SIS2 Intelligent Level Sensor

Operation Manual

FineTek Co., Ltd.

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Contents

1. Reading Labels

Thanks for purchasing FineTek's Product. This operation manual describes the product features, working principles, operation and maintenance methods. It makes the user fully understand how to use the product correctly, so as to prevent dangerous situations such as device damage or operator injury.

➢ Please read this operation manual completely and carefully before using the product.

➢ Please contact the company if this operation manual can't satisfy your demands.

➢ The content of the operation manual is updated based on the version upgrade, which will be uploaded to the website for the user to access.

➢ Please don't disassemble or repair the product on your own, as this will make you disqualified from availing of the warranty service. Please send the product back to the company for repair and calibration, or just contact the company.

➢ Explanation of warning signs:

Danger→ It indicates that wrong operation will cause death or major disasters.

Note→ It indicates that wrong operation will cause injury and device damage to some extent.

Electric shock→ It warns of possible electric shock.

Fire→ It warns of possible fire.

Prohibited→ It indicates the prohibited wrong behavior.

2. Product Warranty

2.1 New product warranty

➢ We don't charge for the inspection, part/s and repair for the product of the company that has a defect within 12 months from the delivery date and meets the warranty terms.

➢ If the product defect is not due to human error during its transportation, user may change to a new unit from the company within 7 days from delivery date.

➢ When the product needs to be sent back to the factory for repair, please send the whole set, and don't disassemble the parts. Moreover, please be sure it is completely packed to avoid damage and causing more loss and defect during the transportation.

➢ The warranty is not available for causes that fall under the following circumstances, for which the company shall charge for the inspection, part/s and repair according to the actual condition:

- The product or its parts are beyond the warranty period.
- Fault or damage is caused by not following the instruction and use environment described on the operation manual.
- The product damage is caused by a force majeure factor (natural disasters, floods, fire, earthquakes, lightning, typhoon, etc.), human destruction (scratches, dropping, latch broken, tapping, cracks and punching), human error (using improper voltage, high-humidity, water leakage, stain, corrosion, loss, improper storage, etc.) and other abnormal factors.
- The damage is caused by the customer or the 3rd party through the installation, addition, expansion, modification and repair of parts not authorized or certified by the company.
- The volume label information is wrong or unclear, so the product serial number can't be confirmed.

2.2 Repair warranty

A 6-month warranty service is provided for the repaired part of the product, during which the same product can be repaired free of charge in case of the same fault.

2.3 Service network

Company	Address	Telephon	Fax
Taipei Headquarters (Taiwan)	No.16, Tzuchiang St., Tucheng Industrial Park, New Taipei City 23678	+886 2 2269 6789	+886 2 2268 6682
Taichung Sales office (Taiwan)		+886 4 2465 2820	+886 4 2463 9926
Kaohsiung Sales office (Taiwan)		+886 7 333 6968	+886 7 536 8758
Fine automation Co., Ltd. (China)	No. 451, Duhui Road, Zhuanqiao Township, Minhang District, Shanghai City 201109	+86 021 64907260	+86 021 6490 7276
FineTek Pte Ltd. (Singapore Branch)	37 Kaki Bukit Place, Level 4 Singapore 416215	+65 6452 6340	+65 6734 1878
FineTek GmbH (Germany Branch)	Bei den Kämpen 26 21220 Seevetal-Ramelsloh, Germany	+49 (0) 4185 8083 12	+49 (0) 4185 8083 80
FineTek Co., Ltd. (Indonesia Branch)	PERGUDANGAN TUNAS BITUNG JL. Raya Serang KM. 13,8, Blok C3 No. 12&15, Bitung Cikupa, Tangerang 15710	+62 (21) 2923 1688	

3. Product Inspection

3.1 Item check
➢ Sensor (1)
➢ Operation manual (1)

3.2 Safety check
➢ Before unpacking, check the packaging for deformation or damage, and take photos to be used as evidence.
➢ After unpacking, checks the contents for deformation, damage or any quality problems, and take photos to be used as evidence.
➢ After unpacking, check whether the contents match your order and whether the quantity is correct immediately.
➢ In any case described above, please contact us within 7 days (attach photos). Otherwise, free replacements or repairs will not be provided.

4. Product Features

➢ Easy to install due to the standard connector. Protection rating IP67
➢ Conforms to NEPSI explosion-proof certification.
➢ The lightweight and compact design make it easy to carry and enable for quick installation even in narrow spaces or difficult situations.
➢ Probe material PEEK surface roughness Ra <0.8 is with good wear resistance.
➢ The magnetic test action function allows immediate inspection of the wiring and device proper operation.
➢ Strong and durable stainless steel enclosure.
➢ LED indicators provide field device status.
➢ With overcurrent protection, the output would be immediately turned off when the output circuit current is overloaded.
➢ Can be applied to CIP environments.
➢ Suitable for single-point detection and protection of liquids, viscous mediums, powders, and granular mediums in tanks or pipelines.
➢ It provides 2 output signals NPN or PNP.

5. Scope Of Application

Scope

➢ The product is designed based on food grade structure and materials, ideal for food and health areas.

➢ It is suitable for the detection of material levels for output switching of liquids, viscous mediums, powders, and granular mediums.

➢ Can be used for almost all media; low specific gravity, low dielectric, non-conductive media can all work properly.

Special requirements when using in an explosion-proof dust environment.

➢ To avoid static electricity caused by friction or impact, the metal tank or pipe must be grounded.

➢ If the tank or pipe is non-metallic, it must be installed with an adapter for grounding.

➢ The diameter of the wire connected to the ground must be greater than 4mm2 (＞11 AWG). (Please refer to the above installation instructions)

Limitations

➢ Not suitable for bulk solid or rough material (such as quartz sand).

➢ Not suitable for highly corrosive media (strong acids and strong alkaline). Please check the compatibility with the product material first.

6. Ambient Conditions

	Standard type	Rear install type	Explosion-proof type (Standard type)	Explosion-proof type(Rear install type)
Storage temperature	-40°C ~85°C (-40°F~185°F)	-40°C ~85°C (-40°F~185°F)	-40°C ~85°C (-40°F~185°F)	-40°C ~85°C (-40°F~185°F)
Ambient temperature	-40°C~80°C (-40°F~176°F)	-40°C~80°C (-40°F~176°F)	-10°C~70°C (14°F~158°F)	-10°C~70°C (14°F~158°F)
Medium temperature	-40°C~100°C (-40°F~212°F)	-40°C~80°C (-40°F~176°F)	Standard type： Max 100℃(212°F) (continuous) @Ambient emperature： -10℃~70℃(14°F~158°F)	Rear mounting type： Max 70℃(158°F) (continuous) @Ambient temperature： -10℃~70℃(14°F~158°F)
Power supply	12 VDC~30 VDC	12 VDC~30 VDC	12 VDC~30 VDC	12 VDC~30 VDC
Output load current	Max, 50 mA	Max, 50 mA	Max, 50 mA	Max, 50 mA

7. Working Principle

Working principle of this sensor is based on the frequency sweep technology. The sensor tip will send out electric field signal, and different resonance frequency is created according to different medium. Thus a switching signal will be triggered if the sensor is covered with material..
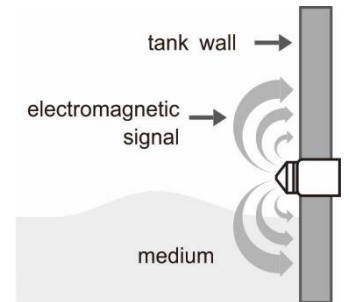

7.1 Output status

The following table shows the corresponding output status for the factory default values (group 1 output NO, group 2 output NC):

Transistor output	Alarm	Detected level	Output	Output signal	LED indicator
PNP	MAX		OUT1	<100µA	Green
			OUT2	I_L	
			OUT1	I_L	Yellow
			OUT2	<100µA	
	MIN		OUT1	I_L	Yellow
			OUT2	<100µA	
			OUT1	<100µA	Green
			OUT2	I_L	
NPN	MAX		OUT1	<100µA	Green
			OUT2	I_L	
			OUT1	I_L	Yellow
			OUT2	<100µA	
	MIN		OUT1	I_L	Yellow
			OUT2	<100µA	
			OUT1	<100µA	Green
			OUT2	I_L	

*IL represents load start

LED locations

LED

Connector socket
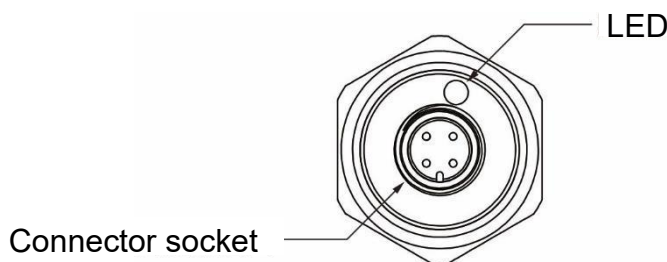
8. Technical Performance

8.1 Specifications

|	Standard type	Rear install type	Explosion-proof type
Scope	Liquid, viscous medium, powder, granular medium		powder, granular medium
Storage temperature	-40~85℃(-40~185℉)		
Ambient temperature	-40~80℃(-40~176℉)		-10~70℃(14~158℉)
Process temperature	-40~100℃ (-40~212℉)	-40~80℃ (-40~176℉)	Standard type：Max 100℃(212°F) Rear mounting type：Max 70℃ (158°F)
Process connection	1/2"G	3/4"G	Standard type：1/2"G Rear mounting type：3/4"G
Rated voltage	12VDC~30VDC		
Power consumption	Max. 50mA		
Over voltage protection	overvoltage category II		
Reversal protection	YES		
Switch output	2 switches: 1st NO mode and 2nd NC mode.		
Output mode	(DC)PNP/NPN(optional)		
Switch delay function	<1 second		
Output load current	Max. 50 mA		
Output voltage drop	Max. 2.5V		
Short-circuit protection	Yes, short-time pulse		
Overload protection	YES		
Electric connection	M12 4PIN connector		
Wetted material (optional)	SUS316、SUS316L		
Process pressure	-1~40 bar		
Probe material/ Surface roughness	PEEK/Ra<0.8		
Enclosure protection rating	IP67		
LED Indicator	Yellow LED for starting, Green LED for resetting		
Simulation output test	Magnetic test (lean a magnet close to the + sing for 3 seconds, there will be switching output)		
Explosion-proof certificate	N/A		NEPSI: Ex ta IIIC T$_{200}$100°C Da

9. External Dimensions
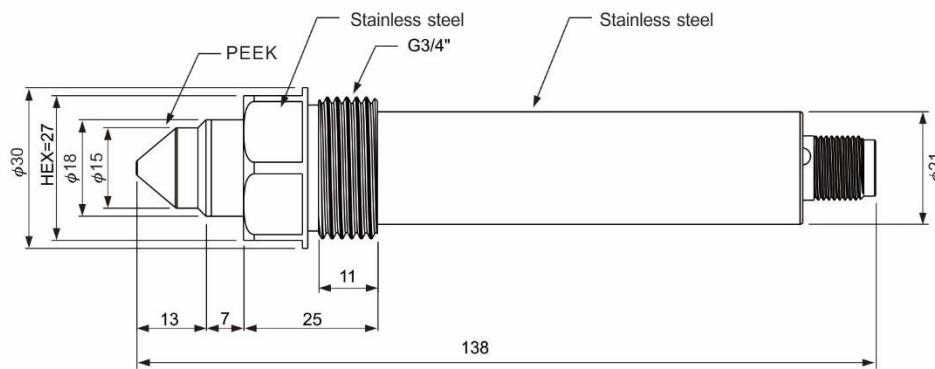
9.1 Dimensions

Standard type

(Unit: mm)

Applied for general medium
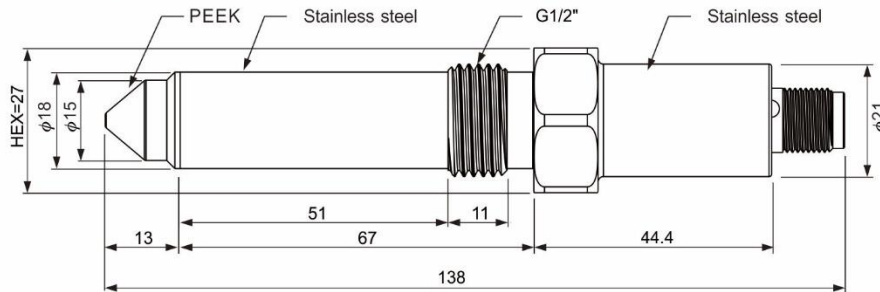
Rear install type

Suitable for no hole on the side or installation extension to prevent from severe bridging.

10. Installation

⚠   ∗ Before installing and unloading the product, make sure that the device is not suffered to any pressure and that the material inside the pipe or container does not have leakage. Pay attention to the potential hazards relevant to the temperature of the device and the media.

   ∗ In an explosion-proof dust environment, actions that cause electrostatic discharges are prohibited. For example, the moving dust particles rapidly, transferring powder, and the spraying process during electroplating.

10.1 Installation Environment

➢ Suggested to install the product in a metal container or pipe.

➢ When installed in a plastic container, performance degradation or malfunction may occur due to interference.

    ● Check that the product is working properly via the field test function.

    ● If interference occurs, take appropriate measures (shielding, grounding).

➢ For pipe installation, the pipe size must be bigger than DN80.

➢ Install the sensor at a distance of at least 30mm from the pipe wall, structural parts, stirrer, and other sensors to prevent errors caused by collision or interference (as shown below).
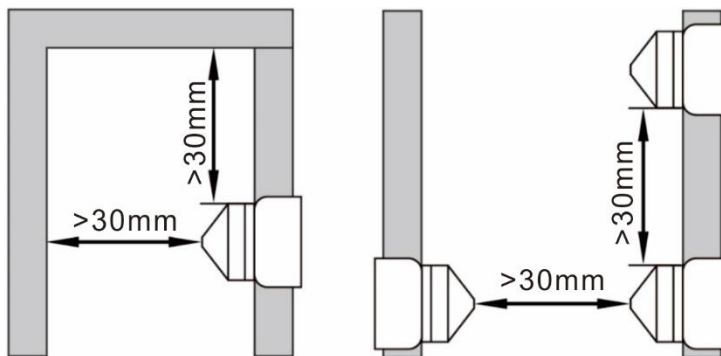

➢ The insertion of the sensor should be sufficient to prevent the sediment from being wrongly considered as the material. The probe of the sensor must be completely through the tank wall.

🚫   ➢ Do not use seal tape. The sensor must be well grounded with the container or pipe.

   ➢ The sensor probe must be protected from direct sunlight (UV).

10.2 Installation process

➢ Make sure that the sealing surface is clean before installation and remove the protective cover only when installing. If the sealing surface is damaged, replace the device.

➢ The distance between the front probe and the silo wall has to be over 30mm in order to prevent the sensibility to be influenced.

➢ Install or weld the adapter sleeve onto the container/pipe.

➢ For installation of the tri-clamp, follow the relevant provisions for additional installation steps.

➢ Attach the seal to the sensor through the thread lock sleeve. The seal must be correctly positioned and locked. Close the gap between the sensor and the adapter sleeve end face.

 ● An inappropriate seal may cause installation errors.
  - The seal is too large: It may be squeezed out, causing shear damage and unable to seal.
  - The seal is too thin: The seal is insufficiently compressed between the sensor and the adapter sleeve. Leakage may occur.

➢ Applicable sealing ring specifications: ID18.72xØ2.62; material: Viton(black)
 Part number: HP412-A130202805
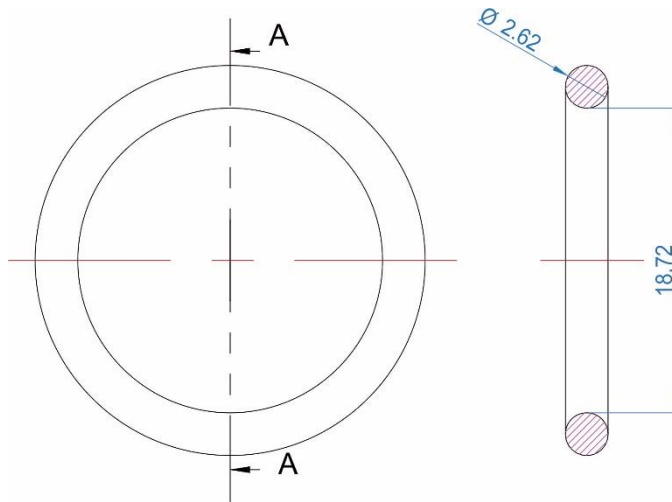
SIS2 standard type, use O-RING; material: Viton; colour: black.

Standard
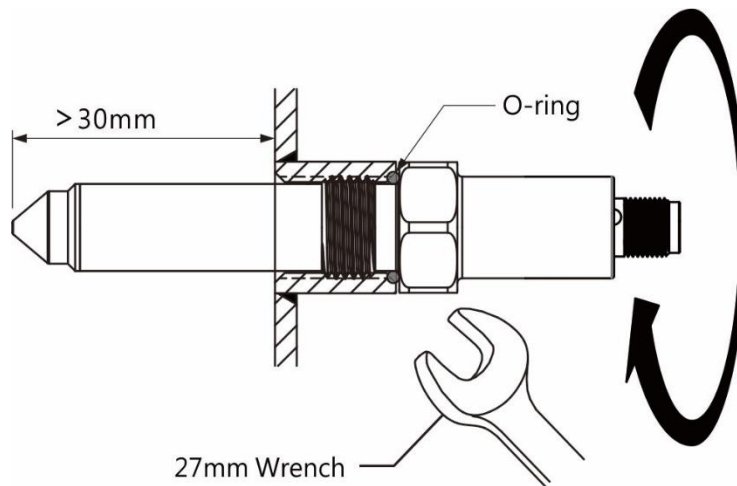
- Apply a little grease in the thread to help locking.
- Lock the sensor into the adapter sleeve and tighten with a tightening torque of 20...25 Nm.
- After locking, the seal must not be exposed or cut off. It must be compressed at least 1/4 wire diameter or more than 0.3mm to ensure sealing.

Rear install type

O-ring
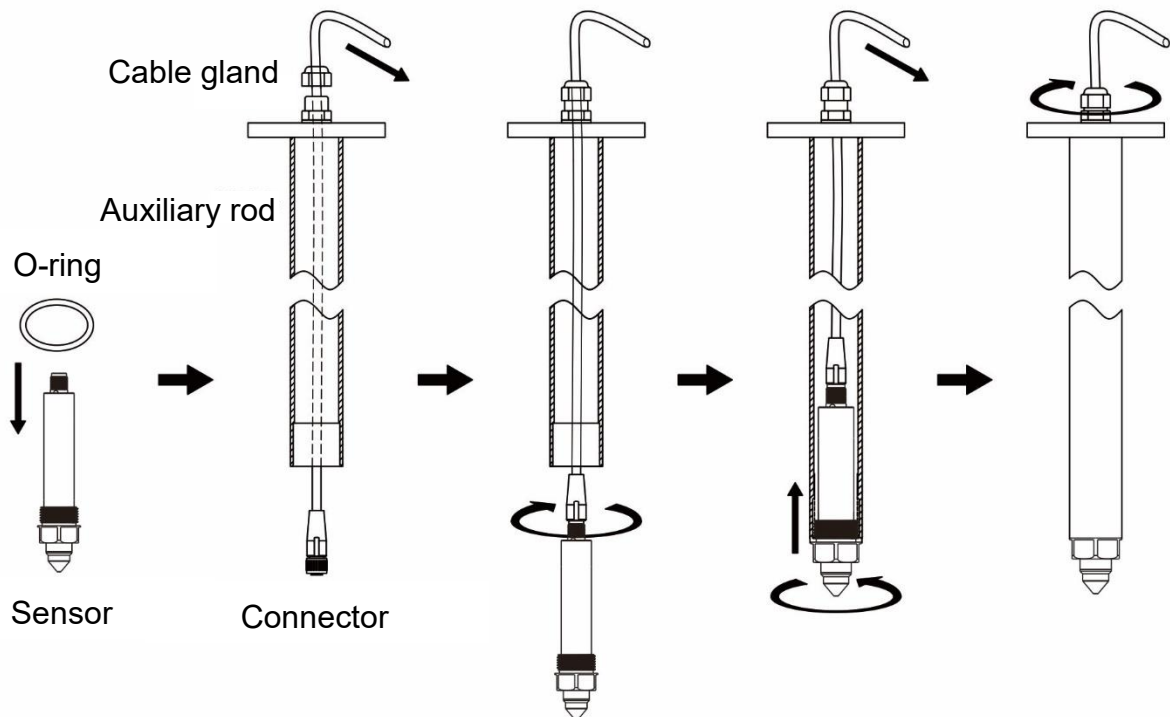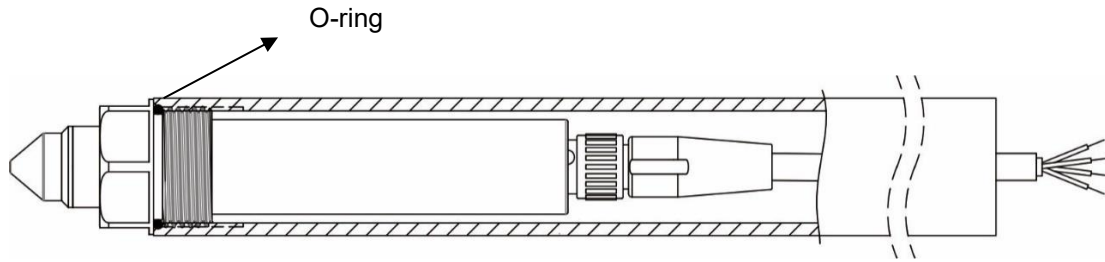
- Auxiliary rod is needed for rear installation, auxiliary rod is not included in the order (customized order if need)。
- When tightening, the sealing ring is not exposed and must be compressed at least 1/4 wire diameter or more than 0.3mm to ensure the seal, and the tightening torque is controlled between 20...30 Nm.
- Applicable sealing ring specifications: OD30.09xID25.07x2.51t; material: NBR(black).
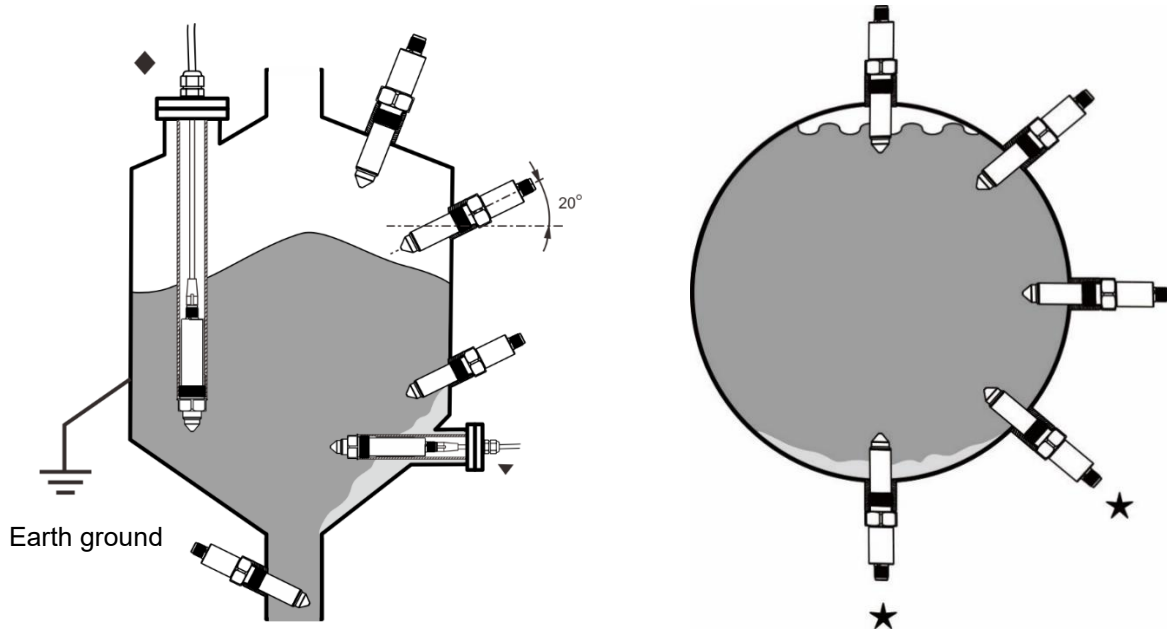 Part number: HP403-C030350702
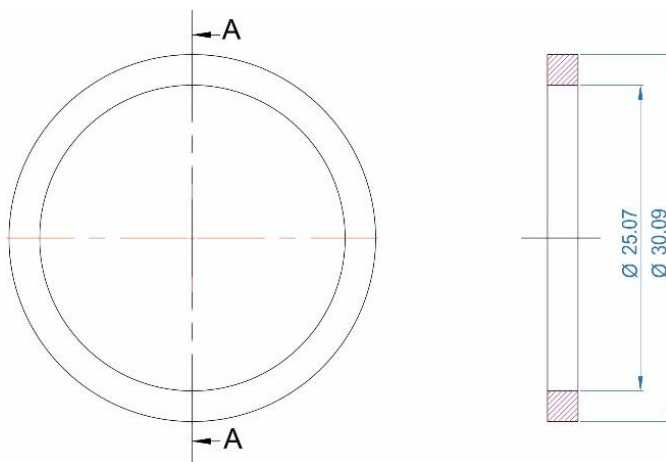
SIS2 rear-mounted type: use gasket; material: NBR; Colour: black.

10.3 Installation examples

The sensor can be installed as shown below:

Tank Diagram

The upper-left picture shows an installation on a tank for detecting levels and idling protection.

The upper-right picture shows an installation on a pipeline for monitoring liquids.

Note！

1. Mounting the probe at a 20° incline will can avoid material bridges from forming. It also won't be damaged by the inflowing material.

2. For top-mounted installation, the rear-mounted type with the extension of the auxiliary rod can be installed at a lower position (◆: the auxiliary rod is not included in the order).

3. The rear-mounted auxiliary rod extends through the sediment can prevent from severe bridging. (▼: auxiliary rod is not included in the order)

4. If the viscous medium is inside, do not install it at the location marked ★; the residue may be mistaken as the liquid output level.

Rear install type
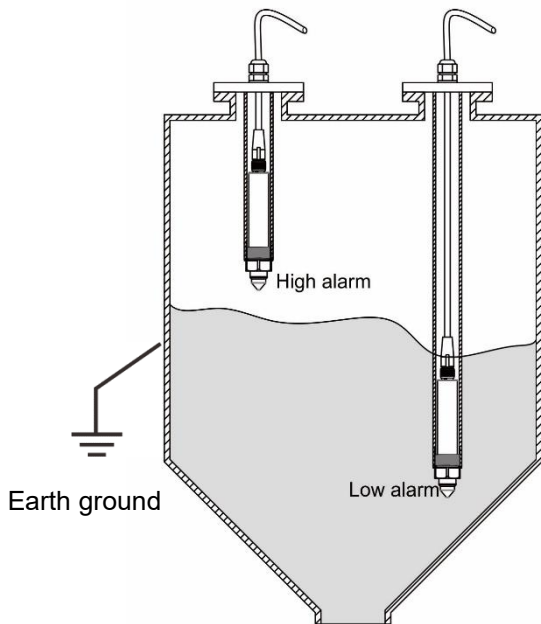
Top-mounted   Side-mounted
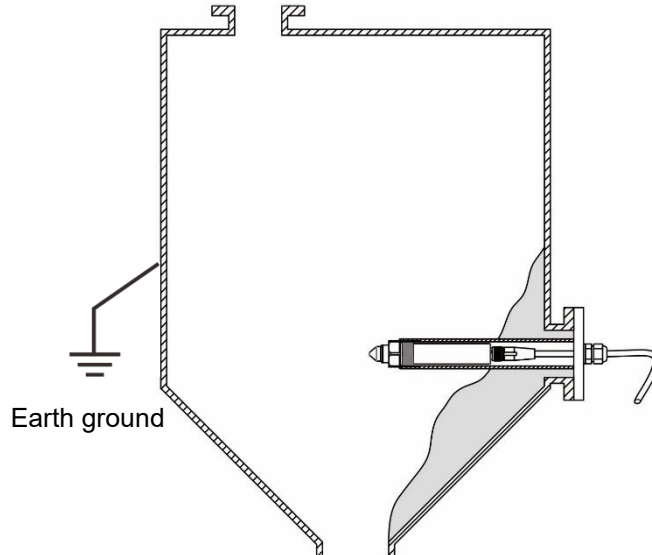
High/low alarm; to solve the
problem of not having holes
at the side.at the side.

The probe crosses the material of
the barrel wall and effectively
inhibits bridging.

- After installation, please check whether the resistance of the container or pipe entrance is within the allowable range.
- Make sure that the top cable is properly sealed, such as installing and locking the cable gland.
- Cables cannot be routed directly upwards, please go around for a short distance and then route them upwards to release water.

10.4 Requirements for use in an explosion-proof dust environment: grounding instructions

- To prevent danger due to static electricity caused by friction or impact, check the environment and ground correctly before using the product.
- It is recommended to install it in a metal tank or pipe. The product is grounded through an adapter. Please ensure that the system is grounded to prevent electrostatic charges.
- If the tank or pipe is non-metallic, it must be installed with an adapter for grounding.

11. Wiring Instructions

⚠️ Attention! Wiring must be carried out by an electrician.

Make sure you comply with national and international regulations related to the installation of electrical equipment.

The input power supply must be within the specifications of the product.

Product application requirements for standard type / explosion-proof dust product application requirements for standard type

➤ Turn off the power before wiring.

➤ Make connections according to the wiring diagram below.

➤ Insert the connector plug into the top socket of the sensor and tighten the nut.

➤ For hexagon nuts, please use a 14mm open spanner to tighten torque of 1~1.5 Nm(0.1~0.15 kgf.m).

Torque: 1.5Nm

14mm
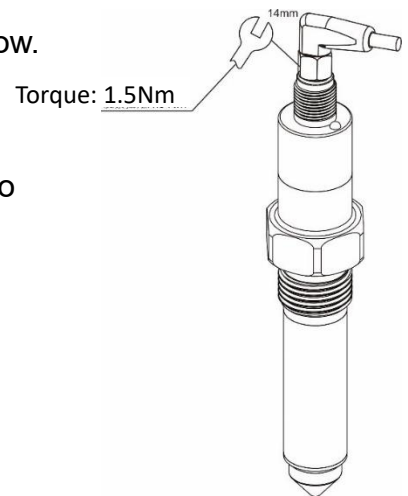
Requirements for use in an explosion-proof dust environment；M12 cable.

1. Do not open the connector in an explosive dust environment.

2. nstall the M12 cable in a safe area first, then proceed with the onsite installation. Supply power only after the onsite installation is complete.

3. Use a 14mm wrench; tightening torque: 1~1.5 Nm (0.1~0.15 kgf.m).

4. The M12 cables must conform with NEPSI-approved explosion-proof environments: numbers (PC312-2221415M02、PC312-1221415M03).

Wiring diagram:

M12 Connector		
PIN	Connection	wire color
1	Power supply+	Brown
2	OUT2	White
3	Power supply-	Blue
4	OUT1	Black

PNP Wiring

NPN Wiring
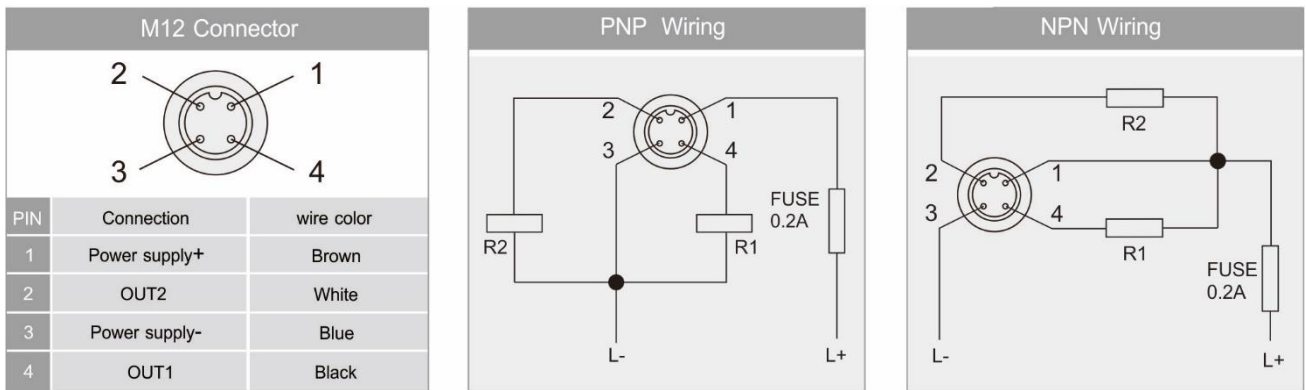
➢ R1 and R2 represent the load of OUT1 and OUT2 respectively.

➢ To protect the sensor from damage in the event of system failure, adding FUSE 0.2A to the power circuit is recommended.

➢ only represents the property. The actual wire color depends on the connector purchased.

11.1 Simulation output test

1. Finished the installation and supply the nsor with 12~30Vdc.
2. Lean a magnet close to the + sing for 3 seconds or more, there will be switching output with corresponding LED light display.
3. Remove the magnet from the + sign, the switching output and corresponding LED light display will return to normal status.
4. Magnetic(min 100GS@10mm)is in use.
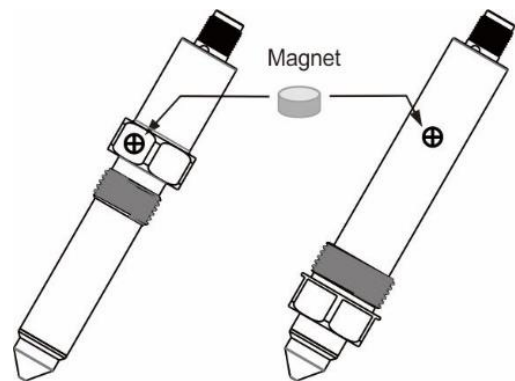
12. Step of magnetic alignment/Calibration for sis sensor

Magne

LED yellow and green lights
(yellow and green lights will
flash at an interval)
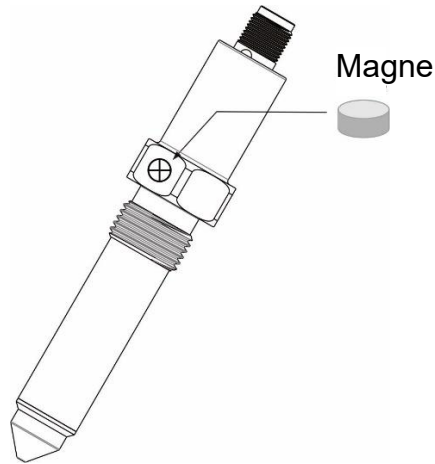
(Figure 1)   (Figure 2)

1. Under the power supply, take the magnet close to the hexagonal surface of the
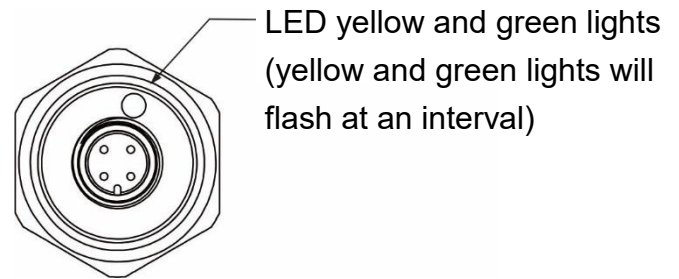   sensor (Figure 1), an analog alarm will appear after 3 seconds, and the yellow
   LED will turn on (Figure 2). Confirm that there is no abnormality in the induction,
   and power off the sensor while not removing the magnet at this time.
2. Turn on the power again, and after about 3 seconds, remove the magnet, and the
   yellow and green lights of the sensor will flash at an interval of every 2 seconds
   (Figure 2).
   It means the calibration can be proceeded from now.
3. The probe should not touch any material. Take the magnet close to the hexagonal
   head surface again for staying one second, and remove the magnet. The yellow
   and green lights will flash respectively for 1 second. At this time, the sensor will
   record this status for not touching the materials.
4. Make the sensor touch the detected materials to measure, and have the magnet
   close to the hexagon head again, stay for one second and then remove the
   magnet. The yellow and green lights will flash at an interval of about 0.5 seconds.
   At this time, the sensor will record the state of the detected material.
5. Take the sensor out of the materials (if material is attached ,no need to remove the
   materials from the probe).
   Have the magnet close to the hexagon head again, stay for 1 second, and remove
   the magnet. Check if the green light flashes for 3 times, and calibration is
   completed.

13. Daily Maintenance And Handling

➤ Regularly check the probe for material accumulation or damage and clean as needed. Replace the device if it is damaged.
Before removing and reinstalling the device, carefully clean the probe neck and the mounting slot, especially the sealing cone. Take appropriate methods to ensure that no external matter enters the device.

⚠ Attention! If the medium is changed, you need to change the sensor model.

➤ The sensor is packaged on a one-time basis and cannot be repaired.
➤ Follow local regulations when disposing of the device.
➤ Before returning the product, make sure that the product is free of dirt, especially dangerous or toxic substances. Appropriate packaging must be used to avoid damage to the device.

14. Simple Troubleshooting

Anomaly	Cause	Solution
No lights are lit and the switch is not working.	The device is not powered.	Check and repair the power cord.
		Check and turn on the power switch.
	The connector is not plugged in properly.	Check the M12 connector and plug it in properly.
	The power supply is not within product specifications.	Check that the power supply is 12~30Vdc and make corrections (if the wire is too long, pressure drop must be taken into account).
Yellow and green lights flash alternately every second.	Overvoltage protection is active.	Check that the power supply is 12~30Vdc and make corrections.
The yellow light continues to flash once per second.	Overcurrent protection is active.	Check that the rated current consumption of the load is be less than 50mA and make corrections.
	Over temperature protection is active.	-40~85°C. The alarm is automatically cleared if the temperature returns to normal.
The green light continues to flash once per second.	The device is damaged.	Contact your local sales representative.
The switch is working, but the output is abnormal.	Cable error.	Check the wiring, terminal pins and make corrections.
		Check the cable for damage, short circuit, breaks, and repair it.
	The power supply is not sufficient to drive the output.	Check that the power supply $>$ 12Vdc and make corrections.
Absence of material is indicated when material is present.	The material characteristic parameter setting is incorrect.	Contact your local sales representative.
Presence of material is indicated when material is absent.	The sensor probe is attached with a large amount of material.	Check and clean the sensor probe.
	The material characteristic parameter setting is incorrect.	Contact your local sales representative.

15. List Of Applicable Media

As shown in the table below, you can select the medium form and the corresponding factory setting.

➢ Attention! Failure to operate according to the scope indicated may result in inability to measure or inst ability.

➢ The symbol ● means that the medium can be used according to the factory setting.

➢ Always ensure that the device is set correctly and the corresponding material medium.

	Item	Water Based	Oil Based/ Powder
1	Tap water	●	
2	Seawater	●	
3	Pure water	●	
4	Beer	●	
5	Wine	●	
6	Liquor(40%)	●	
7	Juice (Stock)	●	
8	Juice (Distillate)	●	
9	Milk	●	
10	Yoghurt Drink	●	
11	Vinegar	●	
12	Condensed Milk 7.5％	●	
13	Chocolate(40°C)		●
14	Syrup		●
15	Honey		●
16	Fructose	●	
17	Albumen	●	
18	Yolk	●	
19	Egg(Liquid)	●	
20	Jam(Almond)	●	
21	Jam(Strawberry)	●	
22	Barbecue Sauce	●	
23	Barbecue Sauce	●	

24	Flour		●
25	Starch		●
26	Cocoa Powder		●
27	Coffee Powder		●
28	Hazelnut Powder(40℃)		●
29	Pepper(Ground)		●
30	Mashed Potatoes		●
31	Creamer(Powder)		●
32	Salt		●
33	Caster Sugar		●
34	Crystal ugar(Ground)		●
35	Mayonnaise		●
36	Olive Oil		●
37	Palm Oil		●
38	Canola Oil		●
39	Sunflower Oil		●
40	Linseed oil		●
41	Glycerin	●	
42	Mineral Oil(15W40)		●
43	Methanol	●	
44	Ethanol	●	