			Determined by the manufacturer
Maximum installation depth	6000mm			
Switch status	Normally open type, normally closed type, switching type			
Maximum quantity of switches	Normally open and normally closed type: 8 Nos.; switching type: 6 Nos.			
Float type and diameter	See the parameters of floats (determined by the manufacturers according to the operating pressure, medium density and installation method, or designated by the user)			
Process temperature	304 and 304+PTFE: -40°C~120°C; polypropylene≤80°C; PVC≤60°C			
High temperature type	≤120°C			≤120°C
Process pressure	304 and 304+PTFE: ≤16MPa, polypropylene and PVC: ≤1.6MPa			≤1.6MPa
Perpendicularity of installation	≤±25°			≤+10°
Medium density	≥0.5g/cm³			
Degree of protection	IP65			
Explosion-proof certification	CNEX flameproof type Ex db IIC T6 Gb; EAC Flameproof type 1Ex db IIC T6...T3 Gb X			
Cable entry	M20×1.5 or 1/2”NPT	0.5m conductor		
Typical medium	Carbonic acid, organic acid, strong and weak alkali liquor, brine, alcohols, aldehydes, light oil, toluene, 98% fuming sulfuric acid, water and other media compatible with 304, 316L, PTFE, polypropylene, PVC, etc.			

5.2. MBKT magnetic displacer level controller

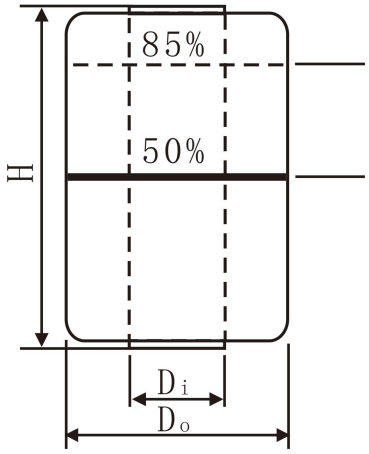
Optional materials	20#, 304, 316L, titanium alloy, etc.
Product appearance	
Installation	Flange DN20~DN25 (HG/T20592-2009)
Center distance for installation	150mm~6000mm
Switch status	Switches of normally open type, normally closed type, switching type are optional
Quantity of switches	The quantity is unlimited, it can be determined according to the needs of length L. Switch spacing ≥50mm.
Process temperature	-40°C~80°C; -40°C~120°C (by levels)
Process pressure	≤32MPa
Perpendicularity of installation	≤±10°
Medium density	≥0.5g/cm³
Degree of protection	IP65
Explosion-proof certification	CNEX flameproof type Ex db IIC T6 Gb; EAC Flameproof type 1Ex db IIC T6...T3 Gb X
Cable entry	M20×1.5 or 1/2”NPT
Typical medium	Carbonic acid, organic acid, strong and weak alkali liquor, brine, alcohols, aldehydes, light oil, toluene, 98% fuming sulfuric acid, water and other media compatible with stainless steel

5.3. MBKC magnetic float direct-insertion level controller

Optional materials	304, 316L, titanium alloy, etc.
Product appearance	A-direction→ 
Installation	Plate-type welded flange DN50/RF (HG/T20592-2009; when >PN100, DN≥65, HG/T20615-2009
Installation depth	80~300mm
Float diameter	When ≤6.3MPa, the float diameter is 45mm; when >6.3MPa, the float diameter is 65mm
Switch status	Switches of normally open type, normally closed type, switching type are optional, 1 switch
Maximum switching voltage	250V AC, 230V DC, both are resistive load
Maximum switching current	0.6A(SPDT), 2A (SPST), resistive load for all
Maximum contact capacity	0.6A/60W (reed pipe type); 2A/200W(microswitch type); both are resistive load
Process temperature	-40°C~80°C; -40°C~120°C (by levels)
Process pressure	PN2.5-PN160 for different levels (if>PN100, connection flange≥DN65)
Perpendicularity of installation	≤±10°
Medium density	≥0.5g/cm³
Degree of protection	IP65
Explosion-proof certification	CNEX flameproof type Ex db IIC T6 Gb; EAC Flameproof type 1Ex db IIC T6...T3 Gb X
Cable entry	M20×1.5 or 1/2”NPT
Typical medium	Carbonic acid, organic acid, strong and weak alkali liquor, brine, alcohols, aldehydes, light oil, toluene, 98% fuming sulfuric acid, water and other media compatible with stainless steel

6. Parameters of MBKS and MBKL floats

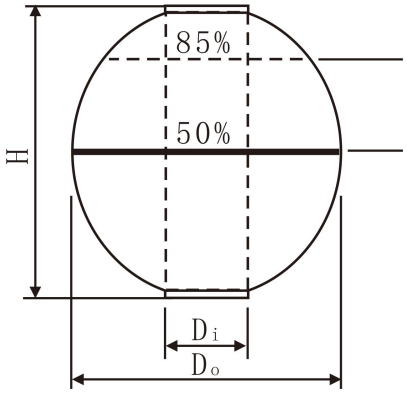
6.1. Cylindrical float



Critical medium density when 85% (volume) float is soaked in the medium (minimum medium density)

Standard medium density when 50% (volume) float is soaked in the medium

6.2. Spherical float



Critical medium density when 85% (volume) float is soaked in the medium (minimum medium density)

Standard medium density when 50% (volume) float is soaked in the medium

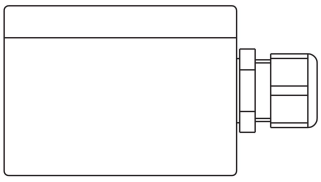
6.3. Table of parameters

Float material	Float code	Di (mm)	Do (mm)	H (mm)	Maximum operating pressure (PN)	Working temperature (°C)	Standard density g/cm³	Critical density g/cm³
1Cr18Ni9Ti 316L	V24	9	24	24	10~16	150	1.0	0.8
	V28	9	24	28	10~16	150	1.0	0.78
	V38	9	38	27	10~16	150	1.0	0.55
	V45	16	45	50	10~16	150	1.0	0.6
	V51	16	51	60	10~16	150	1.0	0.5
	V75	16	75	75	25	150	1.0	0.55
	V125	22	125	125	25	150	1.0	0.55
	V110	16	110	110~180	40~63	150	1.0	0.8
Titanium alloy	T95	16~22	95	110~180	40~160	150	1.0	0.5
	T110	16~22	110	110~180	40~160	150	1.0	0.5
Teflon	F48	22	48	70~100	6~16	150	1.0	0.7

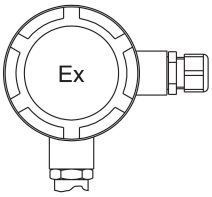
Float material	Float code	Di (mm)	Do (mm)	H (mm)	Maximum operating pressure (PN)	Working temperature (°C)	Standard density g/cm³	Critical density g/cm³
Polypropylene (PP)	P48	24.5	48	60~120	6~20	≤80	1.0	0.8
	P58	24.5	58	60~120	6~20	≤80	1.0	0.6
	P76	24.5	76	70~120	6~16	≤80	1.0	0.5

Notes:
1. Float specifications can be specially ordered according to actual conditions. If the medium density is less than 0.5 g/cm³, special orders can be placed;
2. Titanium alloy, polytetrafluoroethylene and polypropylene floats are all cylindrical floats, while the others are cylindrical or spherical floats;
3. The data in the above-mentioned table are for reference only. Manufacturers are allowed to change the structural type and size of floats according to the difference of operating pressure and medium density.

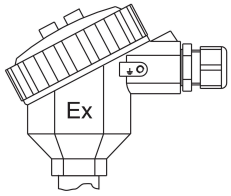
7. Type of junction box



Non-explosion proof junction box



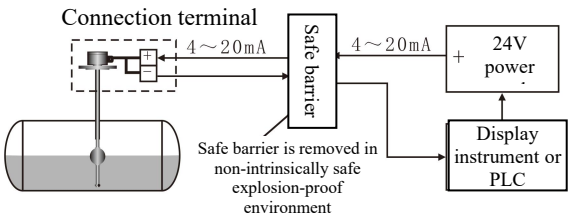
Explosion proof junction box



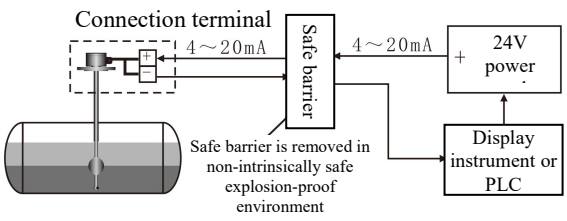
Explosion proof junction box

8. External wiring diagram

Level detection

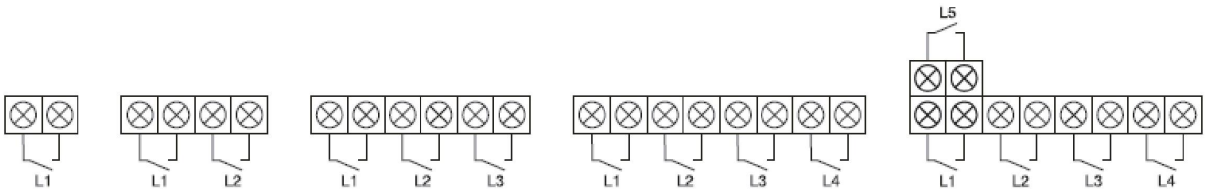


Interface detection

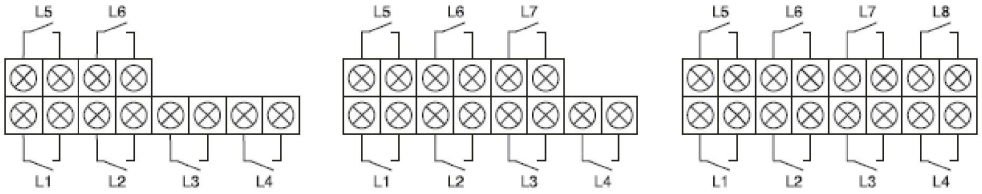


9. Internal wiring diagram

9.1. Normally open type, normally closed type

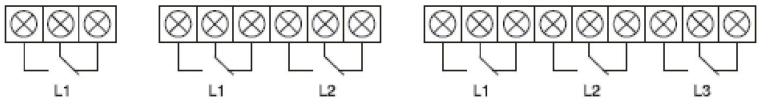


1 switch 2 switches 3 switches 4 switches 5 switches

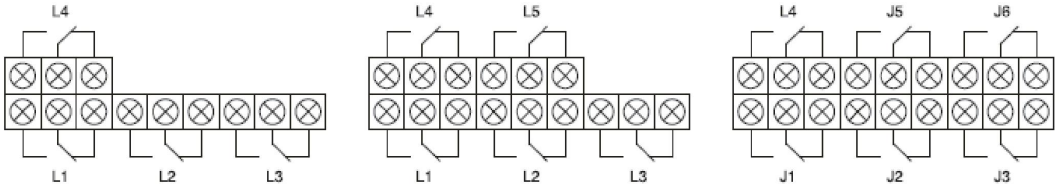


6 switches 7 switches 8 switches

9.2. Switching type



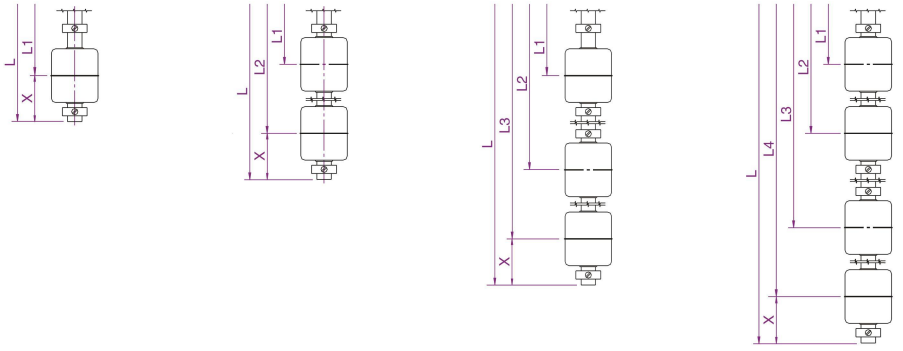
1 switch　　2 switches　　3 switches



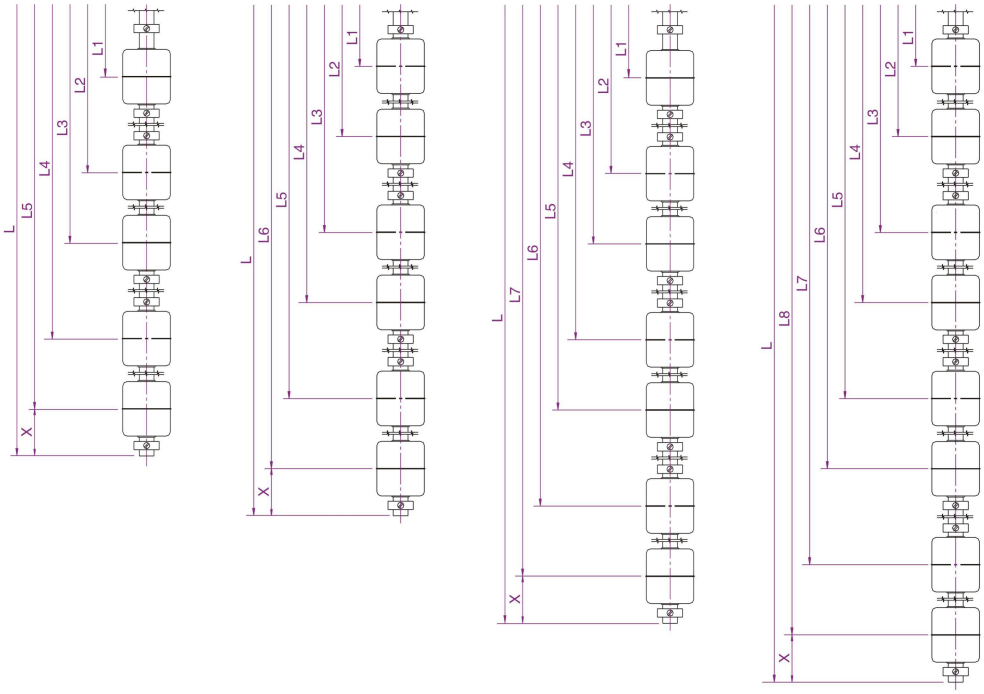
4 switches　　5 switches　　6 switches

10. Position of MBKS, MBKL switches

1 switch　　2 switches　　3 switches　　4 switches



5 switches　　6 switches　　7 switches　　8 switches



Note: 1. "X" value varies with density and pressure;
2. If the switch position and state are as required by the users, the manufacturer may change the position of positioning ring.

11. Table of MBKS and MBKL models

Model parameters	Specification code	Description
Product	MBK	Magnetic float basic level controller
Installation type	S	Top-mounted
	L	Side installation (limit of process pressure ≤16kgf/cm²)
Housing/cable inlet	X	0.5 m conductor (for upward installation)
	S	Die casting Al M20×1.5
	B	Die casting Al 1/2"NPT
Safety certificate	X	No requirement (for upward installation)
	O	CNEX: Flameproof type Ex db IIC T6 Gb
	J	EAC: flameproof type 1Ex db IIC T6...T3 Gb X
Conduit material	A	304
	B	316L
	E	PP (process temperature limited to ≤80°C)
	F	304+PTFE
Conduit diameter (Unit: mm)	A	14 (process pressure limited to≤16kgf/cm²; installation depth limited to ≤2000mm)
	B	16
	C	20
Quantity of switch contact	X	Unit: no, range 1-8, fill in the table based on the quantity filled
Float material	A	304
	B	316L
	E	PP
	F	304+PTFE
Installation depth	XXXX	Unit: mm, top-mounted 0150mm-6000mm; side-mounted 0150-1500mm (The installation depth of side-mounted meter is the center distance L of connecting flange)
Process temperature	C	-30°C~80°C(for upward installation)
	D	-40°C~80°C
	E	-40°C~120°C
Process pressure (kgf/cm²g)	A	2.5
	B	6.0
	C	16
	D	25
	E	40
	F	63
	G	100
	H	160
Process connection	A	G2" thread (downward installation)
	B	G3/8" thread (for upward installation)
	C	G1/2" thread (for upward installation)
	E	G1-1/2" thread (downward installation)
	D	Standard flange

Model parameters	Specification code	Description
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)
Flange type	A	Flat welding flange (process pressure limited to≤40kgf/cm²)
	B	Lap joint flange (process pressure limited to≤40kgf/cm²)
	C	Butt welded flange
Flange type	A	Flat welding flange (process pressure limited to≤40kgf/cm²)
	B	Lap joint flange (process pressure limited to≤40kgf/cm²)
	C	Butt welded flange
Flange size	B	DN20 (L only for installation type)
	C	DN25 (L only for installation type)
	E	DN50
	F	DN80
	G	DN100
	H	DN125
	J	DN150
Pressure rating (kgf/cm²) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	H	PN63
	J	PN100
	K	PN160
	M	Class150
	N	Class300
Flange sealing face type	A	RF
	B	FM
	C	M
	D	T tongue face
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	RJ ring joint face
Material of flange	A	304
	B	316L
	C	PP
	E	304＋PTFE
Companion flange	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel

Model parameters	Specification code	Description
Connection accessories	X	Without bolt group and flange gasket
	A	304 bolt group+flange gasket
Position of switch 1 (L1)	XXXX	Unit: mm, fill with a 0 in the front for those less than four digits, E.G.: 0100
Type of switch 1	A	Normally open type
	B	Normally closed type
	C	Switching type
Position of switch 2 (L2)	XXXX	Unit: mm, fill with a 0 in the front for those less than four digits, E.G.: 0200
Type of switch 2	A	Normally open type
	B	Normally closed type
	C	Switching type
Position of switch 3 (L3)	XXXX	Unit: mm, fill with a 0 in the front for those less than four digits, E.G.: 0300
Type of switch 3	A	Normally open type
	B	Normally closed type
	C	Switching type
Position of switch 4 (L4)	XXXX	Unit: mm, fill with a 0 in the front for those less than four digits, E.G.: 0400
Type of switch 4	A	Normally open type
	B	Normally closed type
	C	Switching type
Position of switch 5 (L5)	XXXX	Unit: mm, fill with a 0 in the front for those less than four digits, E.G.: 0500
Type of switch 5	A	Normally open type
	B	Normally closed type
	C	Switching type
Position of switch 6 (L6)	XXXX	Unit: mm, fill with a 0 in the front for those less than four digits, E.G.: 0600
Type of switch 6	A	Normally open type
	B	Normally closed type
	C	Switching type
Position of switch 7 (L7)	XXXX	Unit: mm, fill with a 0 in the front for those less than four digits, E.G.: 0700
Type of switch 7	A	Normally open type
	B	Normally closed type
	C	Switching type
Position of switch 8 (L8)	XXXX	Unit: mm, fill with a 0 in the front for those less than four digits, E.G.: 0800
Type of switch 8	A	Normally open type
	B	Normally closed type
	C	Switching type

- Typical model 1: MBKLSXAA3A0800DCA-0300C/0500C/0700C
- Typical model 2: MBKSBXFA4F2200DAD-BBGCABXX-0200A/0400A/1800A/2000A

12. Table of MBKT Model

Model parameters	Specification code	Description
Product	MBKT	Magnetic displacer level controller
Housing/cable inlet	S	Die casting Al M20×1.5
	B	Die casting Al 1/2"NPT
Safety certificate	X	No requirement
	O	CNEX: Flameproof type Ex db IIC T6 Gb
	J	EAC: flameproof type 1Ex db IIC T6...T3 Gb X
Material of bypass pipe	A	304
	B	316L
	C	321
Float material	A	304
	B	316L
	C	321
Installation depth	XXXX	Center distance L of connecting flange: unit: mm; range: 0150mm-6000mm
Process temperature	D	-40°C~80°C
	E	-40°C~120°C
	F	20°C~250°C
	G	20°C~350°C
Process pressure (kgf/cm²g)	A	2.5
	B	6.0
	C	16
	D	25
	E	40
	F	63
	G	100
	H	160
Process connection	D	Standard flange
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)
Flange type	A	Flat welding flange (process pressure limited to≤40kgf/cm²)
	B	Lap joint flange (process pressure limited to≤40kgf/cm²)
	C	Butt welded flange

Model parameters	Specification code	Description
Flange size	A	DN15
	B	DN20
	C	DN25
	D	DN32
	N	DN40
	E	DN50
	F	DN80
Pressure rating (kgf/cm^2) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	H	PN63
	J	PN100
	K	PN160
	M	Class150
	N	Class300
Flange sealing face type	A	RF
	B	FM
	C	M
	D	T tongue face
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	RJ ring joint face
Material of flange	A	304
	B	316L
	C	321
Companion flange	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel
Connection accessories	X	Without bolt group and flange gasket
	A	304 bolt group+flange gasket

■ Typical model: MBKTSXBB0950EDD-BCDDABXX

13. Table of MBKC model

Model parameters	Specification code	Description
Product	MBKC	Magnetic float direct-insertion level controller
Housing/cable inlet	S	Die casting Al M20×1.5
	B	Die casting Al 1/2"NPT
Safety certificate	X	No requirement
	O	CNEX: Flameproof type Ex db IIC T6 Gb
	J	EAC: flameproof type 1Ex db IIC T6...T3 Gb X
Material of bypass pipe	A	304
	B	316L
	C	321
Float material	A	304
	B	316L
	C	321
Installation depth	XXX	Unit: mm, range: 080-300mm
Process temperature	D	-40°C~80°C
	E	-40°C~120°C
Process pressure (kgf/cm^2g)	A	2.5
	B	6.0
	C	16
	D	25
	E	40
	F	63
	G	100
	H	160
Process connection	D	Standard flange
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)
Flange size	E	DN50(process pressure limited to<63kgf/cm^2)
	F	DN80
	G	DN100
	H	DN125
	J	DN150

Model parameters	Specification code	Description
Pressure rating (kgf/cm^2) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	H	PN63
	J	PN100
	K	PN160
	M	Class150
	N	Class300
Flange sealing face type	A	RF (recommended)
	B	FM
	C	M
	D	T tongue face
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	RJ ring joint face
Material of flange	A	304
	B	316L
	C	321
Companion flange	X	Without companion flange
	A	304
	B	316L
Connection accessories	X	Without bolt group and flange gasket
	A	304 bolt group+flange gasket

■ Typical model: MBKCBXAA080DAD-AEMAAXX

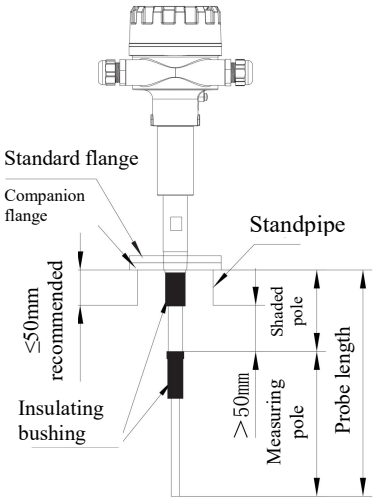
RAS RF Admittance Level Switch



1. Measuring principle

RAS RF admittance level switch consists of a measuring pole, a shaded pole and an earthing pole (the threaded part). When the measuring pole is covered by the material the admittance value will increase, thus the instrument sends switch signal or alarm current signal. The shielded pole is located between measuring pole and earth pole. Its signal waveform is identical with that of the measuring pole. The earth pole is completely isolated from the measuring pole.

When material attaches to the probe, variation of admittance between the measuring pole and the earth pole can be restrained. Meanwhile, only the variation of admittance between the measuring pole and the wall of the container can be sensed so as to eliminate the incorrect signal as the result of the material attached.



2. Product features

- ◆ Highly-universal: Be able to measure the level of liquid and material and extensively applicable to flying ash, particulates, powder, liquid, ropiness, conductivity, non-conducting material; be able to measure under varied temperatures, pressures and with varied media as well as be applicable to harsh sites with corrosion, impact and others;
- ◆ Anti-buildup of material: The circuit is designed uniquely to allow the measuring circuit to ignore the material adhered to the probe and allow for automatic correction;
- ◆ Maintenance-free: There is no mobile component during measuring. There is also no problem such as mechanical damage. It is free from maintenance;
- ◆ **Anti-disturbance**: It supports contacting measurement and has high capacity of resisting disturbance. It can overcome the impact from steam, foam and stirring;
- ◆ Simple installation: The meter can be installed with thread or flange in a simple, easy and quick way.

3. Application industries

RF Admittance Level Switch is widely used. Its typical applications are:

- ◆ Liquid: conductive liquid and insulating liquid (industries: chemical industry, oil field, water and sewage treatment)
- ◆ Slurry: conductive slurry and insulating slurry (industries: papermaking, pharmacy, water and sewage treatment)
- ◆ Powder: cement, flying ash, etc. (industries: power plant, metallurgy, cement)
- ◆ Particulates: coal, cereal, fodder, plastic particulates, etc. (industry: power plant, metallurgy, cereal)

4. Technical characteristics

❖ Operating voltage	• 18V~36V DC (output ripple less than 100mVp-p) • 90V~265V AC 50/60Hz
❖ Power consumption	• <0.8W@24V DC • <5VA@240V AC
❖ Output	• DPDT relay output • 8mA/16mA two-wire output
❖ Relay contact capacity	• 5A/250V AC
❖ Alarm delay	• Adjustable within 0-20s
❖ Measurement range	• 1-3300pF
❖ Resolution	• 0.01pF
❖ Electrical accuracy	• 0.05pF
❖ Stability	• 0.01%/°C
❖ Max. process pressure	• 63kgf/cm²
❖ Process temperature	• -40°C~1,200°C (it can be customized if process temperature is higher than 230°C)
❖ Process connection	• Installation with thread or flange
❖ Load capacity	• ≤51Nm (transverse load capacity of normal temperature type RF admittance) • ≤215Nm (transverse load capacity of high temperature type RF admittance) • ≤20kN (dragging force of wirerope type RF admittance)
❖ Ambient temperature	• Normal temperature working conditions-40°C~80°C, low-temperature working conditions -60°C~80°C (see the Explosion Protection Certificate for ambient temperature of explosion-proof products)
❖ Case protection class	• IP66/IP67
❖ Safety certification information	• Intrinsic safety and explosion proof type Ex ia IIC T2…T4 Ga • Intrinsic safety and dust explosion proof type Ex ia IIIC T_{200} 135°C…T 200 300°C Da • Complex explosion proof type Ex ia/db IIC T2…T4 Ga/Gb • Complex dust explosion proof type Ex ia/tb IIIC T_{200} 135°C…T_{200} 300°C/T135°C Da/Db • EAC: Intrinsic safety and explosion Proof 0Ex ia IIC T4…T2 Ga X • EAC: Intrinsic safety and dust explosion proof type Ex ia IIIC T_{200}135°C…T_{200}300°C Da X • EAC: Complex explosion proof type 0/1Ex ia/db IIC T4…T2 Ga/Gb X • EAC: Complex dust explosion proof type Ex ia/tb IIIC T_{200}135°C…T_{200}300°C/T135°C Da/Db X
❖ Cable entry	• 2 M20×1.5 or 1/2"NPT thread inlet (non-flameproof type: outer diameter of cable limited to 6mm~12mm, flameproof type: outer diameter of cable limited to 8mm~12mm)

5. Installation guide

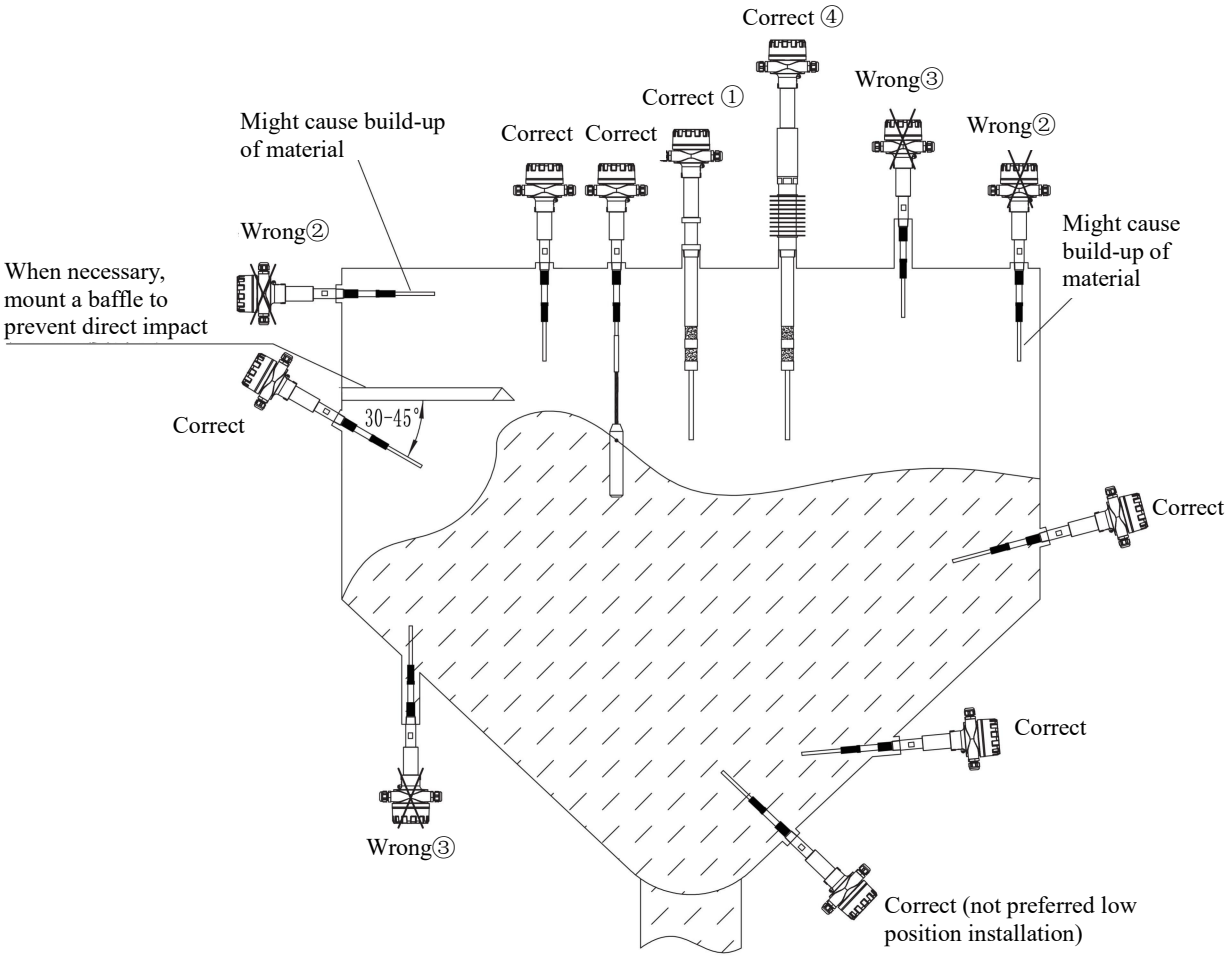
5.1. Selection of installing position

The meter can be installed at top, on the side and at the bottom as shown in the figure below:

◆ "①" and "④" are high temperature probes. During installation, ensure that the ambient air is circulated to ensure the proper radiation of the hot extended part of the meter;

◆ "② "probe represents an improper installation which gets excessively closer to the wall and top of the container. Thus, this can affect the sensitivity of the probe and generate build-up of material between the probe and the wall of container;

◆ "③"probe represents an improper installation where the measuring pole does not reach out of the standpipe. It is highly possible that material may accumulate between the shaded pole and the standpipe and thus the meter can't make proper measurement. The shaded pole should reach out of the standpipe over 50mm.



5.2. Attentions for installation

◆ Feed:

The probe should be installed where it is far away from the feed inlet, so as to reduce effect of build-up of material and impact and avoid wrong action.

◆ Distance to the container wall:

Install the probe at a point far away from the wall of the container so as to prevent the rob probe or cable probe from contacting the wall and thus to avoid forming an enclosed space and accumulating material over time.

◆ Installation in short pipe:

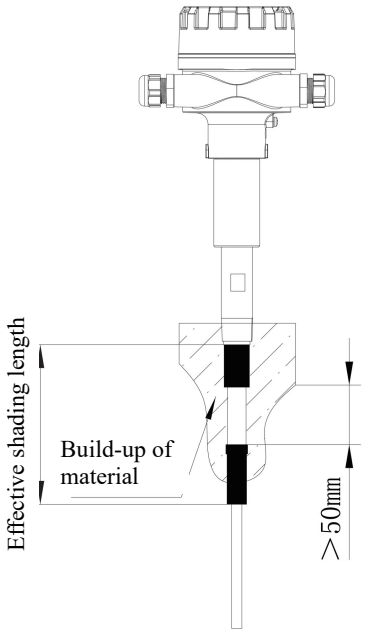
Ensure the length of the shielded pole ≥(height of standpipe + thickness of tank wall +50 mm)

◆ Installation at top:

Make sure of an adequate distance between the probe and the wall of container Avoid forming an enclosed space and accumulating material over time. To use a cable probe, make sure of an adequate distance from the probe to the wall of container to avoid accumulating material over time.

◆ Side installation:

The probe should be installed with a downward inclination of 30°~45° degrees. A protective plate should be used to ensure that the probe is not affected by the impact from the falling material.



◆ Installation at the bottom:

It is not recommended to install the instrument at the bottom of the container. The instrument can be installed at the bottom only when material doesn't accumulate.

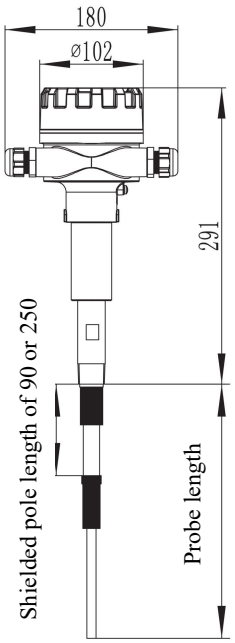
◆ Installation on tank:

When the tank is made of metal, the earth terminal on the housing should be connected with the container; If the tank is non-metallic, the earth terminal of the enclosure should be grounded.

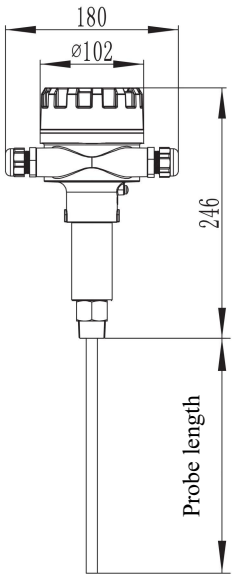
6. Structural size

6.1. Meter size

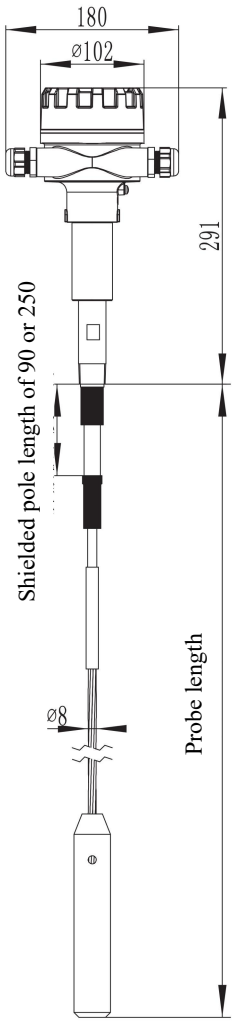
Common type



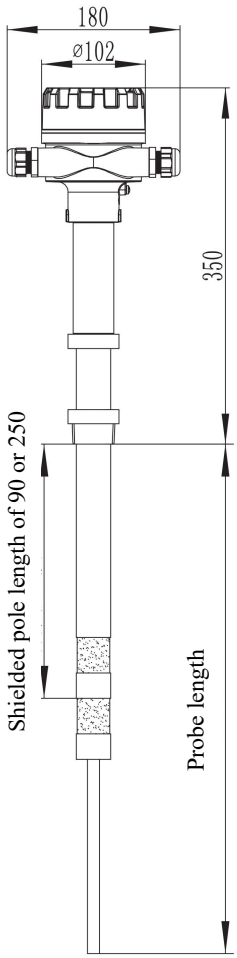
Corrosion resistance/insulating



Wirerope type

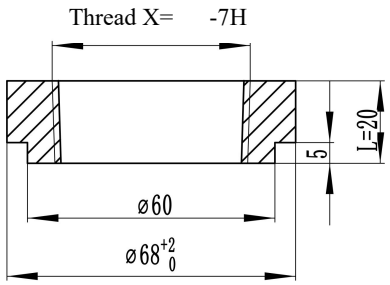


High temperature type



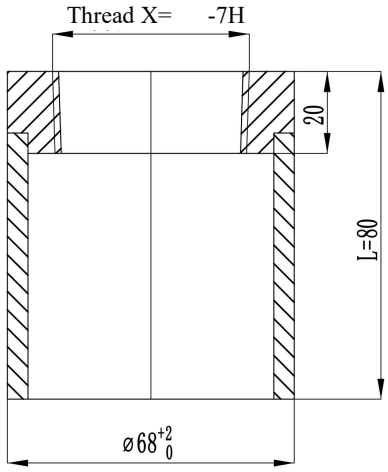
6.2. Size of welding seat

Height of welding seat 20 mm, HS or HC



Note: thread X should be machined as required.

Height of welding seat 80 mm, HA or HD



7. Table of RAS model

Model parameters	Specification code	Description
Product	RAS	RF Admittance Level Switch
Measured medium	L	Liquid
	S	Solid
Housing/cable inlet	S	Die casting Al (cable inlet 2×M20×1.5)
	B	Die casting Al (cable inlet 2×1/2"NPT)
	G	Stainless steel 316 (cable inlet 2×M20×1.5)
	H	Stainless steel 316 (cable inlet 2×1/2"NPT)
Power supply and output	B2	24VDC, 8mA/16mA two-wire output
	B4	24VDC, DPDT relay output
	U4	220VAC, DPDT relay output
	U2	24VDC/220VAC, DPDT relay output
	U6	24V DC, NPN/PNP transistor output
Safety certificate	X	No requirement
	I	Intrinsic safety and explosion proof type Ex ia IIC T2…T4 Ga (B2 only for power supply and output)
	M	Intrinsic safety and dust explosion proof Ex ia IIIC T_{200}135°C…T_{200}300°C Da (B2 only for power supply and output)
	N	Complex explosion proof type Ex ia/db IIC T2…T4 Ga/Gb (B4 or U4 only for power supply and output)
	D	Complex dust explosion proof type Ex ia/tb IIIC T_{200}135°C…T_{200}300°C/T135°C Da/Db (B4 or U4 only for power supply and output)
	E	EAC: Intrinsic safety and explosion Proof 0Ex ia IIC T4…T2 Ga X (B2 only for power supply and output)
	L	EAC: Intrinsic safety and dust explosion proof type Ex ia IIIC T_{200}135°C…T_{200}300°C Da X (B2 only for power supply and output)
	K	EAC: Complex explosion proof type 0/1Ex ia/db IIC T4…T2 Ga/Gb X (B4 or U4 only for power supply and output)
	J	EAC: Complex dust explosion proof type Ex ia/tb IIIC T_{200}135°C…T_{200}300°C/T135°C Da/Db X (B4 or U4 only for power supply and output)
Material of probe	A	304
	B	316L
Type of probe	B	Flat plate type (specially ordered)
	C	Wirerope type (probe length limited to 1-3.5m)
	P	Rod type (probe length limited to 0.15-1m)
Shielded pole length (cm)	A	9(X only for probe protection, probe length limited to ≥20cm)
	B	25 (X only for probe protection, probe length limited to ≥35cm)
	D	0 (A only for probe protection)
	E	40 (X only for probe protection, probe length limited to ≥50cm)
	F	60 (X only for probe protection, probe length limited to ≥70cm)
	G	80 (X only for probe protection, probe length limited to ≥90cm)

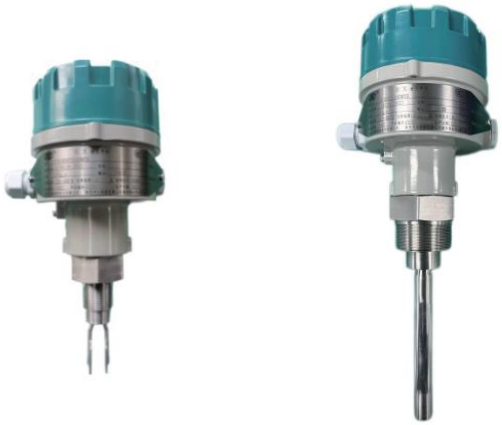
Model parameters	Specification code	Description
Probe length (L)	XXX	Unit: cm, range: 015-350cm, progressive increase of 5 cm)
Probe protection	X	No requirement
	A	Anti-corrosion/insulating (rod type+PFA, D, F only for process temperature)
Process temperature	D	-40°C~80°C
	F	-40°C~230°C
	G	-40°C~400°C (for process pressure M and safety certificate X)
	H	-40°C~800°C (for process pressure M and safety certificate X)
	I	-40°C~1200°C (for process pressure M and safety certificate X)
Process pressure (kgf/cm²g)	L	-1
	M	Atm (atmosphere)
	A	2.5
	B	6
	G	10
	C	16
	D	25
	E	40 (integrated extrusion sensor)
	F	63 (integrated extrusion sensor)
Process connection	TA	3/4"NPT (D, F only for process temperature)
	TN	1-1/4"NPT
	FB	Standard flange
	HS	304 welding seat (L=20 mm)
	HC	Carbon steel welding seat (L=20 mm)
	HA	304 welding seat (L=80 mm)
	HD	Carbon steel welding seat (L=80 mm)
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)
Flange size	A	DN25(1") (D, F only for process temperature)
	B	DN32(1.25") (D, F only for process temperature)
	D	DN40(1.5")
	E	DN50(2")
	C	DN65(2.5")
	F	DN80(3")
	G	DN100(4")
	H	DN125(5")
	J	DN150(6")
	K	DN200(8")
	M	DN250(10")

Model parameters	Specification code	Description
Pressure rating (kgf/cm²) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	H	PN63
	M	Class150
	N	Class300
Flange sealing face type	A	RF (recommended)
	B	FM
	C	M
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	Flat-thin plate flange (8 mm thick, M only for process pressure limited)
Material of flange	A	304
	B	316L
	C	Carbon steel (Q235)
Companion flange (A, B and C options are inherently equipped with 304 bolt , nut, plate washer, flange gasket)	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel (Q235)

Special notes:

- Typical model 1: RASSSB4XAPB050XDATA
- Typical model 2: RASSSB4XAPB050XDAFB-BEBAAX
- Special model: if special selection is required for a certain digit in the model code, fill “Z” in the space of special model in the model code, and “/Z” behind the complete model code; If special accessory is required, please fill "/Z" behind the complete model code. Then, explain all the "digit for special model" and special accessories in words without omission. The text description should be placed in brackets "( )". Before each description, "Zn:" (n = 1, 2, 3, ...) should be used for guidance and each description should be separated by semicolon";". When the specification code has multiple digits, the last digit will be changed to "Z". For example, "TA" will be changed to "TZ".
- Example of special model: RASLSB4XAPZ080XDAFB-BEBAAX/Z (Z1: length of the shielded pole 50cm)

VS Tuning Fork Level Switch



1. Measuring principle

VS tuning fork level switch is a universal level limit switch. The stainless steel tuning fork vibrates at resonant frequency under the excitation of piezoelectric ceramics. The vibration frequency and amplitude of the tuning fork would change when the fork comes into contact with the materials and is gradually sunk into the materials. These changes are detected and processed by the electronic unit, which subsequently outputs a switch signal for indication or control.

2. Product features

- ◆ High adaptability: Varied electric parameters and densities of the materials under measurement do not have any effect on the measuring. Such harsh conditions as scaling, stirring, turbulence, air bubble, vibration, medium viscosity, high temperature, high pressure and others do not have any effect on the detection;
- ◆ Maintenance-free: As the detection is performed by electronic circuit and tuning fork level switch is composed of immobile parts, the tuning fork level switch is free from maintenance once it is installed and put into operation;
- ◆ Adjusting-free: As the detection is free from the effect of electric parameters and density of the medium to be measured, on-site adjustment is not required for whichever liquid is to be measured;

3. Application industries

The tuning fork switch is usually used together with the level meter to control level control.

It mainly aims at the detection of powder and small particle materials with a wide range of density, such as the blockage detection of the inlet and outlet pipes of the dust collector, the material level measurement of the flue-dust retainer of the dust collector, and the limit measurement of plastic, rubber powder, flour, various grains, food and chemical products. It also aims at the limit measurement of liquid of various characters, such as pasty, sticky, foamy and corrosive medium.

4. Technical characteristics

❖ Operating voltage	• 18V~36V DC (output ripple less than 100mVp-p) • 90V~260V AC 50/60Hz
❖ Power consumption	• <0.8W@24V DC • <5VA@240V AC
❖ Output	• DPDT relay output • 8mA/16mA two-wire output
❖ Frequency of vibration	• Liquid tuning fork 1,200 Hz • Solid tuning fork 130Hz • Vibrating rod 350 Hz
❖ Relay contact capacity	• 5A/250V AC
❖ Alarm delay	• Adjustable within 0s~20s
❖ Sensitivity	• Liquid tuning fork: 500 g/l • Solid tuning fork: 10g/l • Vibrating rod: 200 g/l
❖ Stability	• 0.01%/°C
❖ Max. process pressure	• 63kgf/cm²
❖ Process temperature	• -40°C~250°C
❖ Process connection	• 1" NPT (for liquid tuning fork) • 3/4"NPT (only for liquid tuning fork, recommended) • 1-1/2" NPT
❖ Medium viscosity	• ≤10000mm²/s (cSt) (Liquid tuning fork)
❖ Transverse load capacity	• ≤75Nm (liquid tuning fork) • ≤340Nm (solid tuning fork) • ≤130Nm (vibrating rod)
❖ Ambient temperature	• Normal temperature working conditions -40°C~80°C, low-temperature working conditions -60°C~80°C (see the Explosion Protection Certificate for ambient temperature of explosion-proof products)
❖ Case protection class	• IP66/IP67
❖ Safety certification information	• SIL2 • Gas explosion proof Ex db IIC T2…T6 Gb • Dust explosion proof Ex tb IIIC T80°C…T300°C Db • EAC: Gas explosion proof 1Ex db IIC T4…T2 Gb X • EAC: Dust explosion proof Ex ta IIIC T_{200}135°C…T_{200}300°C Da X • EAC: Intrinsic safety and explosion proof 0Ex ia IIC T6…T2 Ga X
❖ Cable entry	• 2 M20×1.5 or 1/2"NPT thread inlet (non-flameproof type: outer diameter of cable limited to 6mm~12mm, flameproof type: outer diameter of cable limited to 8mm~12mm)

5. Installation guide

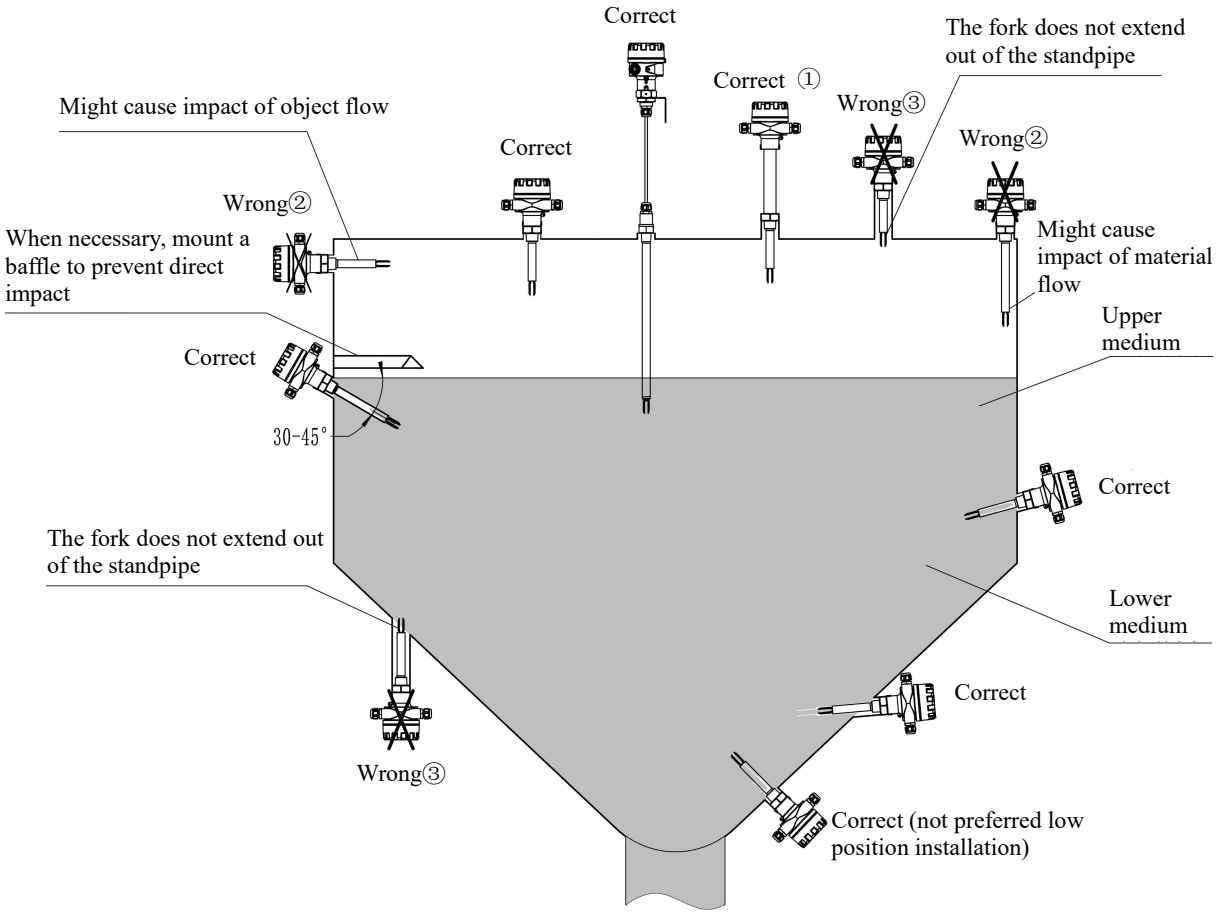
5.1. Selection of installing position

The meter can be installed at top, on the side and at the bottom as shown in the figure below:

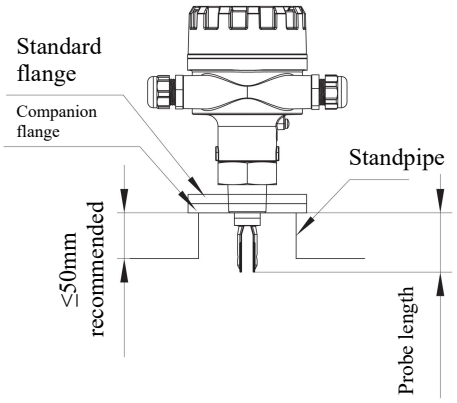
◆ "①" is high temperature probe which is applicable to the site with high temperature that ranges from -40°C~250°C. During installation of high temperature probe, ensure that the ambient air is circulated to ensure the proper radiation of the hot extended part of the meter;

◆ "②"probe represents an improper installation which gets excessively closer to the wall and top of the container. It is likely to generate build-up of material between the probe and the wall of container, as a result, the meter cannot measure properly;

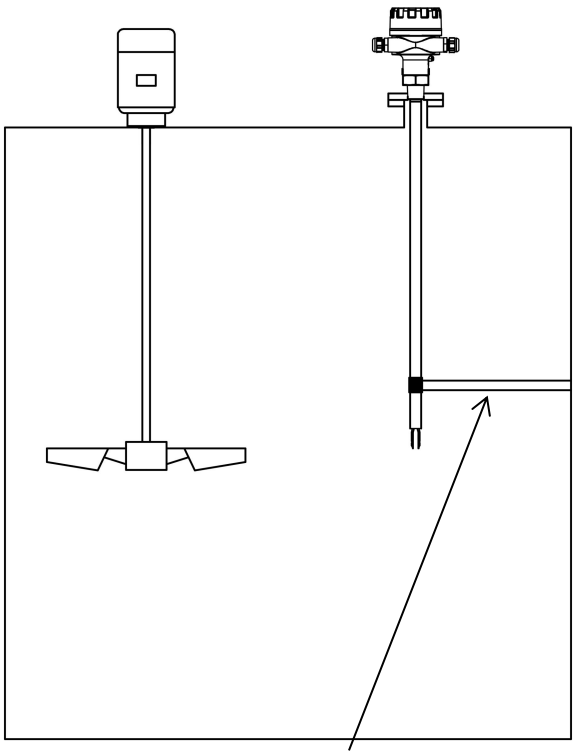
◆ "③" probe represents an improper installation, the fork is not extended out of the standpipe. It is likely to come into contact with the standpipe wall or tank wall, and the material might be accumulated between the fork, as a result, the meter cannot measure properly;



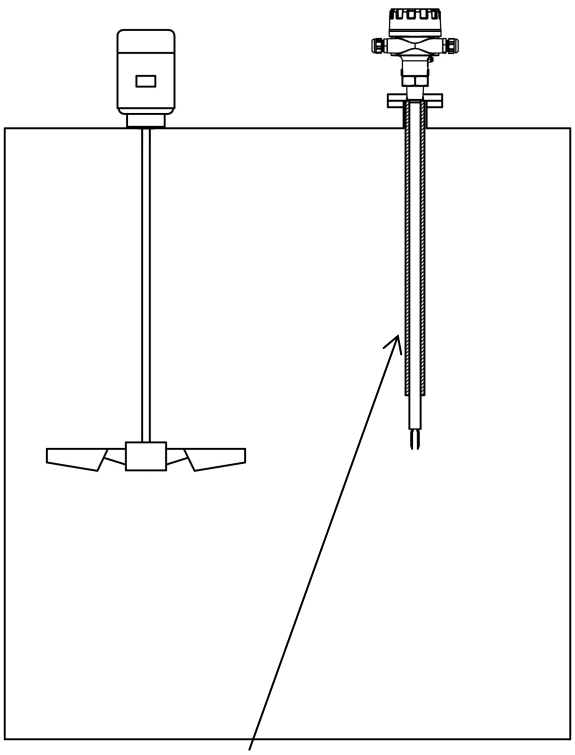
5.2. Attentions for installation



- Disturbance from feed: The probe should be installed far away from the feed inlet, so as to reduce effect of material impact and avoid wrong action due to material flow.
- Disturbance from wall of container: The probe should be installed far away from the container wall to prevent the fork from coming into contact with the container wall after extending into the container and avoid build-up of material between the fork and the container wall over time.
- Installation in standpipe: Make sure that the fork would not come into contact with the mounting standpipe after entering (see the right figure).
- Installation at top: Make sure of an adequate distance from the probe to the container wall to avoid accumulating material over time. To use a cable probe, make sure of an adequate distance from the fork to the wall of container to avoid accumulating material over time.
- Installation on the side: The probe should be installed with a downward inclination of 30 to 45 degrees. A protective plate should be mounted to ensure that the probe is not affected by the impact from the falling material.
- Installation at the bottom: It is not recommended to install the meter at the bottom. The instrument can be installed at the bottom only when material doesn't accumulate.
- When there is a severe dynamic load on the site (liquid tuning fork): vibration from agitation equipment or the equipment may cause the liquid tuning fork switch to be subject to a large side force. Therefore, do not choose an extension pipe that is too long. A tuning fork switch might be installed on the side. If a long extension pipe cannot be avoided, it can be secured by installing a suitable stay bar under the extension tube. You may also make a special request to weld a protective sleeve under the flange for protection. See the figure below.



Support is required to secure the extension pipe

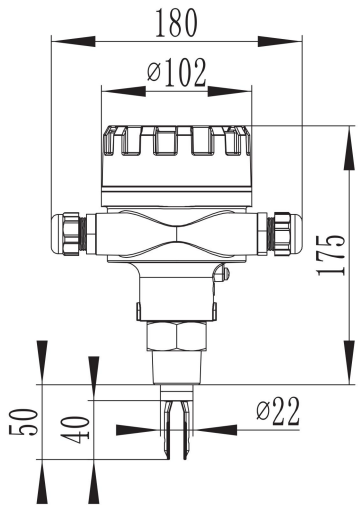


The installation ways of protective sleeve might be increased according to use demands

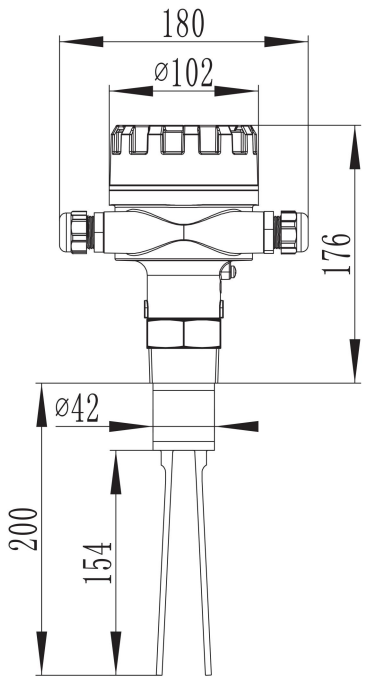
6. Structural size

6.1. Meter size

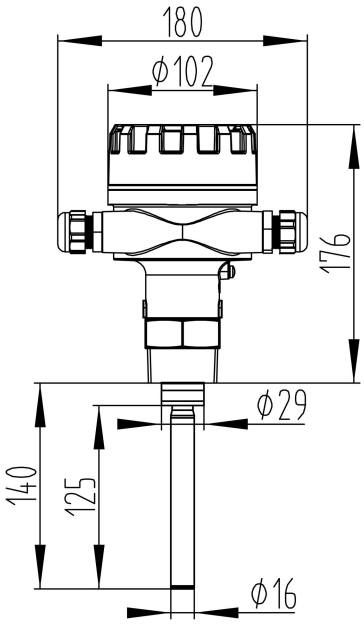
Standard liquid tuning fork



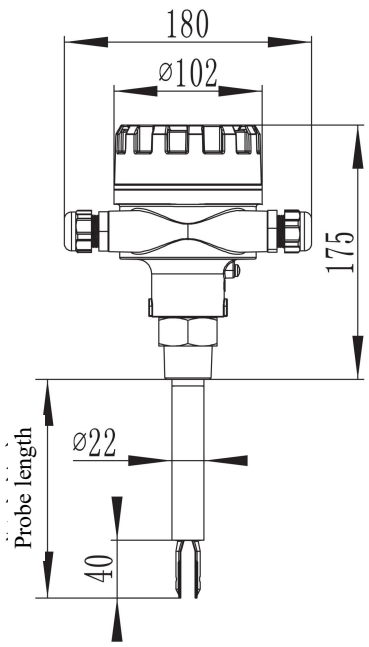
Standard solid tuning fork



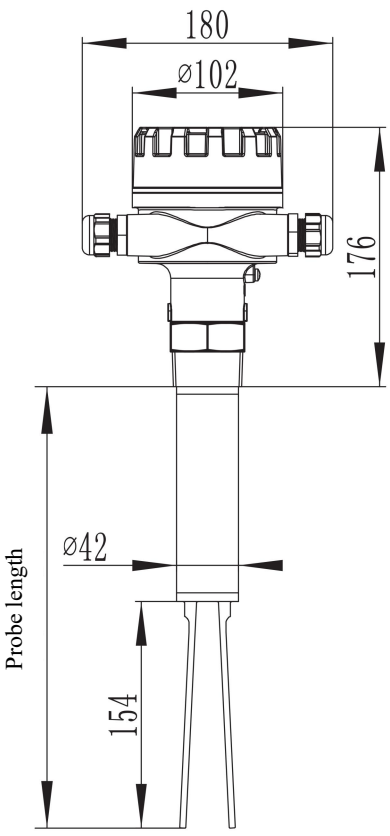
Standard vibrating rod



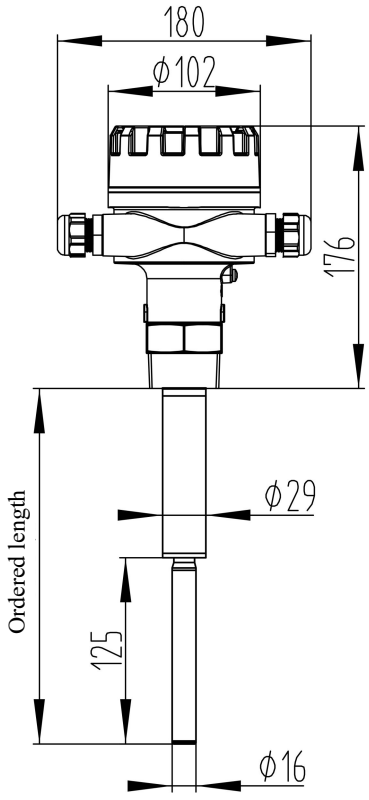
Extended liquid tuning fork



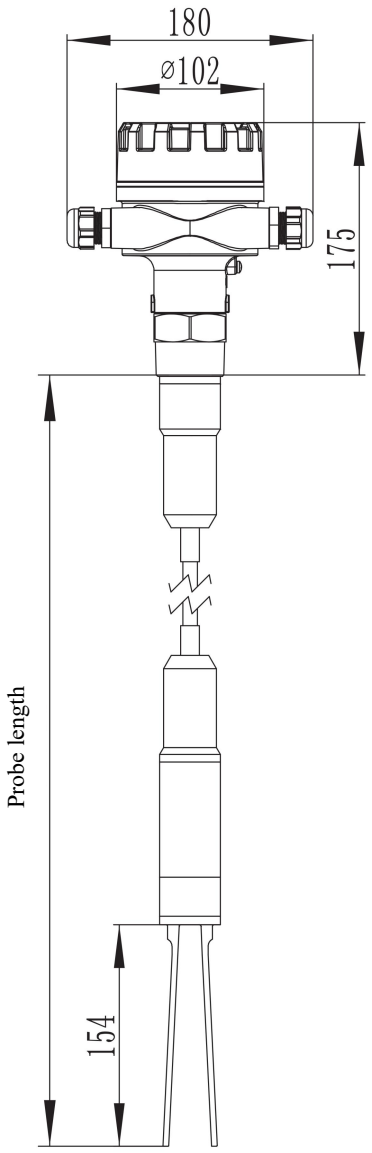
Extended solid tuning fork



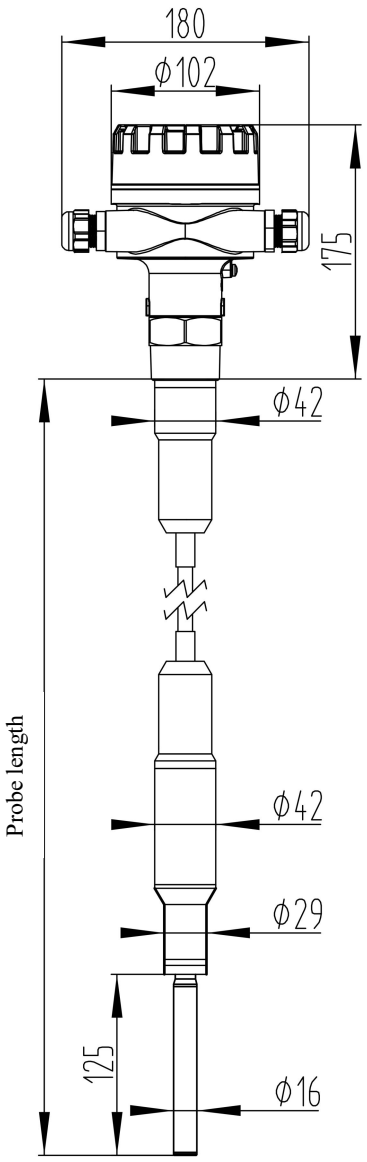
Extended vibrating rod



Cable type solid tuning fork

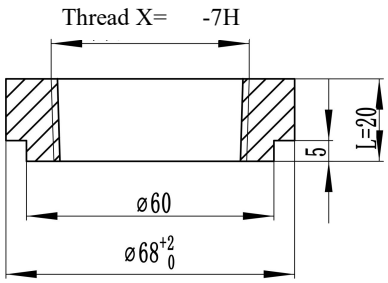


Cable type vibrating rod



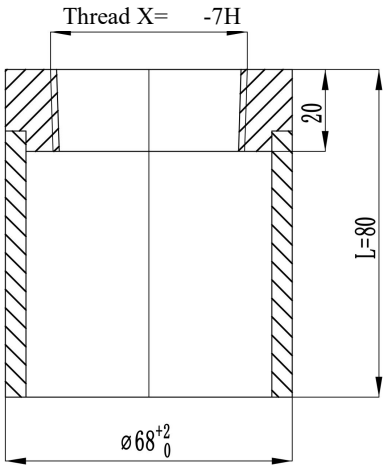
6.2. Size of welding seat

Height of welding seat 20 mm, HS or HC



Note: thread X should be machined as required.

Height of welding seat 80 mm, HA or HD



7. Table of VS model

Model parameters	Specification code	Description
Product	VS	Tuning Fork Level Switch
Measured medium	P	Liquid (liquid tuning fork), probe length limited to ≥50 mm
	S	Solid (solid tuning fork), probe length limited to ≥200 mm
	R	Solid (vibrating bar), probe length limited to ≥140 mm
Housing/cable inlet	S	Die casting Al (cable inlet 2×M20×1.5)
	B	Die casting Al (cable inlet 2×1/2"NPT)
	G	Stainless steel 316 (cable inlet 2×M20×1.5)
	H	Stainless steel 316 (cable inlet 2×1/2"NPT)
Power supply and output	B2	24VDC, 8mA/16mA two-wire output
	B4	24VDC, DPDT relay output
	U4	220VAC, DPDT relay output
	U2	24VDC/220VAC, DPDT relay output
	U6	24V DC, NPN/PNP transistor output
	N2	Namur output
Safety certificate	X	No requirement
	D	Gas explosion proof Ex db IIC T2…T6 Gb
	N	Dust explosion proof Ex tb IIIC T80°C…T300°C Db
	I	Intrinsic safety explosion proof type: Ex ia IIC T6 Ga (N2 only for power supply and output) EAC: Intrinsic safety and explosion proof 0Ex ia IIC T6…T2 Ga X (for power supply and output N2)
	J	EAC: Gas explosion proof 1Ex db IIC T4…T2 Gb X
	K	EAC: Dust explosion proof Ex ta IIIC T_{200}135°C…T_{200}300°C Da X
Material of probe	A	304
	B	316L
	C	316L liquid-contacting component lined with fluorine ECTFE(D, E only for process temperature)
	D	316L liquid-contacting components lined with fluorine PFA
Type of probe	P	Rod type(probe length limited to ≤4m， it should be customized when probe length >2m)
	C	Cable type(probe length limited to>0.5m, for installation at top: only)
Probe length (L)	XXX	Unit: cm, fill with a 0 in the front for those less than three digits, E.G.: 015
Process temperature	D	-40°C~80°C
	E	-40°C~150°C
	F	-40°C~250°C (for probe type P)

Model parameters	Specification code	Description
Process pressure (kgf/cm²g)	L	-1
	M	Atm (atmosphere)
	A	2.5
	B	6
	G	10
	C	16
	D	20
	E	40 (P only for the measured medium)
	F	63 (P only for the measured medium, A and B only for probe material)
Process connection	TA	1"NPT (P only for the measured medium)
	TB	3/4"NPT (P only for the measured medium, recommended)
	TN	1-1/2"NPT
	FB	Standard flange
	HS	304 welding seat (L=20 mm)
	HC	Carbon steel welding seat (L=20 mm)
	HA	304 welding seat (L=80 mm)
	HD	Carbon steel welding seat (L=80 mm)
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)
Flange size	A	DN25(1")(P only for the measured medium)
	B	DN32(1.25") (for measured medium P, R)
	D	DN40(1.5")(P and R only for the measured medium)
	E	DN50(2")
	C	DN65(2.5")
	F	DN80(3")
	G	DN100(4")
	H	DN125(5")
	J	DN150(6")
	K	DN200(8")
	M	DN250(10")

Model parameters	Specification code	Description
Pressure rating (kgf/cm^2) (The process pressure should not be higher than the flange pressure rating and the maximum allowable process pressure)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	H	PN63
	M	Class150
	N	Class300
Flange sealing face type	A	RF (recommended)
	B	FM
	C	M
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	Flat-thin plate flange (8 mm thick, M only for process pressure limited)
Material of flange	A	304
	B	316L
	C	Carbon steel (Q235)
Companion flange (A, B and C options are inherently equipped with 304 bolt , nut, plate washer, flange gasket)	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel (Q235)

Special notes:

- Typical model 1: VSPSB4XAP020DMTB
- Typical model 2: VSPSB4XAP020DMFB-BECAAX
- Special model: if special selection is required for a certain digit in the model code, fill “Z” in the space of special model in the model code, and “/Z” behind the complete model code; If special accessory is required, please fill "/Z" behind the complete model code. Then, explain all the "digit for special model" and special accessories in words without omission. The text description should be placed in brackets "( )". Before each description, "Zn:" (n = 1, 2, 3, ...) should be used for guidance and each description should be separated by semicolon";". When the specification code has multiple digits, the last digit will be changed to "Z". For example, "TA" will be changed to "TZ".
- Example of special model: VSPSB4XAP020DMFB-ZEHZAX/Z (Z1: GB/T 9124.1-2019; Z2: T sealing face)

RS Rotary Paddle Level Switch (Solid)



1. Measuring principle

RS rotary paddle level switch's synchronous motor drives the spindle and paddle through the reduction gear. When the solid material to be measured contacts or covers the paddle, the rotation of the blade is blocked, the resistance is transmitted to the detector inside the meter through the spindle, and the detector outputs a switch signal to the outside and cuts off the power supply of the motor to stop the paddle. The resistance of the paddle disappears when the materials leave. The detector restores to the original state by virtue of the spring tension and the paddle restores rotation. The rotary paddle level switch can measure material of wide specific gravity by adjusting the spring tension. Increase the spring tension in case of large specific gravity; otherwise reduce the spring force.

2. Product features

- ◆ Supported by bearing which offers more reliable operation;
- ◆ Ingenious sealing design which keeps dust from penetrating along the shaft
- ◆ Adjustable steady and reliable torque
- ◆ The clutch starts to slip to prevent the motor from being damaged in case the paddle is overloaded
- ◆ It is not necessary to remove the whole meter away from the site when the internal components need to be checked or maintained
- ◆ IP65 design of excellent sealing property offers reliable outdoor installation and usage

3. Application industries

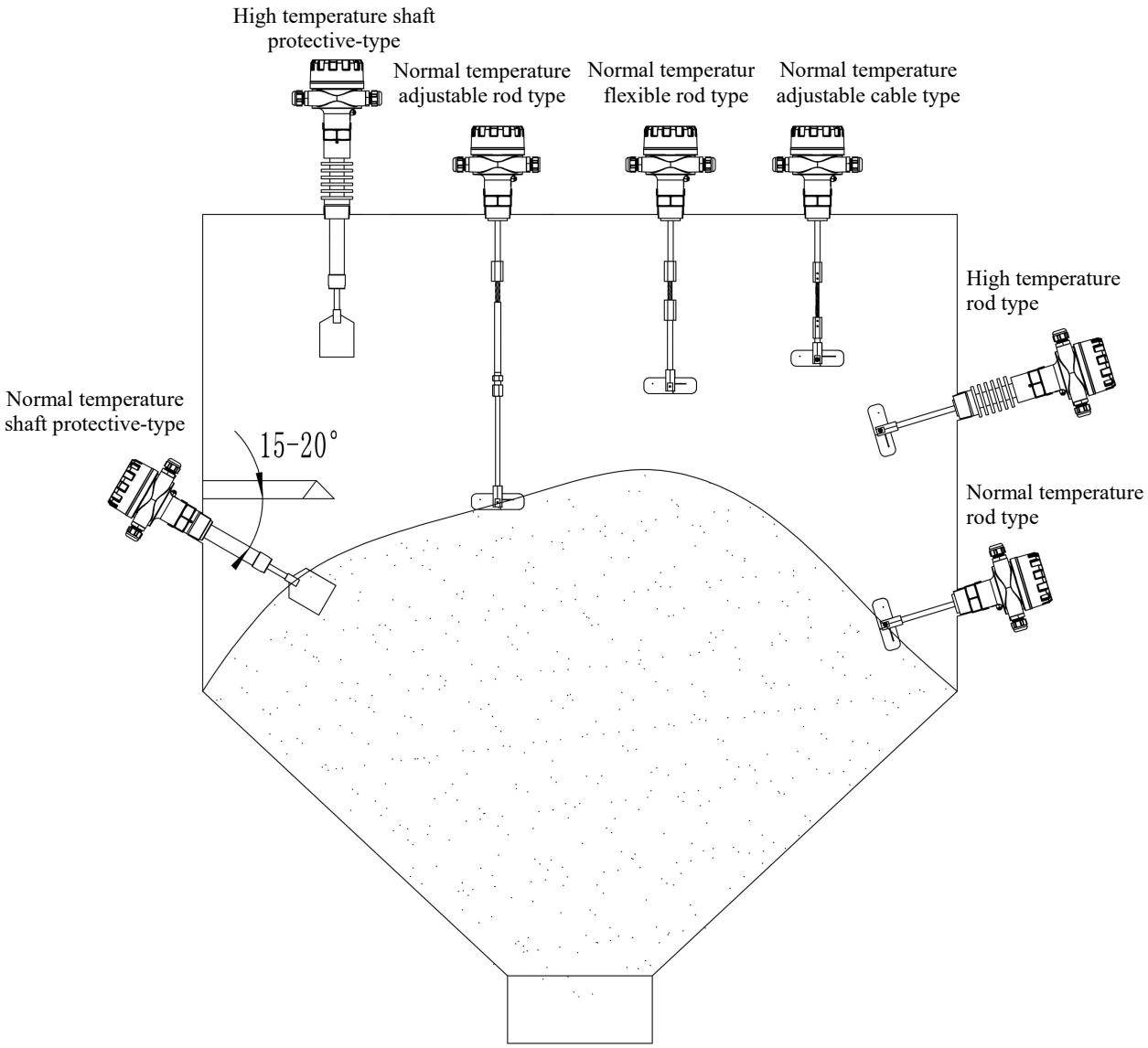
- ◆ Plastic industry: dust, particle, grain cluster, etc.
- ◆ Building industry: limestone, foamed polystyrene, molding sand, urea, cement, gypsum, magnetite
- ◆ Food industry: milk powder, flour, salt, bran, minerals, herbs, rice
- ◆ Paper/pulp industry: wood, sawdust, etc.
- ◆ Chemical industry: rubber, coating, foam
- ◆ Iron and steel industry: iron ore, coal, coke, sand

4. Technical characteristics

❖ Operating voltage	• 24V DC (output ripple less than 100mVp-p) • 220V AC 50/60Hz
❖ Power consumption	• 4W
❖ Output	• SPDT (single-pole double-throw output)
❖ Relay contact capacity	• 5A/250V AC
❖ Paddle speed	• 1RPM (r/min)
❖ Alarm torque	• 1.0kgf·cm
❖ Density of material	• ≥0.5g/cm³
❖ Process temperature	• -40°C~400°C
❖ Process connection	• 1-1/2"NPT • Installation with flange
❖ Load capacity	• ≤10Nm (transverse load capacity of rod type rotary paddle level switch) • ≤209Nm (transverse load capacity of Shaft protection type rotary paddle level switch) • ≤2.6kN (dragging force of other types of rotary paddle level switches, vertical installation)
❖ Ambient temperature	• -40°C~80°C
❖ Case protection class	• IP65
❖ Process pressure	• Atmosphere
❖ Insulation resistance	• ≥50MΩ
❖ Safety certification information	• SIL2 • Gas explosion proof: Ex db IIC T1…T4 Gb • Dust explosion proof: Ex tb IIIC T135°C…T450°C Db
❖ Cable entry	• 2 M20×1.5 or 1/2"NPT thread inlet (non-flameproof type: outer diameter of cable limited to 6mm-12mm, flameproof type: outer diameter of cable limited to 8mm-12mm)

5. Installation guide

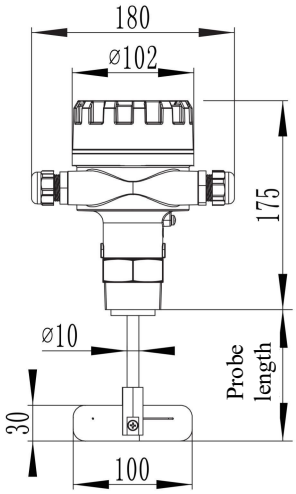
- ◆ Attentions for installation: The case outlet must be installed downward.
- ◆ The cable must be fixed and tightened with nuts.
- ◆ Flexible rod type, flexible adjustable rod type and wirerope type rotary paddle level switches are only applicable to installation at top.
- ◆ In case of side installation, the meter can be installed downward 15°~20°, to reduce the impact of material on the probe.
- ◆ When measuring massive materials, it is recommended to weld a steel plate on the warehouse wall above the probe, so as to reduce the impact of materials on the probe.
- ◆ In case of side installation and probe length ≥300mm, it is recommended to weld a steel plate of enough strength on the warehouse wall above the probe, so as to reduce the impact of materials on the probe and avoid damage to the probe.
- ◆ Installation in a place of minimum vibration and away from the vibration source can extend the service life of the equipment.



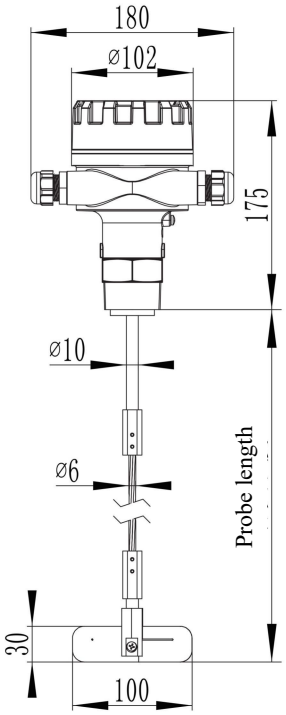
6. Structural size

6.1. Meter size

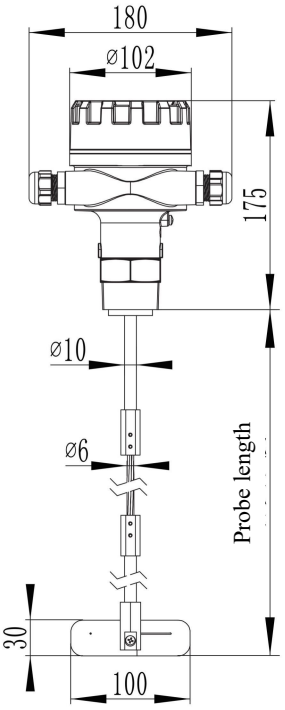
Normal temperature standard type



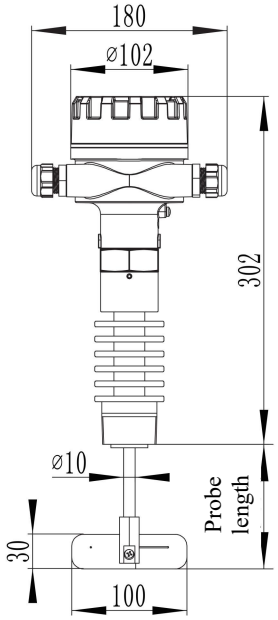
Normal temperature steel cable type



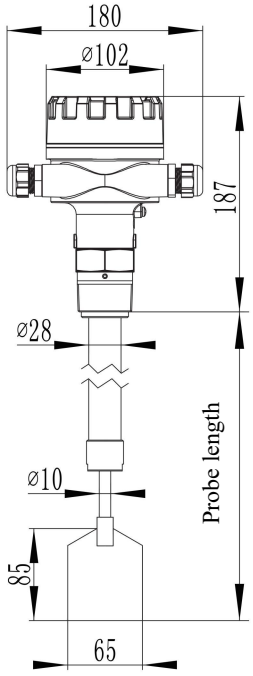
Normal temperature adjustable cable type



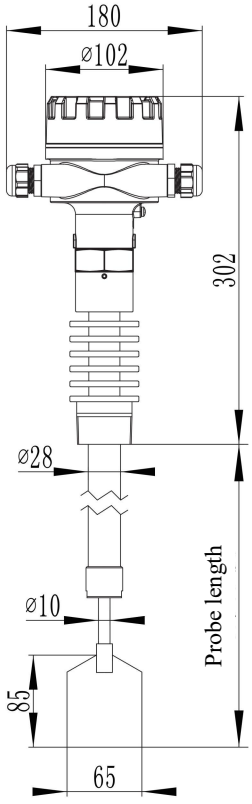
High temperature standard-type



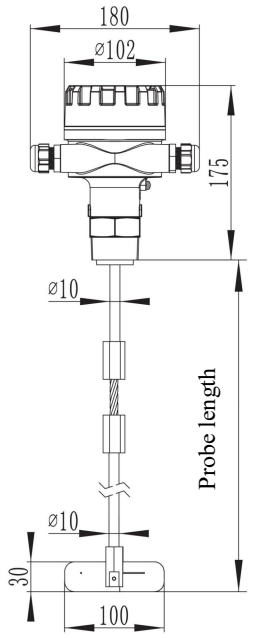
Normal temperature shaft protective-type



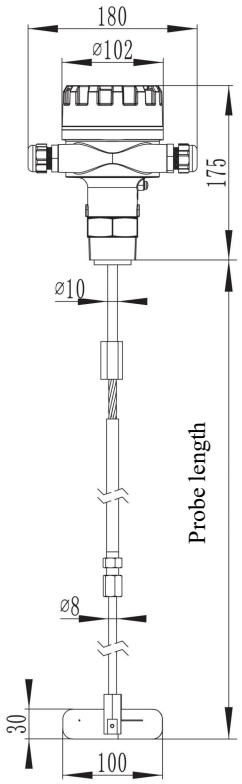
High temperature shaft protective-type



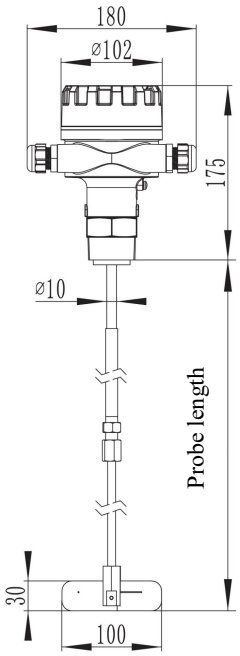
Normal temperature flexible rod type



Normal temperature flexible adjustable rod type

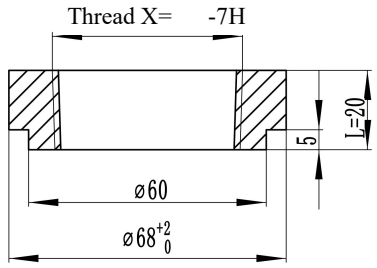


Normal temperature adjustable rod type

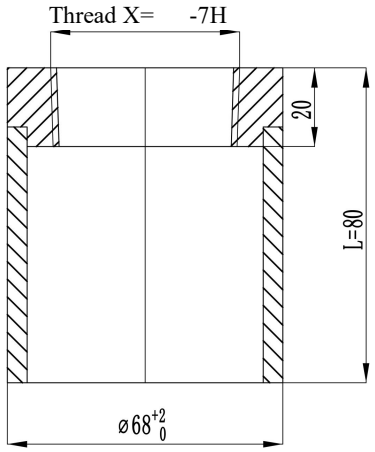


6.2. Size of welding seat

Height of welding seat 20 mm, HS or HC



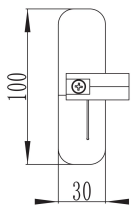
Height of welding seat 80 mm, HA or HD



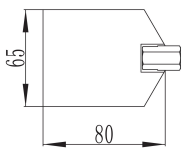
Note: thread X should be machined as required.

6.3. Blade size

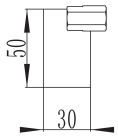
Spring paddle



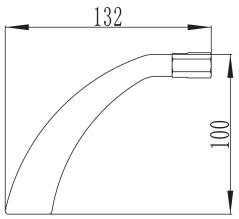
Ladder-type paddle



L-type paddle



Sickle-type paddle



Special note: Extended spring paddle (applicable to special working condition of light powder)

7. Table of RS model

Model parameters	Specification code	Description
Product	RS	Rotary paddle level switch
Power	B	24V DC
	U	220V AC
Safety certificate	X	No requirement
	O	Gas explosion proof: Ex db IIC T1…T4 Gb
	N	Dust explosion proof: Ex tb IIIC T135°C…T450°C Db
Output selection/probe material	S	SPDT (single-pole double-throw) output /304 material
	B	SPDT (single-pole double-throw) output /316L material
	H	SPDT (single-pole double-throw) output/(single-pole double-throw) output C22 material
Housing/cable inlet	S	Die casting Al (cable inlet 2×M20×1.5)
	B	Die casting Al (cable inlet 2×1/2"NPT)
	G	Stainless steel 316 (cable inlet 2×M20×1.5)
	H	Stainless steel 316 (cable inlet 2×1/2"NPT)
Process temperature	D	-40°C~80°C
	F	-40°C-200°C
	G	-40°C~400°C
Sensor type	A	Rod
	B	Cable type
	C	Adjustable cable type
	D	Shaft protective-type
	E	Flexible rod type (shot cable rod type)
	F	Flexible adjustable rod type (short cable adjustable rod type)
	G	Adjustable rod type
Paddle type	A	Spring paddle
	B	Ladder-type paddle
	C	L-type paddle
	D	Sickle-type paddle
	E	Extended spring paddle (for light ash working condition)

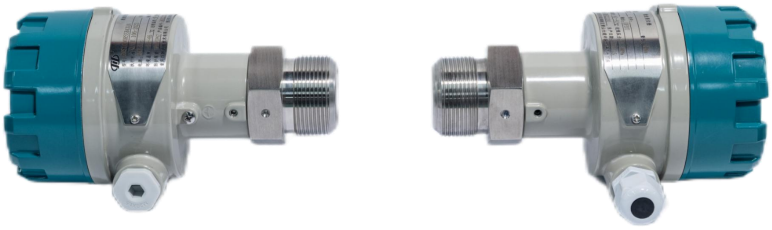
Model parameters	Specification code	Description
Probe length (cm)	015	(for standard rod type, A only for sensor type)
	020-070	(for extended rod type, A only for sensor type, progressive increase by 10 cm)
	070-300	(for cable type, B only for sensor type, progressive increase by 10 cm)
	120-350	(for adjustable cable type, C only for sensor type, progressive increase by 10 cm, with an adjustable scope of 50 cm, the probe length refers to the maximum length that the probe can be extended)
	070-150	(for Shaft protection type, D only for sensor type, progressive increase by 10 cm)
	040-150	(for flexible rod type, E only for sensor type, progressive increase by 10 cm)
	150-250	(for flexible adjustable rod type and rod type, F, G only for sensor type, progressive increase by 10 cm, with an adjustable scope of 50 cm, the probe length refers to the maximum length that the probe can be extended)
Process connection	TN	1-1/2"NPT
	FB	Standard flange
	HS	304 welding seat (L=20 mm)
	HC	Carbon steel welding seat (L=20 mm)
	HA	304 welding seat (L=80 mm)
	HD	Carbon steel welding seat (L=80 mm)
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)
Flange size	D	DN40(1.5")
	E	DN50(2")
	C	DN65(2.5")
	F	DN80(3")
	G	DN100(4")
	H	DN125(5")
	J	DN150(6")
	K	DN200(8")
	M	DN250(10")
Pressure rating (kgf/cm^2)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	H	PN63
	M	Class150
	N	Class300

Model parameters	Specification code	Description
Flange sealing face type	A	RF (recommended)
	B	FM
	C	M
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	Flat- thin plate flange (thickness 8mm)
Material of flange	A	304
	B	316L
	C	Carbon steel (Q235)
Companion flange (A, B and C options are inherently equipped with 304 bolt , nut, plate washer, flange gasket)	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel (Q235)

Special notes:

- Typical model 1: RSBXSSDAA030TN
- Typical model 2: RSBXSSDAA030FB-BGCAAX
- Special model: if special selection is required for a certain digit in the model code, fill “Z” in the space of special model in the model code, and “/Z” behind the complete model code; If special accessory is required, please fill "/Z" behind the complete model code. Then, explain all the "digit for special model" and special accessories in words without omission. The text description should be placed in brackets "( )". Before each description, "Zn:" (n = 1, 2, 3, ...) should be used for guidance and each description should be separated by semicolon";". When the specification code has multiple digits, the last digit will be changed to "Z". For example, "TN" will be changed to "TZ".
- Example of special model: RSBXSSDAA030TN/Z (Z1: with L100/304/1.5NPT welding seat)

GMS1000 Microwave Barrier



1. Measuring principle

The microwave barrier consists of transmitter and receiver. The transmitter and the receiver are installed in pairs at the position where the material is to be monitored. A specific microwave energy beam is transmitted from the transmitter to the receiver. If the microwave energy beam is absorbed or reflected in the transmission, the receiver will be unable to detect the microwave energy beam signal. The receiver controls the relay according to the appearance or disappearance of the microwave energy beam to achieve the purpose of indication or control.

2. Product features

- ◆ Strong orientation: 24 GHz microwave beam of good orientation is adopted;
- ◆ Span: the measuring distance can be up to 100 m;
- ◆ Mode of power supply: AC and DC power supply are available;
- ◆ Process temperature With the addition of the radiator, the maximum process temperature can reach 800°C;
- ◆ Adjustable delay: adjustable time delay of 0.5 s to 20 s;
- ◆ Highly protective: waterproof, dustproof, chemical corrosion proof.

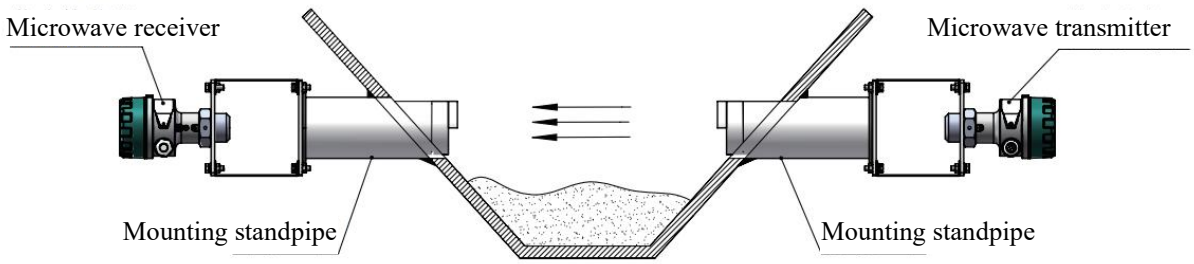
3. Scope of application

- ◆ Chute blockage detection
- ◆ Low level detection, high level detection
- ◆ Conveyor item detection
- ◆ Overload detection of rail/truck
- ◆ Anti-collision detection of lift
- ◆ Blockage detection of viscous material in feed pipe
- ◆ Level measurement of calcium carbide, acetylene tank
- ◆ Flow/stop detection

4. Technical characteristics

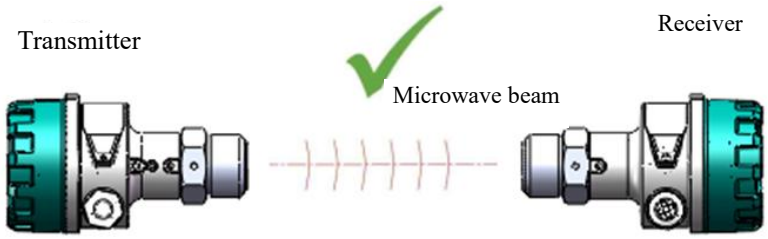
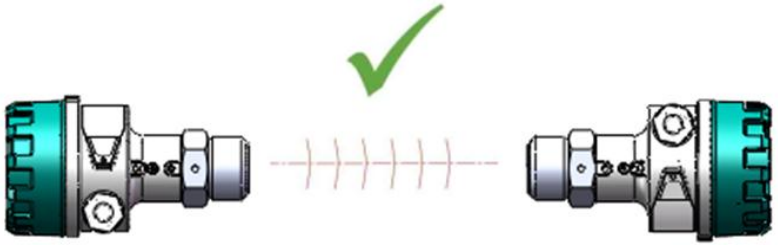
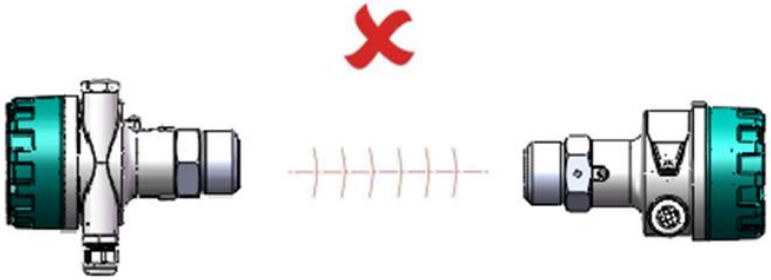
❖ Operating voltage	• 18V~36V DC (output ripple less than 100mVp-p) • 90V~260V AC, 50/60Hz
❖ Power consumption	• Transmitter<2 W, receiver<3 W
❖ Output mode	• DPDT relay output
❖ Relay contact capacity	• 5A/250V AC
❖ Measuring range	• 0.2m-40m/0.2m-100m
❖ Microwave frequency	• 24GHz
❖ Beam angle	• 20°
❖ Alarm mode	• High level alarm/low level alarm
❖ Alarm delay	• 0.5s~20s
❖ Ambient temperature	• -30°C~65°C
❖ Process temperature	• -40°C~80°C (radiator is installed, because the maximum temperature reaches 800°C)
❖ Max. process pressure	• 25kgf/cm²
❖ Indication of power state	• Green LED display
❖ Indication of level alarm	• Red LED indicator display
❖ Degree of protection	• IP66/IP67
❖ Cable entry	• 2 M20×1.5 or 1/2"NPT thread inlet (non-flameproof type: outer diameter of cable limited to 6mm-12mm, flameproof type: outer diameter of cable limited to 8mm-12mm)
❖ Housing material	• aluminum casting
❖ Process connection	• G1-1/2" male thread, or 4 installation holders with 10 mm holes • Standard flange • With UHMW or PTFE window weldment • Ceramic window component • Firebrick window component
❖ Safety certification information	• Ex db IIC T6 Gb • Ex tb IIIC T80°C Db

5. Installation example



6. Installation angle

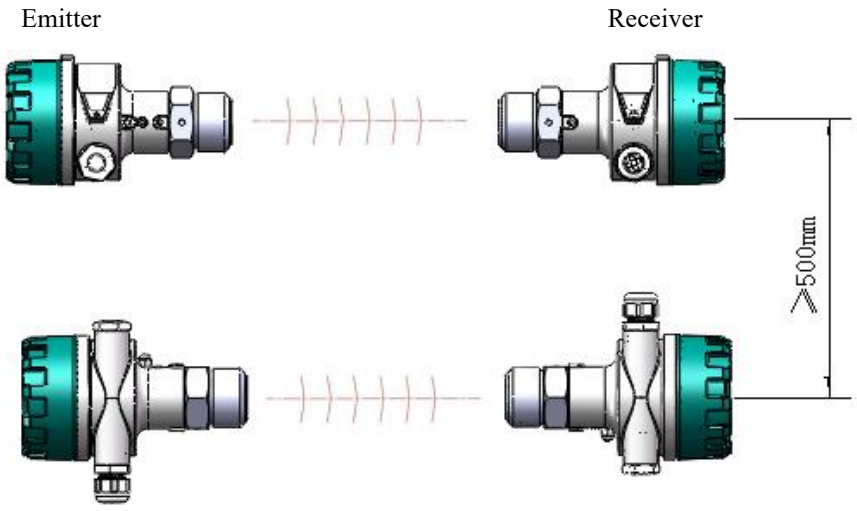
Because the microwave beam is directional, the transmitter and the receiver installed in pairs must have the same angle in the axial direction or rotate at a dislocation of 180°. If the dislocation is 90°, the receiver cannot receive the microwave beam signal.

Description	Schematic diagram
The transmitter and the receiver are installed at the same angle	
The transmitter and the receiver are installed at a dislocation angle of 180°	
The transmitter and the receiver are installed at a dislocation angle of 90°	

Note: The installation dislocation angle of transmitter and receiver in the axial direction should be controlled within 0±5° or 180±5°.

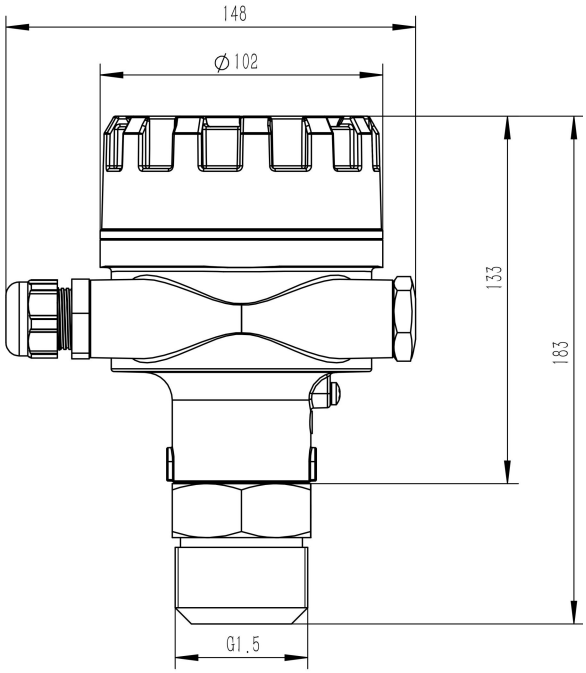
7. Installation of multiple equipment

To install several pairs of microwave barriers in close proximity, each of the two adjacent pairs of limit grids should be installed with an offsetting of 90°, and the center distance should be maintained at more than 500 mm.

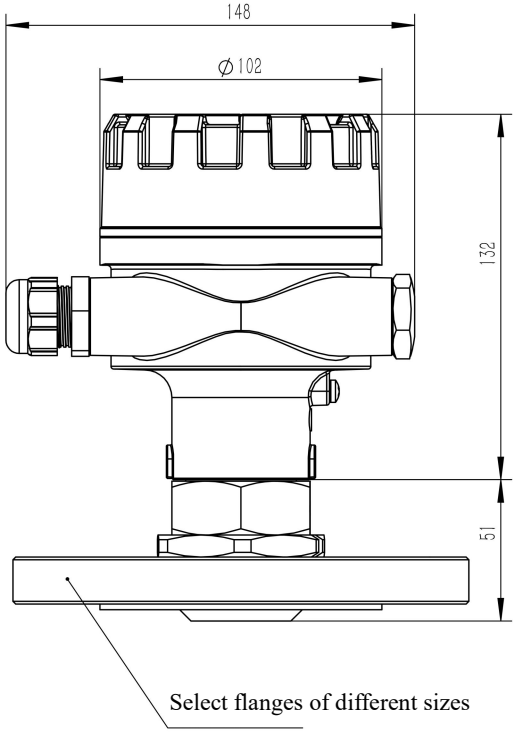


8. Structural size

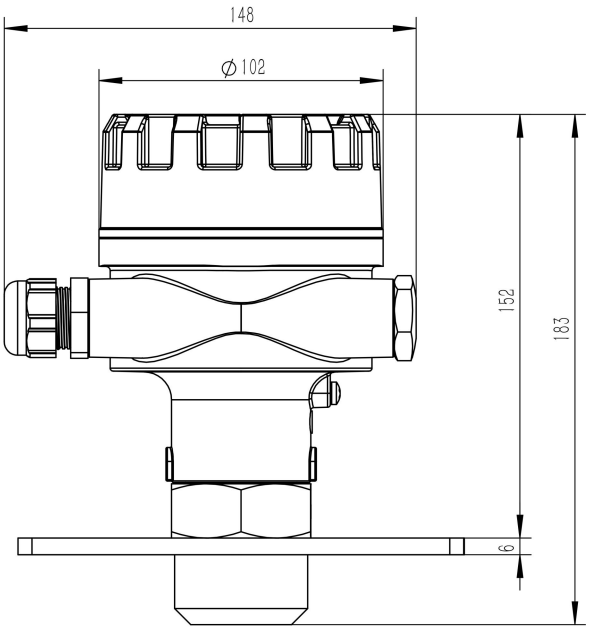
Installation with thread

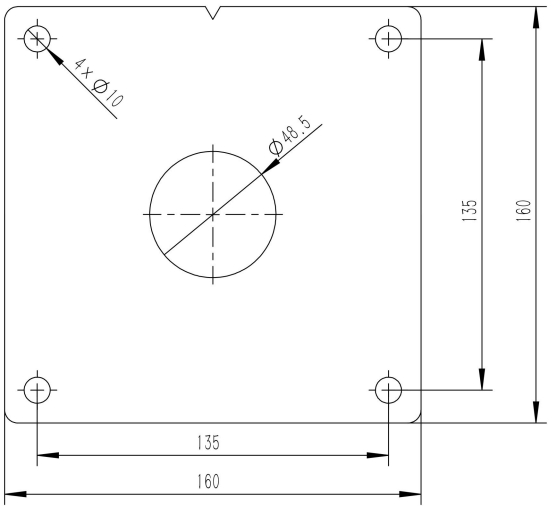


Installation with flange



Installation with holder





9. Table of GMS model

Model parameters	Specification code	Description
Product	GMS1000	Microwave barrier
Classification of functions	T	Emitter
	R	Receiver
Measured medium	L	Liquid
	S	Solid
Housing/cable inlet	S	Die casting Al (cable inlet 2×M20×1.5)
	B	Die casting Al (cable inlet 2×1/2"NPT)
	G	Stainless steel 316 (cable inlet 2×M20×1.5)
	H	Stainless steel 316 (cable inlet 2×1/2"NPT)
Power supply and output	B4	24V DC, DPDT relay output
	U4	220V AC, DPDT relay output
Safety certificate	X	No requirement
	D	Gas explosion proof: Ex db IIC T6 Gb
	N	Dust explosion proof: Ex tb IIIC T80°C Db
Sensor material	A	304+PTFE
	B	304+ceramics
Maximum span	A	40m
	B	100 m
Installation accessories	M01	Calcium carbide inclined standpipe (carbon steel)
	M11	Calcium carbide vertical standpipe(carbon steel)
	M02	Acetylene inclined standpipe (carbon steel)
	M12	Acetylene vertical standpipe (carbon steel)
	M03	Blast furnace inclined standpipe(carbon steel)
	M04	Flange pipe (carbon steel)
	M05	Microwave mounting base (carbon steel, thread installation for sensor)
	M06	Standard flange
	M07	Installation with holder
Flange standard	A	HG/T20615-2009 (Class series)
	B	HG/T20592-2009 (PN series)

Model parameters	Specification code	Description
Flange size	E	DN50(2")
	F	DN80(3")
	G	DN100(4")
	H	DN125(5")
	J	DN150(6")
	K	DN200(8")
	M	DN250(10")
Pressure rating (kgf/cm²)	A	PN2.5
	G	PN6
	B	PN10
	C	PN16
	D	PN25
	F	PN40
	H	PN63
	M	Class150
	N	Class300
Flange sealing face type	A	RF
	B	FM
	C	M
	E	FF flat (flange pressure rating limited to be ≤PN16)
	F	Flat- thin plate flange (thickness 8mm)
Material of flange	A	304
	B	316L
	C	Carbon steel (Q235)
Companion flange (A, B and C options are inherently equipped with 304 bolt , nut, plate washer, flange gasket)	X	Without companion flange
	A	304
	B	316L
	C	Carbon steel (Q235)

Special notes:

- Typical model 1: GMS1000TSSB4DAA
- Typical model 2: GMS1000TSSB4DAA-M01
- Typical model 3: GMS1000RSSB4DAA-M06-BECAAX
- Special model: if special selection is required for a certain digit in the model code, fill “Z” in the space of special model in the model code, and “/Z” behind the complete model code; If special accessory is required, please fill "/Z" behind the complete model code. Then, explain all the "digit for special model" and special accessories in words without omission. The text description should be placed in brackets "( )". Before each description, "Zn:" (n = 1, 2, 3, ...) should be used for guidance and each description should be separated by semicolon";". When the specification code has multiple digits, the last digit will be changed to "Z". For example, "M01" will be changed to "M0Z".
- Example of special model: GMS1000TSSB4DAA-M02/Z (Z1: 20mm thick bakelite as the riser shield)

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