

I N S T R U C T I O N M A N U A L

F O R

P N E U M A T I C L E V E L S E N S O R



M O D E L : F P



Revision 2012-01-12

Read and understand this manual for safe usage.

- This manual describes the product of standard specification. Read the other manual for the product of explosion-proof specification.
- This manual describes the handling, inspection and adjustment of the product whose model is mentioned on the cover page. Read and understand this manual before handling.
- Follow the additional document and/or direction, submitted by NOHKEN INC. and our distributor or agent, even if the terms are mentioned in this manual.
- Save this manual in a proper place being available to refer to immediately.
- The specification of product mentioned in this manual may not be satisfied by the condition of environment and usage. Check and consider carefully before using.
- Contact to sales office at NOHKEN INC. for any question or comment about this manual and product.

The following are the description of the terms in this manual.

 WARNING	Indicates a potentially hazardous situation which, if not paid attention to, could result in death, serious injury or serious disaster.
 CAUTION	Indicates a hazardous situation which, if not paid attention to, may result in minor or moderate injury or damage to the device.

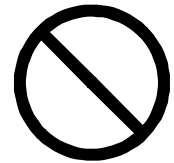
	Indicates a prohibited matter. The explanation with this mark shall be followed.
	Indicates an instructed matter. The explanation with this mark shall be followed.

—  **WARNING** —

This product is not explosion-proof construction. Do not install this product to the place where the flammable gas or vapor occurs. If installed, the flammable gas or vapor may be ignited, and serious disaster may occur. Use the product of explosion-proof construction in this case.



Do not modify or disassemble the product. Otherwise, the product and connected device may be malfunctioned, damaged, fired, or minor injury and electric shock may occur.
(Follow the additional document and/or direction, submitted by NOHKEN INC. and our distributor or agent.)



Turn off the power, before wiring and inspection. Otherwise, electric leakage, fire caused by short circuit, and electric shock may occur.



Ensure the wire is properly connected. The product and connected device may be malfunctioned, damaged, fired, or minor injury and electric shock may occur by improper wiring.

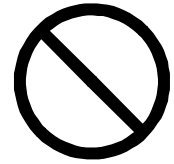


Turn off the power immediately, if the smoke, strange smell and sound occur. Do not use it until the problem is solved.



—  **CAUTION** —

Avoid strong shock and rough handling to this product. The product may be damaged by strong shock such as dropping, falling, throwing, knocking, lugging, etc.



Follow the specification of operating temperature, operating pressure, switch rating, etc. Otherwise, the product and connected device may be malfunctioned, damaged, fired, or minor injury and electric shock may occur. Check the manual or specification sheet.



Operation test shall be done before practical usage. If the serious accident is expected to occur by malfunction of the product, the other operating principle of product shall be installed in parallel.



 CAUTION

Check and deeply consider the chemical compatibility for the material of product in advance.



In case of connecting inductive or lamp load to the product.
Provide protective circuit to the load to avoid over voltage and over current. If not provided, the contact may be damaged.



Provide arrester or surge absorber to avoid electrical impact such as lightning and static electricity. If not provided, the product and connected device may be malfunctioned, damaged, and fired, or minor injury and electric shock may occur.



INTRODUCTION

- A) This manual specifies the specification of a general product.
If you order a special product, some details of specification may be different with the manual.
- B) We are glad to suggest and advise for Model selection and chemical resistance of material, but final decision has to be made by the customer.
- C) This manual has been prepared with close attention. Ask sales office at NOHKEN INC. for any question or comment about the contents of this manual.
- D) For replacement parts
The quality of product has frequently improved, so same spare parts may not be supplied. In this case, replacement parts or products may be supplied. Ask sales office at NOHKEN INC. for details.
- E) The contents of this manual are subject to change any time without notice due to the improvement of the product.

WARRANTY & DISCLAIMER

- A) NOHKEN INC. warrants this product against defect in design, material and workmanship for a period of 1(one) year from the date of original factory shipment.
- B) The warranty only covers the damage of products. The secondary and third kind disasters are not covered by NOHKEN INC.
- C) NOHKEN INC. shall not be liable for the following.
 - C-a) Do not follow the description and direction in this manual.
 - C-b) Damage due to improper installation, wiring, usage, maintenance, inspection, storing, etc.
 - C-c) Repair and modification are done by the person who is not an employee of NOHKEN INC. and our distributor or agent.
 - C-d) Improper parts are used and replaced.
 - C-e) The damage is occurred by the device or machine except our products.
 - C-f) Improper usage. (See "Purpose of use" in chapter 1 in this manual)
 - C-g) Force Majeure including, but not limited to, fire, earthquake, tsunami, lightning, riots, revolution, war, radioactive pollution, acts of God, acts of government or governmental authorities, compliance with law, regulation, and order.

THE TERMS OF WARRANTY AND DISCLAIMER SHALL IN NO WAY LIMIT YOUR LEGAL RIGHTS.

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1. PURPOSE OF USE

Pneumatic Level Sensor FP is a level switch to detect liquid head pressure to know the liquid level. Without needing electrode or float, FP sensors can cover a wide range of applications including highly adhesive or corrosive liquids, or liquids containing debris. Its compact body is ideal for a control device to be integrated into a machine or equipment.

FP sensor detects liquids such as water, oil or chemical at a desired level to send signals utilized for alarm or control output. Do not use it for any other purpose.

2. SPECIFICATIONS

Table 1

	Standard FP-1A	Anti-corrosion FP-1S	Simplified FP-3
Working condition	Open tank		
Protection degree	IP23		IP20
Contact rating (resistive load)	250V, 5A AC 250V, 0.25A DC		
Set point (mm)	80 ± 10	70 ± 10	65 ± 10
Reset point (mm)	60 ± 15	50 ± 15	50 ± 15
Material of body	Aluminum die casting (silver baking finish)		Black phenolic resin (PMG)
Material of chamber	Aluminum die casting (silver baking finish)	304 stainless steel or equivalent	Black phenolic resin (PMG)
Material of diaphragm	Polychloroprene (CR)	Fluorine rubber (FPM/FKM)	Polychloroprene (CR)
Working temperature	0 to 70		0 to 60
Cable inlet	G 3/4 or equivalent		Rubber bushing (7)
Mounting thread	G 1 (Rc 1/2 for detection pipe connection)		

- Set point is the point at which the switch turns ON as a result of level rise. Reset point is the point at which the switch turns OFF as a result of level fall. The values for these points shown in the chart are the distance measured from the pipe end.

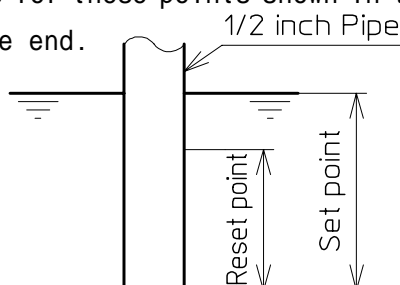


Fig.1

- Set points shown in the above table are for when measuring a liquid of specific gravity 1, using a 1/2 inch detection pipe of 300mm in length.
- Set/reset point values for a liquid of specific gravity other than 1 are gained by dividing the values in the table by the specific gravity of the measured liquid.

3. PRINCIPLE OF OPERATION

When the sensor is connected to a detection pipe and mounted on a tank as shown in Fig 2, the pressure applied to the pipe end (P) is gained by $P = \rho gh$; The upward force applied to diaphragm is $P \times A$, where A is the pressure receiving area of diaphragm.

The microswitch activates when the following condition is met:

$$hA > F + f,$$

where F is the force required to activate the switch, and f the total weight of diaphragm, pressure receiver and plunger.

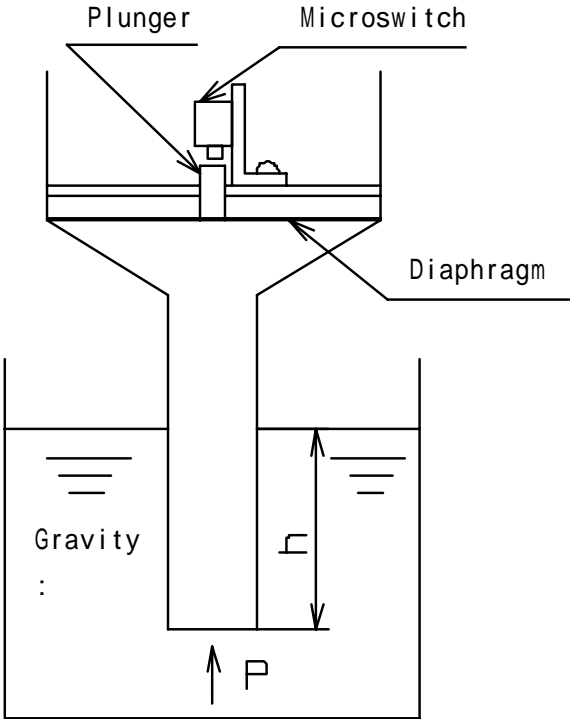


Fig. 2

4. INSTALLATION

Using the threaded connection or flange, mount the sensor so that the diaphragm rests horizontally. See Figs. 3 and 4.

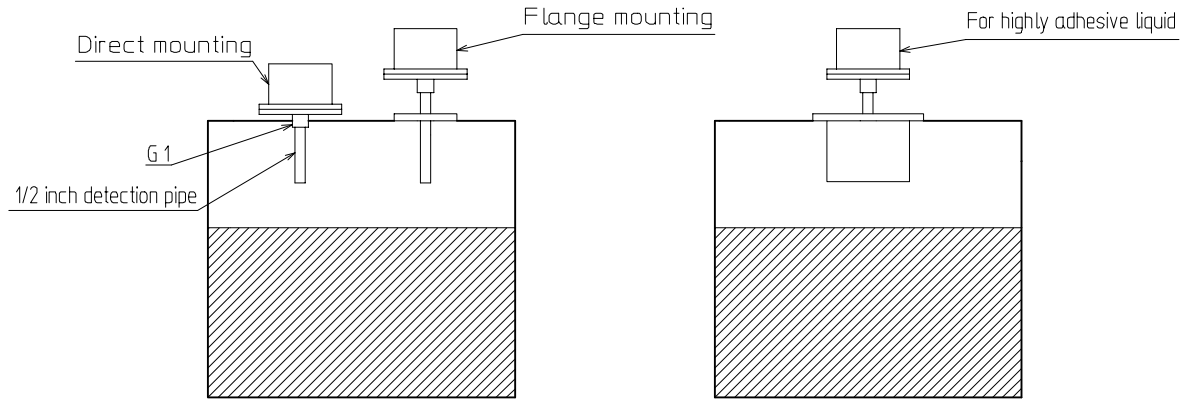


Fig.3

Fig.4

Note:

When measuring a highly adhesive liquid, the liquid inside the pipe may not move along with the rising or falling level. In such a case, use a detection pipe with a wider diameter so that the liquid inside the pipe can rise and fall as the level does.

- When the sensor is used for a low limit or corrosive liquid application, air purging is recommended. Air purge version is available on request. Contact our sales office if you require this version.

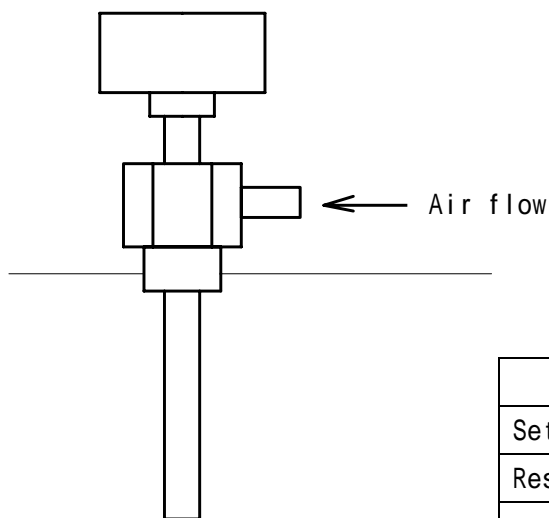


Fig.5

$0 < \text{air flow} < 1 \text{ l/min.}$

$0 < \text{pressure} < 50\text{kPa}$

Note:

See the table below for set/reset points when the air purge feature is used.

	FP-1A	FP-1S
Set point (mm)	40 ± 10	30 ± 10
Reset point (mm)	25 ± 10	25 ± 10
	FP-3	/
Set point (mm)	50 ± 10	
Reset point (mm)	30 ± 10	

5. INTERNAL CIRCUIT

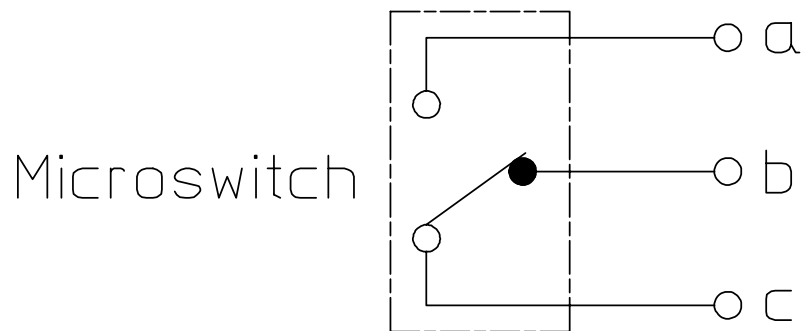


Fig.6

6. HANDLING NOTES

- Seal the connection of the sensor and detection pipe completely. Seal tape can cause air leak and thus operation failure. Use paste-like sealing compound.
- Ensure that the sensor is mounted horizontally.
- Use air purge feature or ventilate the detection pipe at times for a low limit application where air or gas is continuously trapped inside the detection pipe due to little level change.
- If the section area of the detection pipe is changed, the detection point is also changed. The set/reset points shown in this manual are for when the 1/2 inch pipe of 300mm in length is used. The set/reset points become lower as the section area becomes larger, and higher as the area becomes smaller.
- This sensor is operated by a very small pressure. Do not use it on a pressure tank.

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