

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

Read and understand this manual for safely 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 which model is mentioned on 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 proper place being available to refer 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 followings are the description of the terms in this manual.

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

	Indicates prohibited matter. The explanation with this mark shall be followed
	Indicates 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 is occurred.

If installed, the flammable gas or vapor may be ignited, and serious disaster may be occurred. 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 miner injury and electric shock may be occurred. (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 be occurred.



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



Turn off the power immediately, if the smoke, strange smell and sound are occurred.

Do not use it until the problem is solved.



 **CAUTION**

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



Follow the specification of operating temperature, operating pressure, switch rating, and etc. Otherwise, the product and connected device may be malfunctioned, damaged, fired, or miner injury and electric shock may be occurred. 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 product, the other operating principle of product shall be installed in parallel.





CAUTION

Check and deeply consider the chemical compatibility for material of product in advance. The part especially float, which is very thin, may be malfunctioned by miner corrosion.



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



Hold the stem very close to mounting point, when carrying, installing, and removing. If hold the terminal box, it may be taken off from the flange or plug, and the product may be damaged by dropping.



The product is 50cm or longer

The product shall be kept in horizontally. The product and other goods be damaged, and miner injury may be occurred by falling.



Earth terminal shall be grounded to JIS Class D ground (earth resistance less than 100Ω). If not grounded, electric shock may occurred by any accident.



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



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 provide, the contact may be damaged.



INTRODUCTION

- A) This manual specifies the specification of general product. If you order special product, some details of specification may be different with the manual.
- B) We are glad to suggest and advice for Model selection and chemical resistant of material, but final decision has to be made by the customer.
- C) This manual has 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 part may not be supplied. In this case, replacement part or product 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 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, and etc.
 - C-c) Repair and modification are done by the person who is not 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 "Proper of usage" 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 REGAL LIGHT.

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1. PURPOSE OF USE

The Wide-differential float sensor 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	F S - 2 S	
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 M Ω or more (Measured with 500 V DC 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 ²
Operation characteristics	Control width	0.6 to 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 to +80 °C
	Application	Leave open tank
Construction		IP 42
Materials	Terminal box	Phenol (Cover : PP)
	Wetted parts	304 Stainless Steel (Bellows ; CR)
Others	Installation	Refer to 4. INSTALLATION.
	Cable inlet	G 3/4 or equivalent

2. 2 Outline drawing

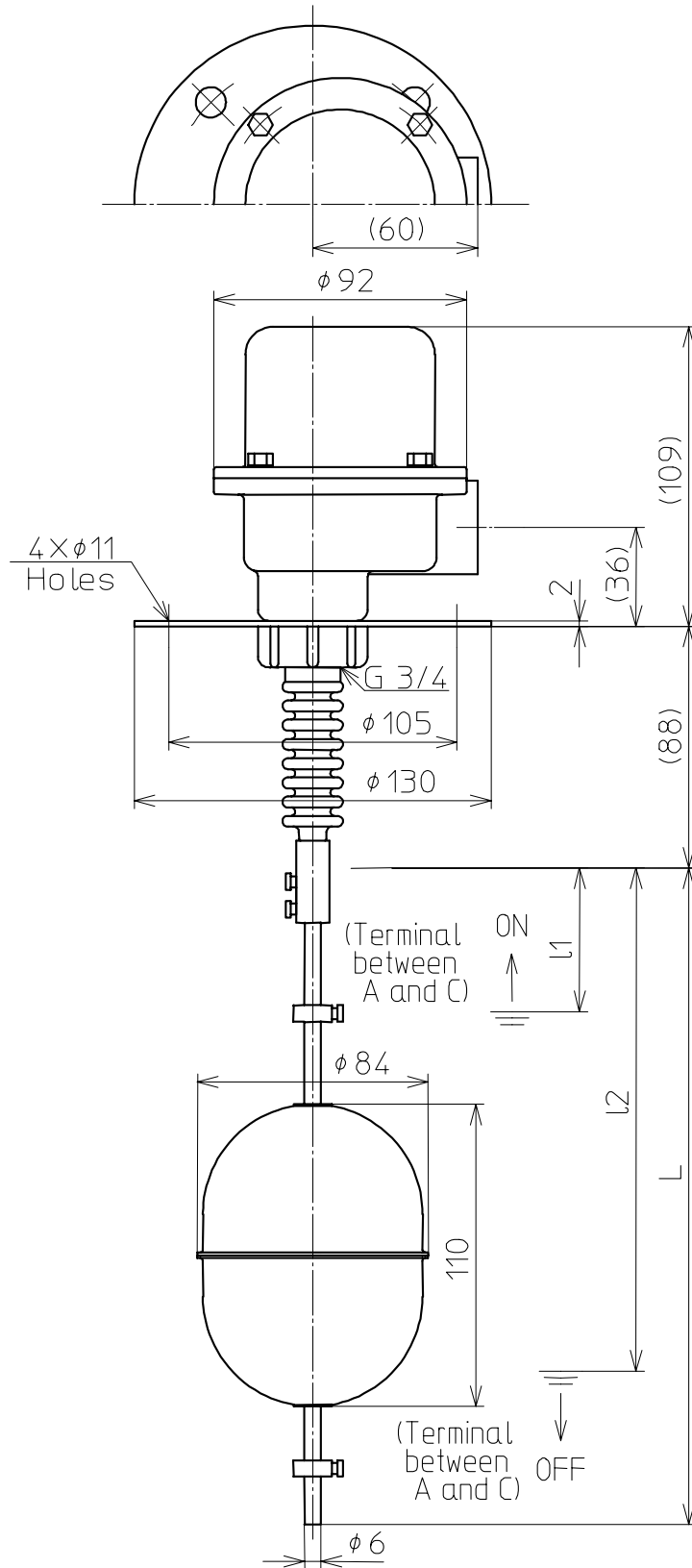


Fig. 1 Outline of Model FS-2S

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.

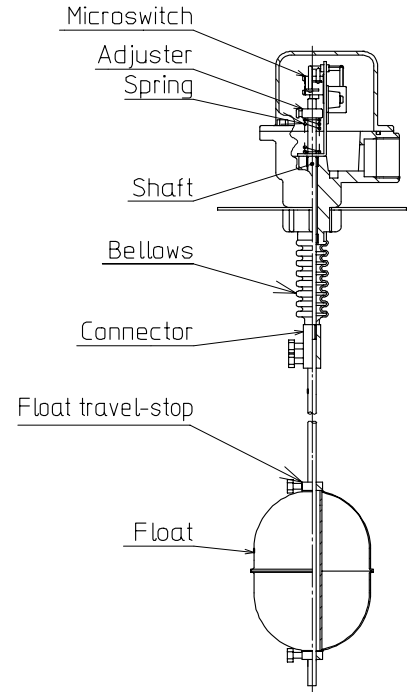


Fig. 2 Drawing of construction

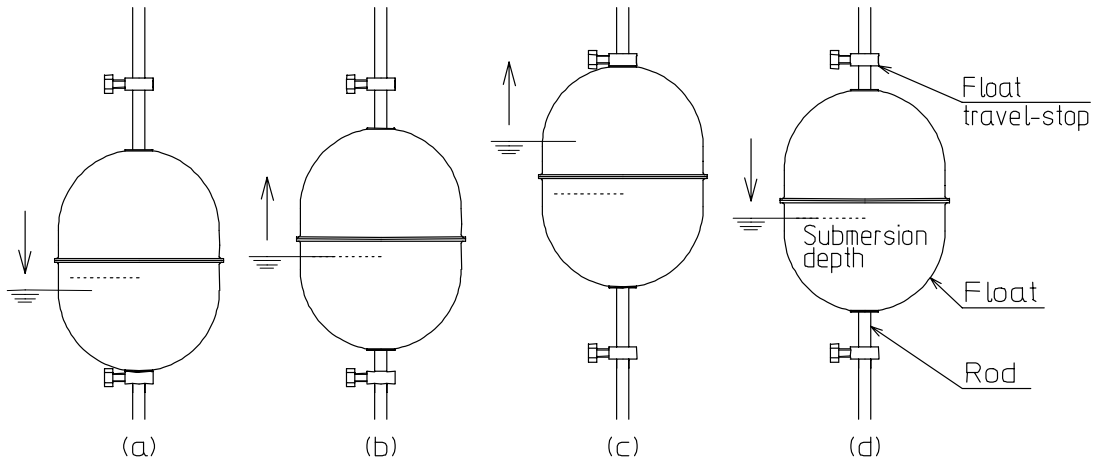


Fig. 3 Float operation

4. INSTALLATION

4. 1 U n p a c k i n g

The Wide-differential float sensor 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 Wide-differential float sensor 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 I n s t a l l a t i o n L o c a t i o n

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 NH_3 , SO_2 , Cl_2 and so on.)
- (4) No excessive vibration.

4. 3 A s s e m b l y

Usually, the Wide-differential float sensor is set specified measuring length before shipment. When not specified, each parts are packed severally.

In that case, proceed to assemble as follows.

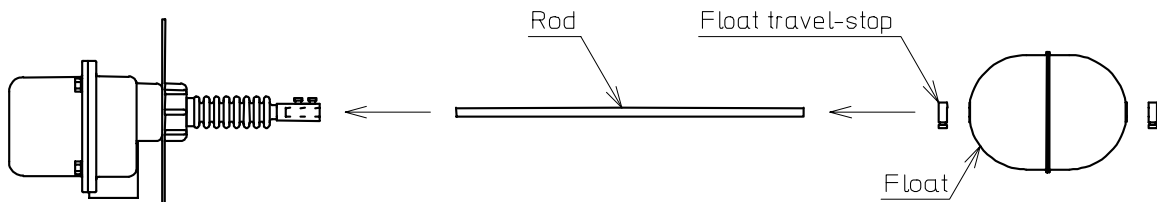


Fig. 4

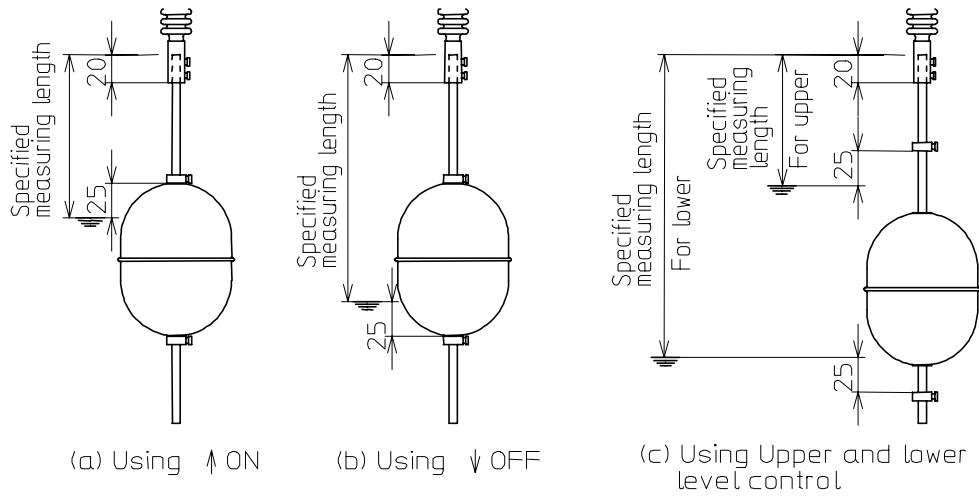


Fig. 5 Application

N o t e ; (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 I n s t a l l a t i o n m e t h o d

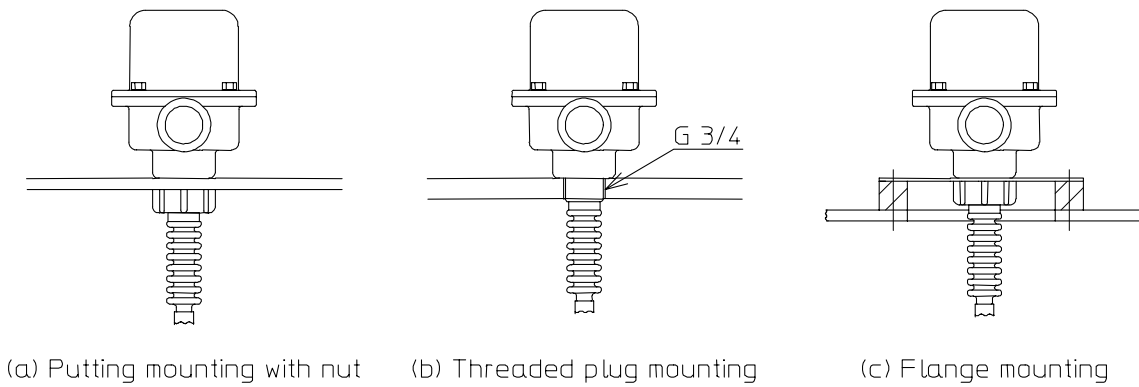


Fig. 6 Installation method

5. WIRING

Note ;

- (1) This sensor 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.

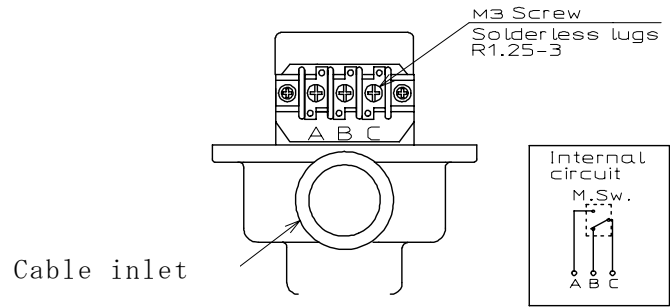


Fig. 7 Inside terminal box

6. TECHNICAL NOTES

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

7. MAINTENANCE/INSPECTION

The size of the cable inlet is G 3/4.

There are two ways for connecting the sensor cable. One is fixing the cable with a cable gland. The other is connecting a conduit to the housing. In either case, an adequate sealing should be provided to prevent water or dust ingress into the housing through the sensor cable.

Secure the cable using sealing material for the conduit connection, or a proper tool when the gland is used, to protect the housing inside from dust or water.

When water or moisture comes into the housing from the conduit, use putty to fill the inside of the conduit.

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".

8. 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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