

## BALL FLOAT TYPE

## FB-7000 LEVEL SWITCH

### GENERAL

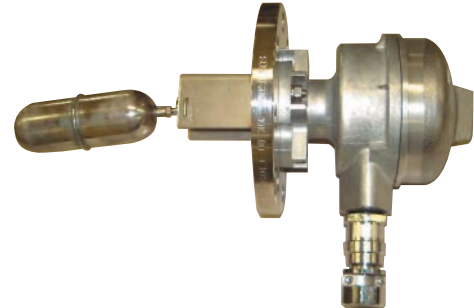
FB-7000 is a ball float type level switch which is installed through tank nozzle or through external chamber. The incorporated micro switch is actuated when liquid level reaches set point. This microswitch contact can be utilized to drive buzzers, lamps or to control pumps and valves to monitor and control liquid level in vessels for safety and efficiency.

### FEATURES

- ☐ Perfect isolation between tank side and electric compartment by magnetic coupling for safety.
- ☐ No moving part except float guarantees high durability.
- ☐ Easy installation and maintenance.
- ☐ External chambers are available for isolation from process.
- ☐ Flameproof enclosure: Usable at hydrogen atmosphere (Exd II CT6).

### STANDARD SPECIFICATION

- Applicable fluid : Liquids (Density  $\geq 0.35$ )\*  
Interface of two different liquids  
(Difference of Density  $\geq 0.2$ )\*  
\* : Min. 0.5g/cm<sup>3</sup> for repelling action type  
Theoretically not suitable for liquids containing ferrous particles.
- Max.OP.Press : 40kg/cm<sup>2</sup>G (Subject to flange rating)  
Up to 70kg/cm<sup>2</sup>G (at ambient temp.)  
available as special order.  
Consult factory for further details.
- Liquid Temp : -170°C to +400°C  
\*A cooling fin will be provided for low and high temp, versions. Refer to Model Code for details.
- Ambient temperature : -20 to +80°C  
-10 to +40°C (Intrinsically safe)  
-20 to 55°C (Flameproof type)
- Process connection : 1) Tank nozzle installation standard 3" flange  
3BJIS5KRF, 3BJIS10KRF, 3"JPI#150,  
3"ANSI#150, 3BJIS20KRF, 3"JPI#300,  
3"ANSI#300, Others (4" flange on request)  
2) Through external chamber  
Chamber connection to vessel :  
1"SW, Rc1, 1BJIS10KRF, 1"JPI#150,  
1"ANSI#150, 1BJIS20KRF, 1"JPI#300,  
1"ANSI#300, Others
- Enclosure : 1) Water tight (IP65)  
2) Flameproof (Exd II CT6)  
3) Intrinsically Safe (TIIS i3nG5)  
Safety relay will be provided. In case such safety relay is in the scope of customer, specify water tight version (FB-709□W or FB-709□WP).



- Type of switch  
Standard : SPDT microswitch  
Opt. : SPDT × 2 microswitch  
(Except for repelling action type)
- Contact capacity  
Standard : AC250V, 5A (Resistance Load)  
DC125V, 0.4A  
Gold plated contact for Minute current  
available on request (DC30V, 0.1A)
- Repeatability : ±5mm
- Reset span : Max.15mm (Fixed)  
(Max.25mm (fixed) for Fin version)  
(Except for special version in repelling action type.)  
Operating position is to be adjusted by the upper and lower distribution of reset span.  
(Normal temperature, atmospheric pressure at the time of water test.)

#### • Cable entry

Construction	Cable entry	Remarks
W, WP	G1/2	
EX	G1/2	Outside dia. of standard applicable cable: ø10 to 10.9
S, SP	G1/2	

(To be with adapter for other standards like NPT.)

- Cable termination : By M3.5 screw
- Material : Float : SUS316L  
Float rod : SUS316 (316LSS available on request)  
Flange : SUS304 or SUS316 (316LSS available on request)  
Housing : Aluminum alloy  
External chamber : Carbon steel, SUS304 or SUS316  
(316L SS available on request)
- High Pressure Gas Regulation certified version :  
Level switches certified by Japanese High Pressure Gas Regulation are available and their manufacturing range is as follows. Consult factory for further details.

Material	Design Temp.	Design Press
Carbon steel	0 to +350°C	70kg/cm <sup>2</sup> (at ambient temp.)
Stainless steel	-170 to +350°C	

(Connection size may be 4" and special form.)

## MODEL CODE



## 1 Magnet action

0	Following Action (Standard)
1	Repelling Action Fig. 4

## 2 Connection flange

1	3BJIS5KRF
2	3BJIS10KRF
3	3 <sup>B</sup> JPI#150
4	3"ANSI#150
5	3BJIS20KRF
6	3 <sup>B</sup> JPI#300
7	3"ANSI#300
9	Others

## 3 Enclosure

W	Water tight
WP	Water tight with JIS F15b gland*2
EX*4	Pressure tight Ex-proof (EX d II CT6) with flame proof glands*3
S*1	Intrinsically Safe (i3nG5, Safety relay provided)
SP*1	Intrinsically Safe (i3nG5, Safety relay provided) with JIS F15b gland*2

\*1 : If intrinsically safe relay is in the scope of customer, specify "W (Water tight)".

\*2 : Inform us of the cable outside diameter.

\*3 : Outside diameter of standard cable:  $\phi 10$  to  $\phi 10.9$ .

If the cable outside diameter is except the above, inform us of the cable outside diameter.

\*4 : For pressure tight Ex-proof enclosure: Type; E, Ex-proof Class JIS d2 G4, and Gland: Nil. (Refer to Fig. 4.)

Inform us of the cable outside diameter if Ex-proof gland is required.

## 4 Material

3	Material Class 3
4	Material Class 4
9	Others

## 5 Contact Construction

S	SPDT (Single contact)
D	SPDT $\times$ 2 (Double contact)

## 6 Temperature Range T (°C) &amp; Fin

0	$-170 \leq T \leq -20$	With long fin (W, S only), Fig. 3
1	$-20 < T \leq +150$	Without fin, Fig. 1-1, 1-2
2	$+150 < T \leq +200$	With aluminum fin, Fig. 2
3	$+200 < T \leq +300$	With long fin, Fig. 3
4	$300 < T \leq +400$	With long fin, Fig. 3*

\* : Special Switch and Internal mechanism for High temp. use provided.

7 Density range (g/cm<sup>3</sup>)

1	0.8 to 1.1
2	0.6 to 0.8
3	0.5 to 0.6
4	0.35 to 0.5
5	1.1 ~
9	Interface detection*

\* : Minimum 0.2 g/cm<sup>3</sup> difference is required.

## 8 External chamber connection

0	No external chamber provided
1	1"SW
2	Rc1
3	1BJIS10KRF
4	1 <sup>B</sup> JPI#150
5	1"ANSI#150
6	1BJIS20KRF
7	1 <sup>B</sup> JPI#300
8	1"ANSI#300
9	Others

## 9 External chamber material

0	No external chamber provided
2	Carbon steel
5	SUS304
7	SUS316
9	Others

## 10 Gasket material (External chamber to level switch flange)

0	No external chamber provided (No gasket)
3	TEFLON (V#7020 or equ.)
4	TEFLON (V#7030 or equ.)
5	METAL WOUND (V#8591 SUS304 or equ.)
6	METAL WOUND (V#8591 SUS316 or equ.)
7	NON ASBESTOS JOINT SHEET (V#6500 or equ.)
9	Others

## 11 Bolt, nut material (External chamber to level switch flange)

0	No external chamber provided
1	SS400/SS400
2	SNB7/S45C
3	SUS304/SUS304
9	Others

# DIMENSION AND MATERIAL

## Level switch

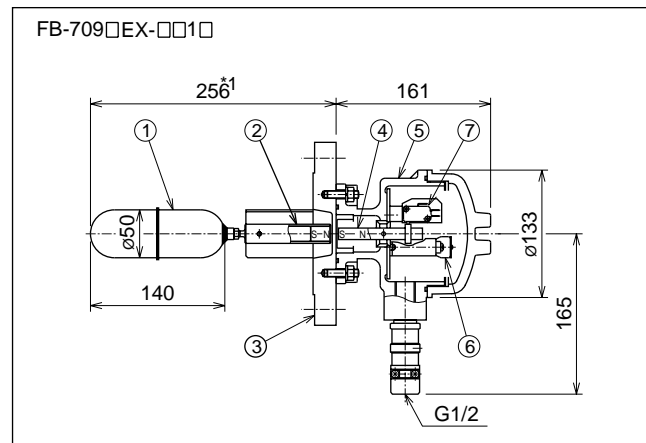


Fig. 1-1

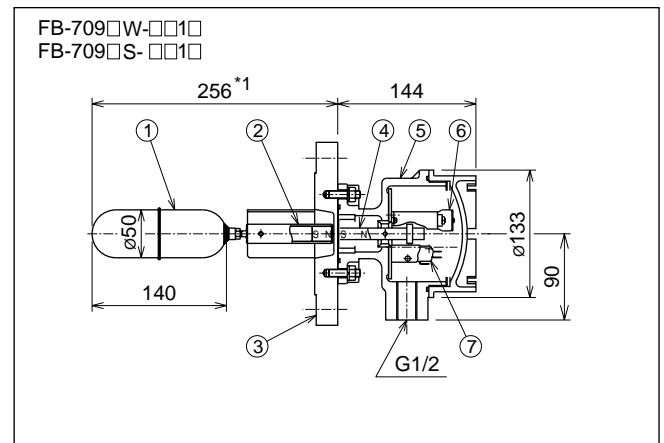


Fig. 1-2

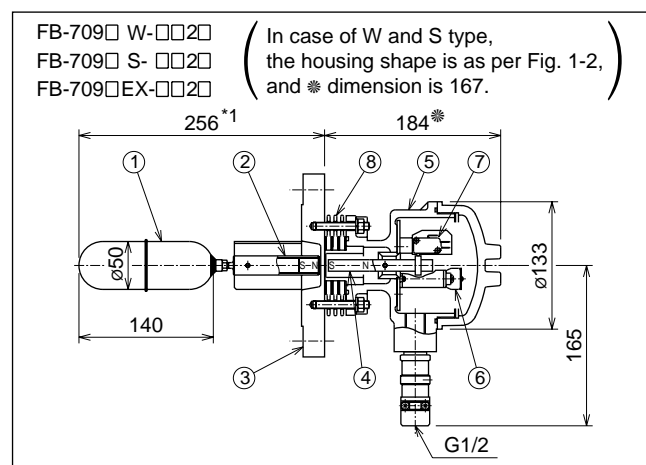


Fig. 2

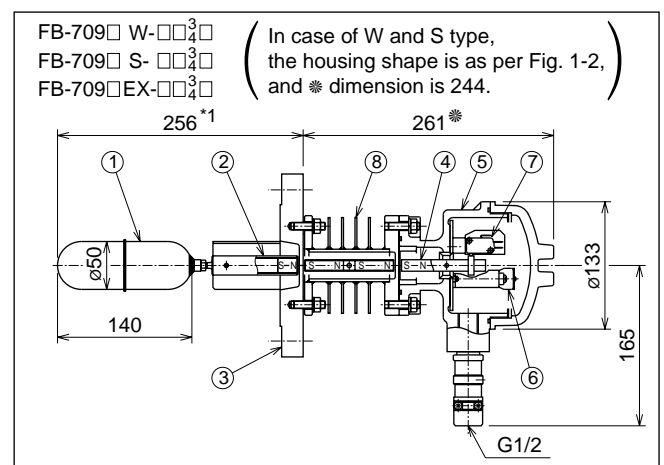


Fig. 3

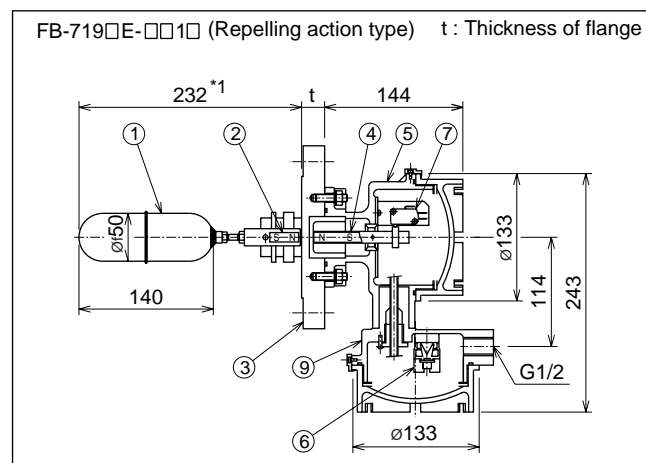


Fig. 4

## <Material>

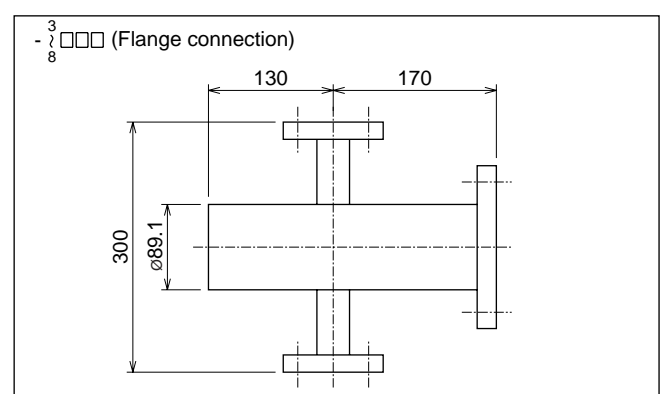
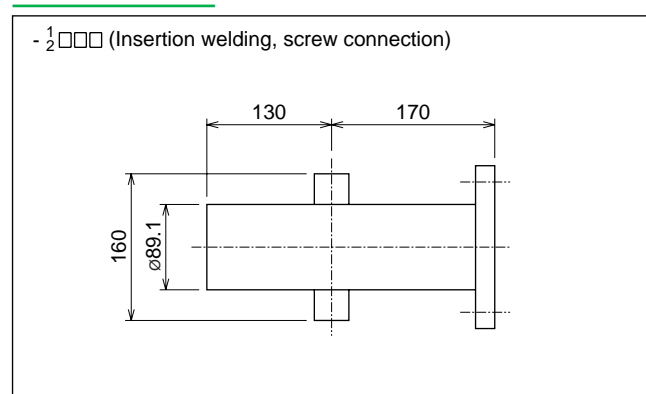
No.	Parts	Material Class 3	Material Class 4
1	Float	SUS316L	
2	Magnet	Assembly	
3	Flange	SUS304*2	SUS316*2
4	Magnet	Assembly	
5	Housing	Aluminum alloy	
6	Terminal	Assembly	
7	Microswitch	Assembly	
8	Cooling fin	Aluminum alloy (Fig. 2), SUS304 (Fig. 3)	
9	Terminal box	Aluminum alloy	

\*1 : In case the Density is less than the following density of liquid, the dimension of float and from flange face to float end will become longer, and also the float shape will be changed.

a) Following type: Less than 0.5 (g/cm<sup>3</sup>)

b) Repelling type: Less than 0.6 (g/cm<sup>3</sup>)

## External chamber



## INTRINSICALLY SAFE RELAY

Safety relay is to be inserted into IS loop of FB-709□S or FB-709□SP version. Select suitable safety relay considering total number of contacts to be handled.

<Model code>

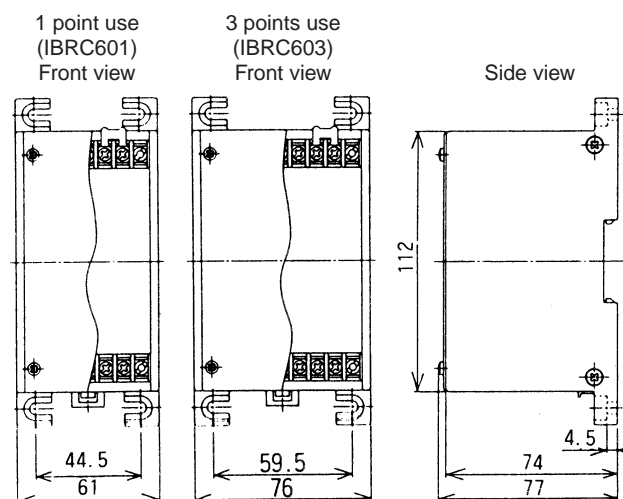
Mode code					Description
IBRC	6			R	
No. of contact	01				1 point use
	02				2 point use
	03				3 point use
	05				5 point use
	06				6 point use
	10				10 point use
Supply voltage		1			AC 100/110 V
		2			AC 200/220 V

- Classification : 3nG5
- Installation : Wall mount (Open type)
- Location : To be in safe area
- Max. voltage for IS circuit : DC16V
- Max. current in short circuit : DC14mA
- Cable termination : M3 screw terminal
- Power supply : AC100/110V, 50/60Hz or AC200/220V, 50/60Hz
- Relay output : AC110V, 5A, AC220V, 2.5A, DC24V, 5A (Resistance load)
- Type approval No. : 37296

## External dimensions

## PRECAUTION FOR WIRING

- "S" Type (Intrinsically safe) and "EX" Type (Flameproof): Wiring work is to be carried out in accordance with a guide book issued by National Institute of Industrial Safety.
- Flameproof version has been approved, assembled with the flameproof equipment. Be sure to use the cable gland of designation of our company.



## SUGGESTIONS

- 1) Bolts, Nuts and gasket for process connection are in the customers' scope of supply.
- 2) Minimum 73mm diameter is required for tank side nozzle. The level switch is to be installed so that the center axis of the level switch is on that of nozzle pipe.

## ORDERING INFORMATION

Specify Model Code.

In case "9:others" is/are in the model code, indicate the details separately.

\*Specification subject to change without notice

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