

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



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MUST BE READ BEFORE USING

- This manual is for standard specifications. Read the other manuals for explosion-proof specifications.
- This manual describes the handling, inspection and adjustment of the sensor. Read and understand this manual before installation.
- Any documents and/or directions from Nohken and the agents aside from this manual shall be preceded.
- Save this manual to refer when you need.
- If you have any questions or comments about this manual and/or the sensor, ask Nohken's sales office written on the front cover.

Signal words in this manual means as follows:

 CAUTION	Indicates an potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
 NOTE	Indicates exceptional cases and attention for handling of sensors.

	Indicates prohibition. The explanation with this manual should always be followed.
	Indicates directions. The explanation with this manual should always be followed.

⚠ CAUTIONS

• Since this sensor is not an explosion-proof construction, do not use where flammable gas, explosive gas or the vapor exists. Otherwise, explosion the gases and/or the vapor may cause serious disasters. Use explosion-proof sensors at hazard areas.



• Do not modify or disassemble the sensor. Otherwise, the sensor may be damaged.



• Operating test shall be conducted before practical use. If malfunction occurs and the accident is predicted, the remedy shall be administrated by using another sensor with different operating principle in parallel.



• To prevent from electric shocks such as lightning and the static electricity, provide conductor or the surge absorber. Otherwise, the sensor may cause malfunction, damage, ignition, electric shock and injury.



• Turn off the power supply immediately when abnormal conditions are encountered, such smoke, disagree smell and unusual noise.



⚠ NOTES

• Do not give strong shocks to the sensor. Dropping, throwing, striking and dragging the sensor, for example, are to cause strong shocks and damage the sensor.



• The specifications such as ambient temperature, maximum voltage and the power rating shall meet the conditions. Otherwise, the sensor may cause malfunction, damage, ignition, electric shock and injury. Read and check the clause of specification in the manual or specification sheets.



• Operating test shall be conducted before practical use. If malfunction occurs and the accident is predicted, the remedy shall be administrated by using another sensor with different operating principle in parallel.



▲ NOTES

- Check the chemical compatibility with the material you want to use.



- To prevent from electric shocks such as lightning and the static electricity, provide conductor or the surge absorber. Otherwise, the sensor may cause malfunction, damage, ignition, electric shock and injury.



- When connecting inductive load or the lamp load to the microswitch output contact.

To prevent overvoltage and overcurrent, provide a protective circuit to the load. Otherwise, the contact may be damaged.



INTRODUCTION

- A. This manual specifies standard specifications of this product. Some specifications may be different from your product if you order the custom-made product.
- B. A variety of specifications are available to meet your process conditions, such as installation conditions, chemical compatibility, and so on. We are glad to offer suggestions to assist your decision.
- C. If you have any questions or comments for the contents of this manual, ask Nohken's sales office written on the front cover.
- D. Nohken Inc. pursues a policy of continuing improvement in design and performance of this product. We will supply the alternative parts or complete new products required to repair or replacement.
- E. Specifications are subject to change without any obligation on the part of the manufacturer.

WARRANTY & DISCLAIMER

- A. Nohken Inc. warrants this product against defects in design, material and workmanship for a period of 1 (one) year from the date of original factory shipment.
- B. If defects occurs during the above-mentioned warranty period, Nohken will, at its option, replace or recondition the product without charge. This shall constitute the exclusive remedy for breach of warranty.
- C. Nohken Inc. makes no warranty with respect to:
 - C-a Failure not to comply with instructions of this manual.
 - C-b Failure or damage due to improper installation, wiring, operation, maintenance, inspection and storing.
 - C-c Product which has been in any way repaired, altered or tampered with by others.
 - C-d Product repaired or modified by using undesignated parts, subassemblies and materials.
 - C-e Direct incidental or consequential damages or losses or expenses resulting from any defective product or the use of any product.
 - C-f Objective of the sensor is clearly specified in chapter 1, PURPOSE OF USE.
 - C-g Inevitable accident such as acts of God, force majeure, radioactive contamination and so on.

THIS WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

NOTE TO USERS

First of all, it is essential that this manual should be read and understood before installation and start-up of the Air Bubbler System Level Measurement.

This manual covers instructions for the installation, wiring, maintenance, and troubleshooting.

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1. PURPOSE OF USE

The present FP type level sensor is of a pneumatic type having capability of knowing level position by detecting head pressure of a liquid.

Accordingly, the sensor needs neither electrode nor float, and in consequence of which it has wide range of application, in particular, it suits liquid having high tackiness and corrosive property to a significant extent, or liquid bearing suspended matters. Furthermore, on account of it being small in size, it is also suitable for employing it as built-in control parts of a machine or equipment.

2. PERFORMANCE PRINCIPLE

As shown by principle chart, when this level sensor is equipped on a liquid tank it being connected with a detecting tube, head pressure denoted by $P = \gamma h$ will be applied on the end of said tube and supposing that pressure receiving area of diaphragm is A , then the force which could push up the diaphragm will assume $P \times A$, and further supposing that the mass of diaphragm, of pressure receiving board and of plunger, etc. is to be F , the microswitch makes action when $\gamma h A > F + f$ becomes to hold good.

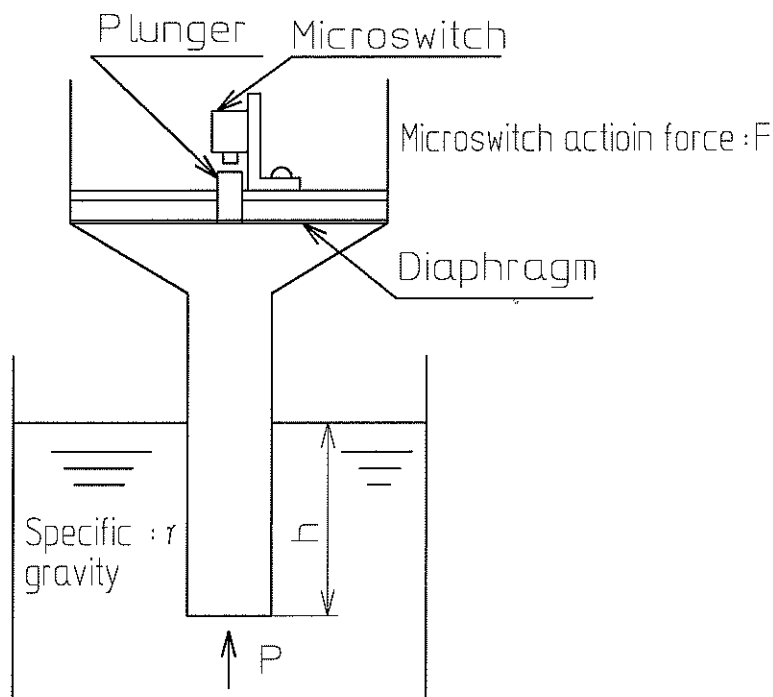


Fig. 1 Principle Chart

3. SPECIFICATION

	FP-1A	FP-1S	FP-3
Application	Open Tank		
Construction	IP23	IP20	
Contact capacity (Resistive load)	250V 5A AC 250V 0.25A DC		
Operating point	80±10mm	70±10mm	65±10mm
Release point	60±15mm	50±15mm	50±15mm
Ambient pressure of diaphragm	0 ~ 100kPa		
Physical			
Housing	ADC12		PMG
Cover	ADC12		SUS304
Chamber	ADC12	*SUS304	PMG
Diaphragm	CR	FPM	CR
Cable inlet	JIS F 20a(G3/4)		φ 7hole

* Equivalent SUS304

- (1) Operating point means the position whereat the switch assumes ON as a result of rise of level, such position being represented by dimensions from the pipe end.
- (2) Returning point means the position whereat the switch assumes OFF as a result of fall of level, such position being represented by dimension from the pipe end.
- (3) Numerals indicating dimensions in the table in reference to the aforementioned working and returning points represent dimensions in case where specific gravity of liquid is 1, and hence, where specific gravity is any otherwise than 1, dimension in such case should be sought by dividing the numerical values shown in the table by the actual gravity of the liquid being handled.

4. ADJUSTMENT

Although the Operating position of this switch has been adjusted before shipment, should any change of working position or malfunction arise due to strong impact, make adjustment according to the following method.

- (1) Adjustment is done by moving up and down the position of microswitch which is fixed by L fitting. Remove L fitting, slack the M3 screw which serves for fixing the microswitch on L fitting, perform fine adjustment moving the microswitch up and down and again fix the microswitch on L fitting and mount it on the body of switch.
- (2) In case where operating point is higher than prescribed value, lower the microswitch a little.
- (3) In case where the working point is lower than the prescribed value, raise the microswitch a little.
- (4) Besides, returning point and response difference cannot be adjusted.

5. SETTING

Figs. 2 to 4 illustrate mounting method.

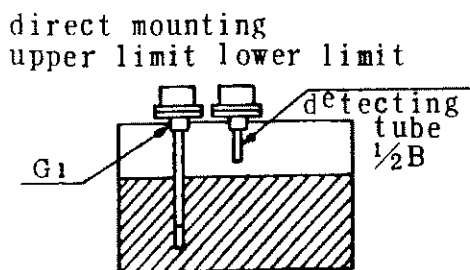


Fig. 2

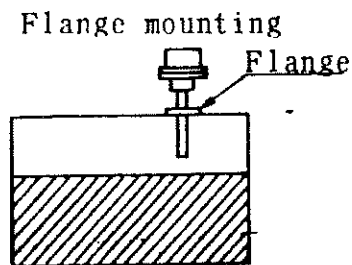


Fig. 3

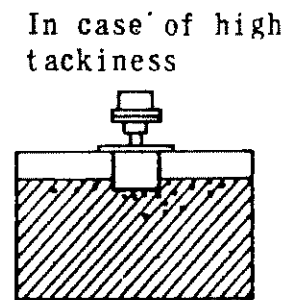


Fig. 4

NOTE :

High tackiness of liquid may stop the follow-up action of the liquid in the detecting tube in response to up and down movement of level. To cope with this it is necessary to make the sectional area of detecting tube large so that follow-up motion is made easily.

6 . T E C H N I C A L N O T E S

- (1) Sealing to be made when connecting this switch with detecting tube must be of perfect air-tight sealing. It is not recommendable to use seal tape as it liable to cause air leakage which in turn may give rise to malfunction. Use paste-like liquid sealing material.
- (2) Mount switch so that diaphragm will rest horizontally.
- (3) In case where this switch is used for measuring lower limit of liquid level, if air and gases are always sealed inside the pipe owing to low degree of circulation of level position in the tank, it is necessary to perform ventilation of the inside of pipe from time to time.
- (4) Since this switch is of pressure type level switch applying Pascal's principle, change of cross sectional area of detecting tube causes change of level detecting position. Numerals indicating working and returning points shown in standard specification represent values in case of pipe of $1/2 B$ is used.
- (5) When cross sectional area of pipe becomes large, the operating points increases.
When cross sectional area of pipe becomes small, working points increases.
- (6) As this switch performs action by micro pressure, it cannot be used for pressure tank.

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