SIS Sanitary Intelligent Level Switch Operation Manual

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/IP68/IP69K.
- The lightweight and compact design make it easy to carry and enable for quick installation even in narrow spaces or difficult situations.
- Surface roughness (Ra) can be customized according to customer needs for chemical pharmaceutical and food processing industry applications.
- 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 and SIP environments.
- Unaffected by foam and viscous medium.
- Suitable for single point level detection and pump idling protection for liquid, viscous medium, and powder medium in containers and pipelines.
- 2 output units can be set individually to help detect 2 different media (such as separate layers, foam or oil + water).
- Acquired NEPSI dust Explosion-proof Certificate, Ex tD A20 IP67 T85℃ T_{200} 100℃.

5. Scope of Application

Scope
➢ The product is designed based on food grade structure and materials, ideal for food and health areas.
➢ Suitable for level detection of water-based medium, oil-based medium, powder or sticky material as a switch output.
➢ Can be used for liquid with separate layers (such as bubbles) and two-level or interface detection (such as oil + water).
➢ Can be used for almost all media; low specific gravity, low dielectric, non-conductive media can all work properly.

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.
➢ Media with separate layers of different natures (such as oil on the water surface) must be checked in advance.
➢ Only explosion-proof type specifications can be used in dust explosion-proof hazardous environments
➢ The sensor must be installed with the exclusive "Thread adapter" and its sealing ring to ensure proper sealing

The special requirement used in the dust-explosion environment
➢ If the connection is the metal tank or pipe, it must be grounded so the danger of static electricity generated by friction or impact can be avoided.
➢ If the connection is not the metal tank or pipe, the sensor must be installed with the exclusive "Thread adapter" and use "thread adapter" to complete the grounding.
➢ The cross-sectional area of the grounding wire must be greater than 4mm^2 (>11AWG). (Please refer to the installation instructions above)

6. Ambient Conditions

Normal type (Standard type / Extension type / Mini type)
➤ Storage temperature: -40°C ~ 85°C (-40°F ~ 185°F)
➤ Ambient temperature:-40°C ~ 85°C (-40°F ~ 185°F)
➤ Medium temperature: Continuous; max.100°C
   @ ambient temperature -40°C~85°C (-40°F~185°F)
   Short time(1hr); max.150°C (Mini type: max.135°C)
   @ ambient temperature -40°C~60°C (-40°F~140°F)
➤ Power supply: 18 VDC ~ 30 VDC
➤ Output load current: Max. 100 mA

Rear install type
➤ Storage temperature: -40°C~85°C (-40°F~185°F)
➤ Ambient temperature: -40°C~80°C (-40°F~176°F)
➤ Medium temperature: -40°C~80°C (-40°F~176°F)
➤ Power supply: 18 VDC~30 VDC
➤ Output load current: Max, 100 mA

Explosion-proof type
➤ Storage temperature: -20°C ~ 85°C(-4°F ~ 185°F)
➤ Ambient temperature: -20°C ~ 70°C(-4°F ~ 158°F)
➤ Medium temperature: Max, 100°C @ Ambient temperature-20°C ~ 70°C(-4°F ~ 158°F)
➤ Power supply: 18 VDC ~ 30 VDC
➤ Output load current: 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..
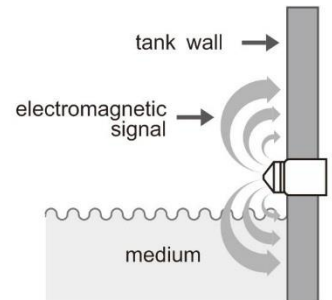

7.1 Output Status

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	filled	OUT1	$<100\,\mu A$	Green
			OUT2	I_L	Yellow
		filled	OUT1	I_L	Yellow
			OUT2	$<100\,\mu A$	Green
	MIN	empty	OUT1	I_L	Yellow
			OUT2	$<100\,\mu A$	Green
		empty	OUT1	$<100\,\mu A$	Green
			OUT2	I_L	Yellow
NPN	MAX	filled	OUT1	$<100\,\mu A$	Green
			OUT2	I_L	Yellow
		filled	OUT1	I_L	Yellow
			OUT2	$<100\,\mu A$	Green
	MIN	empty	OUT1	I_L	Yellow
			OUT2	$<100\,\mu A$	Green
		empty	OUT1	$<100\,\mu A$	Green
			OUT2	I_L	Yellow

*IL represents load start

LED locations

Connector socket   OUT1   OUT2
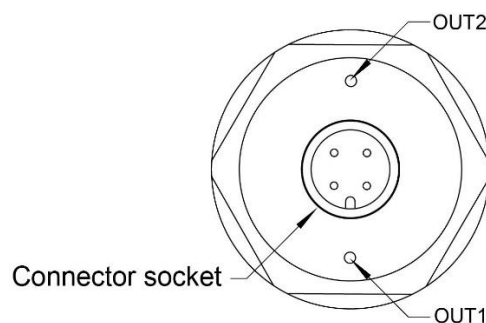
8. Technical Performance

8.1 Specifications

	Normal type	Rear install type	Explosion proof type
Scope (optional)	Water-based media, oil-based media, powder media, dual-level media (such as oil+water), fluid with separation layer (such as bubbles)		Powder media
Storage temperature	-40°C ~ 85°C (-40°F ~ 185°F)		
Ambient temperature	-40°C ~ 85°C (-40°F ~ 185°F)	-40°C ~ 80°C (-40°F ~ 176°F)	-20°C ~ 70°C (-4°F ~ 158°F)
Operating temperature	Continuous: max.100°C while ambient temp. -40°C~85°C(-40°F~185°F) Short time(1hr): max.150°C (Mini type: max.135°C) while ambient temp. -40°C~60°C(-40°F~140°F)	-40°C ~ 80°C (-40°F ~ 176°F)	Max.100°C while ambient temp. -20°C ~ 70°C (-4°F ~ 158°F)
Power Supply	18 VDC ~ 30 VDC		
Current consumption	Max. 50 mA		
Overvoltage protection	Class II		
Reverse protection	Yes		
Output type (optional)	DC PNP/NPN		
Number of outputs	2 switch outputs		
Switch type (optional)	Group 1 output NO, Group 2 output NC		
Output load current	Max. 100 mA		Max. 50 mA
Output voltage drop	Max. 2.5 VDC		

Short circuit protection	Short pulse		
Overload protection	Yes		
Switch delay (optional)	Standard < 1 second (max. 60 seconds)		
Electrical connection	M12 4PIN connector socket		
Wetted part material (optional)	SUS304, SUS316, SUS316L		
Operating pressure	-1 ~ 40 bar		
Process connection	G 1/2"	M32*P1.5	G 1/2"
Probe material/surface roughness	PEEK/Ra<0.8		PEEK-1000/Ra<0.8
Enclosure protection rating	IP67/IP68/IP69K (IP68 up to 1 meter underwater for 30 days)		
Status indication	Switch active LED yellow Switch reset LED green		
Simulation output test (Not available for mini type)	Magnetic test (lean a magnet close to the + sing for 2 seconds, there will be switching output)		
Communication mode	"IO-Link V1.1		
Standard compliance	IEC61000-4-2, IEC61000-4-4, IEC61000-4-11		
Explosion-proof Certificate	N/A		NEPSI Ex tD A20 IP67 T85℃ T_{200} 100℃

Warning !

1. Only Explosion-proof type can be installed and used in Combustible dust explosion environment.

2. The sensor must be installed with the exclusive "Thread connector" or "Thread adapter", in order to ensure the installation sensor operate normally and avoid leakage.

3. The electrical connection of this device has achieved IP68/IP69K protection grade, so it must be connected with the corresponding M12 connection cable in order to be installed properly.

4. Explosion-proof type must be installed with M12 connection cable approved by NEPSI, in order to use it in the explosion environment (please refer to chapter Accessories - Thread Connector/ ADAPTOR").

9. External Dimensions

9.1 Dimensions
Standard type   (Unit: mm)

Applied for general medium

Extension type

Applied for sticky medium or easily buid up medium

Mini type

Applied for general medium narrow space

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.

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 DN25.

➢ Install the sensor at a distance of at least 15mm from the pipe wall, structural parts, stirrer, and other sensors to prevent errors caused by collision or interference (as shown below).
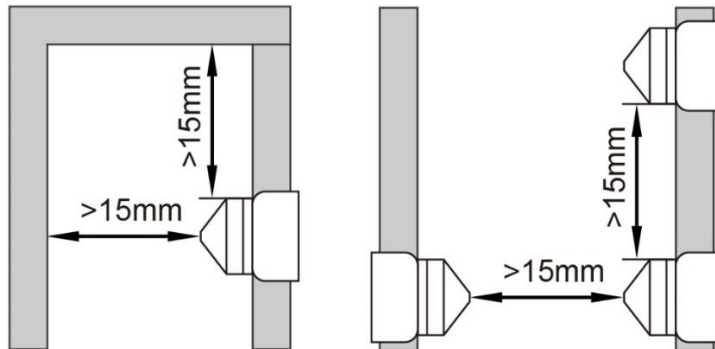
➢ The insertion of the sensor should be sufficient to prevent the sediment from being wrongly considered as the material (especially solid materials). The probe of the sensor must be completely through the tank wall.

🚫 ➢ 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).

**Warning !**

In the dust explosion-proof environment, it is forbidden to produce the process of propagation brush discharge type and brush discharge type. Such as the rapid movement of dust particles, powder transfer process and spraying process in electrostatic coating process.

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 or adapter sleeve.

➢ Install or weld the adapter sleeve onto the container/pipe. For the welding operation, please refer to "SISB Welding Adapter / Thread Adaptor Operating Instructions".

➢ 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.

- ● Use the seal supplied with the sensor only. An inappropriate seal may cause installation errors.
  - The seal is too thick: A gap exists between the sensor tip and the adapter sleeve.
  - The seal is too thin: The seal is insufficiently compressed between the sensor and the adapter sleeve. Leakage may occur.

Normal type
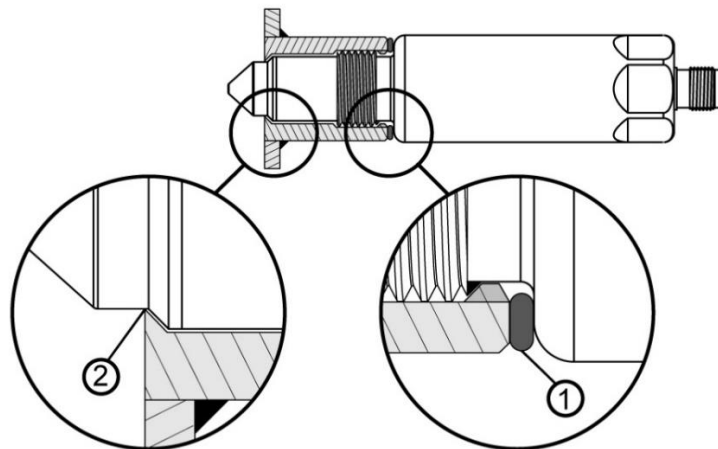
① The seal (supplied with the adapter sleeve) is squeezed

② The sealing cone of the adapter sleeve/the sealing end face of the probe is squeezed

- ● 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.

Rear install type

Cable gland

Auxiliary rod

O-ring

Sensor

Connector
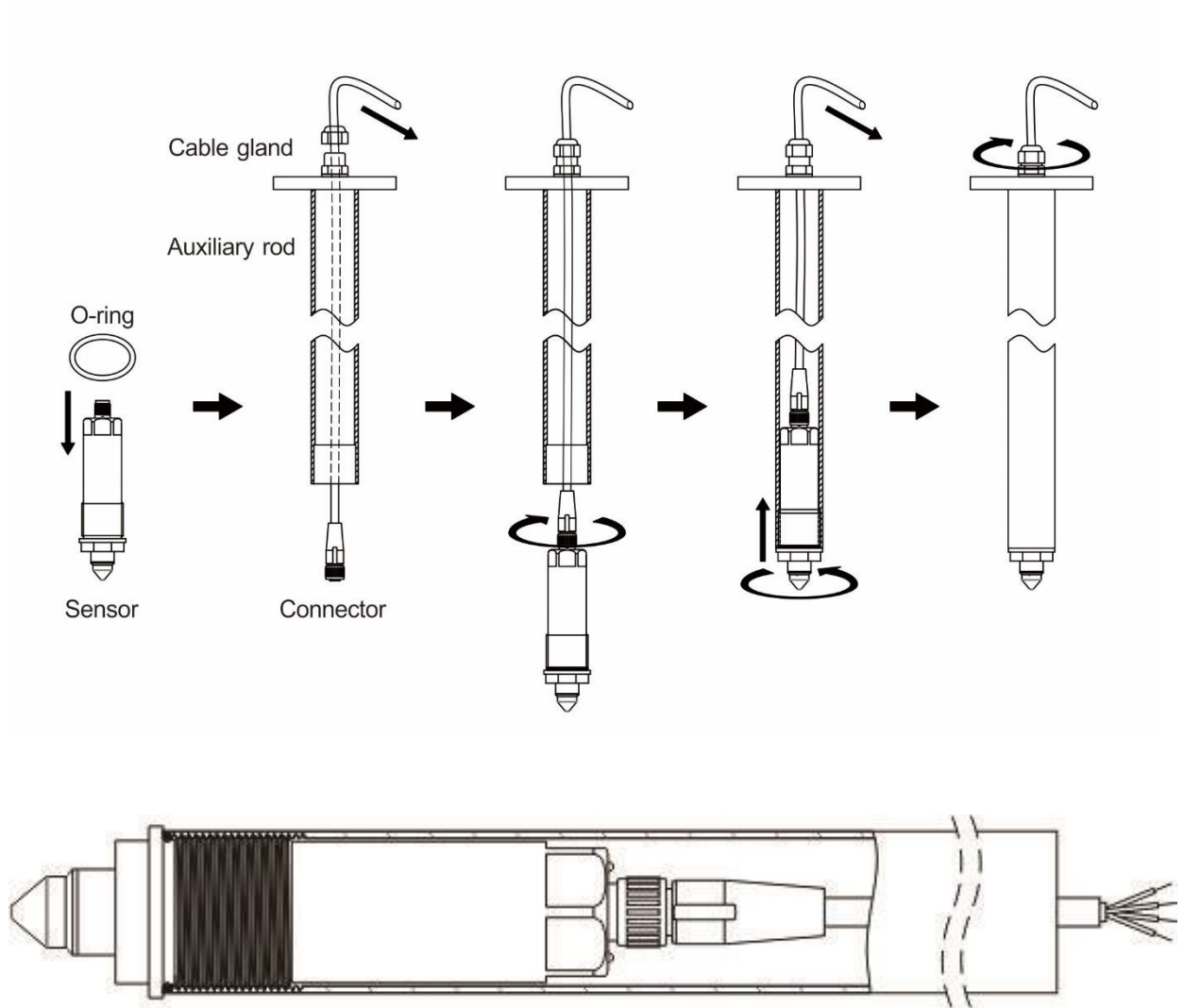
- Auxiliary rod is needed for rear installation, auxiliary rod is not included in the order (customized order if need)。
- When tightening, the sealing ring is not exposed and must be compressed at least 1/4 wire diameter or more than 0.3mm to ensure the seal, and the tightening torque is controlled between 20...30 Nm.

10.3 Installation Examples

The sensor can be installed as shown below:

Normal type

Tank Diagram   Pipeline Diagram
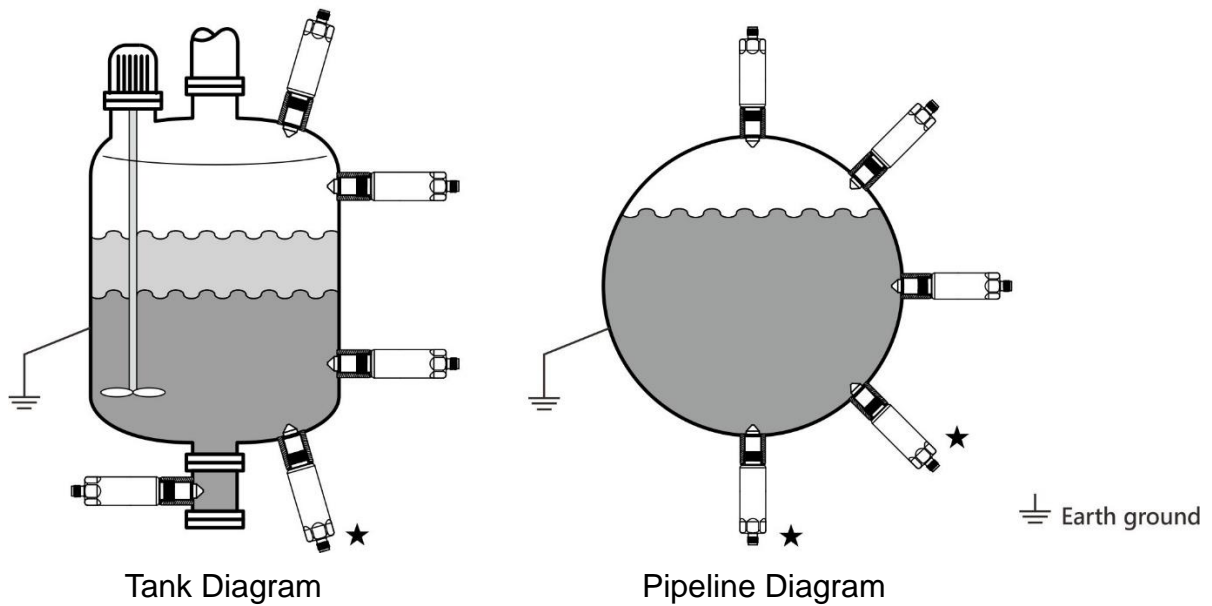
The figure on the left shows an example of container installation, such as for liquid level detection or as idling protection.
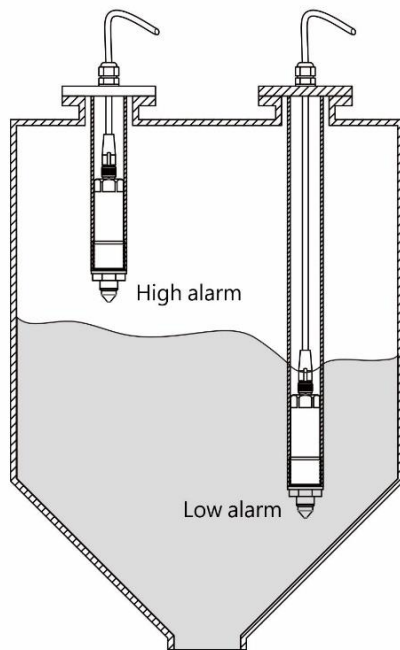
The figure on the right shows an example of pipe installation as liquid level monitoring.

⚠ Attention! For highly viscous medium, the installation location ★ in the figure is only applicable to a certain extent. Residues may be incorrectly detected as liquid level output.
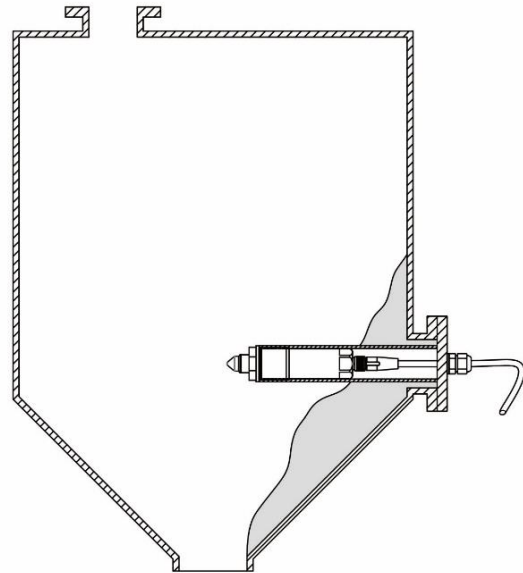
Rear install type

Top-mounted   Side-mounted

High/low alarm and to   The probe crosses the material of
solve the problem that   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 Grounding instructions for dust-explosion zone

- To prevent dust or flow being generated by friction or impact, this product can be used in the dust-explosion area. Please confirm the grounding condition in the installation environment and take proper grounding.
- If the connection is the metal tank or pipe, this product is grounded through "thread adapter" and metal tank or pipe. Please confirm that the installation environment is grounded to prevent electrostatic charge.
- If   the connection is not the metal tank or pipe, the sensor must be installed with the exclusive "Thread adapter" and use "thread adapter" to complete the grounding.
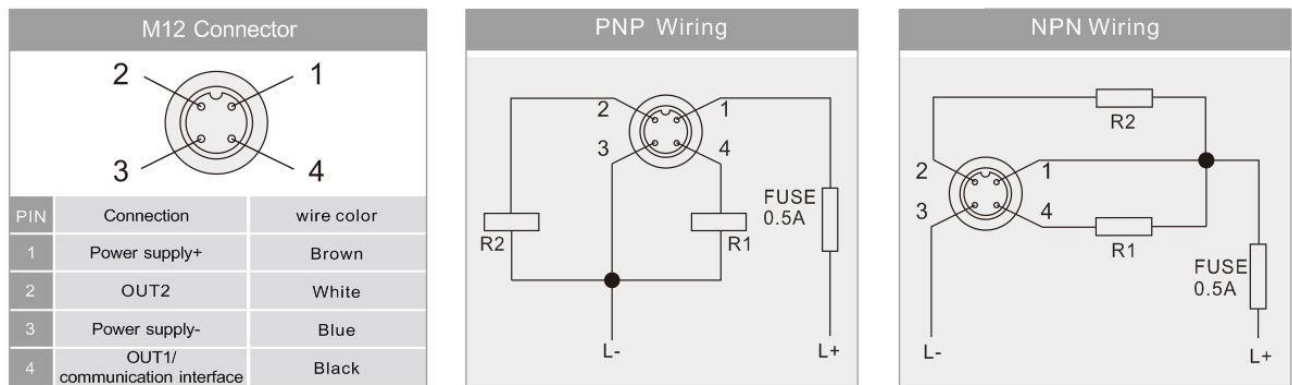
11. Wiring Instructions

⚠️ 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.

➢ 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.

Wiring diagram:

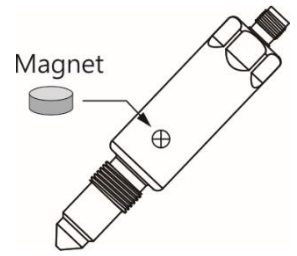| M12 Connector		
PIN	Connection	wire color
1	Power supply+	Brown
2	OUT2	White
3	Power supply-	Blue
4	OUT1/ communication interface	Black

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 0.5A to the power circuit is recommended.

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

Note: The accuracy and efficiency can not be guaranteed if using NON-FineTek connector.

11.1 Simulation output test

1. Finished the installation and supply the sensor with 18~30Vdc.
2. Lean a magnet close to the + sing for 2 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.

11.2 M12 cable connector for dust-explosion zone

● Do not open the connector when there is an explosive dust environment.
● Please   complete the M12 cable installation in the safety area first, and then complete the on-site installation before providing supply power.
● Please use 14mm size open-end wrench to operate with the torque around 1~1.5 Nm (0.1~0.15 kgf.m)..
● Use M12 cable type in dust explosion-proof environment which approved by NEPSI; ADOAH040VAS0005E04, ADOAH043VAS00005E04 (order code; PC3121231415M011, PC312-1232410501)

Torque: 1.5Nm
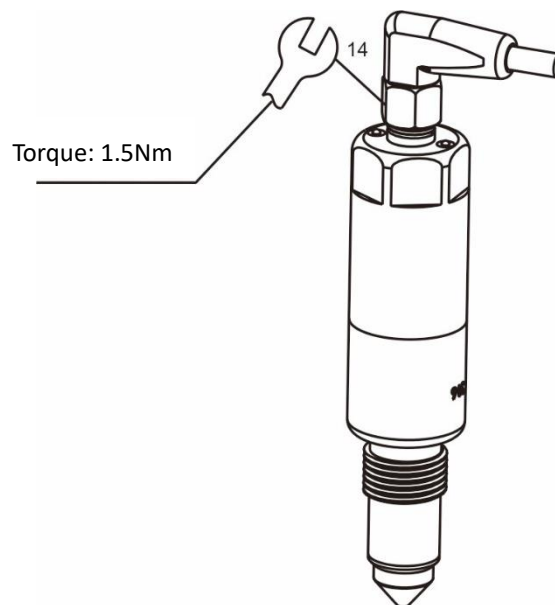
12. Daily Maintenance and Handling

➢ 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 or adjust the sensitivity (driver and software required).

➢ 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.

12.1 Euipment cleaning for dust-explosion zone
➢ When cleaning the non-metallic surface of the equipment, wipe only with a damp cloth that has been wrung out well.
➢ When cleaning the non-metallic surface of the M12 cable connection, wipe only with a damp cloth that has been wrung out well.

13. 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 18~30Vdc 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 18~30Vdc 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 100mA 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 $>$ 18Vdc 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.

14. List Of Applicable Media

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

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

➢ 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	Low Water Content	Oil Based/ Powder
1	Tap water	●		
2	Sea water	●		
3	Pure water	●		
4	Beer	●		
5	Wine	●		
6	Liquor (40%)		●	
7	Juice (Stock)	●		
8	Juice(distillate)	●		
9	Milk	●		
10	Yoghurt	●		
11	Vinegar	●		
12	Condensed milk	●		
13	Chocolate (about 40°C)		●	
14	Syrup		●	
15	Honey		●	
16	Fructose	●		
17	Albumen	●		
18	Yolk		●	
19	Full egg (liquid)	●		
20	Jam (almond)	●		
21	Jam (strawberry)	●		

22	Barbecue sauce	●		
23	Soy sauce	●		
24	Flour			●
25	Starch			●
26	Cocoa powder			●
27	Coffee powder			●
28	Hazelnut powder (about 40°C)			●
29	Pepper (ground)			●
30	Mashed potato			●
31	Creamer (powder)			●
32	Salt			●
33	Caster sugar			●
34	Crystal Sugar (Crushed)			●
35	Salad dressing			●
36	Mayonnaise		●	
37	Olive oil			●
38	Palm oil			●
39	Canola			●
40	Sunflower Oil			●
41	Linseed oil			●
42	Glycerin	●		
43	Mineral oil (15W40)			●
44	Acetone		●	
45	Methanol	●		
46	Ethanol	●		