



## Magnetic Float Level Switch



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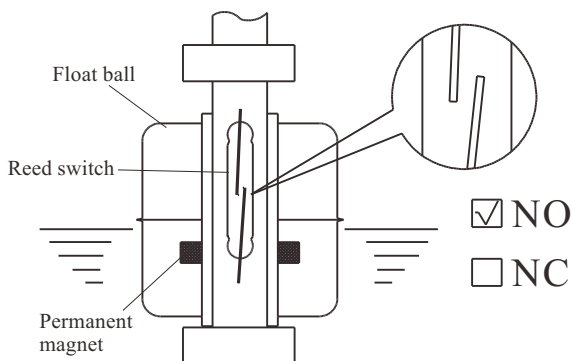
# INTRODUCTION

## PRINCIPLE

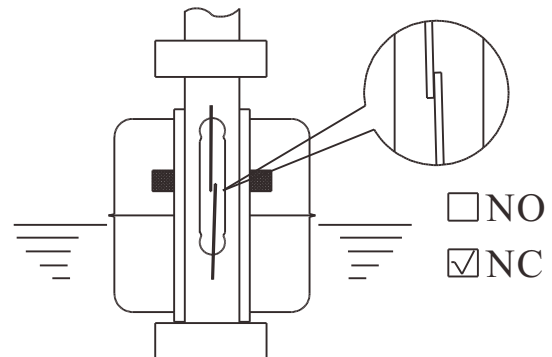
The single unit or multiple reed switch units are housed tightly in stainless steel or engineering plastic stem, and the permanent magnet is sealed into the middle of the specified float ball(s). You can mount the float ball to penetrating through the stem, then the liquid buoyancy will deliver the float ball up and down at the specified position by graduating rings.

When the float internal magnet approaches the reed switch, it will actuate the reed switch contact point to create an open or close circuit. We can apply such on-off output signals to reach liquid level controlling and monitoring purpose.

The figures below show the float orientations on N.O. (Normal Open) and N.C. (Normal Close).



Rising float ball to actuate the reed switch



Rising float ball to switch off.

## FEATURES

- ★ Multiple points measuring, multiple level points could be for custom-made.
- ★ Employing the magnet to actuate the reed switch requires no power. Life expectancy of each contact can reach up to 2 million times.
- ★ All output signal wiring are simplified in same junction box (housing) to economize the external wiring construction.
- ★ FC(D) type magnetic float level switches are more cost-effective than other level switches in terms of multiple points.
- ★ The housing protection is at least IP65.
- ★ Rugged construction and multiple options for materials from engineering plastics as PVDF, PP, PVC, and stainless steels such as SUS304, SUS316, float switches can be applied to versatile applications in chemical corrosion of acidity and alkalinity liquid, solvents or oil fuels.
- ★ The reed switch and lead wire are isolated with liquids absolutely. All stainless steel switches are applicable to high pressure and high temperature environment.

## APPLICATIONS

Shipbuilding Industry, Generator Facilities, Petrochemical Industry, Food/Beverage Industry, Waste Water/Water Purified Facilities, Electronic Industry, Dyeing and Finishing Industry, Chemical Industry, Rubber/ Plastic Industry, Hydraulic.

## SPECIFICATION

| Tube Type | Material | Switching Contact from | Switching Capacity Max. | Switching Voltage Max. | Switching Current Max. | Carry Current Max. |
|-----------|----------|------------------------|-------------------------|------------------------|------------------------|--------------------|
| OD8       | SUS      | SPST                   | 50W                     | 300Vac/350Vdc          | 0.5A                   | 2.5A               |
|           | PVC      | SPDT                   | 20W                     | 150Vac/200Vdc          | 1A                     | 2A                 |
| OD9.5     | SUS      | SPST                   | 50W                     | 300Vac/350Vdc          | 0.5A                   | 2.5A               |
|           |          | SPDT                   | 20W                     | 150Vac/200Vdc          | 1A                     | 2A                 |
| OD12.7    | SUS      | SPST                   | 60W                     | 220Vac/500Vdc          | 3A                     | 4A                 |
|           |          | SPDT                   | 60W                     | 400Vac/1000Vdc         | 1A                     | 2A                 |
| OD16      | PVDF     | SPST                   | 60W                     | 220Vac/500Vdc          | 3A                     | 4A                 |
|           |          | SPDT                   | 60W                     | 400Vac/1000Vdc         | 1A                     | 2A                 |
| OD17.2    | PP       | SPST                   | 60W                     | 220Vac/500Vdc          | 3A                     | 4A                 |
|           |          | SPDT                   | 60W                     | 400Vac/1000Vdc         | 1A                     | 2A                 |

※ Reed switches of UL approval are 240Vac/ 200Vdc, 50w,0.5A.

## APPLICATION FIELDS OF FLOAT

| Environments<br>Float | Working Temp.                | Pressure Rating          | Acid | Alkaline | Oil | Solvent |
|-----------------------|------------------------------|--------------------------|------|----------|-----|---------|
| SUS304                | - 20°C~120°C<br>(200°C Max.) | 10~ 30kg/cm <sup>2</sup> | ×    | △        | ◎   | ◎       |
| SUS316                | - 20°C~120°C<br>(200°C Max.) | 10~ 30kg/cm <sup>2</sup> | △    | ○        | ◎   | ◎       |
| Polypropylene         | -20°C~80°C                   | 4kg/cm <sup>2</sup>      | ○    | ○        | ○   | ×       |
| PVDF                  | -20°C~120°C                  | 3kg/cm <sup>2</sup>      | ◎    | ◎        | ○   | ○       |

Note: ◎ = Excellent    ○ = Good    △ = Acceptable    × =Not good    (S10 resistance:50 kg)

# CHEMICAL RESISTANCE

● Excellent ○ Good △ Fair × Corroded

| Chemical  | Concentration % | Temp |     | Plastic |    |      |      | Rubber |     | Stainless |  |
|---|-----------------|------|-----|---------|----|------|------|--------|-----|-----------|--|
|   |                 | °C   | °F  | PVC     | PP | PVDF | PTFE | NBR    | 304 | 316       |  |
| Ammonia Water<br>NH <sub>4</sub> OH                                       | 10              | 40   | 104 | ●       | ●  | ●    | ●    | ○      |     |           |  |
|   | 10              | 80   | 176 |         | ○  | ●    | ●    |        |     |           |  |
| Aque Regia<br>3HCl+HNO <sub>3</sub>                                       | 10              | 40   | 104 | △       | △  | ●    | ●    |        |     |           |  |
|   | 10              | 80   | 176 |         |    | ●    | ●    |        |     |           |  |
| Benzene<br>C <sub>6</sub> H <sub>6</sub>                                  | Pure            | 40   | 104 | ×       | △  | ○    | ●    |        |     |           |  |
|   |                 | 80   | 176 |         |    | △    | ●    |        |     |           |  |
| Bleaching Liquor<br>Ca(ClO) <sub>2</sub>                                  | 5               | 40   | 104 | ●       |    | ●    | ●    |        |     |           |  |
|   | 5               | 80   | 176 |         |    | ●    | ●    |        |     |           |  |
|   | 20              | 40   | 104 | ●       |    | ●    | ●    |        |     |           |  |
|   | 20              | 80   | 176 |         |    | ●    | ●    |        |     |           |  |
| Boric Acid<br>H <sub>3</sub> BO <sub>3</sub>                              | Satu            | 40   | 104 | ●       | ●  | ●    | ●    | ●      |     |           |  |
|   |                 | 80   | 176 |         | ●  | ●    | ●    | ○      |     |           |  |
| Brine   |                 | 40   | 104 | ●       | ●  | ●    | ●    | ●      |     |           |  |
|   |                 | 80   | 176 |         | ●  | ●    | ●    |        |     |           |  |
| Butadiene<br>CH <sub>2</sub> =CH=CH=CH <sub>2</sub>                       | Gas             | 40   | 104 | ●       |    | ●    | ●    | △      |     |           |  |
|   |                 | 80   | 176 |         |    | ●    | ●    |        |     |           |  |
| Butane<br>CH <sub>3</sub> (CH <sub>2</sub> ) <sub>2</sub> CH <sub>3</sub> | Gas             | 40   | 104 | ●       | ●  | ●    | ●    |        |     |           |  |
|   |                 | 80   | 176 |         | ●  | ●    | ●    |        |     |           |  |
| Nitric Acid<br>HNO <sub>3</sub>   | 10              | 40   | 104 | ●       | ●  | ●    | ●    | ●      | ●   | ●         |  |
|   | 10              | 80   | 176 | ×       | ○  | ●    | ●    |        | ●   | ●         |  |
|   | 30              | 40   | 104 | ●       | ●  | ●    | ●    |        | ●   | ●         |  |
|   | 30              | 80   | 176 | ×       | ○  | ●    | ●    |        | ●   | ●         |  |
|   | 50              | 40   | 104 | ○       | ○  | ●    | ●    |        | ●   | ●         |  |
|   | 50              | 80   | 176 | ×       | ×  | ○    | ●    |        |     |           |  |
|   | 70              | 40   | 104 | ○       | ×  | ●    | ●    |        | ○   | ●         |  |
|   | 70              | 80   | 176 | ×       |    | ○    | ●    |        |     |           |  |
|   | 98              | 40   | 104 |         |    | ○    | ○    |        |     |           |  |
|   | 98              | 80   | 176 |         |    |      | △    |        |     |           |  |
| Oxalic Acid<br>HOOC <sub>2</sub> COH                                      | 20              | 40   | 104 | ●       | ●  | ●    | ●    | ●      |     | △         |  |
|   | 20              | 80   | 176 |         | ●  | ●    | ●    |        |     |           |  |
|   | 50              | 40   | 104 | ●       | ●  | ●    | ●    |        |     | △         |  |
|   | 50              | 80   | 176 |         | ●  | ●    | ●    |        |     |           |  |
| Phosphoric Acid<br>H <sub>3</sub> PO <sub>4</sub>                         | 10              | 40   | 104 | ●       | ●  | ●    | ●    | ●      | ●   | ●         |  |
|   | 10              | 80   | 176 |         | ○  | ●    | ●    | △      | ●   | ●         |  |
|   | 50              | 40   | 104 | ●       | ●  | ●    | ●    | ●      | ●   | ●         |  |
|   | 50              | 80   | 176 |         | △  | ○    | ○    | ×      | ●   | ●         |  |
|   | 80              | 40   | 104 | ●       | ○  | ●    | ●    | ○      | ●   | ●         |  |
|   | 80              | 80   | 176 |         | △  | ●    | ●    |        | ●   | ●         |  |
| Butane<br>CH <sub>3</sub> (CH <sub>2</sub> ) <sub>2</sub> CH <sub>3</sub> | Gas             | 40   | 104 | ●       | ●  | ●    | ●    |        |     |           |  |
|   |                 | 80   | 176 |         | ●  | ●    | ●    |        |     |           |  |
| Sodium Hydroxide<br>NaOH  | 15              | 40   | 104 | ●       | ●  | ●    | ●    | ●      | ●   | ●         |  |
|   | 15              | 80   | 176 |         | ○  | △    | ●    | △      | ×   | ×         |  |
|   | 30              | 40   | 104 | ●       | ●  | ●    | ●    | ●      | ●   | ●         |  |
|   | 30              | 80   | 176 |         | ○  | △    | ●    | ●      | ×   | ×         |  |
|   | 50              | 40   | 104 | ●       | ●  | ○    | ●    | ●      | ●   | ●         |  |
|   | 50              | 80   | 176 |         | ○  | ×    | ●    | ●      | ×   | ×         |  |
|   | 70              | 40   | 104 | ○       | ○  | ○    | ●    |        |     |           |  |
|   | 70              | 80   | 176 |         | ○  | ×    | ●    |        |     |           |  |

| Chemical   | Concentration %                 | Temp                     |     | Plastic |    |      |      | Rubber |     | Stainless |   |
|--|---------------------------------|--------------------------|-----|---------|----|------|------|--------|-----|-----------|---|
|  |                                 | °C                       | °F  | PVC     | PP | PVDF | PTFE | NBR    | 304 | 316       |   |
| Sodium Hypochlorite<br>NaClO                             | 3                               | 40                       | 104 | ●       | ○  | ●    | ●    |        |     | △         | ○ |
|  | 3                               | 80                       | 176 |         |    |      |      |        |     |           |   |
|  | 5                               | 40                       | 104 | ●       | ○  | ●    | ●    |        |     | △         | ○ |
|  | 5                               | 80                       | 176 |         |    |      |      |        |     |           |   |
|  | 7                               | 40                       | 104 | ●       | △  | ○    | ●    |        |     | ×         | × |
|  | 7                               | 80                       | 176 |         |    |      |      |        |     |           |   |
|  | 10                              | 40                       | 104 | ●       | △  | ●    | ●    |        |     | ×         | × |
| Sulfuric Acid<br>H <sub>2</sub> SO <sub>4</sub>          | 10                              | 40                       | 104 | ●       | ●  | ●    | ●    | ●      | ●   | ●         | ● |
|  | 10                              | 80                       | 176 |         | ●  | ●    | ●    | ○      | ○   | ○         |   |
|  | 30                              | 40                       | 104 | ●       | ●  | ●    | ●    | ●      | ×   | ×         |   |
|  | 30                              | 80                       | 176 |         | ●  | ●    | ●    | ○      | ×   | ×         |   |
|  | 50                              | 40                       | 104 | ●       | ●  | ●    | ●    | ○      | ×   | ×         |   |
|  | 50                              | 80                       | 176 |         | ●  | ●    | ●    | △      | ×   | ×         |   |
|  | 60                              | 40                       | 104 | ●       | ●  | ●    | ●    | ●      | ×   | ×         |   |
| Toluene<br>C <sub>6</sub> H <sub>5</sub> CH <sub>3</sub> | 60                              | 80                       | 176 |         | ○  | ●    | ●    | ○      | ×   | ×         |   |
|  | 70                              | 40                       | 104 | ●       | ●  | ●    | ●    | ○      | ×   | ×         |   |
|  | 70                              | 80                       | 176 |         | ○  | ●    | ●    | △      | ×   | ×         |   |
|  | 80                              | 40                       | 104 | ●       | ●  | ●    | ●    | ○      | ×   | ×         |   |
|  | 80                              | 80                       | 176 |         | ○  | ●    | ●    | △      |     |           |   |
|  | 90                              | 40                       | 104 | ○       | ●  | ●    | ●    | △      | ×   | ×         |   |
|  | 90                              | 80                       | 176 |         | ○  | ●    | ●    | △      |     |           |   |
|  | 98                              | 40                       | 104 | △       |    | ●    | ○    |        | ○   | ○         |   |
|  | 98                              | 80                       | 176 |         |    | △    | ○    |        |     |           |   |
|  | Chlorine Gas<br>Cl <sub>2</sub> | Wet<br>Wet<br>Dry<br>Dry | 40  | 104     | ○  |      | ●    | ●      |     |           |   |
| 80   |                                 |                          | 176 |         |    | △    | ●    |        |     |           |   |
| 40   |                                 |                          | 104 | ●       |    | ●    | ●    |        |     |           |   |
| 80   |                                 |                          | 176 |         |    | ●    | ●    |        |     |           |   |
| Chromic Acid<br>H <sub>2</sub> CrO <sub>4</sub>          | 10                              | 40                       | 104 | ●       |    | ●    | ●    |        |     |           |   |
|  | 10                              | 80                       | 176 |         |    | ●    | ●    |        |     |           |   |
|  | 20                              | 40                       | 104 | △       |    | ●    | ●    |        |     |           |   |
|  | 20                              | 80                       | 176 |         |    | ●    | ●    |        |     |           |   |
|  | 40                              | 40                       | 104 | △       |    | ●    | ●    |        |     |           |   |
|  | 40                              | 80                       | 176 |         |    | ●    | ●    |        |     |           |   |
|  | 50                              | 40                       | 104 | ×       |    | ●    | ●    |        |     |           |   |
|  | 50                              | 80                       | 176 |         |    | △    | ●    |        |     |           |   |
| Hydrochloric Acid<br>HCl                                 | 15                              | 40                       | 104 | ●       | ●  | ●    | ●    | ○      |     |           |   |
|  | 15                              | 80                       | 176 |         | ●  | ●    | ●    |        |     |           |   |
|  | 25                              | 40                       | 104 | ●       | ●  | ●    | ●    | ×      |     |           |   |
|  | 25                              | 80                       | 176 |         | ●  | ●    | ●    |        |     |           |   |
|  | 35                              | 40                       | 104 | ●       | ●  | ●    | ●    | ×      |     |           |   |
|  | 35                              | 80                       | 176 |         | ○  | ●    | ●    |        |     |           |   |
|  | 38                              | 40                       | 104 | ●       | ●  | ●    | ●    | ×      |     |           |   |
|  | 38                              | 80                       | 176 |         | ○  | ●    | ○    |        |     |           |   |

● Excellent ○ Good △ Fair × Corroded

| Chemical                              | Concentration % | Temp |     | Plastic |    |      |      | Rubber | Stainless |     |
|---------------------------------------|-----------------|------|-----|---------|----|------|------|--------|-----------|-----|
|                                       |                 | °C   | °F  | PVC     | PP | PVDF | PTFE | NBR    | 304       | 316 |
| Citric Acid<br>$C_6H_8O_7$            | 10              | 40   | 104 | ●       | ●  | ●    | ●    | ●      | ●         | ●   |
|                                       | 10              | 80   | 176 |         | ○  | ●    | ●    | ●      |           |     |
| Gasoline                              | 10              | 40   | 104 | ●       |    | ●    | ●    |        |           |     |
|                                       | 10              | 80   | 176 |         |    | ●    | ●    |        |           |     |
| Diesel Fuels                          |                 | 40   | 104 |         |    | ●    | ●    |        | ●         | ●   |
|                                       |                 | 80   | 176 |         |    | ●    | ●    |        | ●         | ●   |
| Ethyl Alcohol<br>$C_2H_5OH$           | Pure            | 40   | 104 | ●       | ●  | ●    | ●    | ●      | ○         | ○   |
|                                       |                 | 80   | 176 |         | ○  | ●    | ●    | ○      |           |     |
| Formic Acid<br>$HCOOH$                | 90              | 40   | 104 | ○       | ○  | ●    | ●    |        |           |     |
|                                       |                 | 80   | 176 |         |    | ●    | ●    |        |           |     |
| Hydrofluoric Acid<br>HF               | Dilute          | 40   | 104 | ●       | ○  | ●    | ●    |        |           |     |
|                                       |                 | 80   | 176 |         | ○  | ●    | ●    |        |           |     |
|                                       | 30              | 40   | 104 | ○       | ○  | ●    | ●    |        |           |     |
|                                       |                 | 80   | 176 | ×       | ○  | ●    | ●    |        |           |     |
|                                       |                 | 40   | 104 | △       | ○  | ●    | ●    |        |           |     |
|                                       |                 | 80   | 176 |         | ○  | ●    | ●    |        |           |     |
|                                       |                 | 40   | 104 | △       | ○  | ●    | ●    |        |           |     |
|                                       |                 | 80   | 176 |         | ○  | ●    | ●    |        |           |     |
| Hydrogen peroxide<br>$H_2O_2$         | 5               | 40   | 104 | ●       | ●  | ●    | ●    |        | ○         | ●   |
|                                       | 5               | 80   | 176 |         | ○  | ●    | ●    |        |           |     |
|                                       | 20              | 40   | 104 | ●       | ●  | ●    | ●    |        |           |     |
|                                       | 20              | 80   | 176 |         | ○  | ●    | ●    |        |           |     |
|                                       | 30              | 40   | 104 | ○       | ○  | ●    | ●    |        |           |     |
|                                       | 30              | 80   | 176 |         | △  | ●    | ●    |        |           |     |
|                                       | 50              | 40   | 104 | △       | ×  | ●    | ●    |        |           |     |
|                                       | 50              | 80   | 176 |         |    | ●    | ●    |        |           |     |
|                                       | 90              | 40   | 104 |         |    | ●    | ●    |        |           |     |
|                                       | 90              | 80   | 176 |         |    | ●    | ●    |        |           |     |
| Isopropyl Alcohol<br>$(CH_3)_2CHOH$   | Pure            | 40   | 104 | ●       | ●  | ●    | ●    | ○      |           |     |
|                                       |                 | 80   | 176 |         |    | ●    | ●    |        |           |     |
| Kerosene                              |                 | 40   | 104 | ●       | ○  | ●    | ●    |        |           |     |
|                                       |                 | 80   | 176 |         |    | ●    | ●    |        |           |     |
| Methyl Alcohol<br>$CH_3OH$            |                 | 40   | 104 | ○       | ●  | ●    | ●    | △      |           |     |
|                                       |                 | 80   | 176 |         | ○  | ●    | ●    |        |           |     |
| Methyl Ethyl Ketone<br>$CH_3COC_2H_5$ |                 | 40   | 104 |         | △  |      | ●    |        |           |     |
|                                       |                 | 80   | 176 |         |    |      | ●    |        |           |     |
| Potassium Chromate<br>$K_2CrO_4$      |                 | 40   | 104 | ●       | ●  | ●    | ●    | ●      |           |     |
|                                       |                 | 80   | 176 |         | ○  | ●    | ●    | ○      |           |     |

# CONTACT PROTECTION CIRCUITS

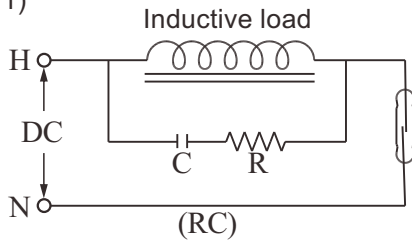
## INDUCTIVE LOADS

When using a reed switch with inductive loads such as motors, relays, solenoids, etc., the contact will be subjected to a high induced voltage during opening of the contact (load circuit).

Such high induced voltage (transients) may cause damages to the reed switch or significantly reduce its life.

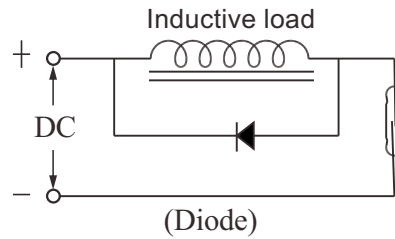
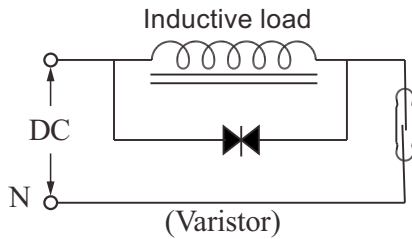
Therefore, protective circuits such as: RC (snubber), varistors or clamping diodes are recommended.(refer to Fig.1)

(Fig.1)



$$C = \frac{I^2}{10} \text{ (uF)}$$

$$R = \frac{E}{10I(1 + \frac{50}{E})}$$



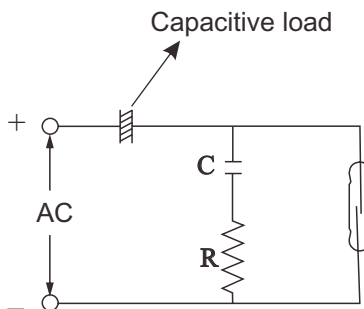
★ It is prohibited to connect directly with any solenoid valve, motor or magnetic switch.

## CAPACITIVE LOADS

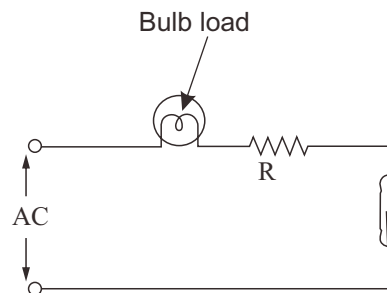
When using a reed switch with capacitive loads such as capacitors, incandescent lamps or long cables, the contact will be subjected to a high surge (inrush) current.

Therefore, protective circuits such as: surge suppressors or current limiting resistors are recommended.(refer to Fig.2)

(Fig.2)



Parallel connection of RC circuit and switch will surge current bypass.



Series connection of resistance and switch limit surge current.

# HOUSING SPECIFICATION

**B**

Material : Aluminum  
Enclosure : IP65  
Terminals : 2~12  
Max.Temp.: -20°C ~200°C

**C**

Material : PP+Fiber  
Enclosure : IP65  
Terminals : 2~12  
Max.Temp.: -20°C ~80°C

**D**

Material : Aluminum  
Enclosure : IP65  
Terminals : 2~12  
Max.Temp.: -20°C ~200°C

**E**

Material : Aluminum  
Enclosure : IP65  
Terminals : 2~6  
Max.Temp.: -20°C ~200°C

**G**

Material : PC  
Enclosure : IP65  
Terminals : 2~6  
Max.Temp.: -20°C ~80°C

**H**

Material : Aluminum  
Enclosure : IP65  
Terminals : 2~12  
Max.Temp.: -20°C ~100°C

\*For side-mounting float series.

**K** Explosion-proof

Material : Aluminum  
Enclosure : CESI 03 ATEX 108  
ATEX II 2G Ex d IIB T6  
Terminals : 2~6  
Max.Temp.: -20°C ~100°C

**L** Explosion-proof

Material : Aluminum  
Enclosure : IP66  
ATEX II 2G Ex d IIC T6  
Terminals : 2~6  
Max.Temp.: -20°C ~90°C

\*For flow switch series.

**M**

Material : SUS316  
Enclosure : IP65  
Terminals : 2~6  
Max.Temp.: -20°C ~200°C

\*For side-mounting float series.

**N**

Material : SUS316  
Enclosure : IP65  
Terminals : 2~6  
Max.Temp.: -20°C ~200°C

**X**

Material : Aluminum  
Enclosure : IP65  
Terminals : 2~6  
Max.Temp.: -20°C ~100°C

## Cable Conduit Ex d IIC

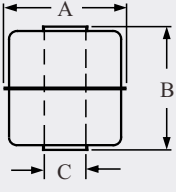
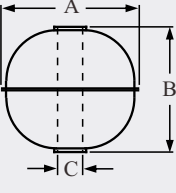
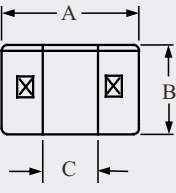
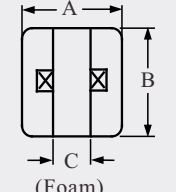
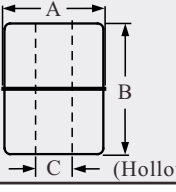
Material: Washer ---NBR  
Body--- Aluminum (3/4" NPT)  
Nickel plated (1/2" NPT)

**29-1104**

**29-1108**

Remark 1 : Cable conduit is optional. Contact us if needed.

# FLOAT SPECIFICATIONS

| MODEL   | TYPE | $\phi A \times B \times \phi C$ | S.G.   | Max. Pressure (kg/cm <sup>2</sup> ) | Weight (g) | Material/Color      | Max. Temp. (°C) |
|---|------|---------------------------------|--------|-------------------------------------|------------|---------------------|-----------------|
|                    | S1   | 28x28x9.5                       | E>0.7  | 10                                  | 8          | SUS 304 / 316L      | 200             |
|   | S3   | 45x55x15                        | E>0.65 | 12                                  | 37.6       | SUS 316             | 200             |
|   | S6   | 75x108x20                       | E>0.5  | 10                                  | 165        | SUS 304             | 200             |
|   | S13  | 38x50x15                        | E>0.62 | 12                                  | 22.9       | SUS 316L            | 200             |
|                    | S2   | 41x38x11                        | E>0.7  | 35                                  | 19.5       | SUS 316             | 200             |
|   | S4   | 52x52x15                        | E>0.55 | 30                                  | 33.4       | SUS 316             | 200             |
|   | S5   | 75x73x20                        | E>0.7  | 30                                  | 102.4      | SUS 316             | 200             |
|   | S7   | 30x28x9.5                       | E>0.82 | 25                                  | 8          | SUS 304 / 316L      | 200             |
|   | S8   | 100x100x20                      | E>0.5  | 15                                  | 249.7      | SUS 304             | 200             |
|   | S9   | 150x150x30                      | E>0.45 | 15                                  | 534        | SUS 304             | 200             |
|   | S10  | 30x32x9.5                       | E>0.82 | 50                                  | 8.6        | SUS 316             | 200             |
|   | S11  | 28x32x9.5                       | E>0.82 | 30                                  | 8.1        | SUS 316             | 200             |
|  <p>(Hollow)</p> | P1   | 25x15x10                        | E>0.65 | 4                                   | 3.5        | PP / white<br>black | 80              |
|   | P2   | 25x25x10                        | E>0.55 | 4                                   | 5          | PP / white<br>black | 80              |
|   | P3   | 48x45x18.5                      | E>0.6  | 5                                   | 35.5       | PP / black          | 80              |
|   | P4   | 20x25x10                        | E>0.7  | 4                                   | 3.7        | PP / black          | 80              |
|   | P5   | 20x20x8.1                       | E>0.75 | 4                                   | 4          | PP / black          | 80              |
|   | P8   | 18.2x15.3x7.2                   | E>0.8  | 4                                   | 1.82       | PP / black          | 80              |
|  <p>(Foam)</p>   | Q6   | 20x20x7.5                       | E>0.75 | ATM                                 | 3.5        | PP / white          | 80              |
|   | Q7   | 25x25x8.8                       | E>0.7  | ATM                                 | 6.7        | PP / white          | 80              |
|   | N1   | 25x15x10                        | E>0.5  | ATM                                 | 2.7        | NBR / black         | 100             |
|   | N2   | 18.5x26x10                      | E>0.7  | ATM                                 | 3.3        | NBR / black         | 100             |
|   | N3   | 19x20x10                        | E>0.55 | ATM                                 | 2.4        | NBR / black         | 100             |
|   | N4   | 17.5x25x10                      | E>0.65 | ATM                                 | 2.5        | NBR / black         | 100             |
|   | N5   | 30x45x12.8                      | E>0.5  | ATM                                 | 11.5       | NBR / black         | 100             |
|  <p>(Hollow)</p> | F2   | 42x44x14                        | E>0.63 | 5                                   | 18.5       | PP                  | 80              |
|   | F3   | 45x45x20                        | E>0.65 | 5                                   | 35.7       | PP                  | 80              |
|   | F4   | 48x62x18                        | E>0.8  | 5                                   | 65.3       | PVDF                | 120             |

※E>0.8 when F4 float used in FC Series. E>0.75 when F4 float used in FG Series.



# ORDER SPECIFIED

## THE PROPERTIES BETWEEN LIQUID AND FLOAT

Please choose the proper float subject to above independent specified terms and chemical characters.

- 1. Temperature:** PVDF Max. 120°C,  
PP Max. 80°C,  
SUS304/ 316 Max. 200°C
- 2. Pressure:** SUS304/ 316 Float, Max. 35kg/cm<sup>2</sup>  
Engineering plastic, Max. 5kg/cm<sup>2</sup>  
(S10 float Max. 50kg)
- 3. Viscosity:** Please choose smaller S.G. with  
greater diameter floats to cope with  
high viscosity liquid applications.

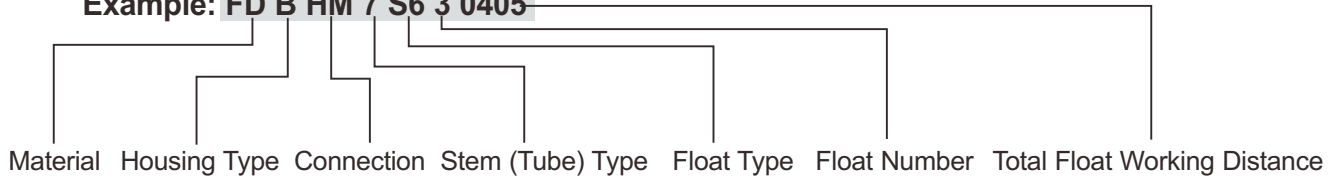
- 4. Chemical:** Please use plastic float for acid/  
alkaline corrosion of chemical  
applications. PVDF float is noted  
for high temperature cases.
- 5. Benzine:** Please choose stainless steel floats to  
apply in any gasoline, fuel oil,  
petroleum application.
- 6. S.G.:** The float S.G. Must be smaller than the  
liquid, otherwise, the liquid buoyancy  
can not deliver the float upward.

### Buyer's guide :

The magnetic level switch can be done as per customer's specified technical data such as the flange, thread, housing, float ball diameter, float ball number, the float traveling up or down actuated position by N.C. or N.O. output, the total float working distance (L) or each

independent float actuating position, please refer the order information to define the application specifications. A single ball driving multiple actuated points is available to apply on the order form.

**Example: FD B HM 7 S6 3 0405**

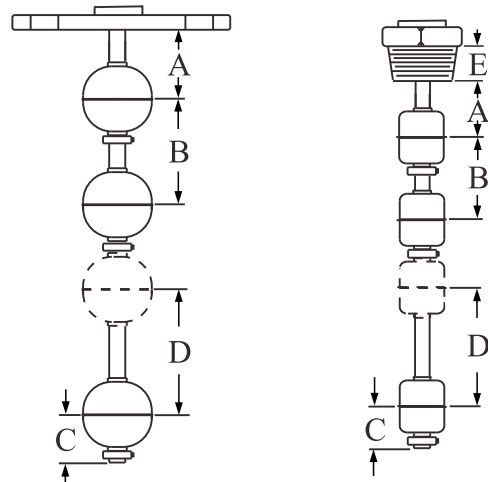


It is requested the minimum interval for a single ball driving dual actuated positions (D) or neighboring two balls (B), or from the bottom to the lowest ball interval (C) or from the mounting position to the first ball (A), otherwise, there will be some magnetic mutually interference involved by insufficient interval. To ensure the defined distance, please see the data below:

- A= Minimum distance from the mounting position to the highest actuation level.
- B= Minimum distance between any two actuation levels.
- C= Minimum distance from end of the lowest level.
- D= Minimum distance between two actuation levels by one float.
- E= Screw length

| FLOAT TYPE | S1 | S2 | S3 | S4 | S5 | S6  | P1 | P2 | P3 | F4 |
|------------|----|----|----|----|----|-----|----|----|----|----|
| A(mm)      | 25 | 32 | 40 | 39 | 50 | 70  | 23 | 27 | 47 | 55 |
| B(mm)      | 50 | 64 | 82 | 78 | 99 | 136 | 44 | 55 | 85 | 98 |
| C(mm)      | 25 | 32 | 40 | 39 | 50 | 70  | 23 | 31 | 43 | 50 |
| D(mm)      | 30 | 40 | 55 | 50 | 65 | 70  | 30 | 30 | 45 | 65 |

| SCREW    | 1/2" | 3/4" | 1" | 1-1/4" | 1-1/2" | 2" | 2-1/2" | 3" |
|----------|------|------|----|--------|--------|----|--------|----|
| (E) (mm) | 14   | 16   | 19 | 22     | 22     | 25 | 28     | 32 |



# HOW TO MAKE YOUR ORDER

**F D B H M 7 S 6 3 0 5 0 0 A (T)**

P: Pipe Shield  
R: Sensor  
T: Test Rod

**Contact Form**

A: SPST C: SPDT F: 1 float 2 points  
G: 1 float 3 points —: No contact

**Length:(L) Unit=mm**

0500: below 500mm  
1000: 501~1000mm  
1500: 1001~1500mm ※ 500mm/per unit

**Quantity of float (1~4)**

**Float Type (Please refer page 7)**

F2, F3, F4  
P1,P2, P3, P4  
S1, S2, S3, S4, S5, S6, S7, S0(S10)  
Q7, N1, N2, N3, N4, N5

**Stem**

| Code size      | Material | Code size      | Material | Code size      | Material |
|----------------|----------|----------------|----------|----------------|----------|
| 0: $\phi$ 8    | PP       | 6: $\phi$ 16   | PVDF     | A: $\phi$ 8    | SUS316   |
| 1: $\phi$ 8    | SUS304   | 7: $\phi$ 17.2 | SUS304   | B: $\phi$ 9.5  | SUS316   |
| 2: $\phi$ 8    | PVC      | 8: $\phi$ 12.7 | P.P.     | C: $\phi$ 12.7 | SUS316   |
| 3: $\phi$ 9.5  | SUS304   | 9: $\phi$ 12.7 | PVC      | D: $\phi$ 17.2 | SUS316   |
| 4: $\phi$ 12.7 | SUS304   |                |          | E: $\phi$ 8    | PFA      |
| 5: $\phi$ 17.2 | P.P.     |                |          | S: special     |          |

**Connection Type**

**Housing Type**

B: AL. (Big space)  
C: PP (Anti-acidity)  
D: Aluminum  
E: AL. (Small space)  
G: PC (Anti-acidity)  
D: Aluminum  
K: AL.  
N: SUS304 or SUS316  
P: Plastic IP65  
-: Without housing  
2: Without housing (Side Mounting)

**Size for flange or screw**

|                |                |
|----------------|----------------|
| A: 3/8" (10A)  | I: 4"(100A)    |
| B: 1/2" (15A)  | J: 5"(125A)    |
| C: 3/4" (20A)  | K: 6"(150A)    |
| D: 1" (25A)    | S: Others      |
| E: 1-1/2"(40A) | 1: 1/8"        |
| F: 2" (50A)    | 2: 1/4"        |
| G: 2-1/2"(65A) | 3: 1-1/4"(32A) |
| H: 3" (80A)    |                |

**Pressure range or other**

M: 5kg/cm<sup>2</sup> JIS  
N: 10kg/cm<sup>2</sup> JIS  
O: 150Lbs ANSI  
P: 300Lbs ANSI  
Q: PT (Male)  
R: PF(G) (Male)  
T: BSP (Male)  
U: NPT (Male)  
S: Others  
W: PN10 (10Bar)  
X: PN16 (16Bar)  
Y: PN25 (25Bar)  
Z: PN40 (40Bar)  
J :Adjustment screw  
K:Adjustment flange  
A: PT (Female)  
B: PF (Female)  
C: BSP (Female)  
U: NPT (Female)

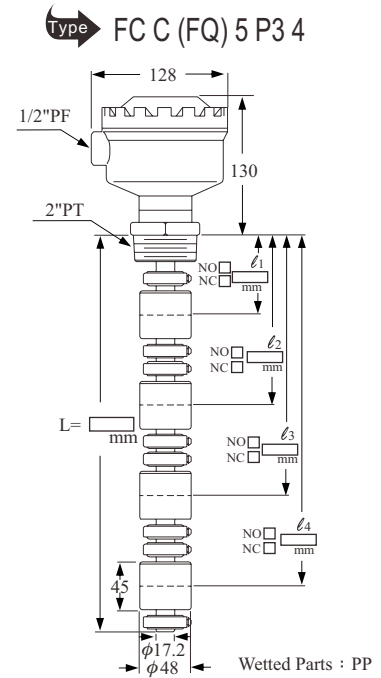
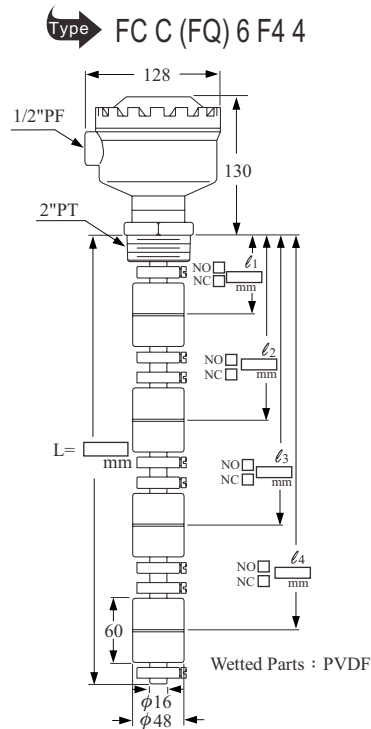
FC: Plastic (Stem)

FD: Metal (Stem)

\* Special term for LR Marine approval: "Environmental test has been carried out but it is not applicable to use in the ship and offshore that type of screw fittings is used for pipe exceeding 51mm outer diameter".

# ANTI-CORROSION SCREW TYPE / FLANGE TYPE

Housing material apply by PP, wet portion material options in PP, PVDF, specially applicable for chemical applications against corrosive environments.



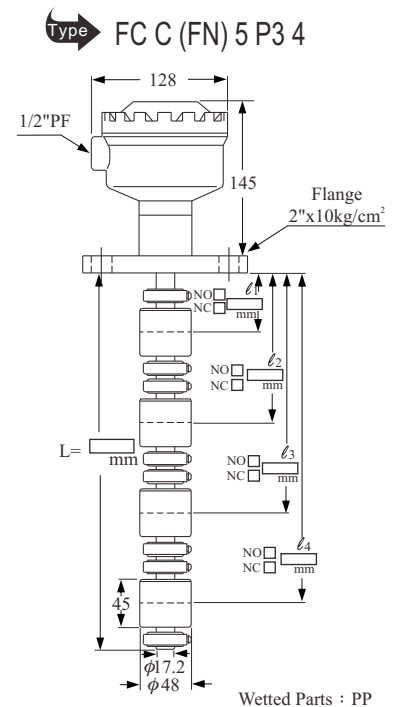
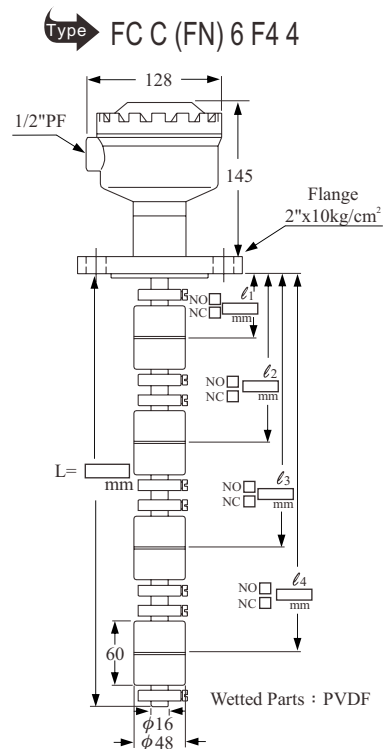
## Order information

Type Housing Type

FC C (FQ) 6 F1 4

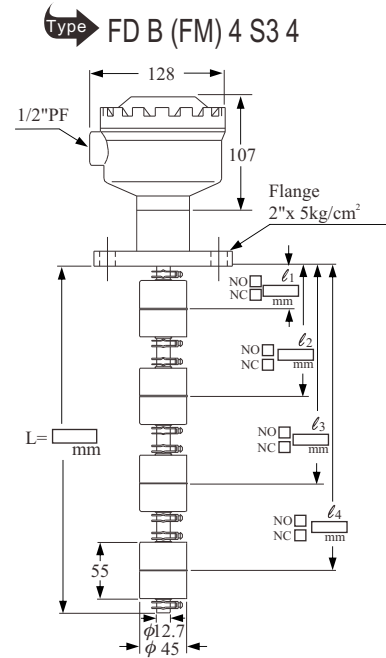
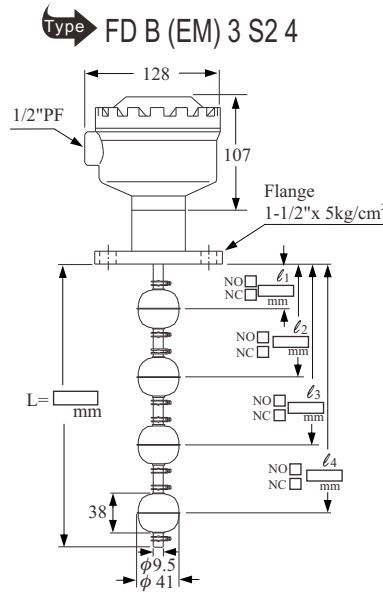
| Connection Flanges         | Pipe Diameter | Float Type     | Float Quantity |
|----------------------------|---------------|----------------|----------------|
| FQ=2" PT                   | 6= φ16        | F4=PVDF φ48x60 | 1~ 4           |
| FQ=2" PT                   | 5= φ17.2      | P3=PP φ48x45   | 1~ 4           |
| FN=2" 10kg/cm <sup>2</sup> | 6= φ16        | F4=PVDF φ48x62 | 1~ 4           |
| FN=2" 10kg/cm <sup>2</sup> | 5= φ17.2      | P3=PP φ48x45   | 1~ 4           |

※ FCC(FQ) & (FN)2" flange/thread are available, too.



# STANDARD FLANGE TYPE

The housing complies with the IP65 rating and can therefore be used in outdoor environment.

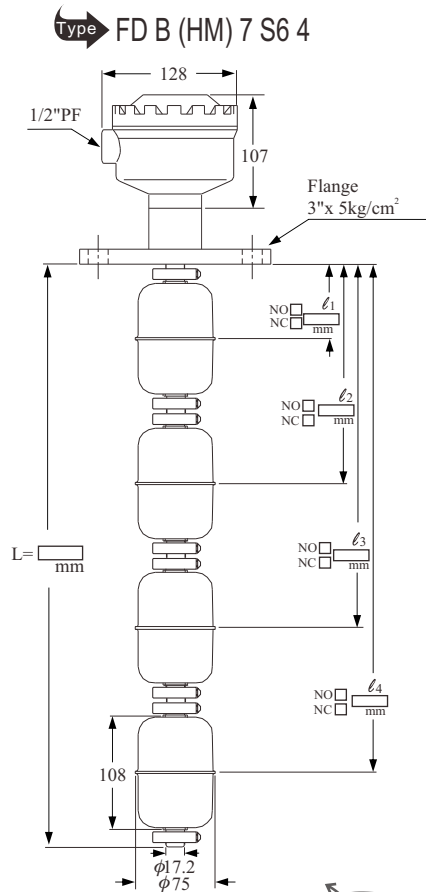
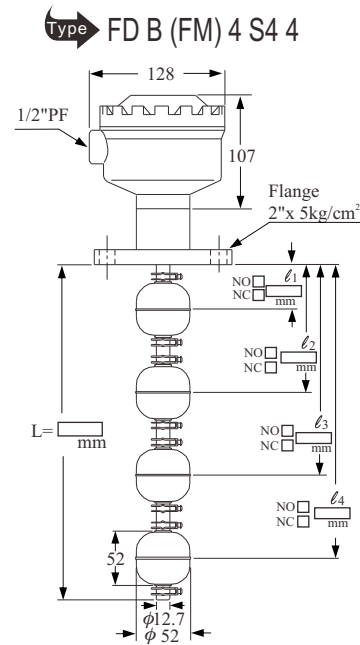


## Order information

Type: **FD B (HM) 7 S6 4**

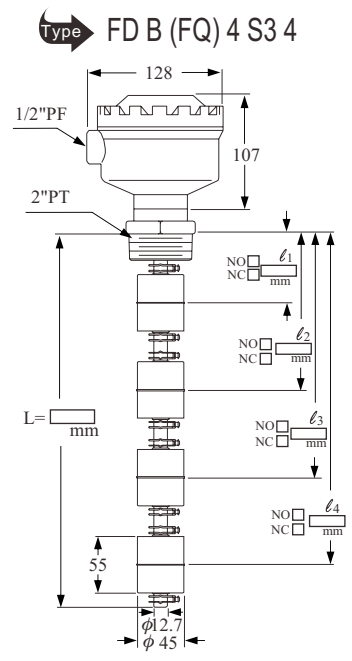
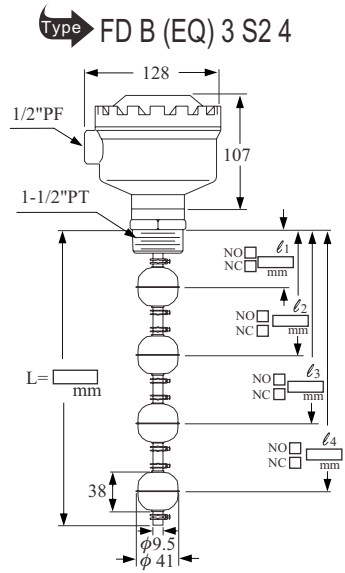
Housing Type: **(HM)**

| Connection Flanges            | Pipe Diameter  | Float Type        | Float Quantity |
|-------------------------------|----------------|-------------------|----------------|
| EM=1-1/2" 5kg/cm <sup>2</sup> | 3= $\phi$ 9.5  | S2= $\phi$ 41x38  | 1~ 4           |
| FM=2" 5kg/cm <sup>2</sup>     | 4= $\phi$ 12.7 | S3= $\phi$ 45x55  | 1~ 4           |
| FM=2" 5kg/cm <sup>2</sup>     | 4= $\phi$ 12.7 | S4= $\phi$ 52x52  | 1~ 4           |
| HM=3" 5kg/cm <sup>2</sup>     | 7= $\phi$ 17.2 | S6= $\phi$ 75x108 | 1~ 4           |



# STANDARD SCREW TYPE

The housing complies with the IP65 rating and can therefore be used in outdoor environment.

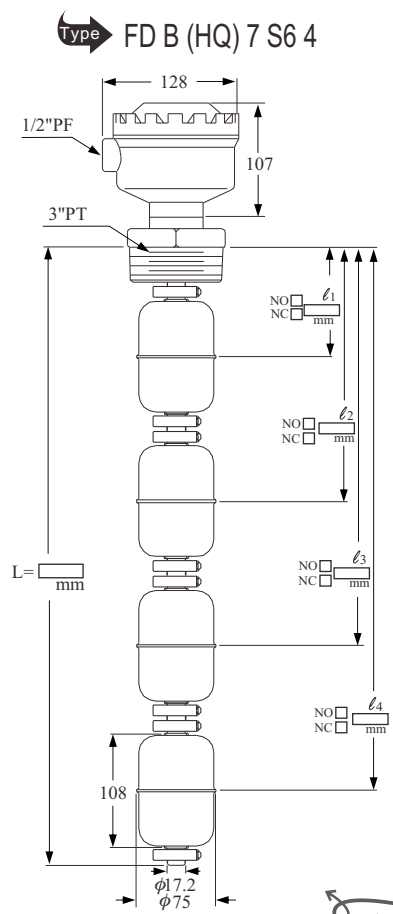
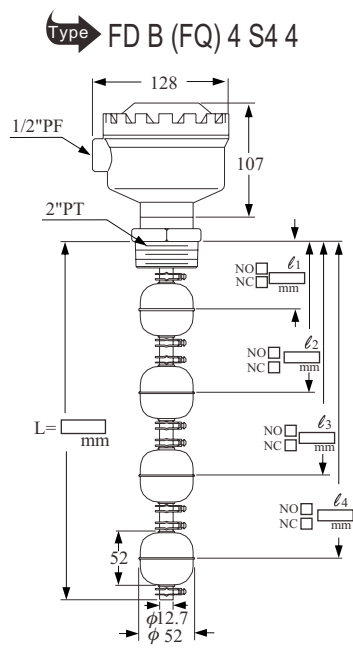


## Order information

Type: **FD B (HQ) 7 S6 4**

Housing Type: **FD B (HQ) 7 S6 4**

| Connection Flanges | Pipe Diameter | Float Type  | Float Quantity |
|--------------------|---------------|-------------|----------------|
| EQ=1-1/2" PT       | 3= φ9.5       | S2= φ41x38  | 1~ 4           |
| FQ=2" PT           | 4= φ12.7      | S3= φ45x55  | 1~ 4           |
| FQ=2" PT           | 4= φ12.7      | S4= φ52x52  | 1~ 4           |
| HQ=3" PT           | 7= φ17.2      | S6= φ75x108 | 1~ 4           |

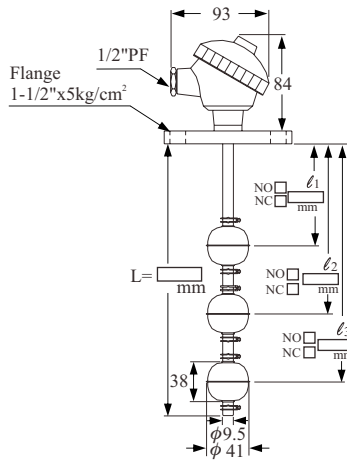


# SCREW TYPE / FLANGE TYPE

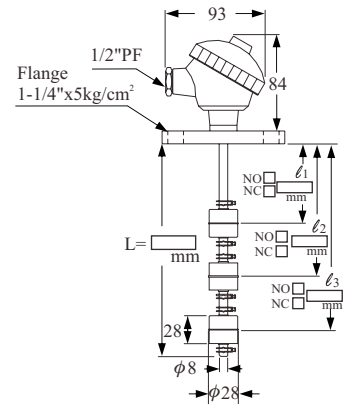
The housing complies with the IP65 rating and can therefore be used in outdoor environment.



Type FD E (EM) 3 S2 3



Type FD E (3M) 1 S1 3

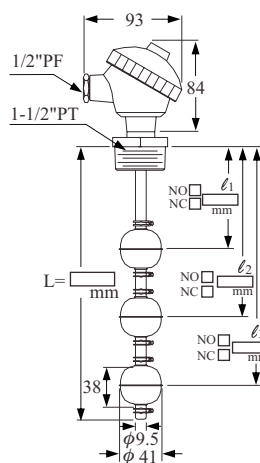


## Order information

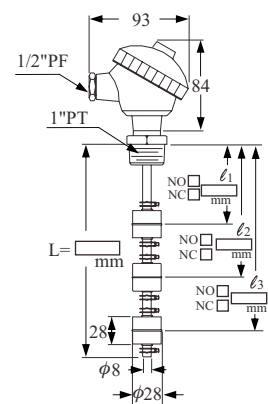
Type: FD E (3Q) 1 S1 3  
Housing Type: (3Q)

| Connection Flanges               | Pipe Diameter | Float Type                 | Float Quantity |
|----------------------------------|---------------|----------------------------|----------------|
| EM=1-1/2"<br>5kg/cm <sup>2</sup> | 3= $\phi 9.5$ | S2=<br>$\phi 41 \times 38$ | 1~ 3           |
| 3M=1-1/4"<br>5kg/cm <sup>2</sup> | 1= $\phi 8$   | S1=<br>$\phi 28 \times 28$ | 1~ 3           |
| EQ=1-1/2"<br>PT                  | 3= $\phi 9.5$ | S2=<br>$\phi 41 \times 38$ | 1~ 3           |
| DQ=1"PT                          | 1= $\phi 8$   | S1=<br>$\phi 28 \times 28$ | 1~ 3           |

Type FD E (EQ) 3 S2 3



Type FD E (DQ) 1 S1 3



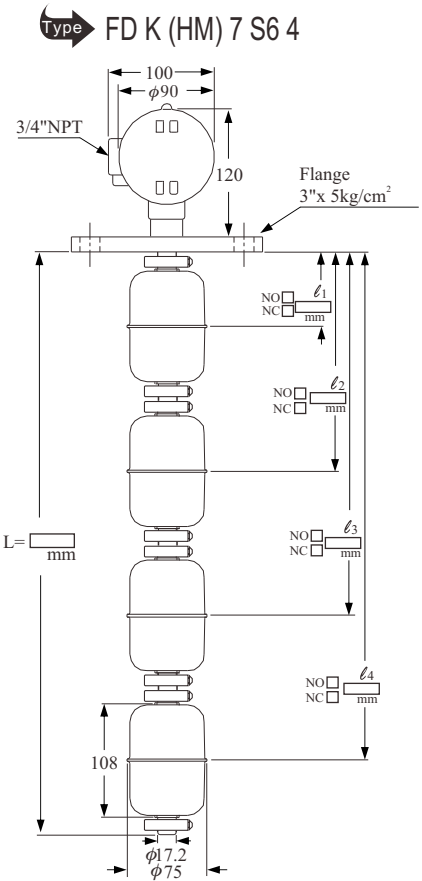
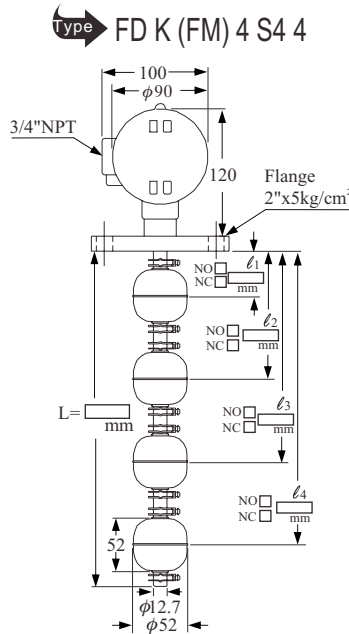
## FLANGE TYPE

### Order information

Type      Housing Type

**FD - K - HM - 7 - S6 - 4**

| Connection Flanges               | Pipe Diameter  | Float Type                  | Float Quantity |
|----------------------------------|----------------|-----------------------------|----------------|
| EM=1-1/2"<br>5kg/cm <sup>2</sup> | 3= $\phi 9.5$  | S2=<br>$\phi 41 \times 38$  | 1~ 4           |
| FM=2"<br>5kg/cm <sup>2</sup>     | 4= $\phi 12.7$ | S3=<br>$\phi 45 \times 55$  | 1~ 4           |
| FM=2"<br>5kg/cm <sup>2</sup>     | 4= $\phi 12.7$ | S4=<br>$\phi 52 \times 52$  | 1~ 4           |
| HM=3"<br>5kg/cm <sup>2</sup>     | 7= $\phi 17.2$ | S6=<br>$\phi 75 \times 108$ | 1~ 4           |



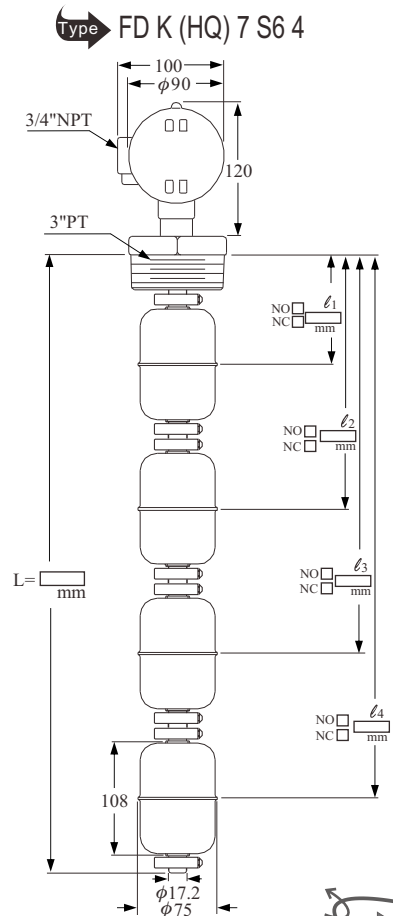
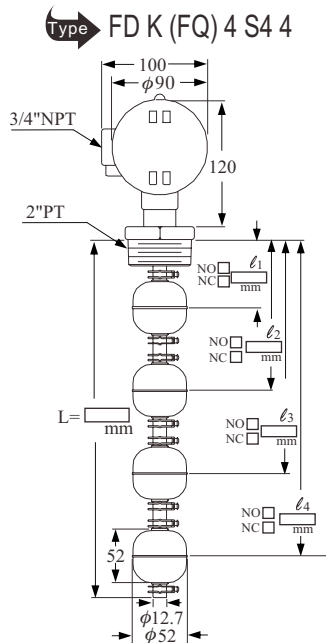
## SCREW TYPE

### Order information

Type      Housing Type

**FD - K - HQ - 7 - S6 - 4**

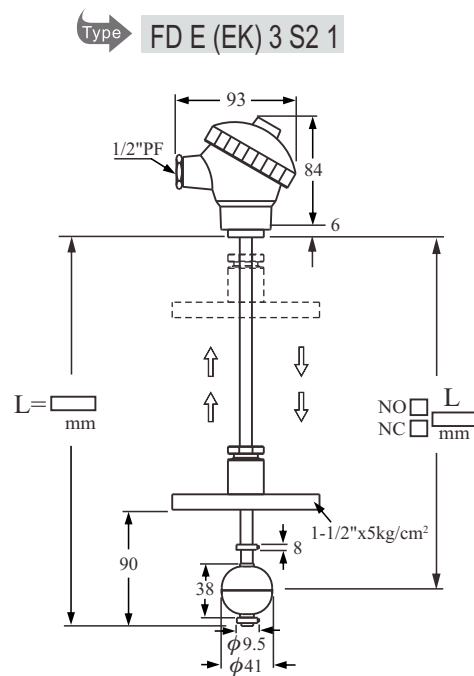
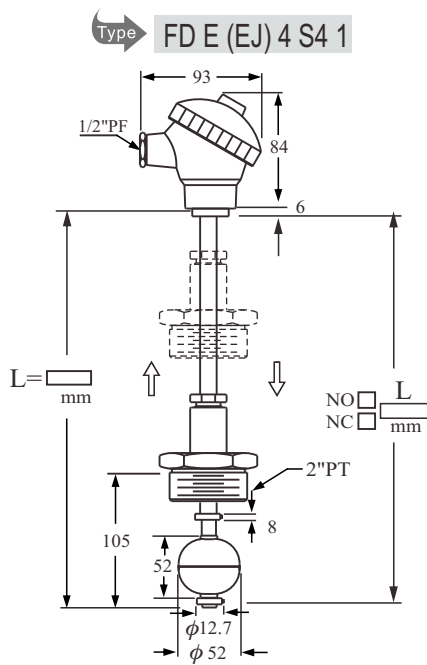
| Connection Flanges | Pipe Diameter  | Float Type                  | Float Quantity |
|--------------------|----------------|-----------------------------|----------------|
| EQ=1-1/2"<br>PT    | 3= $\phi 9.5$  | S2=<br>$\phi 41 \times 38$  | 1~ 4           |
| FQ=2"<br>PT        | 4= $\phi 12.7$ | S3=<br>$\phi 45 \times 55$  | 1~ 4           |
| FQ=2"<br>PT        | 4= $\phi 12.7$ | S4=<br>$\phi 52 \times 52$  | 1~ 4           |
| HQ=3"<br>PT        | 7= $\phi 17.2$ | S6=<br>$\phi 75 \times 108$ | 1~ 4           |



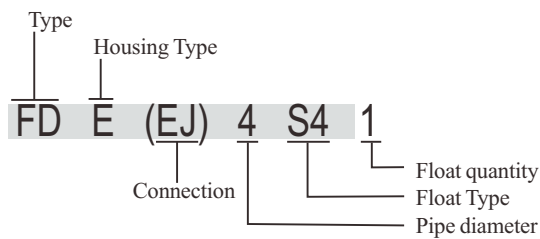
# VERTICAL ADJUSTMENT TYPE

This is a special design for some liquid applications requiring monitoring different actuation levels frequently. The user needs only to loose the hexagon nut, then remove the mounted screw/ flange up or down to achieve the actuated level position adjustment.

- \* Applicable at tank interior pressure under 5 kg/cm<sup>2</sup>.
- \* Standard specification 80°C, special order of max. 200°C available.
- \* Switch contact: 20W/150Vac /250Vdc SPDT  
50W/300Vac /350Vdc SPST  
60W/220Vac /500Vdc SPST  
60W/400Vac /1000Vdc SPDT
- \* Customer specified flange/ screw acceptable.



## Order information



| Connection                    | Pipe Diameter  | Float Type       |
|-------------------------------|----------------|------------------|
| EJ=1-1/2" PT                  | 3= $\phi$ 9.5  | S2= $\phi$ 41x38 |
| FJ=2" PT                      | 4= $\phi$ 12.7 | S4= $\phi$ 52x52 |
| EK=1-1/2" 5kg/cm <sup>2</sup> | 3= $\phi$ 9.5  | S2= $\phi$ 41x38 |

\* Please specify the  $\ell_1$  while placing an order.  
(Length from lower end of housing to center line of float ball)



# TEST ROD

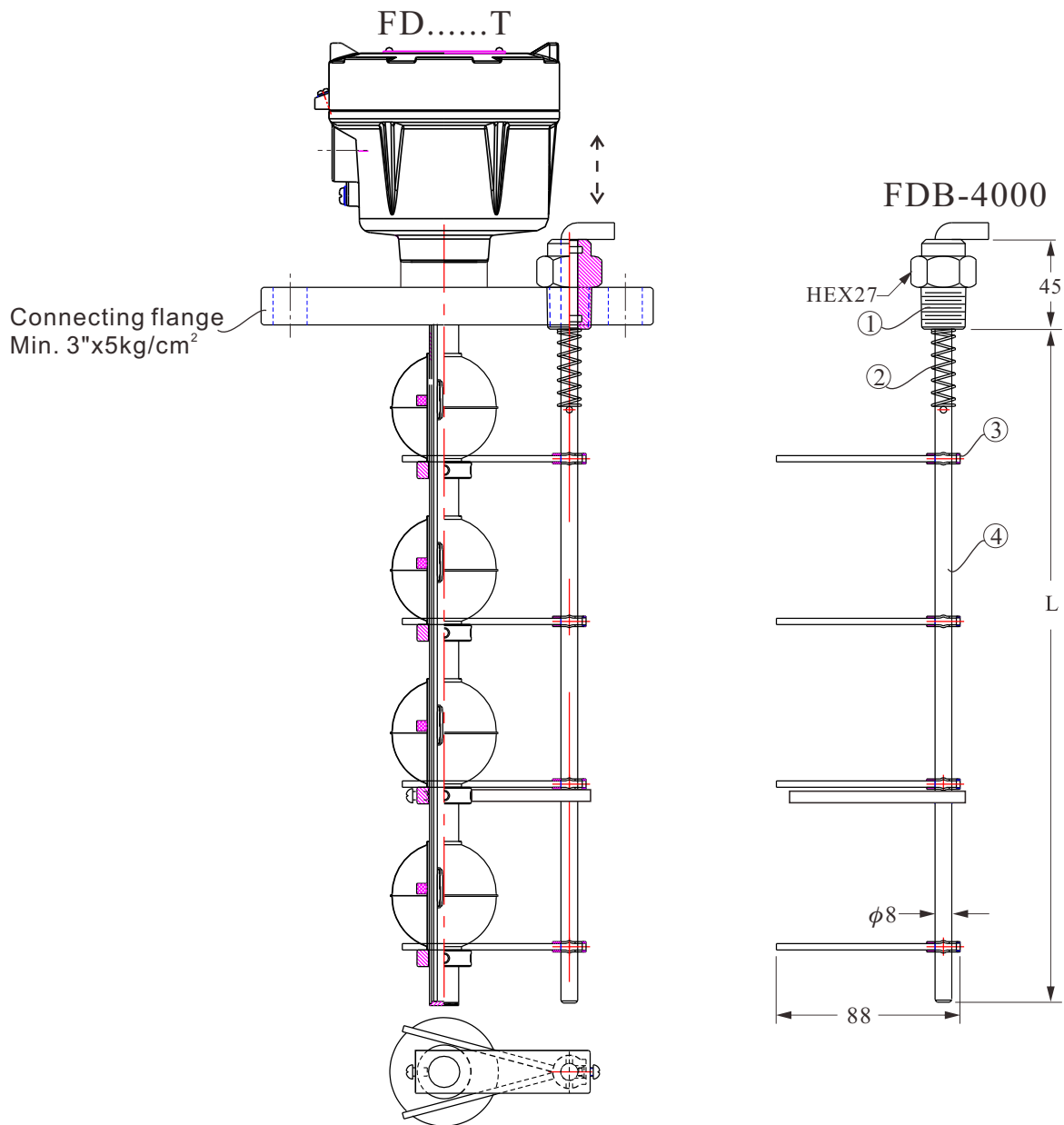
GL Marine Approval 50885-04HH

## FUNCTION:

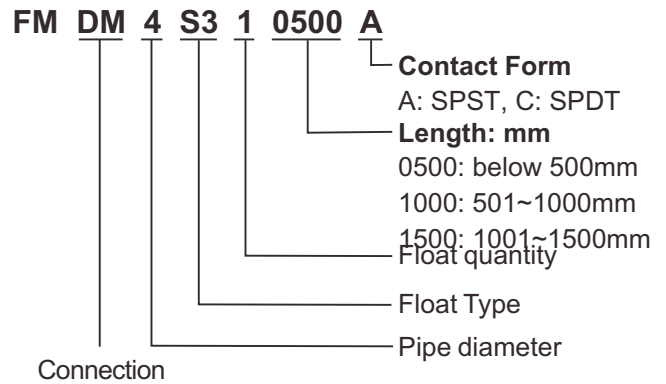
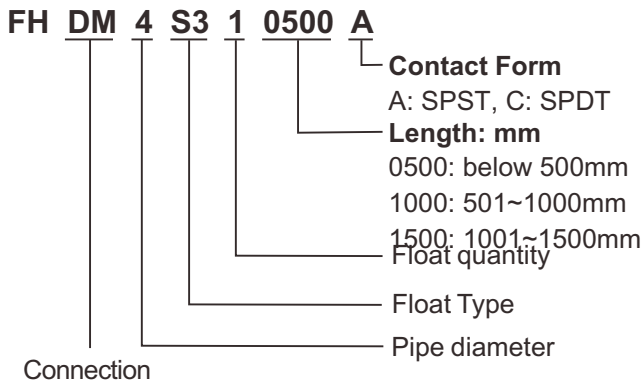
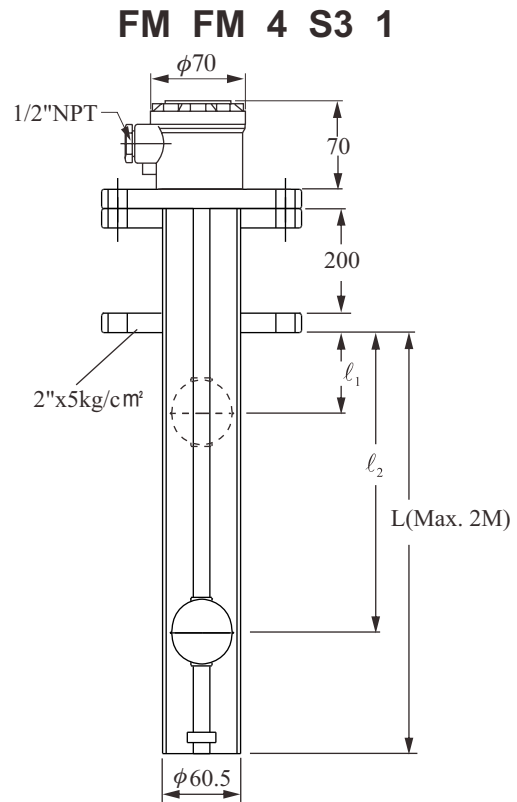
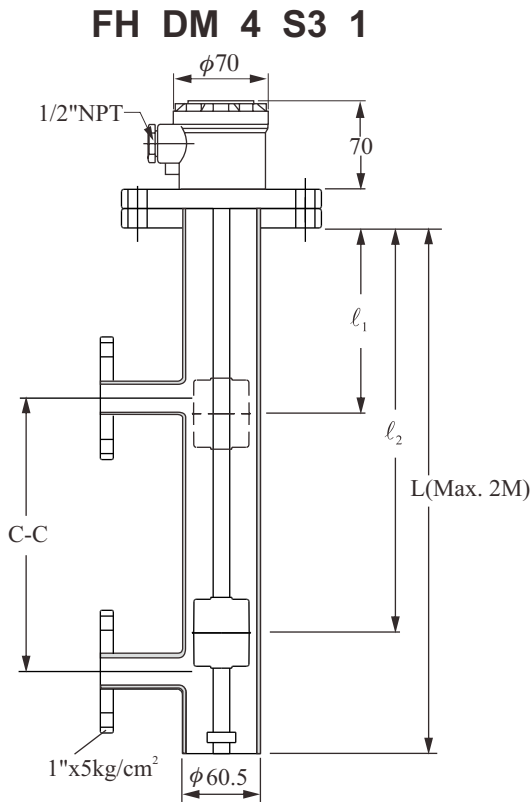
When the Test Rod is attached to a magnetic float level switch, user could test the performance of the magnetic switch directly by pulling the handle of the test rod on the top of the switch.

## MATERIAL:

1. Rod Connection: Bronze
2. Compressed Spring: Stainless Steel
3. Positioning Clip: Stainless Steel
4. Test Rod Stem: Stainless Steel



# MARINE GRADE APPROVAL



\* Please specify the  $l_1$ ,  $l_2$ , C-C and L while placing an order.  
(Length from lower end of housing to center line of float ball)

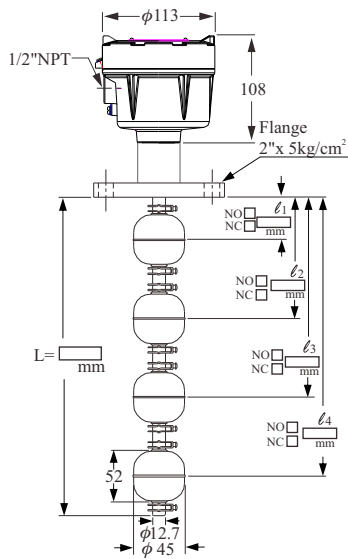
| Connection                  | Pipe Diameter | Float Type |
|-----------------------------|---------------|------------|
| DM=1" x 5kg/cm <sup>2</sup> | 4=φ12.7       | S3=φ45x55  |
| FM=2" x 5kg/cm <sup>2</sup> | 4=φ12.7       | S4=φ52x52  |

\* Special term for LR Marine approval: "Environmental test has been carried out but it is not applicable to use in the ship and offshore that type of screw fittings is used for pipe exceeding 51mm outer diameter".

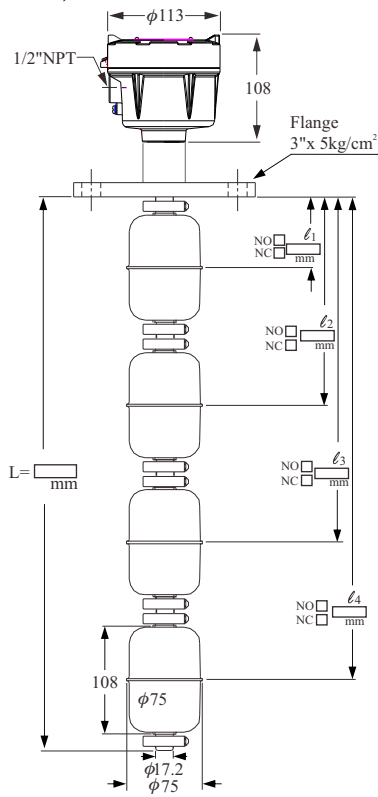
# EXPLOSION PROOF TYPE

## FLANGE TYPE

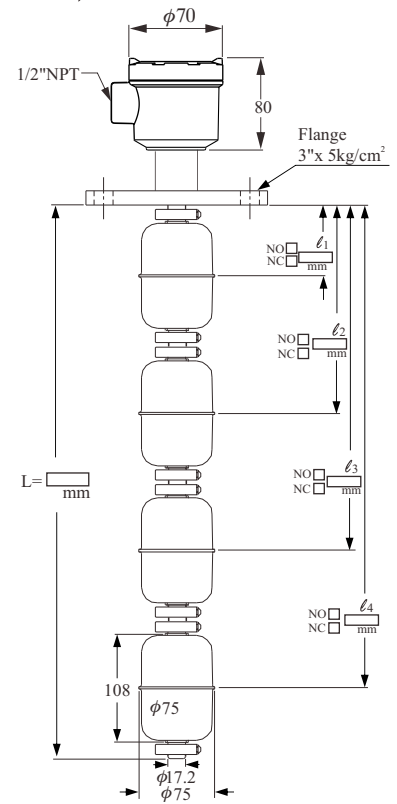
Type RF7 D FM 4 S4 4



Type RF7 D HM 7 S6 4

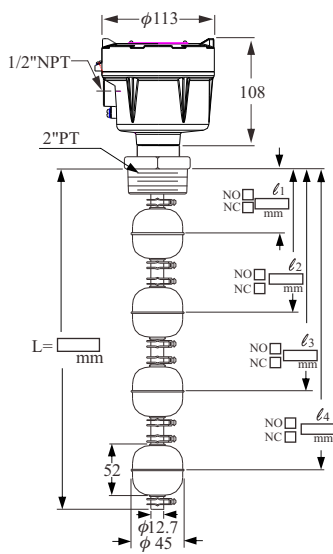


Type RF7 N HM 7 S6 4

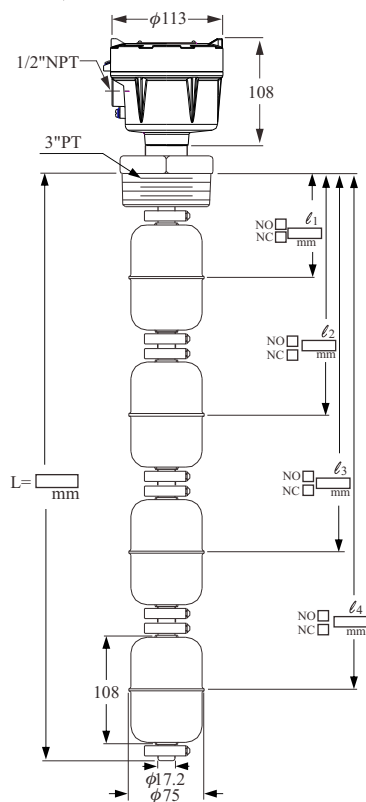


## SCREW TYPE

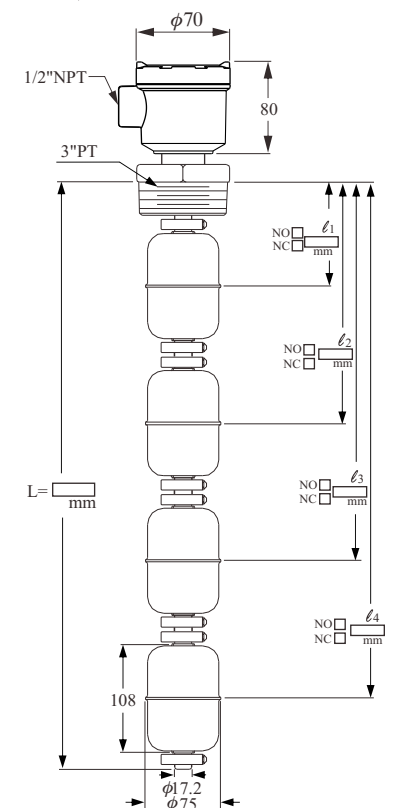
Type RF7 D FQ 4 S4 4



Type RF7 D HQ 7 S6 4



Type RF7 N HQ 7 S6 4



# HOW TO MAKE YOUR ORDER

**F D 7 D H M 7 S 6 3 0 5 0 0 A ( L T )**

T: Test Rog

Tag

**Contact Form**

A: SPST C: SPDT

F: 1 float 2 points G:1 float 3 points

**Length: mm**

0500: below 500mm

1000: 501~1000mm

1500: 1001~1500mm ※ 500mm/per unit

**Quantity of float**

**Float Type (see page 7)**

P1, P2, P3, P4

F2, F3, F4

S1, S2, S3, S4, S5, S6, S7

**Stem**

| Code size      | Material | Code size      | Material | Code size      | Material |
|----------------|----------|----------------|----------|----------------|----------|
| 0: $\phi$ 8    | PP       | 6: $\phi$ 16   | PVDF     | A: $\phi$ 8    | SUS316   |
| 1: $\phi$ 8    | SUS304   | 7: $\phi$ 17.2 | SUS304   | B: $\phi$ 9.5  | SUS316   |
| 2: $\phi$ 8    | PVC      | 8: $\phi$ 12.7 | P.P.     | C: $\phi$ 12.7 | SUS316   |
| 3: $\phi$ 9.5  | SUS304   | 9: $\phi$ 12.7 | PVC      | D: $\phi$ 17.2 | SUS316   |
| 4: $\phi$ 12.7 | SUS304   |                |          |                |          |
| 5: $\phi$ 17.2 | P.P.     |                |          |                |          |

**Connection Type**

**Housing Type**

D: Aluminum

N: SUS304 or SUS316

| Size for flange or screw |                | Pressure range or other     |
|--------------------------|----------------|-----------------------------|
| A: 3/8" (10A)            | I: 4"(100A)    | M: 5kg/cm <sup>2</sup> JIS  |
| B: 1/2" (15A)            | J: 5"(125A)    | N: 10kg/cm <sup>2</sup> JIS |
| C: 3/4" (20A)            | K: 6"(150A)    | O: 150Lbs ANSI              |
| D: 1" (25A)              | S: Others      | P: 300Lbs ANSI              |
| E: 1-1/2"(40A)           | 1: 1/8"        | Q: PT                       |
| F: 2" (50A)              | 2: 1/4"        | R: PF (G)                   |
| G: 2-1/2"(65A)           | 3: 1-1/4"(32A) | T: BSP                      |
| H: 3" (80A)              |                | U: NPT                      |
|                          |                | S: Others                   |
|                          |                | W: PN10 (10Bar)             |
|                          |                | X: PN16 (16Bar)             |
|                          |                | Y: PN25 (25Bar)             |
|                          |                | Z: PN40 (40Bar)             |
|                          |                | J: Adjustment screw         |
|                          |                | K: Adjustment flange        |

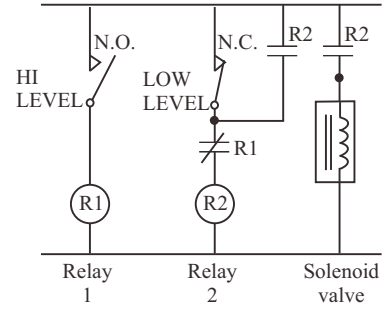
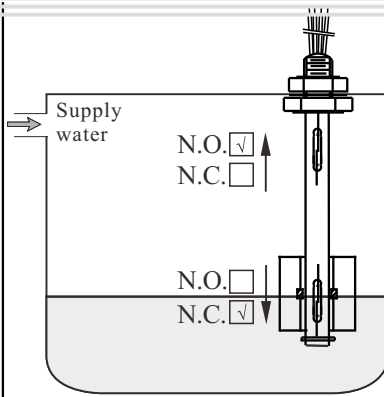
**Explosion proof**

\* Certified by GL, ABS Marine grade are available. (Please see page 17)

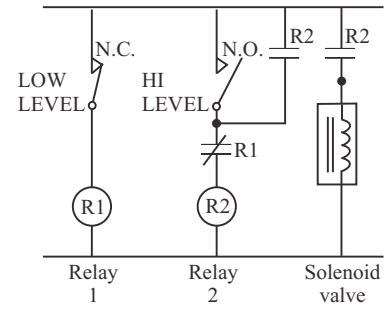
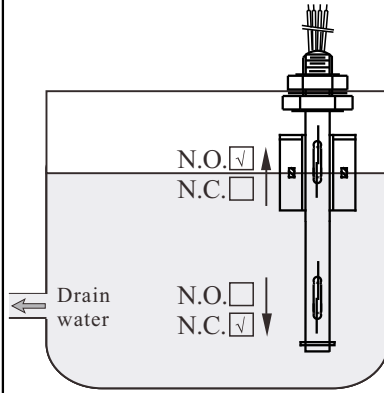
\* Special term for LR Marine approval: "Environmental test has been carried out but it is not applicable to use in the ship and offshore that type of screw fittings is used for pipe exceeding 51mm outer diameter".

# TYPICAL WIRING DIAGRAMS

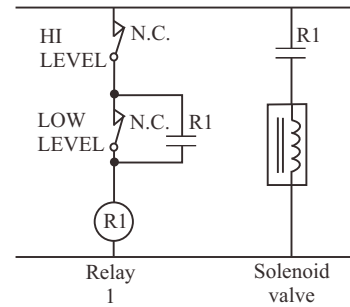
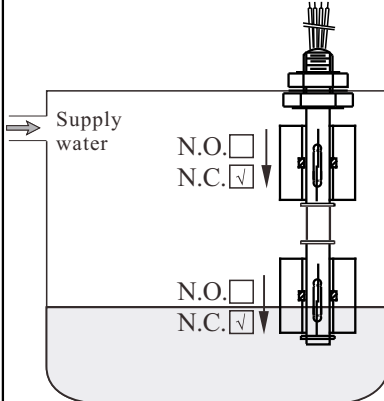
▶ AUTO SUPPLY CASE:  
SINGLE FLOAT  
DUAL SWITCHES



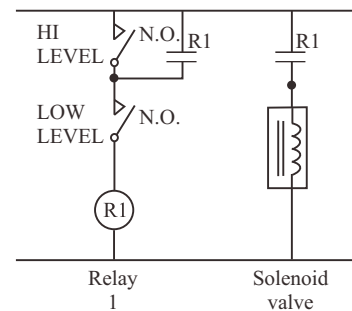
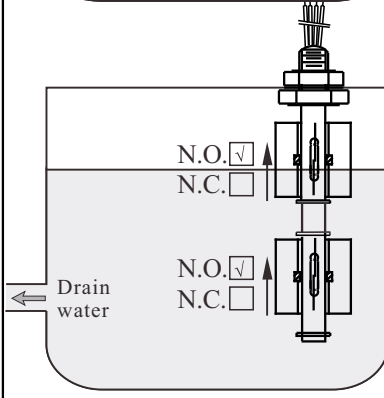
▶ AUTO DRAIN CASE:  
SINGLE FLOAT  
DUAL SWITCHES



▶ AUTO SUPPLY CASE:  
DUAL FLOATS  
DUAL SWITCHES



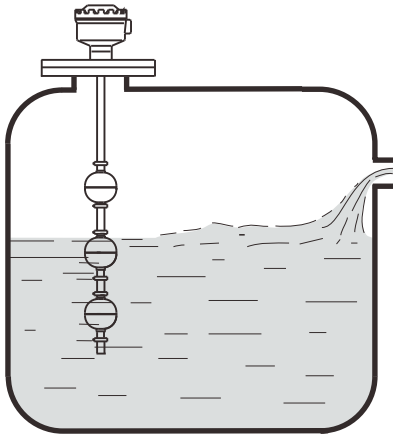
▶ AUTO DRAIN CASE:  
DUAL FLOATS  
DUAL SWITCHES



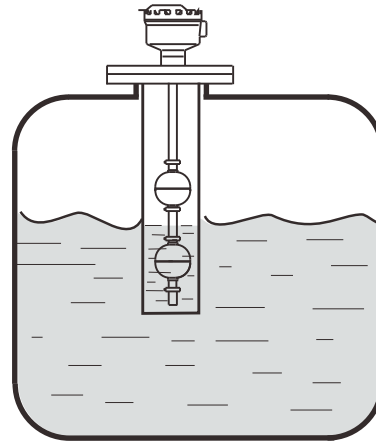
**Note:** The "N.O." Means normally opened circuit of the reed switch (off) in lower liquid level. As the float moves up to the specified higher level, the circuit closed (on).  
The "N.C." Means normally closed circuit of the reed switch (on) in lower liquid level. As the float moves up to the specified higher level, the circuit closed (off).

# INSTALLATION

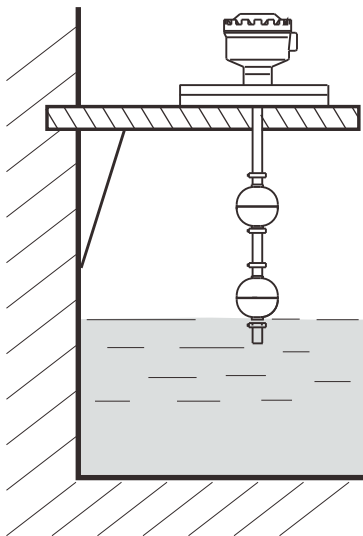
- The float level switch should be mounted far away from liquid inlet. Any strong liquid fluctuation will produce error output signals.



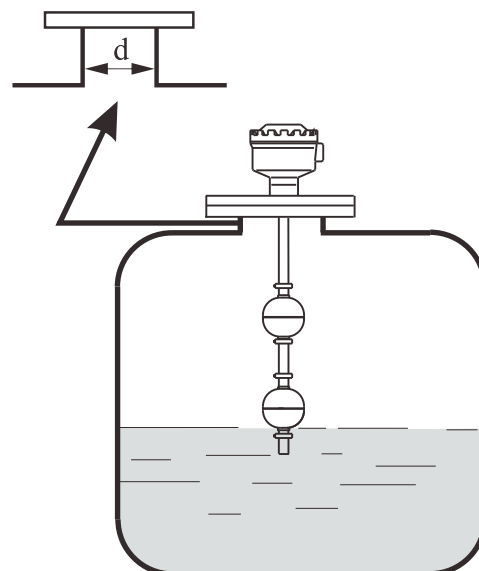
- It is advised to place a pipe shield or equivalent device to normalize the switch actuation if the switch is used near agitator.



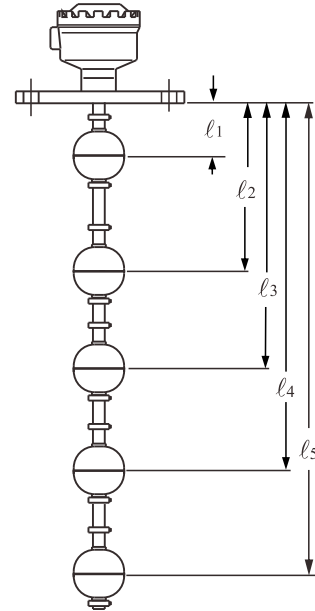
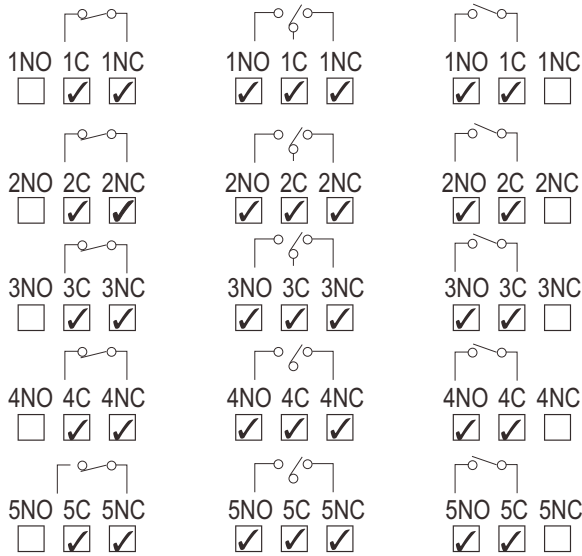
- It had better require an L type supporter, when the switch is mounted in concrete wall tank as figure below.



- It is recommended to select the standpipe with diameter larger than the float ball for installation process.



# CONNECTION DIAGRAMS



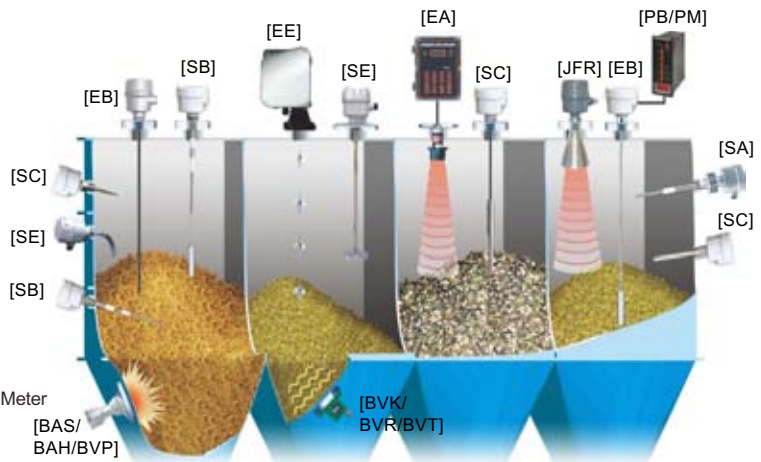
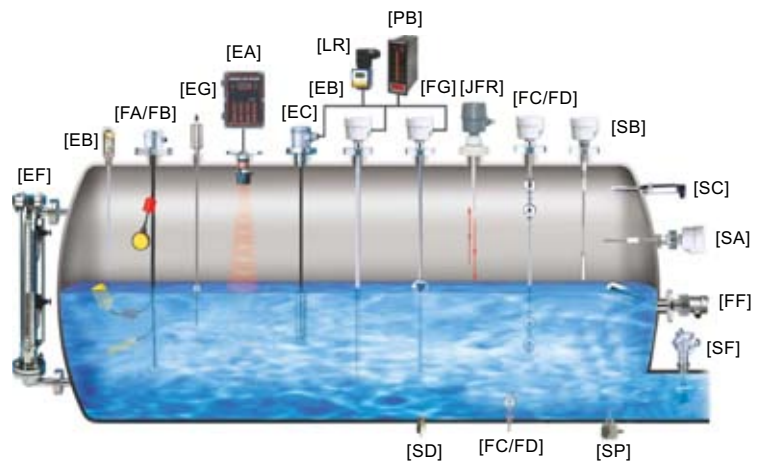
- ※ Means that the NC-C circuit will be close while liquid level lower than the float ball, by mark of "ON".
- ※ Means that the NO-C circuit will be close while liquid level higher than the float ball, by mark of "ON".
- ※ Means that the NO-C circuit will be close while liquid level higher than the float ball, and NC-C circuit will be close while liquid level lower than the float ball.

※ Please screw the housing cap tightly and fix the conduit outlet, it will reinforce the housing performance against the moisture and direct water. ( $\phi$ 8mm multiple cord is recommended for wiring)

※ If the end user is intended to adjust the actuation level position independently, please move the float ball(s) position as well as the interior reed switches, otherwise, it will appear an error or no signal.

# EXAMPLES-OF-TANK-MOUNTING

- [FC/FD] Mini Float/Magnetic Float Level Switch
- [FG] Magnetic Float Level Transmitter
- [FF] Side Mounting Float Switch
- [FA/FB] Cable Float Level Switch
- [SP] Thermal Dispersion Flow Switch
- [SF] Paddle Flow Switch
- [SD] Optical Level Switch
- [SE] Rotary Paddle Level Switch
- [SA] Capacitance Level Switch
- [EC] Pressure Level Transmitter
- [LR] Loop Power Indicator
- [SC] Vibrating Probe Level Switch
- [SC] Tuning Fork Level Switch
- [EB] RF-Capacitance Level Transmitter
- [SB] RF-Capacitance / Admittance Level Switch
- [EG] Magnetostrictive Level Transmitter
- [EF] By-Pass Level Transmitter
- [MEF] Mini By-Pass Level Transmitter
- [EA] Ultrasonic Level Transmitter
- [JFR] FMCW Radar Level Transmitter
- [EE] Electromechanical Level Measuring System
- [ED] Speed Monitor
- [SRT/SRS] Conveyer Belt Misalignment Switch & Safety Cable Pull Switch
- [PB/PM] Microprocessor Based Bargraphic Display Scaling Meter
- [BRD/AE] Valve and Controller for Dust Collector System
- [BAS/BAH/BVP] Air Hammer
- [BVK/BVR/BVT] Pneumatic Vibrator



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