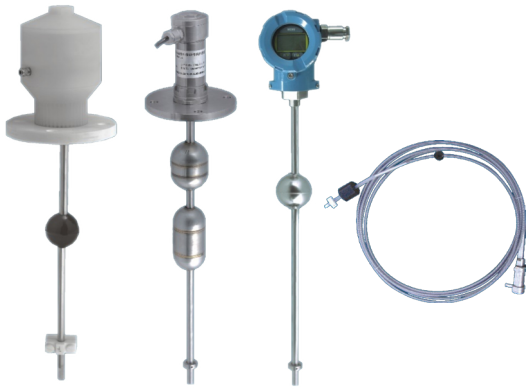
MLM Series
Magnetostrictive Level Sensor



Features

- Highly accurate, highly repeatable measurements
- Absolute output, restart without zeroing
- Multiple signal options, fully isolated design, anti-RF interference can measure multiple position and temperature points at the same time
- Zero point and full scale are 100% adjustable within the range
- No need for regular calibration and maintenance
- Flexible and easy installation
- High dirt resistance, suitable for harsh industrial environment
- Rigid stem structure, good pressure-bearing performance
- Flexible structure, can be displayed with meter head in the field

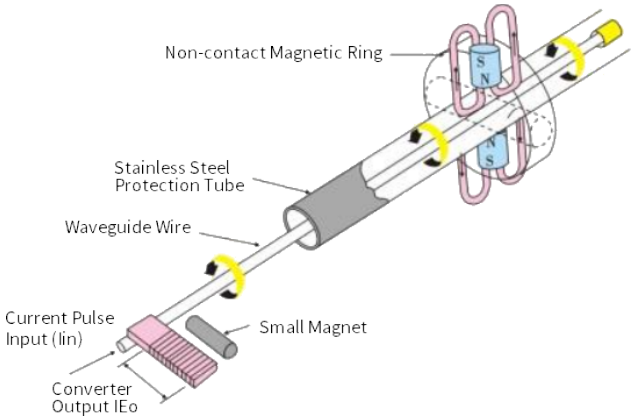
Introduction

MLM type magnetostrictive level sensor is a new generation of liquid level sensor developed by applying magnetostrictive principle (referred to as “magnetic scale”) and combining advanced digital circuit. The product has high measurement accuracy, stable and can work reliably. It can measure multiple liquid levels and temperature points, with compact structure, simple installation. The measurement data can be transmitted over long distances, which is convenient for networking and participation in control. The magnetic scale output is the true absolute position, no need for periodic recalibration maintenance, and no need to reset to zero during the measurement process.

MLM series products can provide a variety of signal outputs such as current, voltage, Modbus, two-wire system, etc., which can provide customers with effective solutions in different applications, as well as rich experience in product application. It can be widely used for level dosage and control of various liquid tanks in petroleum, water conservancy, pharmaceutical, food and beverage industries, hydrological monitoring, water treatment and other environmental protection and industrial processes in the measurement and monitoring of liquid level and interface.

Working Principle

MLM magnetostrictive level sensor mainly consists of magnetostrictive wire (hereinafter referred to as waveguide wire), a measuring rod, an electronic bin and a float set on the measuring rod. The float can go up and down along the measuring rod with the change of liquid level, and there is a set of permanent magnetic ring inside the float. When the sensor works, the electronic circuit in the electronic compartment generates a "start pulse", which is transmitted at a constant speed along the waveguide wire, and at the same time generates a rotating magnetic field along the waveguide wire that follows the pulse. This causes the waveguide wire made of magnetostrictive material to generate a torsional wave pulse at the position of the float, which travels back along the wire at a fixed speed and is detected by the detection mechanism. By measuring the time difference between the pulse current and the torsion wave, the position of the float, i.e. the liquid level, can be precisely determined.



In Modbus output and 2-wire with HART protocol level sensors, a high-precision digital temperature sensor is installed in the measuring rod according to the distribution position of the measuring point, and in addition to measuring the level height, the temperature of the measured liquid at multiple points can also be measured simultaneously.

Analog Output Product

Application

- A variety of analog signal output options are available
- Simultaneous detection of liquid level and interface
- Lower operating current
- Flexible structure, suitable for large storage tank level measurement with high range

Specifications

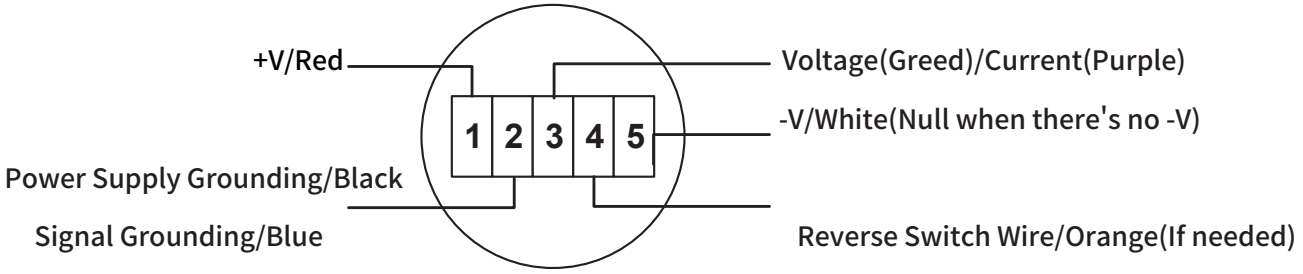
- Measurement Medium:1 to 2 positions
- Power Supply:24V DC, ±15V DC,
  12V ~ 24V DC,
  (±10% floating) optional Output
- Rod Structure:50mm ～ 5000mm
- Flexible Structure:4000mm ～ 20000mm
  (can be customized according to user requirements, more than 5000mm is recommended to use flexible measuring rod, easy to transport and installation)
  Load characteristics
- Current:Max. load resistance 600Ω
- Voltage:Max. load current 2mA
- Working Current: ＜ 70mA
- Operating Temperature:-40°C～ 85°C
- Storage Temperature:-40°C～ 100°C
- Non-linearity: ＜ ±0.05%F.S.;
  Maximum error 150um for range below 300mm
- Repeatability: ＜ ±0.002%F.S.
- Resolution:16Bit D/A conversion
- Hysteresis: ＜ ±0.002%F.S.
- Temperature Effect: ＜ ±0.007%F.S./℃
- Zero Adjustable Range:100%F.S.
- Update time/sampling Frequency:Depend on range, not more than 20ms
- Rod Construction:Rigid rod construction, flexible rod construction, anti-corrosion rod construction
- Rod Material:Stainless steel 304, stainless steel 316, PTFE
- Rod Pressure:Determined by the selected float pressure
- Material Of Electronic Cabin:Stainless steel
- Electronic Cabin Structure:
  A type electronic cabin (rigid structure, recommended to be used above 3000mm range)
  B type electronic cabin (rigid structure, standard configuration)
  C type electronic cabin (rigid structure, suitable for small space occasions)
  D type electronic cabin (anti-corrosion structure, suitable for corrosive environment)
  K-type electronic cabin (rigid structure, special electronic housing with local display)
- Installation Interface:Threaded connection
- Electrical Connection:Straight out cable, aviation plug, terminal block
- Explosion Sign:Exd II BT5 (flameproof type)
- Protection Class:IP65 (IP67 or IP68 can be customized)

Electrical Connection

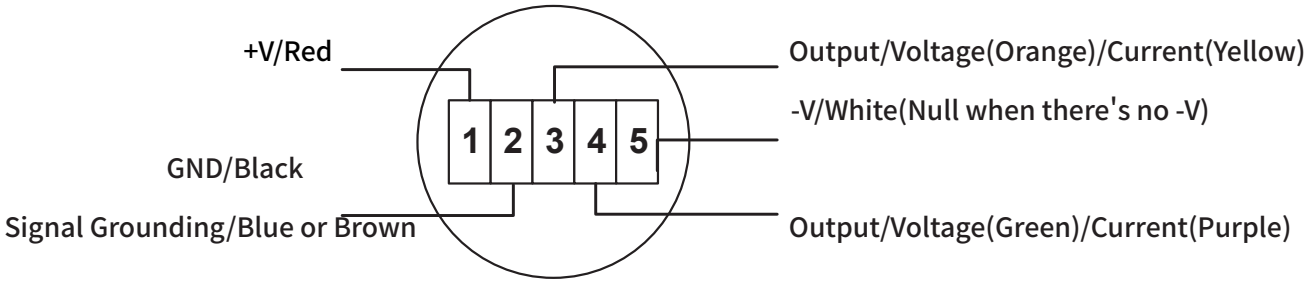
For Straight Out Cable Connection

Cable Color	Meaning	
	Single Position Output	Double Single Position Output
Red	24V DC/15V DC power supply	
Black	Power supply grounding	
White	-15V DC(Positive and negative power supplies need to be connected)	
Orange	Reverse switch wire (can be set via push button if not provided)	Position 1 voltage signal line
Green	Position voltage signal line	Position 2 voltage signal line
Yellow	/	Position 1 current signal line
Purple	Position current signal line	Position 2 current signal line
Brown	/	Position 1 signal grounding
Blue	Positon signal grounding	Position 2 signal grounding
Bare Wire	Shielded Wire	

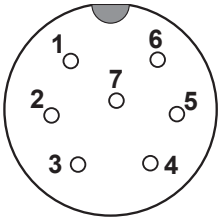
Wire Terminal Electrical Definition



Wiring diagram of single position output wiring terminal



Aviation Plug Electrical Definition

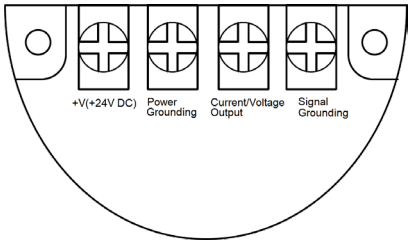


Male Connector (Magnetic scale connection end)

Wiring diagram of double position output wiring terminl

Pin No.	Wire Definition	
	Single Position Output	Double Position Output
1	24V DC	
2	Power supply grounding	GND
3	Position signal output	Position 1 signal output
4	Signal grounding	Position 1 signal output
5	Shielded wire	Shielded wire
6	Null	Null
7	Reverse switch wire(or null)	Reverse switch wire(or null)

Electrical Definition Of Specialized Electronic Housing Terminal



Note:

1. Each sensor should provide a power supply that meets the requirements of the product separately;
2. The shielded cable of the sensor must avoid high-power supply, radio frequency signals and other noisy transmission cables;
3. The shielded wire of the cable must be intact and unbroken, and connected to the ground terminal of the subsequent equipment;
4. The cable length should be customized according to the required length to avoid segmented wire connection.

Order Guide(Analog Output Product)

MLM- Magnetostrictive Liquid Level Sensor

Code	Safety Type
P	Standard
G	Explosion-proof type

Code	Working Voltage
1	24V DC(±10%)
2	15V DC(±10%)
3	±15VDC(±10%)
4	Special(12V ～ 24V DC optional)

Code	Output	Float No.	Function
V - - - - Voltage Output	01=0V ～ 10V DC; 05=0V ～ 5V DC; 55=-5V ～ +5V DC; 11=-10V ～ +10V DC;	1=Single 2=Double	0=Forward(Zero point near the end of the probe) 1=Reverse(Zero point near the electronic cabin)
A - - - - Current Output	42=4mA ～ 20mA DC 02=0mA ～ 20mA DC	1=Single 2=Double	0=Forward(Zero point near the end of the probe) 1=Reverse(Zero point near the electronic cabin)

Code	Rod Structure
G	Rigid rod structure
F	Anti-corrosion rod structure
R	Flexible rod structure

Code	Electronic Cabin
A	A type electronic cabin(rigid structure, recommended for range over 3000mm)
B	B type electronic cabin(rigid structure, standard configuration)
C	C type electronic cabin(rigid structure, recommended for small space installation)
D	D type electronic cabin(anti-corrosion structure, recommended for corrosive environment)
K	K type electronic cabin(rigid structure, special electronic housing with local display)

Code	Measuring Range
....M (Unit: mm)	For G, F structure: 50 ～ 5000mm For R structure: 4000 ～ 20000mm; customized.

Code	Process Connection	
0	None	For G structure
1	M18×1.5	
2	M20×1.5	
3	English Standard: 3/4-16UNF	
7	M27×2	For R structure
F	PTFE	For D structure
X	Special thread	

Code	Electrical Connection
C	Direct Wire Outlet
J	Wiring Terminals (side exit only)
H	Aviation Plug (not applicable to explosion-proof type)

Code	Outlet Direction
0	Top outlet
1	Side outlet

Code	Cable Length
–	0 ～ 9(X=special length, unit: m; default is 3m cable)

Code	Accessory(see attached sheet)	
A	FK-1	For G structure
B	FK-2	
C	FK-3	
D	FK-4	For R structure
F	Anti-corrosion electronic cabin	For D structure
W	None	

Code	Float Type(see attached float list)
——	0: No float 1: Level float 2: Interface float X: Special float

MLM-	P	1	A4210-	G	C	01000M	X	C	1	5-	W	X	Whole Spec.

Order Note

1. When selecting the code, the measured medium should be compatible with the product part that contacts the medium.

2. Code example: MLM-P1M920W-RA11500M7J3D1 means standard level sensor, 24V DC power supply,

4mA~20mA 2-wire output, rigid rod structure, short electrical cabin, measuring range 1000mm(1150mm in total), G1" thread, side outlet 5m, special float.

3. When selecting the product, please refer to the standard "Code Example", and note that "-" should not be omitted and "0" should be added in front of the range less than 5 digits.

ModBus Output Product

Application

- Long transmission distance and less susceptible to interference.
- The product can support up to 3 locations and 5 temperature points to measure simultaneously.
- Multiple devices share one data line.
- Intrinsic safety standard: Exia IIB T5

Specification

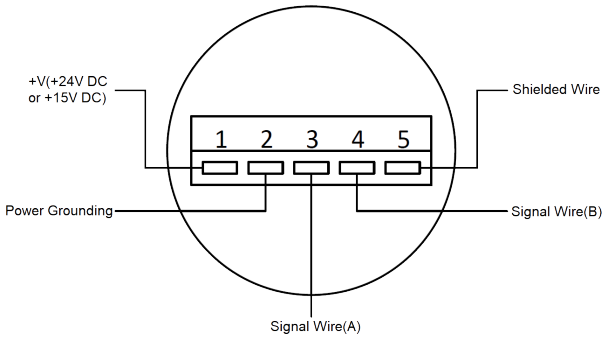
- Measurement medium:1 ～ 3 position,1 ～ 5 temperature point(s)
- Transmisstion mode:RTU
- Bitrate:Cable length ＜ 1000m ＜ 1200m ＜ 1500 ～ 2000m
  Corresponding bitrate 19200bps 9600bps 4800bps
- Power Supply:24V DC(±10%)
- Effective Measuring Range:Rod construction 50mm ～ 5000mm
  Flexible structure 4000mm ～ 20000mm(customized)
- Temperature Measuring Range:-40°C～ 85°C
- Communication Interface:Standard EIA-RS485/RS422
- Working Current: ＜ 40mA
- Working Temp. :-40°C～ 85°C
- Storage Temp. :-40°C～ 100°C
- Intrinsically Safe Parameters (explosion-proof type)
  Power safety grille parameters: Ui=28V DC, Ii=93mA, Pi=0.65W, Ci=0.034μF, Li=1.8mH
  Signal safety grille parameters: Ui=10V DC, Ii=200mA, Pi=0.5W, Ci=0μF, Li=0mH
- Non-linearity: ＜ ±0.05%F.S.; max.150μm for range below 300mm
- Repeatability: ＜ ±0.002%F.S.
- Resolution: ＜ 4μm
- System Resolution:Determined by the resolution of the display or controller
- Hysteresis: ＜ 4μm
- Temperature Effects: ＜ ±0.007%F.S./°C
- Zero Adjustable Range:100%F.S.
- Update Time/Sampling Frequency:Range-dependent, not more than 20ms
- Temperature Measurement Accuracy:±0.5°C (-10°C～ 85°C)
- Measuring Rod Structure:Rigid measuring rod structure, flexible measuring rod structure, anti-
- corrosion measuring rod structure
- Rod Material:Stainless steel 304, stainless steel 316, PTFE
- Pressure Resistance Of The Measuring Rod:Determined by the selected float pressure
- Material Of Electronic Cabin:Stainless steel 304
- Structure Of Electronic Cabin:
  A Type(rigid structure, recommended for range over 3000mm)
  B type electronic cabin(rigid structure, standard configuration)
  C type electronic cabin(rigid structure, recommended for small space installation)
  D type electronic cabin(anti-corrosion structure, recommended for corrosive environment)
  K type electronic cabin(rigid structure, special electronic housing with local display)
- Installation Interface:Thread connection, can be customized
- Electrical Connection:Cable outlet, aviation plug, wiring terminals
- Explosion Sign:Exd II BT5(flame-proof), Exia IIB T5(intrinsically safe)
- Protection Class:IP65(IP67 or IP68 is optional)

Electrical Connection

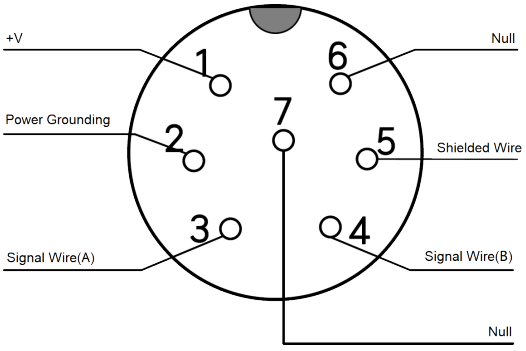
Cable outlet:

Wire Color	Function
Red	+V
Black	Power Grounding
Orange	Signal Wire(A)
Blue	Signal Wire(B)

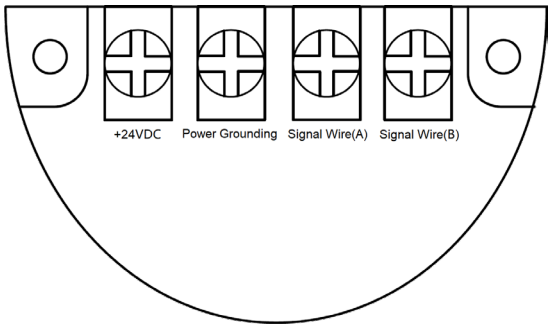
Wiring terminals:



Aviation plug:



Specialized electronic housing terminal blocks:

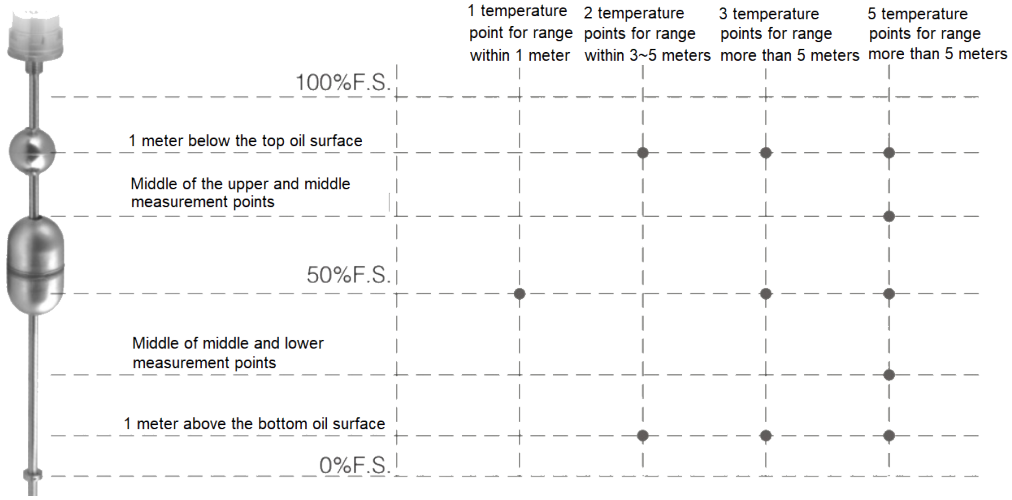


Note:

1. Each sensor should preferably be provided with a separate power supply that meets the product requirements.
2. The shielded cable wire of the sensor must avoid high-power power supplies, RF signal sources and other noisy transmission cables.
3. The shielded cable must be intact without disconnection and connected to the earth end of the subsequent equipment.
4. The cable should be customized in accordance with the required length, to avoid segmented wire connection.

Temperature Point Installation Location

For the installation position of temperature point, it can be specified by the customer. If no special designation is made, it is recommended to install according to the provisions of "GB8927-88 Petroleum and Liquid Petroleum Products Temperature Measurement Method", which is the "standard solution" defined in our selection table, as shown in the following figure.



Note: 2-wire products with HART protocol are also suitable for this temperature point installation scheme.

Order Guide(Modbus Output Product)

MLM-	Magnetostrictive Liquid Level Sensor

Code	Safety Type
P	Standard
G	Explosion-proof type
B	Intrinsically safe type

Code	Power Supply
1	24VDC(±10%)
2	15VDC(±10%)
3	Customized(12VDC ～ 24VDC optional)

Code	Communication Baud Rate	Number of Floats	Temperature Points	Location of Temp. Points
M - - - - (ModBus RTU Output)	9=9600bps 4=4800bps 1=-19200bps	1=Single Float 2=Double Floats 3=Triple Floats	0=None 1…5 temperature measuring points (1~5 points optional)	W=None S=Standard P=Average distribution X=Customized

Code	Probe Structure
G	Rigid rod structure
F	Anti-corrosion rod structure
R	Flexible rod structure

Code	Electronic Cabin
A	A type electronic cabin(rigid structure, recommended for range over 3000mm)
B	B type electronic cabin(rigid structure, standard configuration)
C	C type electronic cabin(rigid structure, recommended for small space installation)
D	D type electronic cabin(anti-corrosion structure, recommended for corrosive environment)
K	K type electronic cabin(rigid structure, special electronic housing with local display)

Code	Measuring Range
....M (Unit: mm)	For G, F structure: 50 ～ 5000mm For R structure: 4000 ～ 20000mm; customized.

Code	Process Connection	
0	None	Suitable for G Structure
1	M18×1.5	
2	M20×1.5	
3	English Standard 3/4-16UNF	
7	M27×2	Suitable for R Structure
F	PTFE Flange	Suitable for D Structure
X	Special Thread	

Code	Electrical Connection
C	Direct Wire Outlet
J	Wiring Terminals (side exit only)
H	Aviation Plug (not applicable to explosion-proof type)

Code	Outlet Direction
0	Top outlet
1	Side outlet

Code	Cable Length
_	0 ～ 9(X=special length, unit: m; default is 3m cable)

Code	Accessory(see attached sheet)	
A	FK-1	Suitable for G Structure
B	FK-2	
C	FK-3	
D	FK-4	Suitable for R Structure
F	Anti-corrosion electronic cabin	Suitable for D Structure
W	None	

Code	Float Type(see attached float list)
——	0:No float 1:Level float 2:Interface float 1 3:Interface float 2 X:Special float

MLM-	P	1	M920W-	R	A	11500M	7	J	1	3-	D	1	Whole Spec.

Order Note

1. When selecting the code, the measured medium should be compatible with the product part that contacts the medium.

2. Code example: MLM-P1M920W-RA11500M7J3-D1 means standard level sensor, 24V DC power supply, Modbus-RTU output, bit rate 9600bps, double floats, flexible probe structure, A type electrical cabin, measuring

range 1500mm, M27×2 thread, side outlet 3m, FK-4 accessory.

3. When selecting the product, please refer to the standard "Code Example", and note that "-" should not be omitted and "0" should be added in front of the range less than 5 digits.

2-wire Output Product(With Hart Protocol)

Application

- High precision, high stability, high reliability, high resolution
- 4mA ～ 20mA DC 2-wire output optional HART protocol
- Simple installation and commissioning, easy maintenance
- Compact structure, strong environmental adaptability, dirt-proof, dust-proof, waterproof
- Reverse polarity protection, lightning protection, anti-RF interference

Specification

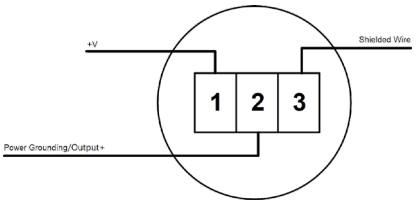
- Measuring Object:1 position (also optional with HART protocol)
- Power Supply:24V DC (±10%)
- Effective Measuring Range:Rod structure, anti-corrosion structure 50mm ～ 4000mm
  Flexible structure 4000mm ～ 20000mm (customized)
- Working Temperature:Without indicator -40°C～ 85°C , with indicator -20°C～ 70°C
- Working Current:4mA ～ 20mA DC
- Storage Temperature:-40°C～ 100°C
- Non-linearity: ＜ ±0.2%F.S. (Maximum error 1mm below 500mm range)
- Repeatability: ＜ ±0.01%F.S.
- Resolution: ＜ 4μm
- System Resolution:16bit D/A
- Temperature Effect: ＜ ±0.01%F.S./°C
- Rod Structure:Rigid rod structure, flexible rod structure, anti-corrosion rod structure
- Rod Material:Stainless steel 304, stainless steel 316, PTFE
- Pressure resistance of the measuring rod:Determined by the selected float bearing pressure
- Electronic Cabin Material:Stainless steel
- Electronic Cabin Structure:
  A type electronic cabin (rigid structure, recommended to be used above 3000mm range)
  B type electronic cabin (rigid structure, standard configuration)
  C type electronic cabin (rigid structure, suitable for small space occasions)
  D type electronic cabin (anti-corrosion structure, suitable for corrosive environment)
  K-type electronic cabin (rigid structure, special electronic housing with local display)
- Electrical Connection:Straight out cable, aviation plug, terminal block
- Explosion Sign:Exd II BT5 (flameproof type), Exia IIC T6(Intrinsically safe type)
- Protection Class:IP65 (IP67 or IP68 can be customized)

Electrical Connection

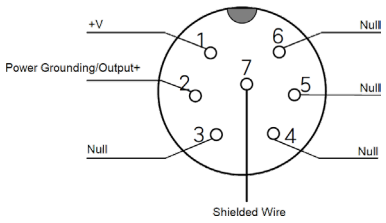
Cable outlet:

Wire Color	Function
Red	+V
Black	Power Grounding/+ Output

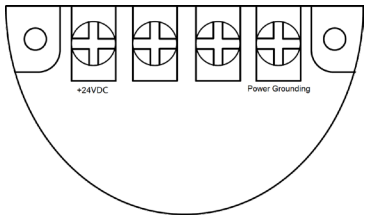
Wiring terminals:



Aviation plug:



Specialized electronic housing terminal blocks:



Note:

1. Each sensor should preferably be provided with a separate power supply that meets the product requirements.
2. The shielded cable wire of the sensor must avoid high-power power supplies, RF signal sources and other noisy transmission cables.
3. The shielded cable must be intact without disconnection and connected to the earth end of the subsequent equipment.
4. The cable should be customized in accordance with the required length, to avoid segmented wire connection.

Order Guide(2-wire Output Product Optional With Hart Protocol)

MLM- Magnetostrictive Liquid Level Sensor

Code	Safety Type
P	Standard
G	Explosion-proof type
B	Intrinsically safe type

Code	Power Supply
1	24V DC(±10%)
2	15V DC(±10%)
3	Customized(12VDC ~ 24VDC optional)

Code	Output	Number of Floats	Function/Temperature Points	Location of Temp. Points
T- - - - (2-wire Output)	42=4mA ~ 20mA	1=Single Float	0=Forward(Zero point near the end of probe) 1=Reverse(Zero point near the end of electronic cabin)	
H- - - - (Hart Output)	42=4mA ~ 20mA	1=Single Float 2=Double Floats	0=No installation 1…5 temperature measuring points(1~5 points optional)	W=None S=Standard P=Average distribution X=Customized

Code	Rod Structure
G	Rigid rod structure
F	Anti-corrosion rod structure
R	Flexible rod structure

Code	Electronic Cabin
A	A type electronic cabin(rigid structure, recommended for range over 3000mm)
B	B type electronic cabin(rigid structure, standard configuration)
C	C type electronic cabin(rigid structure, recommended for small space installation)
D	D type electronic cabin(anti-corrosion structure, recommended for corrosive environment)
K	K type electronic cabin(rigid structure, special electronic housing with local display)

Code	Measuring Range
.....M (Unit: mm)	For G, F structure: 50 ~ 5000mm For R structure: 4000 ~ 20000mm; customized.

Code	Process Connection	
0	None	Suitable for G Structure
1	M18×1.5	
2	M20×1.5	
3	English Standard 3/4-16UNF	
7	M27×2	Suitable for R Structure
F	PTFE Flange	Suitable for D Structure
X	Special Thread	

Code	Electrical Connection
C	Direct Wire Outlet
J	Wiring Terminals (side exit only)
H	Aviation Plug (not applicable to explosion-proof type)

Code	Outlet Direction
0	Top outlet
1	Side outlet

Code	Cable Length
–	0 ~ 9(X=special length, unit: m; default is 3m cable)

Code	Accessory(see attached sheet)	
A	FK-1	Suitable for G Structure
B	FK-2	
C	FK-3	
D	FK-4	Suitable for R Structure
F	Anti-corrosion electronic cabin	Suitable for D Structure
W	None	

Code	Float Type(see attached float list)
——	0:No float 1:Level float 2:Interface float 1 3:Interface float 2 X:Special float

MLM-	P	1	T4210	G	B	03500M	1	C	0	3-	W	1	Whole Spec.

Order Note

1. Code example: MLM-P1T4210-GB03500M1C03-W10 means standard level sensor, 24V DC power supply, 4mA~20mA output, single float, rigid rod structure, B type electronic cabin, measuring range 3500mm, M18×1.5 thread, top direct wire outlet 3m, no accessory.

2. When selecting the product, please refer to the standard writing style of "Code Example", and note that "-"

Product Structure Instructions

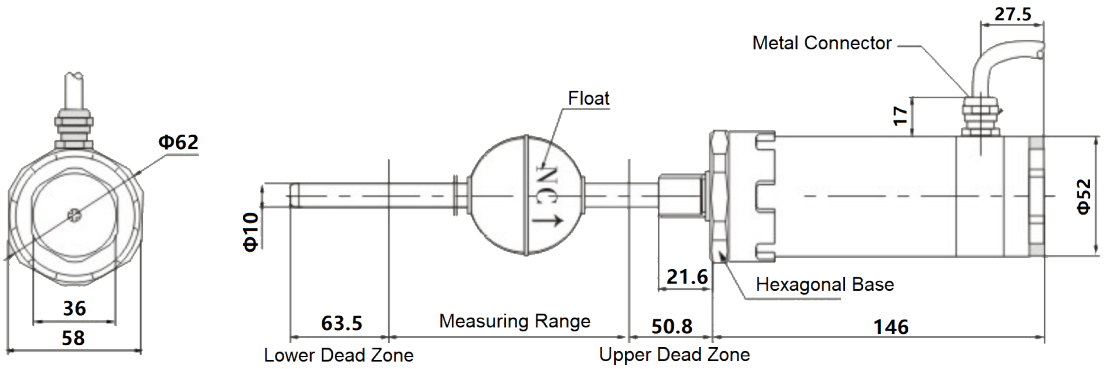
Unit: mm

should not be omitted and "0" should be added in front of the range less than 5 digits.

- Rigid Structure(A type electronic cabin)

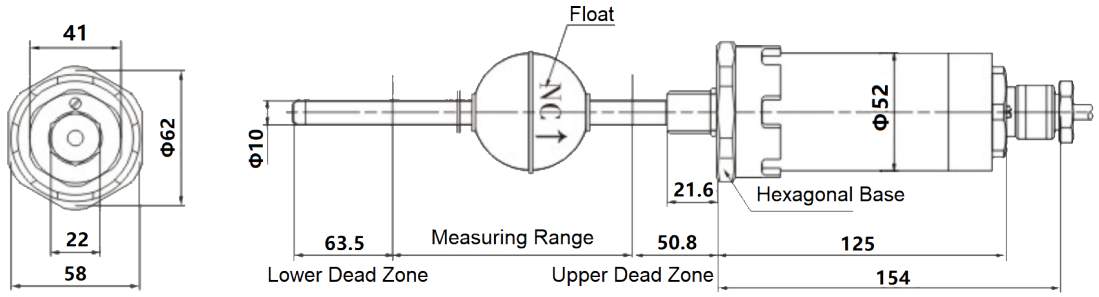
Standard Type

Cable Connection



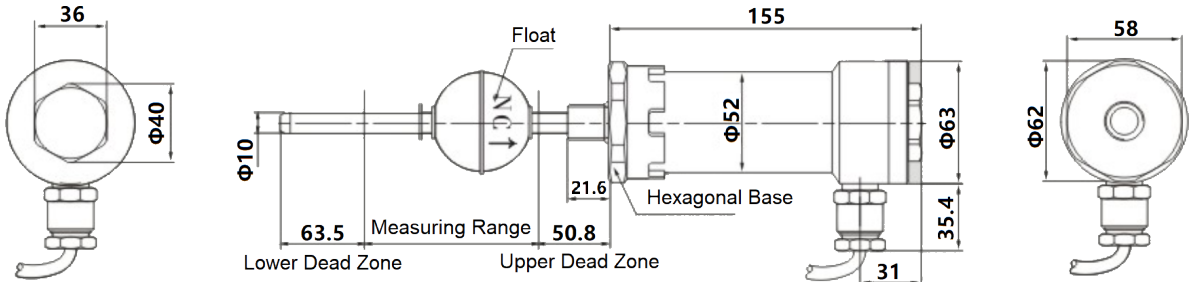
Explosion-proof Type

Cable Connection



Wiring terminals

Terminal Connection



Note 1: The different outer diameter of the stainless steel measuring rods are as below:

Level range≤3m: 10mm Level range>3m: 13mm

With temperature measurement: 14mm

Note 2: The housing material of the electronic cabin is stainless steel.

Note 3: It is recommended to use A-type electronic cabin structure for products with a level of 3m or higher.

Note 4: For common type terminals and explosion-proof products, the end cover needs to be opened for zero point and

full scale adjustment.

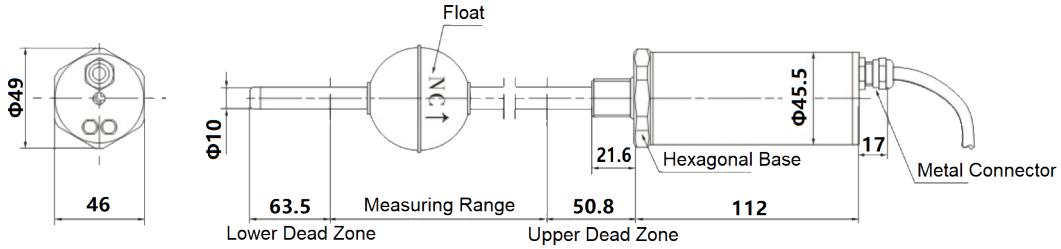
Product Structure Instructions

Unit: mm

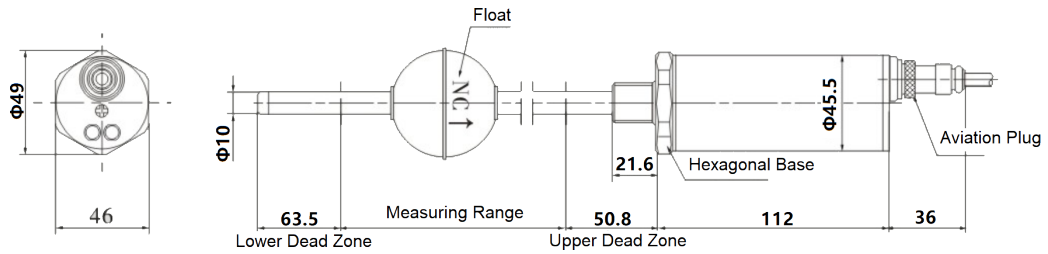
- Rigid Structure(B type electronic cabin)

Standard Type

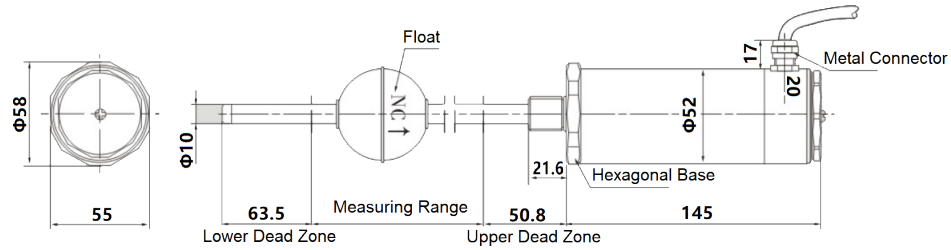
Cable Connection



Aviation Plug Connection

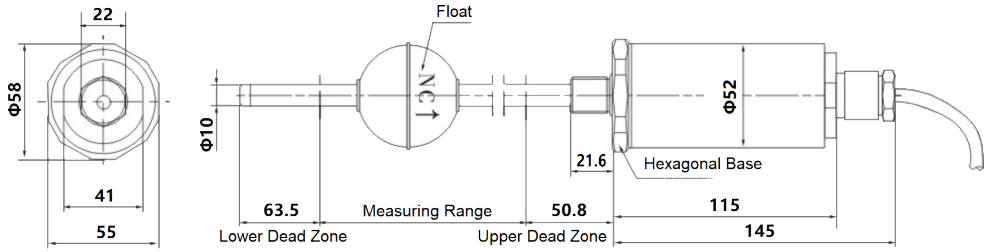


Terminal Connection

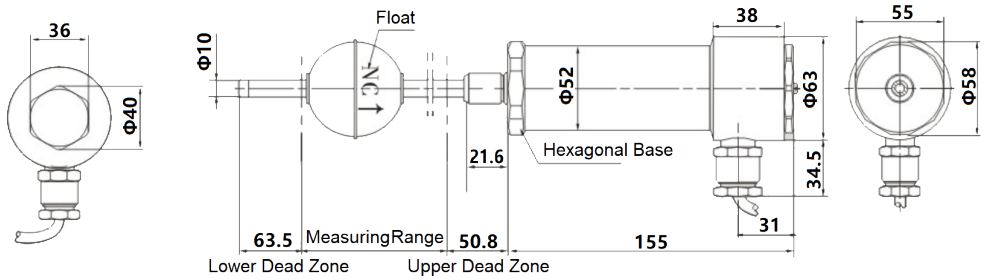


Explosion-proof Type

Cable Connection



Wiring Terminal Connection

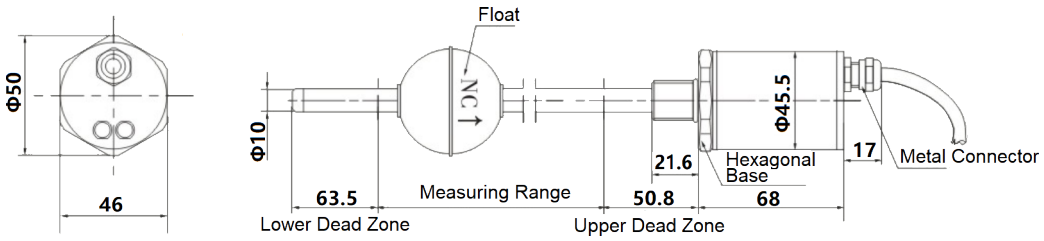


Product Structure Instructions

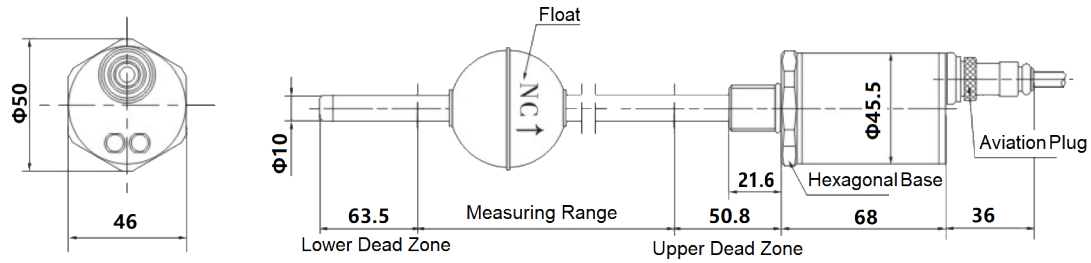
Unit: mm

- Rigid Structure(C type electronic cabin)

Standard Type



Aviation Plug Connection



Note 1: The different outer diameter of the stainless steel measuring rods for B and C type cabin are as below:
Level range≤3m: 10mm Level range>3m: 13mm

Note 3: It is recommended that when used in harsh environments (e.g., oil, water, etc.), the product structure is recommended for B and C type electronic compartments.

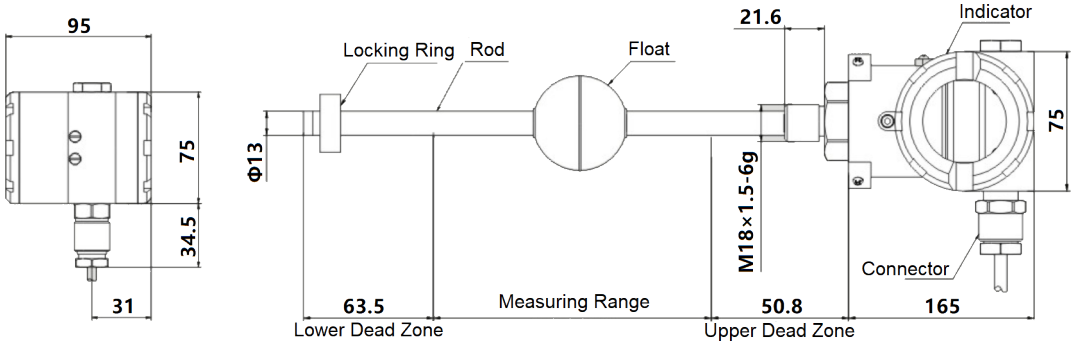
Note 4: Common type terminal block and explosion-proof terminal block products, zero point and full scale adjustment need user to open the end cover for operation.

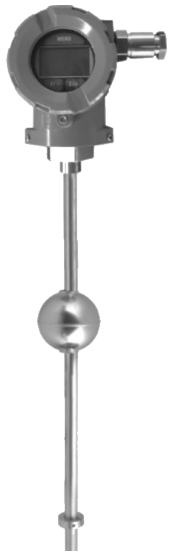
Note 5: C-type electronic cabin structure is suitable for the installation of small space occasions.

Note 6: C-type electronic cabin structure to the top of the line for example, side line structure optional. The outer diameter of the side exit wire compartment is 52mm and the outer diameter of the hexagonal base is 58mm.

- Rigid Structure(K type electronic cabin)

Special Electronic Housing



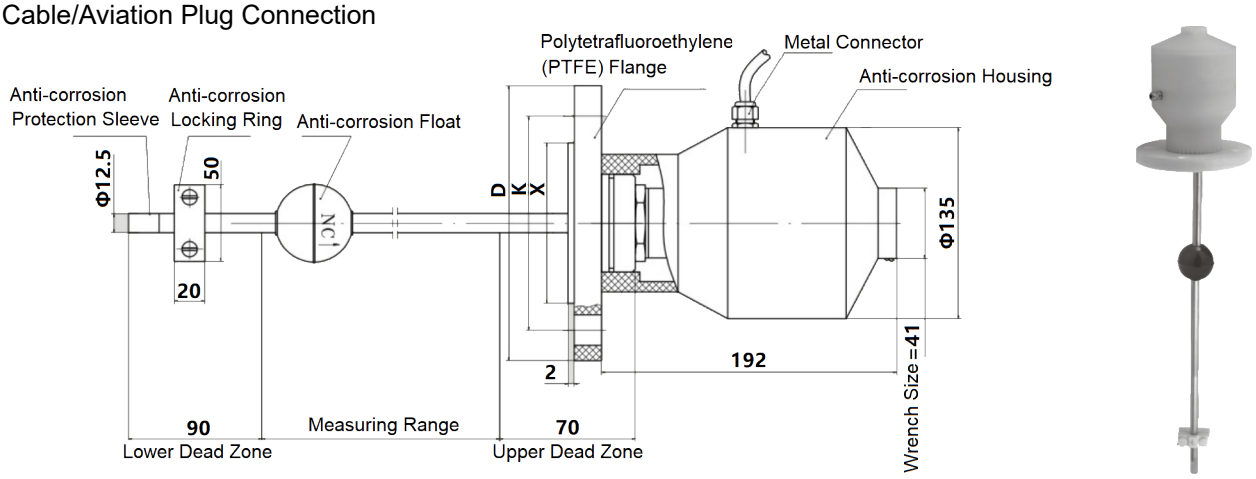


Note: The above diagram takes the representative head rigid measuring rod structure as an example, the structure with indicator is also applicable to the flexible and anti-corrosion measuring rod structure.

Product Structure Instructions

Unit: mm

- Overall Anti-corrosion Structure(D type electronic cabin)
  Cable/Aviation Plug Connection



Note 1: The different outer diameter of the stainless steel measuring rods are as below:
Level range ⩽ 3m: 12.5mm Level range>3m: 15mm

Note 2: Anti-corrosion flange size (D, K, X), please refer to the "Anti-corrosion flange size table".

Note 3: The anticorrosive structure is based on the overall anticorrosive type, and the rod anticorrosive type is calculated separately.

- R Type Flexible Structure

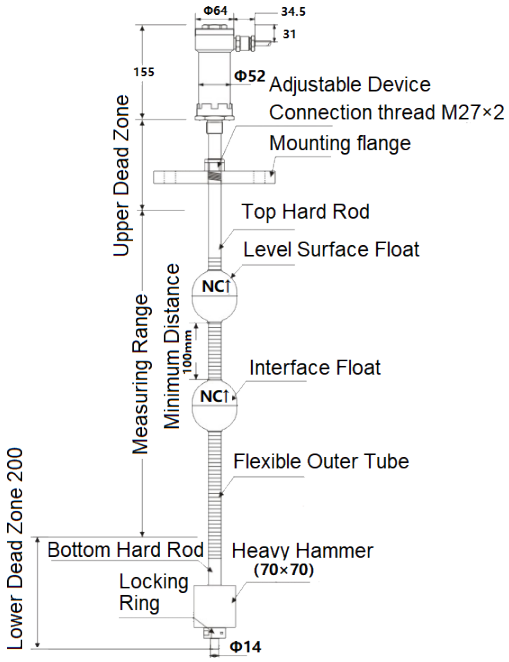
About position of temp. points:

For the installation location of the temperature point, it can be specified by the customer, and if not specified specifically, it is recommended to install according to the provisions of "GB8927-88 Petroleum and Liquid Petroleum Products Temperature Measurement Method", which is the "standard solution" defined by our selection. Please refer to the information on page 9 for specific solutions.

Note 1: The different outer diameter of the stainless steel measuring rods are as below:
With temperature measurement: 14mm Without temperature measurement: 16mm

Note 2: The minimum distance between liquid surface float and interface float is 100mm, when the distance between the two floats is less than 100mm, it may affect the accuracy of the two position signals of the magnetic scale, taking the flexible measuring rod structure as an example, other structures are omitted.

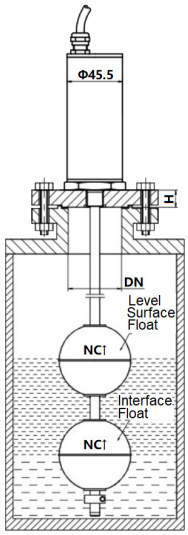
(Measuring rod material: PTFE)



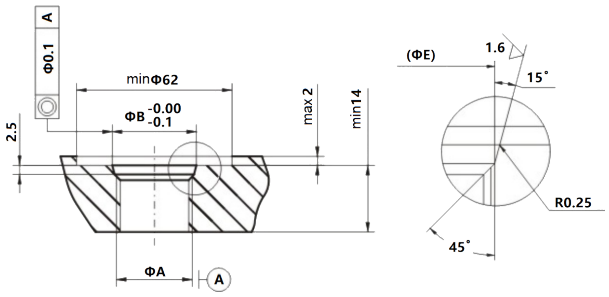
Installation of Rigid Structure

Unit: mm

- Method 1(Flange connection)



Size of Installation Hole

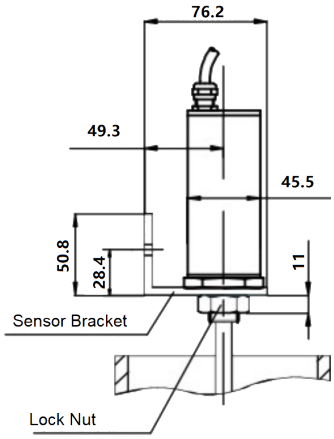


Installation Size

Code \ Size	A	B	E
M1	M18×1.5-6H	Φ20 $^{0}_{-0.1}$	Φ18.7
M2	M20×1.5-6H	Φ21 $^{0}_{-0.1}$	Φ20.3
M3	3/4-16UNF	Φ20.3 $^{0}_{-0.1}$	Φ19.3

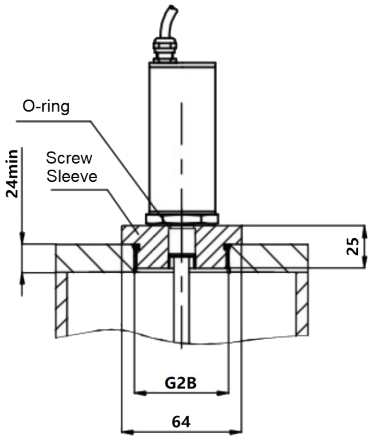
- Method 2(Accessory FK-1)

  This method is suitable for open tank measurement. A special sensor bracket with lock nut fittings can be used to fix the level sensor at the required installation position.



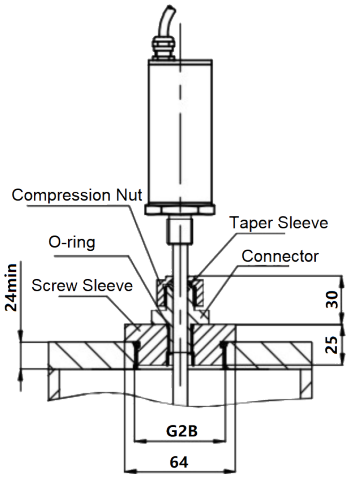
- Method 3(Accessory FK-2)

  This method is suitable for sealed tank measurement. When installing the sensor, the aperture of the hole opened in the tank is small and it is easy to remove the sensor.



- Method 4(Accessory FK-3)

  This method is suitable for the measurement of sealed tanks with adjustable measurement height.



- Accessory List

Item	Quantity
Float	1*
Locking Ring	1
Hexagon socket screws	1
Hexagonal screwdriver	1
Small straight screwdriver	1

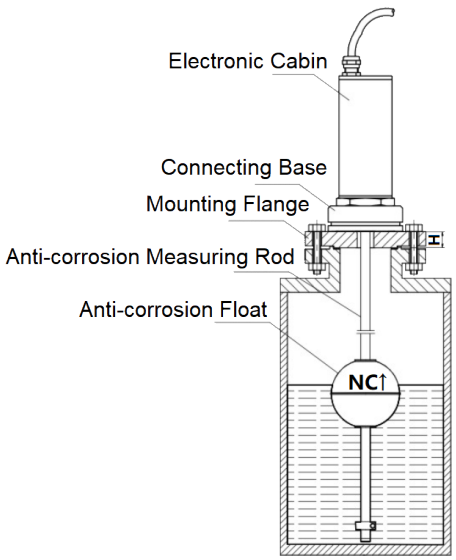
*__Note 1:__ The quantity of float is determined by the part no. of the code.

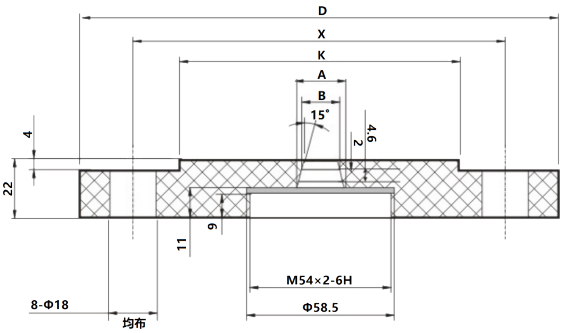
- Installation Accessory List

Item	Quantity		
	FK-1	FK-2	FK-3
Lock nut	1		
Sensor bracket	1		
Screw sleeve		1	1
Connector			1
Taper Sleeve			1
Compression nut			1
O-ring (gasket)		1	1

Installation of Anti-corrosion Structure

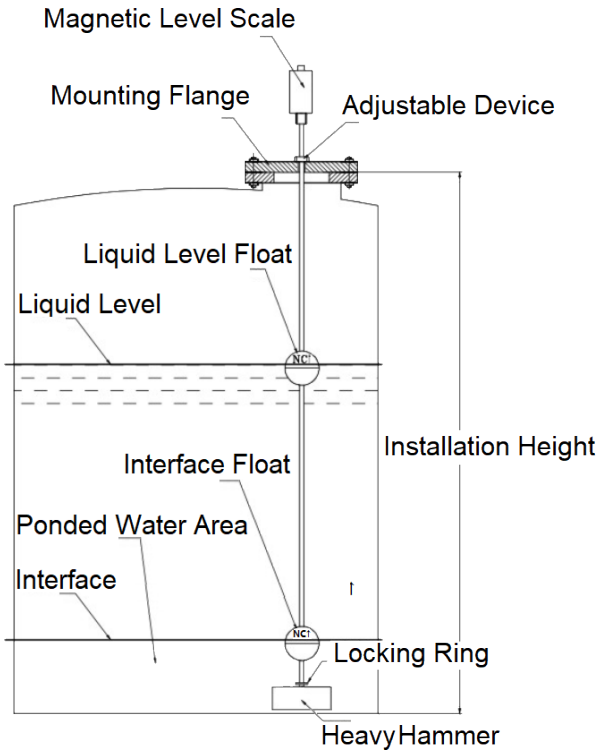
The products of anticorrosive structure of the measuring rod have made anticorrosive treatment for the measuring rod, locking ring and float, etc. Users can process the anticorrosive flange by themselves according to the actual situation, or propose specific specifications and materials, and the factory will process them for users.





X Flange Code	Flange Specification	D	X	K
F1	DN650，PN2.0MPa	180	105	139.5
F2	DN80，PN2.0MPa	190	127	152.5

Installation of Flexible Structure

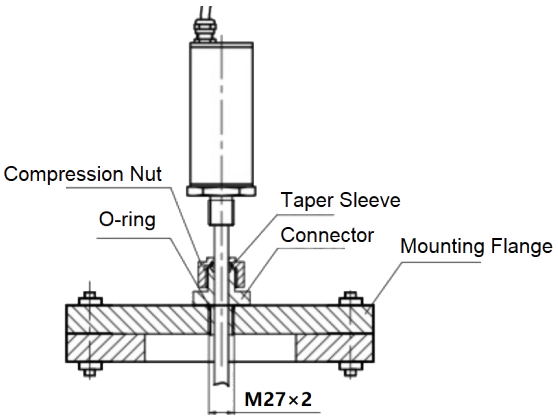


Accessory List

Item	Qty
Float	1*
Top and bottom locking ring	1
Locking screw	1
Small straight screwdriver	1

Rod Diame-ter	A	B
Φ10	16.5	14
Φ13	19	16.5

The quantity of float is determined by the part no. of the code.



With Accessory FK-4

Accessory List

Item	Qty
Float	1*
Locking Ring	1
Hexagon socket screws	1
Hexagonal screwdriver	1
Small straight screwdriver	1
Heavy Hammer	1

Installation Accessory List

Item	Qty FK-4
Connector	1
Taper Sleeve	1
Compression nut	1
O-ring	1

The quantity of float is determined by the part no. of the code.

Note: Before ordering, the user should measure or calculate the installation height of the tank installation position (the height from the inside of the installation flange to the bottom of the tank, see above) and allowable measurement error shall be within ±200mm.

Special Installation Method

- When the liquid level in the tank fluctuates due to agitation or flow, the float will go up and down with the fluctuation of the liquid level, causing the output data to be unstable. Therefore, the above problems can be solved by installing a guard tube or a bypass tube, a guard tube as shown in Fig. 1, and a bypass tube as shown in Fig. 2.

- When the magnetic scale is used to measure the liquid level in a vessel under pressure (such as liquefied natural gas), it is recommended to use the special installation method for vessels under pressure, as shown in Fig. 3.

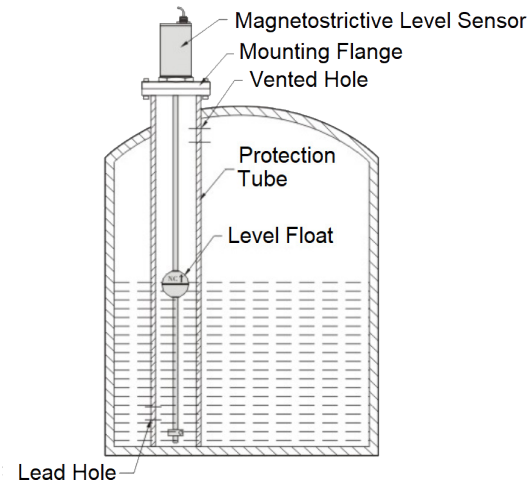


Fig. 1 Protection tube installation diagram

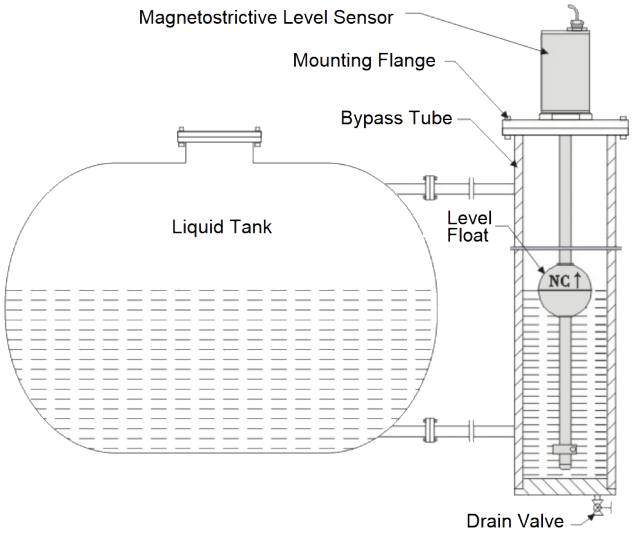


Fig. 2 Bypass tube installation diagram

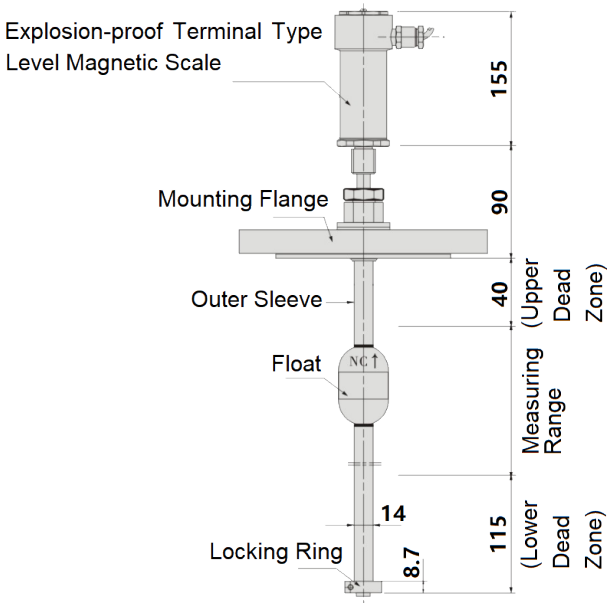


Fig. 3 Special type with pressure vessel

Note 1: Using the above two installation methods, the float can be protected from impact, making the measurement more accurate and the value more stable.

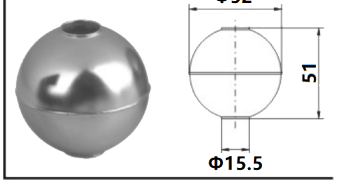
Note 2: When using the protective tube installation method, the air guide above should be opened in a place where the liquid level cannot reach, so that the air inside and outside the protective tube is connected to ensure the same level inside and outside.

Note 3: When doing system maintenance or product overhaul, there is no need to open the cover or relieve pressure, which greatly reduces maintenance costs.

Appendix: Float Selection Specifications

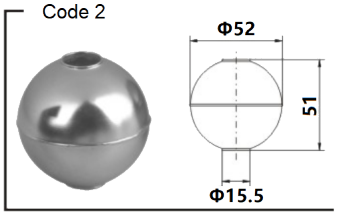
Unit: mm

Code 1



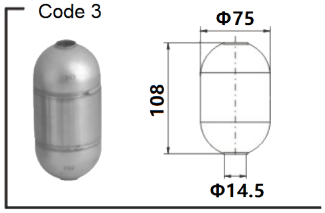
Material: Stainless Steel 316 Density: 0.6g/cm³
Overpressure: 2.5MPa Minimum Dead Zone: 43

Code 2



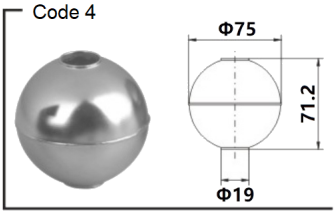
Material: Stainless Steel 316 Density: 0.8g/cm³
Overpressure: 2.5MPa Minimum Dead Zone: 55

Code 3



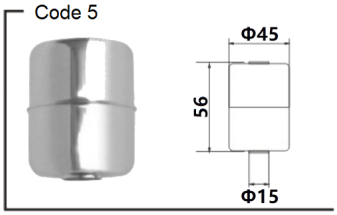
Material: Stainless Steel 316 Density: 0.44 g/cm³
Overpressure: 2.5MPa Minimum Dead Zone: 100

Code 4



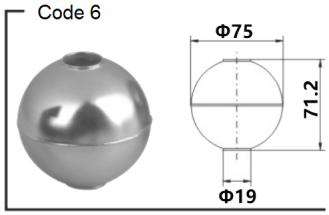
Material: Stainless Steel 316 Density: 0.7g/cm³
Overpressure: 2.5MPa Minimum Dead Zone: 63.5

Code 5



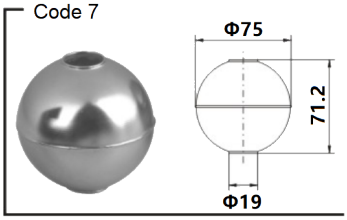
Material: Stainless Steel 316 Density: 0.57g/cm³
Overpressure: 1.0MPa Minimum Dead Zone: 63.5

Code 6



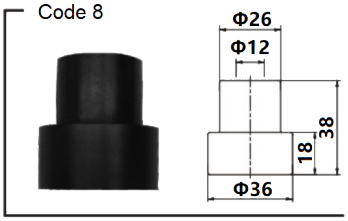
Material: Stainless Steel 316 Density: 0.9g/cm³
Overpressure: 2.5MPa Minimum Dead Zone: 63.5

Code 7



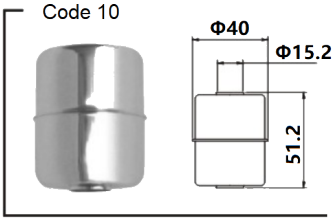
Material: Stainless Steel 316 Density: 1.1g/cm³
Overpressure: 2.5MPa Minimum Dead Zone: 63.5

Code 8



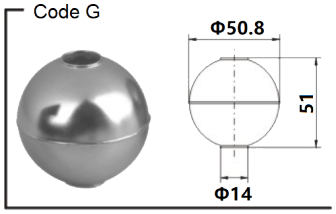
Material: Nitrile Rubber Density:0.4g/cm³
Overpressure:10MPa Minimum Dead Zone:40

Code 10



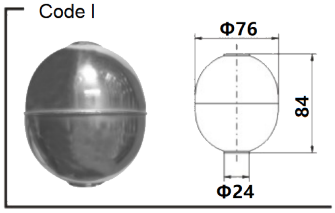
Material: Stainless Steel Density:0.7g/cm³
Overpressure:1.0MPa Minimum Dead Zone:48

Code G



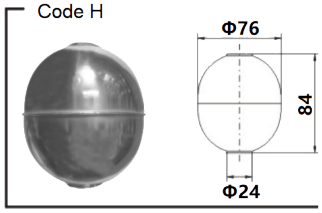
Material: Stainless Steel 316 Density: 0.66 g/cm³
Overpressure: 6.8MPa Minimum Dead Zone: 50

Code I



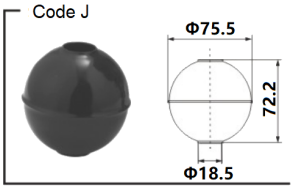
Material: Stainless Steel 316 Density: 0.91 g/cm³
Overpressure: 2.5MPa Minimum Dead Zone: 58
Note: Suitable For Oil-water Interface

Code H



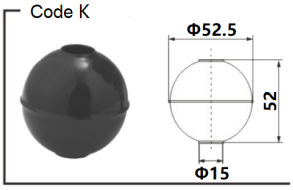
Material: Stainless Steel 316 Density: 0.7g/cm³
Overpressure: 2.5MPa Minimum Dead Zone: 58

Code J



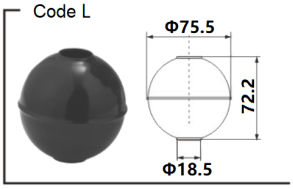
Density:0.78g/cm³ Overpressure:2.5MPa
Minimum Dead Zone:63.5
Note: Suitable For Strong Corrosive Environment
Material: Stainless Steel 316 With Corrosion Resistant Material Covered Inner Liner Surface

Code K



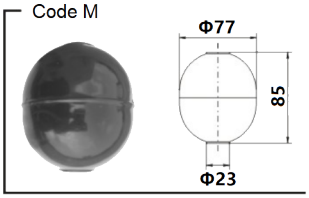
Density:0.68 g/cm³ Overpressure:2.5MPa
Minimum Dead Zone: 43
Note: Suitable For Strong Corrosive Environment
Material: Stainless Steel 316 With Corrosion Resistant Material Covered Inner Liner Surface

Code L



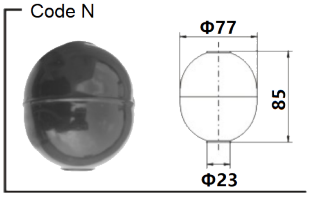
Density:0.98 g/cm³ Overpressure:2.5MPa
Minimum Dead Zone: 63.5
Note: Suitable For Strong Corrosive Environment
Material: Stainless Steel 316 With Corrosion Resistant Material Covered Inner Liner Surface

Code M



Density:0.75 g/cm³ Overpressure:2.5MPa
Minimum Dead Zone:58
Note: Suitable For Strong Corrosive Environment
Material: Stainless Steel 316 With Corrosion Resistant Material Covered Inner Liner Surface

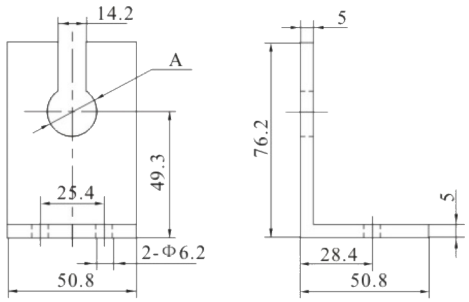
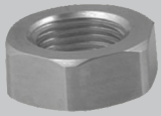
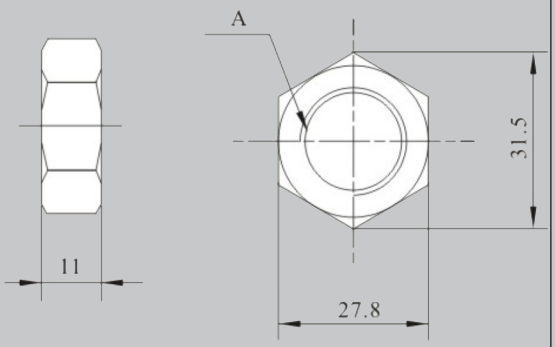
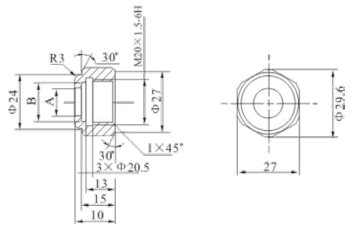
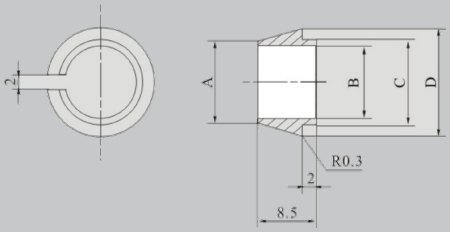
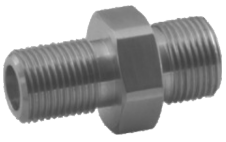
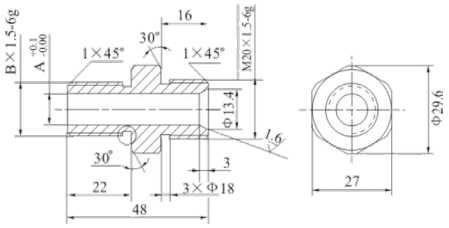
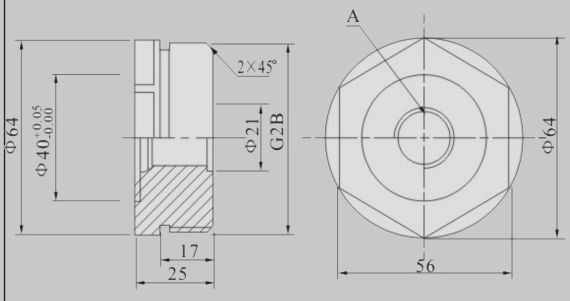
Code N



Density: 0.91g/cm³ Overpressure:2.5MPa
Minimum Dead Zone:58
Note: Suitable For Strong Corrosive Environment
Material: Stainless Steel 316 With Corrosion Resistant Material Covered Inner Liner Surface

Appendix: Installation Accessories Selection Specifications

Unit: mm

Substance	Structure Diagram	Material	Code	Specification
 Sensor Bracket		Alumi-num	1	A: Φ18.5 (M18×1.5)
			2	A: Φ20.2 (M20×1.5)
			3	A: Φ20.2 (3/4-16UNF)
 Lock Nut		Stainless Steel	1	A: M18×1.5
			2	A: M20×1.5
			3	A: 3/4-16UNF
 Compression Nut		Brass	1	A: Φ12.2 B: Φ17
			2	A: Φ14.7 B: Φ19.5
 Taper Sleeve		Brass	1	A: Φ14.7 B: Φ10.2 C: Φ12 D: Φ14
			2	A: Φ14 B: Φ13.1 C: Φ14.5 D: Φ16.5
 Connector		Stainless Steel	1	A: Φ10.5 B: M18×1.5
			2	A: Φ13.2 B: M20×1.5
 Screw Sleeve		Stainless Steel	1	A: M18×1.5
			2	A: M20×1.5
			3	A: 3/4-16UNF