

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

W I D E - D I F F E R E N T I A L   F L O A T   S E N S O R

M O D E L :   F S

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**NOHKEN INC.**



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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.

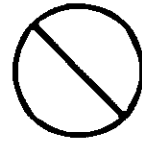
Signal words in this manual means as follows:

 <b>CAUTION</b>	Indicates an potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
 <b>NOTE</b>	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.



⚠ 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.



- The sensor which is 50cm or longer

Do not leave the sensor upright, but lay it down on the floor.

Otherwise, the sensor and/or the surrounding things may be damaged or get injured if the sensor falls.



- 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 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.

# NOTES TO USERS

First of all, it is essential that this manual shall be read and understood before installation and start-up of the Float type Level Switch. This manual covers instructions for the installation and handling.

## TABLE OF CONTENTS

MUST BE READ BEFORE USING  
INTRODUCTION  
WARRANTY & DISCLAIMER  
NOTE TO USERS  
TABLE OF CONTENTS

	Page No.
1. PURPOSE OF USE	..... 2
2. SPECIFICATIONS	..... 2
2.1 Standard specification	.. 2
2.2 Outline drawing	..... 3
3. OPERATING PRINCIPLE	..... 4
4. INSTALLATION	..... 5
4.1 Unpacking	..... 5
4.2 Installation location	... 5
4.3 Assembly	..... 5
4.4 Installation method	..... 6
5. WIRING	..... 7
6. TECHNICAL NOTES	..... 7
7. MAINTENANCE/INSPECTION	..... 7
8. TROUBLE SHOOTING	..... 8

# 1. PURPOSE OF USE

The Float Type Level Switch Model FS-2S designed to detect for clean liquid level using microswitch.

This switch is possible upper and lower level control due to having a function of holding.

# 2. SPECIFICATIONS

## 2. 1 Standard specification

Table 1 Standard specification

Model		FS-2S
Electrical characteristics	Max. contact rating	250 V, 5 A / 125 V, 0.6 A DC
	Withstand voltage	1500 V AC 1 minute or more. (Between each terminals and non-charge part)
	Insulation resistance	100 MΩ or more (Measured with 500 V DC megger between each terminals and non-charge part)
Mechanical characteristics	Buoyancy of float	Approx. 2.10 N (At S.G. 1)
	Allowable impact	100 m/s <sup>2</sup>
Operation characteristics	Control width	0.6 ~ 850 mm (L = 1000 mm)
	Specific gravity	0.85 or more
	Float submersion depth	51 mm
	Gap between rod and float	4.5 mm
Environment	Working temperature	0 ~ +80 ℃
	Application	Leave open tank
Construction		IP 42
Materials	Terminal box	Phenol (Cover : Polypropylene)
	Wetted parts	304 Stainless Steel (Bellows : Polychloroprene)
Physical	Installation	Refer to 4. INSTALLATION.
	Cable inlet	Equivalent JIS F 20a (G 3/4)

2. 2 Outline drawing

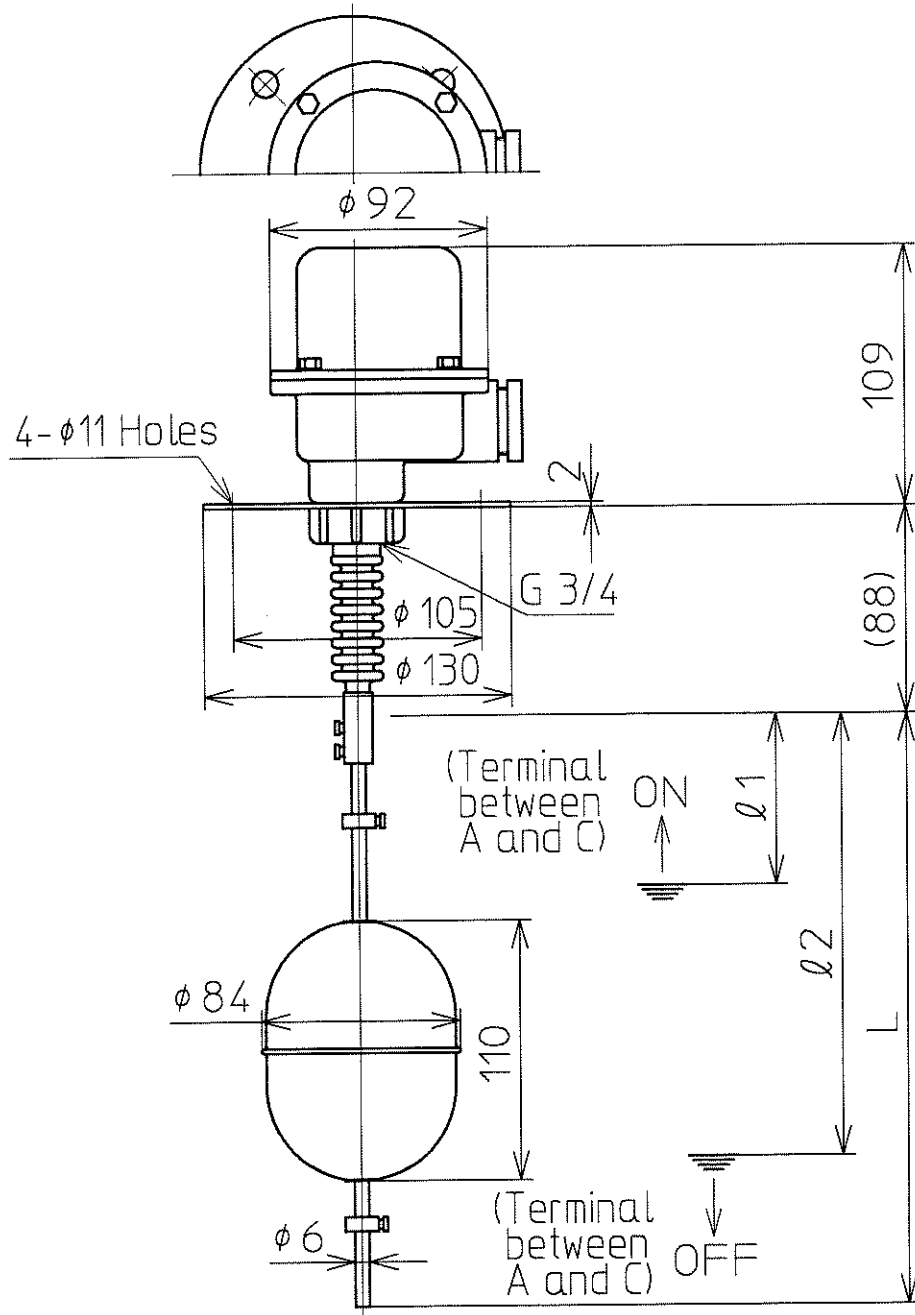


Fig. 1 Outline of Model FS-2S

### 3. OPERATING PRINCIPLE

Fig. 2 denote construction of Model FS-2S. The float travels between both float travel-stops for upper and lower level on the rod according to falling or rising level. The microswitch does not actuate, when liquid level falls, the float reaches to float travel-stop for lower level, and that is applied weight of float (state of (a) in Fig. 3 ). When liquid level rises, the float travels according to rising level but the shaft keeps in that position, the microswitch does not actuate until the float reaches to float travel-stop for upper level (state of (b) in Fig. 3 ). When float travel-stop for upper level is applied float buoyancy as level rises further, the microswitch is pushed up by the shaft and actuates (state of (c) in Fig. 3 ). Similarly, when liquid level falls, the shaft keeps in that position and microswitch keeps actuation until float reaches to float travel-stop for lower level (state of (d) in Fig. 3 ). This switch is able to control liquid level between float travel-stops for upper and lower because of having a function of holding.

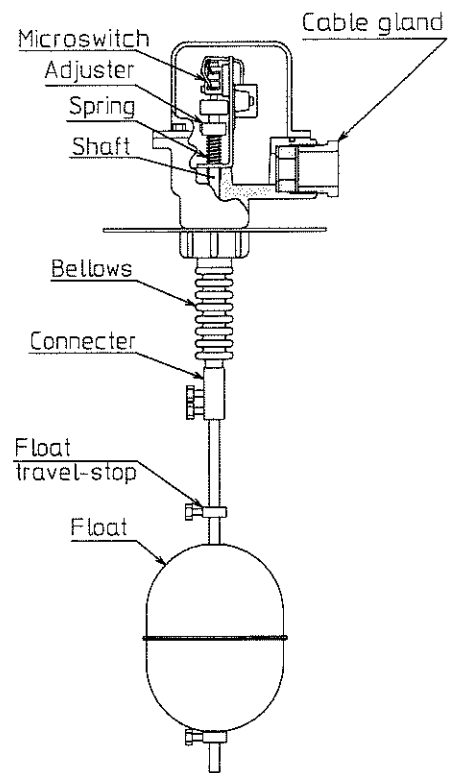


Fig. 2 Drawing of construction

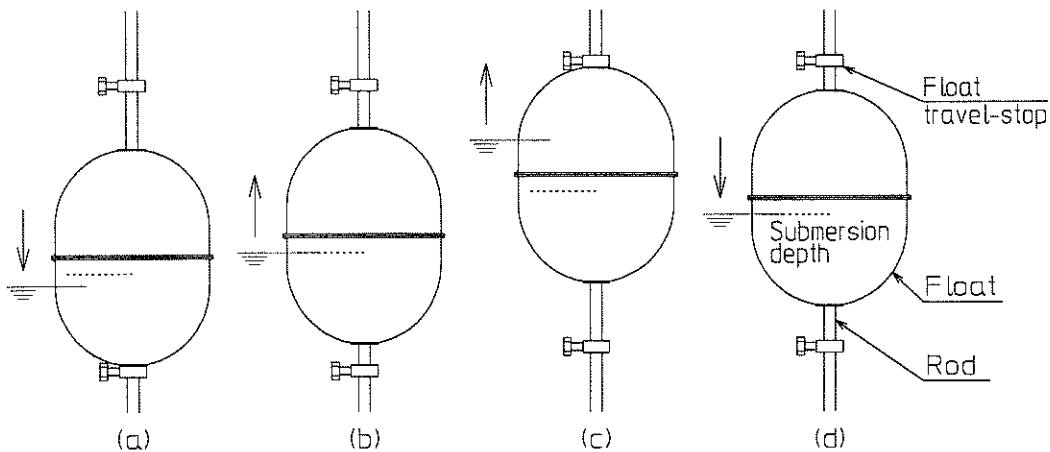


Fig. 3 Float operation

## 4. INSTALLATION

### 4. 1 Unpacking

The Float Type Level Switch Model FS-2S have been thoroughly inspected and carefully packed at the factory to prevent from damage during shipment. When unpacking, exercise due care not to subject the instrument to mechanical shock. After unpacking, visually check the instrument exterior for damage. NOTE the following points ;

- (1) Do not bend and pull the shaft extremely during installation.
- (2) Make sure that the Float Type Level Switch is provided equipment according to ordering specification.
- (3) Protector of metal made is put between tip of shaft and microswitch to avoid mechanical shock during shipment. Remove that protector certainly before using.

### 4. 2 Installation Location

This switch should be installed in an area where the following condition.

- (1) Provide ample space for maintenance/inspection.
- (2) Low relative humidity and no exposure to moisture.
- (3) No corrosive gases. (Such as  $\text{NH}_3$ ,  $\text{SO}_2$ ,  $\text{Cl}_2$  and so on.)
- (4) No excessive vibration.

### 4. 3 Assembly

Usually, the Float Type Level Switch is set specified measuring length before shipment. When not specified, each parts are packed severally. In that case, proceed to assemble as follows.

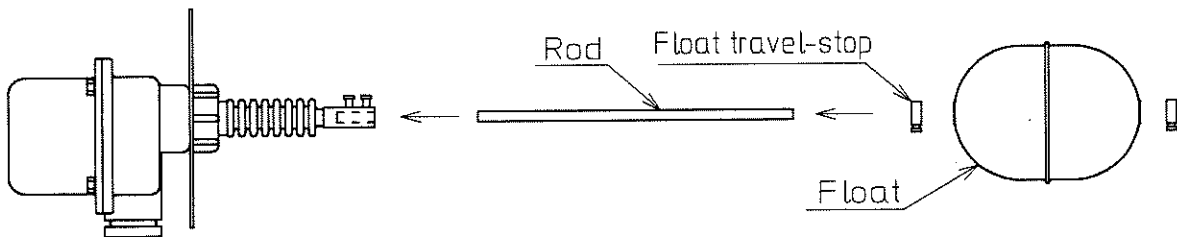


Fig. 4

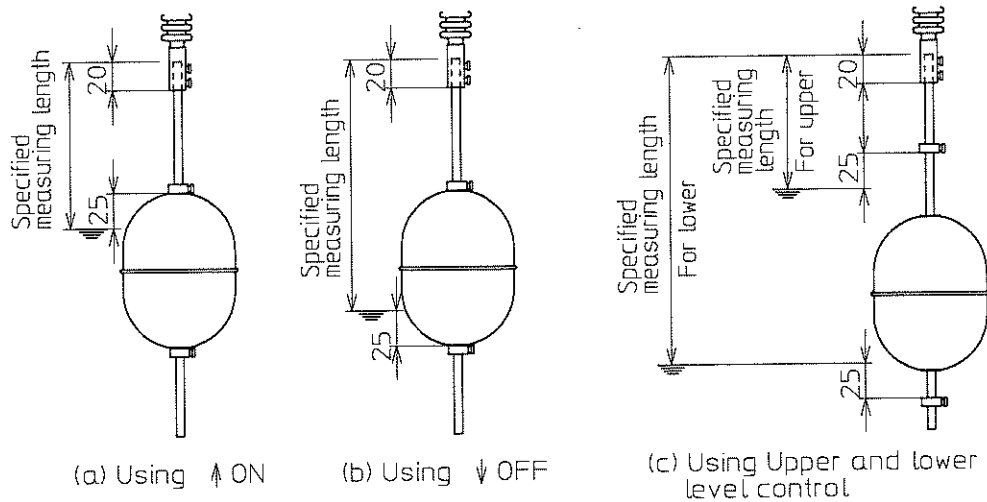


Fig. 5 Application

Note ; (1) Setting length is adjusted at S.G. 1.

When S.G. of liquid is not 1, reset both float travel-stops due to changing the actuation level according to length of the actual level.

(2) Do not cut and do not join the rod. Otherwise the level switch may malfunction.

#### 4. 4 Installation method

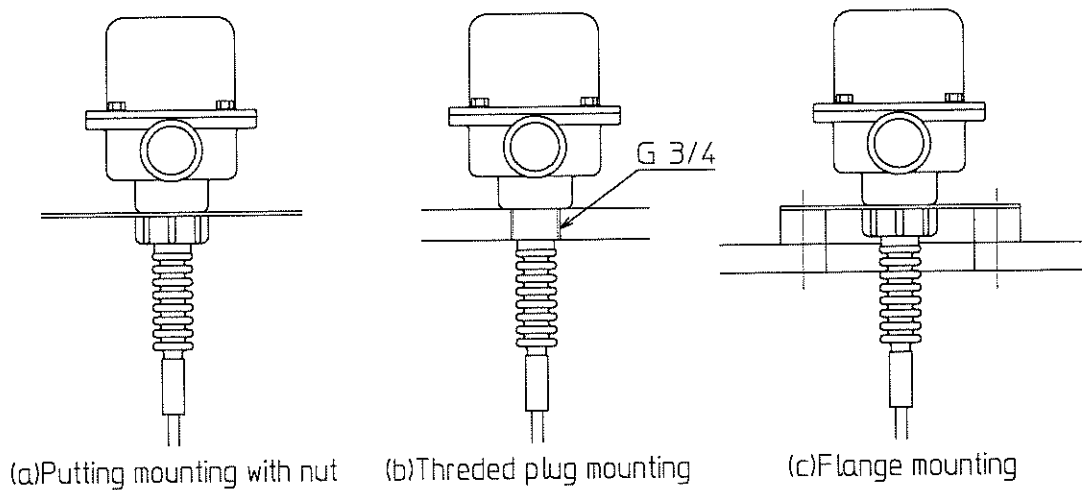


Fig. 6 Installation method

## 5. WIRING

Note :

- (1) This switch contact is S. P. D. T. by microswitch.
- (2) Do not exceed the contact ratings.
- (3) Install solderless lugs fitted to M3 screw to the ends of lead wires.

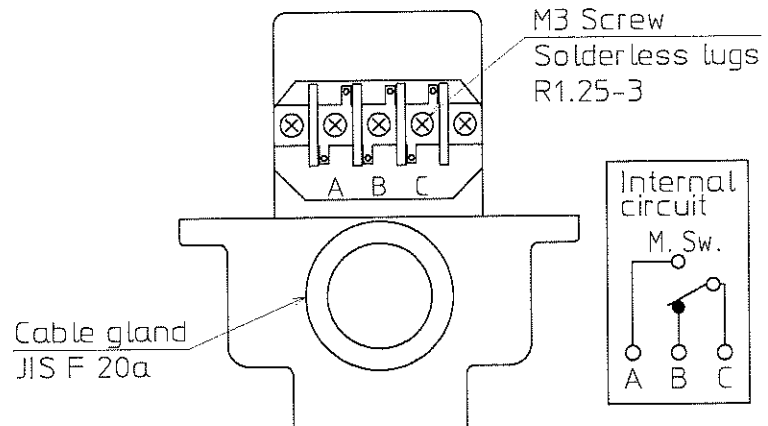


Fig. 7 Inside terminal box

## 6. TECHNICAL NOTES

- (1) This switch shall be mounted vertically.
- (2) When there are surface wave motion, install stilling tube.

## 7. MAINTENANCE/INSPECTION

The following annual servicing tasks should be carried out on the switch.

- (1) Visually check the switch exterior for damage.
- (2) If sediment or other foreign matter are stained on wetted parts of switch, keep wetted parts of switch clean.
- (3) Connect ohmmeter or electronic buzzer to terminals, check the switch actuation corresponding to float operation.

Re-install and re-wiring the switch after maintenance / inspection in accordance with "4. INSTALLATION" and "5. WIRING".

## 7. TROUBLE SHOOTING

▲ CAUTION

Use the following chart to troubleshoot the malfunctioning sensor.  
If your remedies are unsuccessful, ask Nohken for repair and replacement.

Table 2

Problems	Possible causes	Remedies
Liquid exceeds the actuation level, but switch does not activate.	S. G. is larger than 0.85.	Re-choose except Model FS-2S.
	Miswiring.	Wire correctly.
	Set for improper float travel-stop.	Adjust position according to "4.3 Assembly".
	Liquid immerse in float	Replace the switch.
	Affected by deposit.	Clean the switch.
	Microswitch is damage.	Replace the microswitch.
Liquid does not exceed the actuation level, but switch activate.	Miswiring.	Wire correctly.
	Set for improper float travel-stop.	Adjust position according to "4.3 Assembly".
	Affected by deposit.	Clean the switch.
	Microswitch is damage.	Replace the microswitch.

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