

INSTRUCTION MANUAL
FOR

CABLE SUSPENDED FLOAT SENSOR

MODEL : FT

Issued May. 24, 1999

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IMPORTANT INFORMATION

- A. This manual describes the installation, operation, adjustment and maintenance of model FT Cable Suspended Float sensor. Read and understand this manual before installation. After reading, save to refer when you need.
- B. Specifications are subject to change without any obligation on the part of the manufacturer.
- C. This manual specifies standard specifications of this product. Some specifications may be different from your product if you order the custom-made product.
- D. 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.
- E. If you have any questions or comments for the contents of this manual, ask Nohken's sales office written on the front cover.
- F. 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.
- G. Signal words in this manual means as follows:

G-a  WARNING

indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

G-b  CAUTION

indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

G-c  NOTE

indicates exceptional cases and attention for handling of products.

G-d REFERENCE

indicates technical valuable suggestions which is unrelated to the hazard.


G-e  indicates prohibition.

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1. WARRANTY & DISCLAIMER

- A. Nohken Inc. warrants this product against defects in design, material and workmanship for a period of one (1) 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 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.

2. PURPOSE OF USE

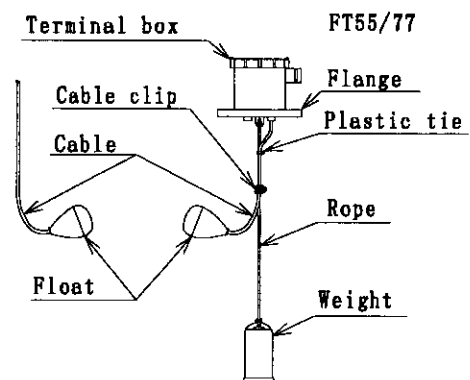
The cable suspended float sensor, model FT, is designed for point level detection of liquids. It is ideal for pump control or liquid level alarms. Do not use in any other applications. In case of a part of sensor, model are FT-2A/2B or FT-3A/3B.

3. DESCRIPTION

3.1 PRODUCTS DESCRIPTION

The FT should hang freely in the tank or pit from the top. The tilting action of the suspended float (*) results in the built-in microswitch (*) opening and closing.

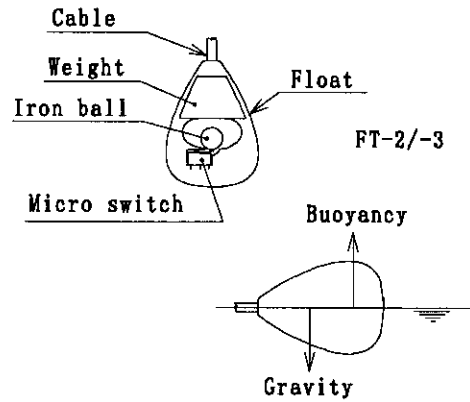
*: See section 11 for the word explanation.



3. 2 P R I N C I P L E O F O P E R A T I O N

The float of the FT is conical in shape and is weighted on one side. But the center of buoyancy is at the side of the float face. By separating the center of buoyancy and gravity, the float follows the movement of the level. As the liquid level rises and falls, the weight which is installed in the float at predetermined angle causes the inclination of the float to change.(FT-2/-3)

This tilting action in a fixed direction makes the microswitch opening and closing. Principle of operation for the FT55/77 is same, but those floats are non-submersible designs at SG=1.0.



4. SPECIFICATIONS

4.1 MODEL NUMBERING

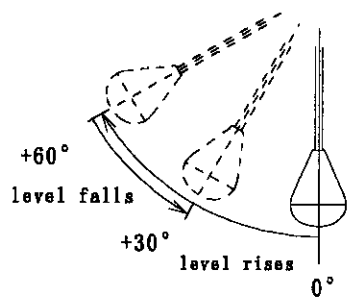
① ②
F T □ □ - □

①	Contact capacity and levels
-2A	Small capacity, Single float, Make
-2B	Small capacity, Single float, Break
-3A	High capacity, Single float, Make
-3B	High capacity, Single float, Break
55	Small capacity, Multiple floats
77	High capacity, Multiple floats

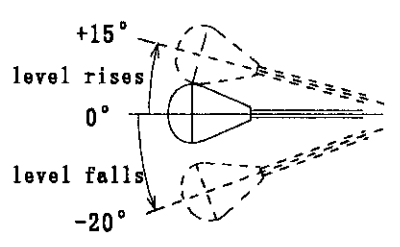
②	Number of float
1~6	For model 55 and 77 only

4.2 STANDARD

Model		FT-2A/2B	FT-3A/3B
Electrical	Max. working current	0.1A AC, 0.1A DC	3A AC, 3A DC
	Max. working voltage	125V AC, 30V DC	250V AC, 30V DC
	Min. Resistive load	5mW, but Min. 5V DC	0.8W, but Min. 5V DC
Mechanical	Float withstand Pressure	200 kPa	
	Allowable impact	500 m/s ²	
Operational	Actuation Angle	(*)30~60° (For vertical direction.)	
	Specific Gravity	Min. 0.9	
	Life Expectancy	Greater than 2×10 ⁵ operations at 180° bent of the cable.	
Operating Temperature		-10°C to +50°C	
Material	Float	ABS	
	Cable	Mild PVC sheathed	



Max. resistive load.

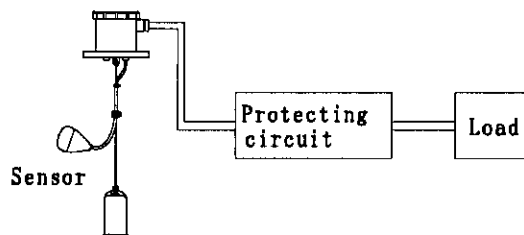
Model		FT55	FT77
Electrical	Max. working current	0.1A AC, 0.1A DC	3A AC, 3A DC
	Max. working voltage	125V AC, 30V DC	250V AC, 30V DC
	Min. Resistive load	5mW, but Min. 5V DC	0.8W, but Min. 5V DC
Mechanical	Float withstand Pressure	200 kPa	
	Allowable impact	500 m/s ²	
Operational	Actuation Angle	+15~-20° (For horizontal direction.)	
			
Operating Temperature	Specific Gravity	Min. 0.8	
	Life Expectancy	Greater than 2×10 ⁵ operations at 180° bent of the cable.	
Construction		-10℃ to +50℃	
Material		IP45	
	Terminal Box	ABS	
	Flange	PVC	
	Float	ABS	
	Cable	Mild PVC sheathed	
	Weight	PVC (Build in:Carbon steel)	
	Rope	PE	
	Cable Clip	PVC	
Installation		Flange (JIS 10K 100A or equivalent, 4 holes)	
Cable entry		JIS F 20a or equivalent (G 3/4)	

Max. resistive load.



CAUTION

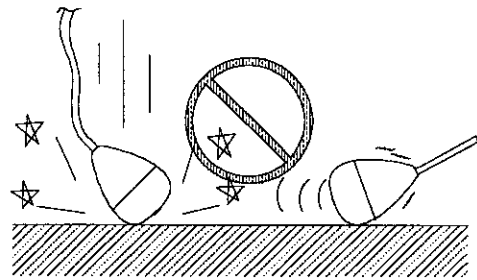
If the relay is inductive load or lamp load, connect protecting circuit to the load side to avoid overvoltage or overcurrent. If exceeds maximum value, the reed switch shall be damaged.



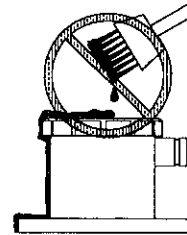
5. HANDLING NOTES

Cautions shall be taken as follows. If not, the sensor may cause malfunction.

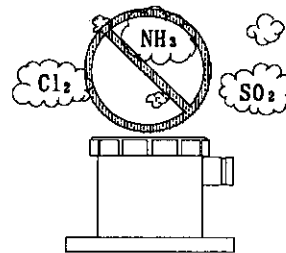
5. 1 Avoid physical shock. Dropping, throwing or bumping shall damage the sensor.



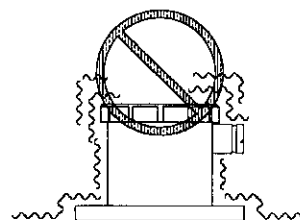
5. 2 When painting the sensor, do not paint on the nameplate to keep the indication of serial number for future reference when ordering parts.



5. 3 Do not use or store in a corrosive atmosphere (NH_3 , SO_2 , Cl_2 , etc.). Internal circuit shall be corroded and conduction failure may occur.



5. 4 Locate away from severe vibration. The sensor shall be installed and stored in a vibration-free environment. Provide appropriate means to guard if inevitable.



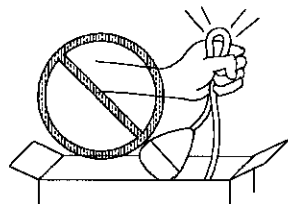
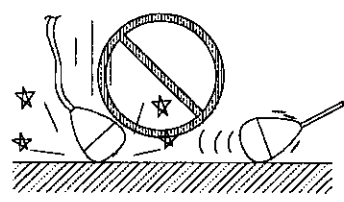
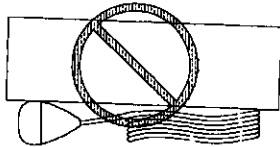
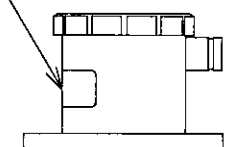
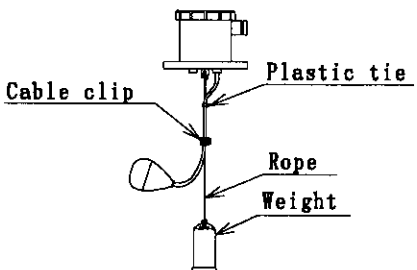
6. INSTALLATION



WARNING

Do not use in hazardous locations. The FT is not an explosion-proof.

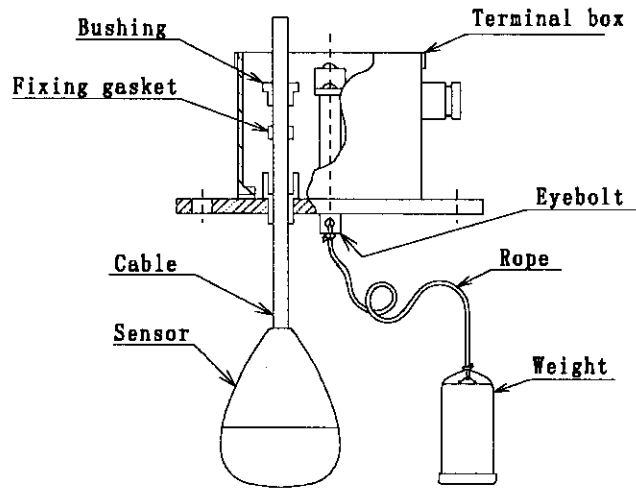
6.1 UNPACKING

<p>6.1.1 Take out the sensor from the package carefully. Do not bend the cable strongly. Otherwise, the cable may be broken.</p>	
<p>6.1.2 Avoid physical shock. Dropping, throwing or bumping shall damage the sensor.</p>	
<p>6.1.3 Do not put things on the sensor. Otherwise the cable may be nicked.</p>	
<p>6.1.4 Model numbering of the sensor is indicated on the nameplate. Check it to be sure as required.</p>	<p>Nameplate</p> 
<p>6.1.5 Check the sensor exterior for damage and the contents of packing slip. If there is, or any part such as cable clip, rope, weight or plastic tie is missing or wrong, contact Nohken.</p>	

6. 2 ASSEMBLY OF MULTIPLE FLOATS

Usually, the multiple switch points are set specified measuring length before shipment. When not specified, each parts are packed severally. Proceed as follows:

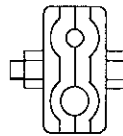
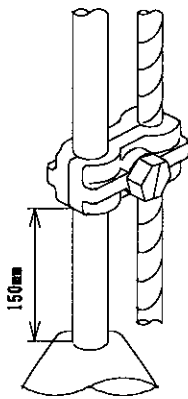
- (1) Fasten one end rope to the eyebolt on the flange and another end of rope to the anchor weight according to depth of the tank. Make sure the cable can not with draw from the anchor weight.
- (2) Insert the cable into the flange from wetted side, and then put the fixing gasket and the bushing into the cable.



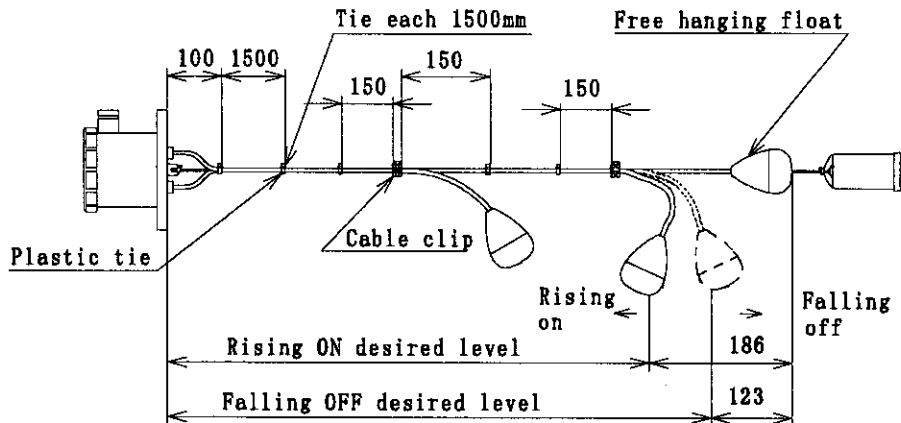
- (3) Set the float on the rope according to specified measuring length with the cable clip. See page 9.

⚠ CAUTION

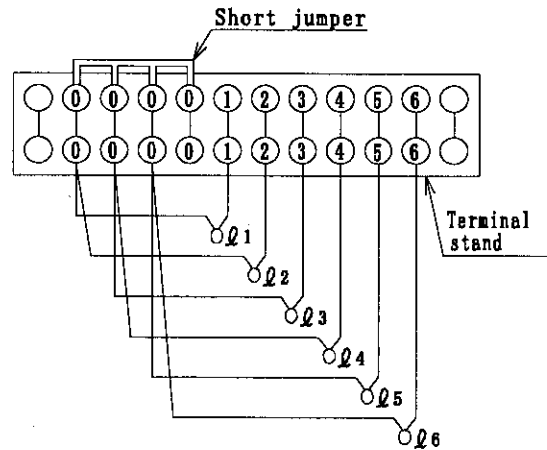
Observe the cable length from the clip on the rope to the float - 150mm is normal. If the length is less than 150mm, the wires in the cable may be weak or broken.



- (4) Tighten the bushing not to be loose and/or move the cable.
- (5) Bundle the cable and the rope with plastic ties.

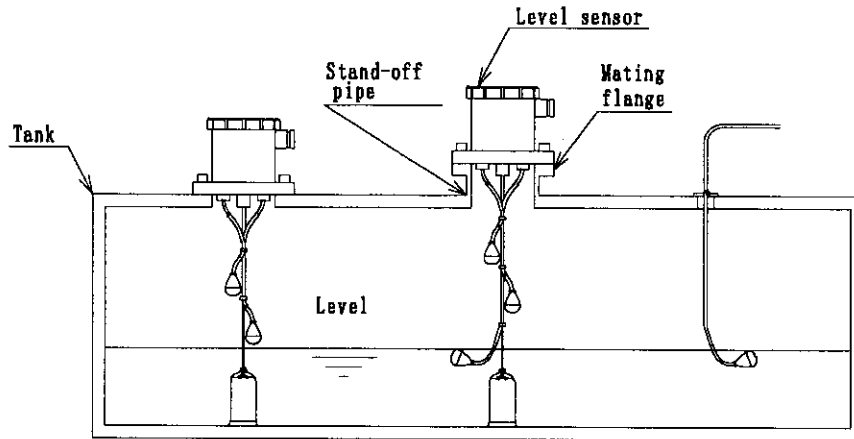


- (6) Cut the useless part of cable and connect lead wires to the terminals. In case of triple level detection, wire l_1 , l_2 and l_3 are as shown on the right.



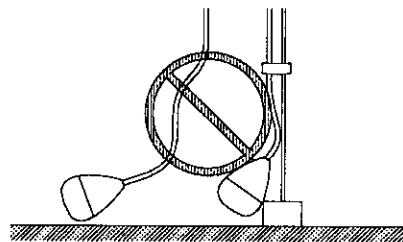
6.3 MOUNTING

Locate the float at the position where the liquid level variation will actually make contact with it. The FT requires a gasket, bolts and fittings for installation. Provide the compatible mating flange on tank top. Install the sensor with a suitable gasket and conforming bolts by using appropriate tool. Single float use is also available suspend the sensor and from freely in the container from the top and fasten it. Please do not overtighten.

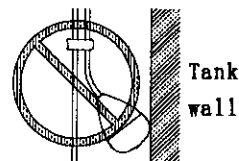


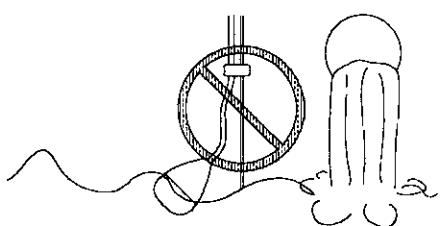
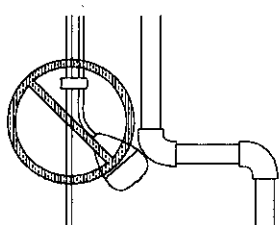
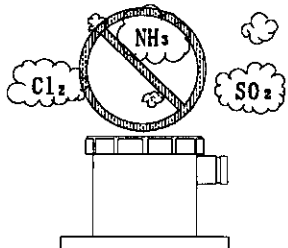
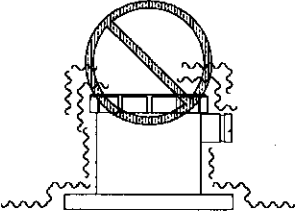
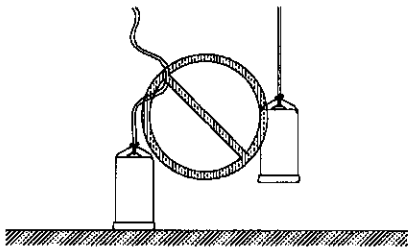
Keep an ample space for maintenance and inspection. Make sure the sensor is installed in an area which meets the following conditions.

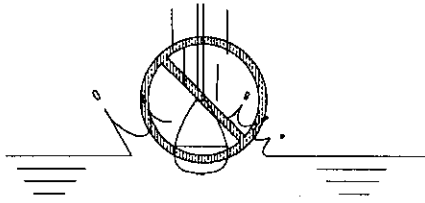

6.3.1 When hanging the sensor, the float should be free-moving. Keep it out of contacting with the weight or the tank bottom.



6.3.2 Keep a certain free surface area to operate without interference. Locate away from the tank wall.



<p>6.3.3 Do not locate near agitator, liquid inlets/outlets or inlet of pump. The float operation will be unstable.</p>	
<p>6.3.4 Keep a certain free surface area to operate without interference. Locate away from pipe, cable or chain of pump, and so on.</p>	
<p>6.3.5 Do not use or store in a corrosive atmosphere (NH₃, SO₂, Cl₂, etc.). Internal circuit shall be corroded and conduction failure may occur.</p>	
<p>6.3.6 Do not use or store where vibration occurs. If inevitable, provide appropriate means to prevent from vibration.</p>	
<p>6.3.7 The weight must be mounted at the bottom of tank to prevent from streaming or swinging. Tighten the rope to avoid slack.</p>	

<p>6.3.8 When immersing the sensor in liquid, drop it slowly and carefully. Hitting the float may break the sensor.</p>	
<p>6.3.9 Do not nick the cable or bend it extremely.</p>	

7. WIRING

7. 1 PREPARATION

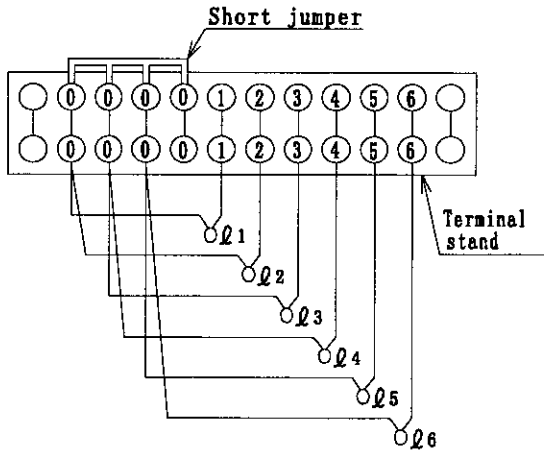
Turn off the power supply.

⚠ WARNING

To avoid personal injury, leakage current or short circuit, the power supply shall be always turned off while wiring.

7. 2 INTERNAL WIRING

Indicating connection of the terminal stand and the cable from the float.

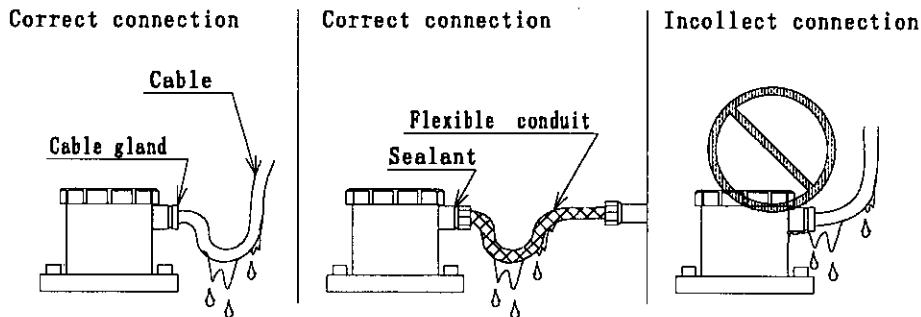


7. 3 CABLE INLET

Wiring shall be in accordance with all local codes. Control cable from 0.75mm² to 1.25mm² is recommended. This cable must be led into the housing in the cable gland or in the flexible conduit.

In case of the cable gland, it is JIS F 20a (Max. cable outside diameter is ϕ 12mm). It must be properly fitted to preserve IP45 after wiring.

In case of the flexible conduit, size of screw is G 3/4. Sealing compound shall be applied onto the screw of the cable inlet to protect water and dust penetration.



7. 4 WIRING

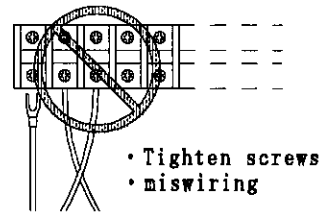
When you use solderless terminals, we recommend to use R1 25-3.5 (JIS C 2805 for M3.5 screw). Outside diameter of it should be less than 7mm.

NOTE

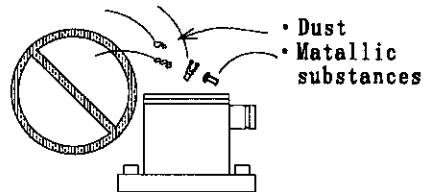
In case of overload, wire to miniature relays, suppressors or similar devices as a protective circuit.

In case of low-load, electrical contact failure may occur. We recommend to use our model RE7000 relay unit with low-contact type model FT-2A/2B or FT55 See the RE7000's instruction manual.

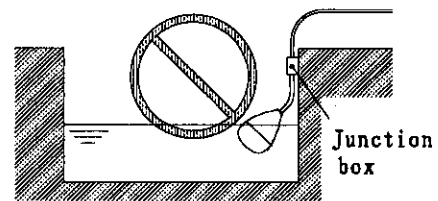
7.4.1 Make sure there is no miswiring. Tighten screws on the terminal.



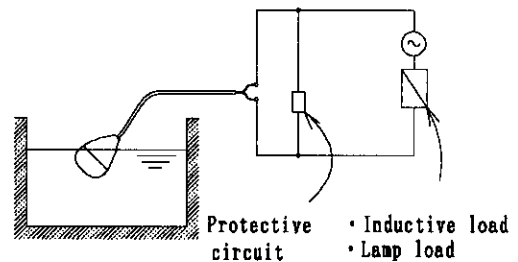
7.4.2 Locate the housing away from splashing water, moisture, dirt, dust and metallic substances.



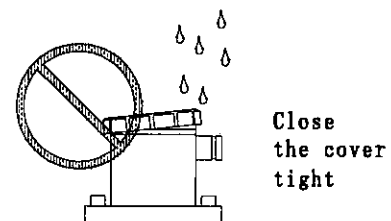
7.4.3 When installing the FT-2A/2B or FT-3A/3B without housing, wiring shall be done outside of the avoid personal injury or leakage current, do not locate the junction box near drop, splash or vapor of water.



7.4.4 Microswitch may be damaged by the direct starting of lump loads and inductive loads such as relay, motor, contactor, solenoid valve and so on. Wire to diode, suppressor or similar device as a protective circuit.



7.4.5 The housing cover shall be tightened to protect the housing from rain, splashing water, dust, and so on.



7. 5 OPERATIONAL CHECK


Make sure the sensor operation in the test stage. If the operation is unsuccessful, check wiring or ask Nohken.

8. MAINTENANCE & INSPECTION

Remove the sensor from the tank before maintenance. See section 5. Keep the ample space for maintenance.

8.1 REMOVING

8.1.1 Turn off the power supply.

 WARNING
<p>To avoid personal injury, the power supply shall be always turned off while wiring.</p>

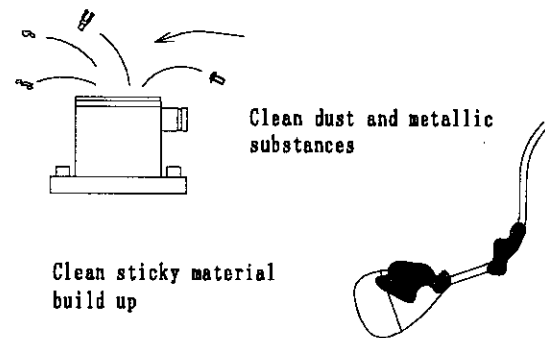
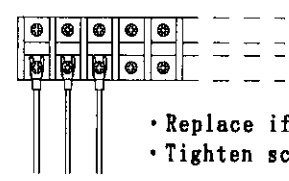
8.1.2 Remove the housing cover. Disconnect all wires and the flexible conduit.

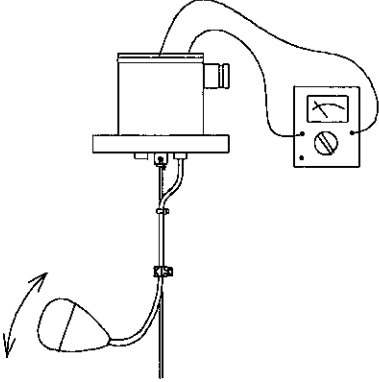
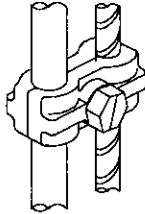
8.1.3 Unscrew the fixing bolts and remove the sensor carefully from the tank.

8.1.4 Put the sensor on the flat and ample space.

8.2 MAINTENANCE & INSPECTION

Inspect the sensor semi-annually or annually. Since inspection intervals varies with applications and process conditions such as pressure, temperature and so on, we recommend you to inspect periodically.

<p>8.2.1 Clean contaminant or sticky material build-up on the float.</p> <p>8.2.2 Check for and replace damaged/collapsed parts.</p> <p>8.2.3 Clean dirt, dust and moisture from housing.</p>	 <p style="text-align: right;">Clean dust and metallic substances</p> <p style="text-align: center;">Clean sticky material build up</p>
<p>8.2.4 Check for and replace the corroded terminal and corroded wires.</p> <p>8.2.5 Tighten loose terminals.</p>	 <ul style="list-style-type: none"> • Replace if corroded • Tighten screws

<p>8.2.6 Connect an ohmmeter to lead wires or terminals. Check the sensor operation by moving floats. Reading value is ∞ at break (open) and 1Ω or less at make (close). If correct value is not read, see section 10.</p>	
<p>8.2.7 Tighten loose cable clips.</p>	

8. 3 RE-INSTALLATION

See 6.3, MOUNTING

8. 4 WIRING

See 7, WIRING.

8. 5 REPLACEMENT PARTS & CYCLE

Replace to our special-purpose parts if the following symptoms occur. Since the FT-2A/2B and the FT-3A/3B outwardly looks much the same, check the model number and specifications carefully.

Unit and float of the FT55/77 multiple sensor are designed as a matched set.

FT-2A/-2B and FT-3A/-3B are manufactured as a single submersible sensor.

DO NOT mix floats of FT55/77 and others for any reason.

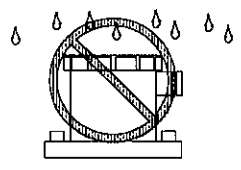
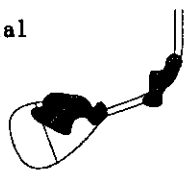
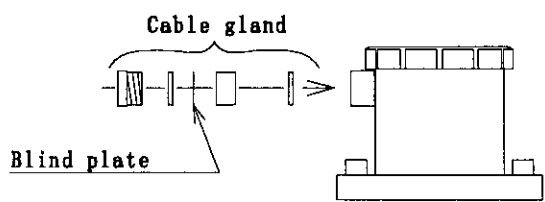
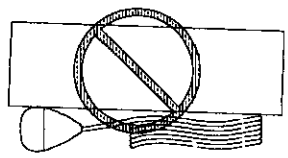
Parts Name	Replacement Cycle
Terminals	When it is corroded.
Bushing Gasket Rope Cable clip Weight Float	When it is damaged or corroded.

9. STORING

The sensor shall be stored under the following conditions when it is not used for a long time:

9. 1 Environmental conditions are as follows:

- The storing temperature range is -10°C to +50°C.
- Relative humidity is 85% Max.
- No corrosive gases (such as NH₃, SO₄, Cl₂, etc.).
- Locate away from condensation, dust and foreign matters.
- Vibration is low.

<p>9. 2 Locate the sensor away from rain and splashing water.</p>	
<p>9. 3 Clean deposit or sticky material build-up on the float. Otherwise, the float operation will be affected after solidifying.</p>	<p>Clean sticky material build-up</p> 
<p>9. 4 Tighten the housing cover and the cable gland. Do not remove the blind plate from the cable gland to protect from dust or moisture.</p>	
<p>9. 5 Do not put things on the sensor. It shall damage the float or nick the cable.</p>	

REFERENCE

Keep the sensor in sealed plastic bags with desiccant or other moisture-proof packing.

10. TROUBLESHOOTING

10.1 NO CONTACT OUTPUT WITH LEVEL CHANGE

- Check for miswiring or loose wiring. ⇒ Wire correctly. See section 7.
- Cable is broken or stiffened. ⇒ Replace the sensor. Check the chemical compatibility and replace to the proper material if necessary. * NOTE
- Float is collapsed, dissolved, swelled or damaged. ⇒ Replace the sensor. Check the chemical compatibility and replace to the proper material if necessary.
* NOTE
- Microswitch is broken. ⇒ Replace it and check the load. Provide the protective circuit if necessary. See section 4.
- Electrical contact is at fault due to low-load. ⇒ Change the sensor to the FT-2. See section 4
- Float is touching the tank wall or another. ⇒ Install in good location.
- Sediments or other foreign matters on float. ⇒ Clean it.

10.2 CONTACT ALWAYS OUTPUTS WITHOUT LEVEL CHANGE

- Miswiring or short-circuited wiring. ⇒ Wire correctly. See section 7.
- Cable is broken or stiffened. ⇒ Replace the float. Check the chemical compatibility and replace to the proper material if necessary. * NOTE
- Microswitch is broken. ⇒ Replace it and check the load. Provide the protective circuit if necessary. See section 4.
- Float is stuck to the tank wall or another. ⇒ Install in good location.

10.3 CONTACT OUTPUTS AT UNDESIRE POSITION

- Check for improper setting position or length of float and cable.

10.4 SWITCH CHATTER

- Check for turbulence. Use baffle or stilling well or connect the time-delay relay.
- Check for loose wiring. Tighten terminals.

NOTE

The ABS covered float and mild PVC-jacketed cable are compatible with a wide range of liquids. However, there are some liquids that are not effected by these materials.

- Aromatics (benzene, toluene, xylene) may cause to dissolve ABS.
- Esters and ketones may cause to swelling ABS.

- Oils, especially vegetable oils and fats, tends to absorb the plasticizer of mild PVC-jacketed cable. Consequently the cable stiffens. As the duration of immersion and temperature increases, the flexibility decreases. Besides, the sensor is effected by some chemicals such as Hydrochloric acid, Sodium Hydroxide, Sulfuric acid, etc.

11. GLOSSARY

- Cable clip : To fix the sensor at desired actuation levels by fastening cable and rope together through it's holes.
- Float : Floating body. The float of the FT is submerged in water (SG=1.0).
(FT-2/-3) But it afloats with liquid level due to its own turning moment.
- Float : The floats of model FT55/77 are non-submersible designs at SG=1.0.
(FT55/77)
- Microswitch: Miniature switch which consists of a precisely spaced snap-action mechanism with a prescribed force.