



TECHNICAL GUIDANCE

FOR MULTIPOINT LEVEL ALARM DETECTION BY ONE UNIT

FP-4000 Series

FLOAT LEVEL SWITCH

OUTLINE

The FP-4000 series is a float level switch, which is installed through the tank nozzle on tanks and/or pits.

Level alarm detection is possible at up to 11 points (up to 6 points for the flameproof version). This switch can be used to control loading/unloading pumps and monitor High-high and Low-low level alarms, saving total instrumentation costs.

In addition to the standard stainless steel material for wet parts, other materials such as PVC, HPVC, PP and fluorocarbon resins are also available. Thus, the switch can be used for monitoring and controlling the level of ordinary water, waste water, chemicals and highly corrosive liquids. Besides weatherproof type, flameproof and intrinsically safe versions are available for use in hazardous area.

MAIN APPLICATIONS

- Preventing overflow of liquids and idle suction by pumps
- Controlling loading/unloading pumps
- Monitoring the liquid level of underground tanks/pits

STANDARD SPECIFICATION

Measuring objects : Any liquids with a viscosity of 600 mPas or less

No freezing, adhesion, or coagulation

Minimum liquid density: See "Float details & outside dimensions of body."

Liquid temp. :

a. Model FP-4000 and FP-4100

Wetted part material	Material code	Liquid temp. range
SUS304,316,316L	0 1 2	-5 to 100°C (Special: 100 to 150°C)
PVC	4	0 to 60°C
H PVC	5	0 to 80°C
PP	6	0 to 60°C
PFA	7	0 to 100°C

b. Model FP-4200

Wetted part material	Material code	Liquid temp. range
SUS304,316,316L	0 1 2 3	-5 to 80°C
PVC	4	0 to 60°C
H PVC	5	0 to 80°C
PP	6	0 to 60°C
PTFE	7	-5 to 80°C
PFA	8	0 to 80°C

Ambient temperature :
-20 to 70°C
-20 to 55°C (Flameproof)
-20 to 60°C (Intrinsically safe)

Pressure range :

Model FP-4000 and FP-4100 See float details.
Model FP-4200 See float details.

Connection :

Model FP-4000 and FP-4100 2" (50 mm) flange.
3" (80 mm) flange for PFA
Thread connections such as G2 and R2 are also available excluding PFA. Contact us for details.

Model FP-4200 3" (80 mm) flange

Max length of guide pipe : Refer to it for each model.

Enclosure :

Model FP-4000 Weatherproof or intrinsically safe (safety relay required)
Model FP-4100 and FP-4200 Weatherproof, flameproof*1 or intrinsically safe (safety relay required)

Protection code : Equiv. to IP65
*1Class : Exd II BT6 (RIIS, Japan)
Model FP-4100 TC14695-14697
Model FP-4200 TC14698-14700



FP-4000

FP-4100

FP-4200

Alarm contract : Reed switch, NO or NC

Contact setting : Set the operation for each contact point.

Contact capacity :

Model FP-4000 and FP-4100 50 W

Max. switching voltage

220 V AC, 110 V DC

Max. switching current

0.7 A

Model FP-4200

10 W AC/DC

Max. switching voltage

100 V AC/DC

Max. switching current

0.5 A

A surge suppressor is provided except for the intrinsically safe version.

Repeatability : Within ± 5 mm

Reset span : 10 mm or less

No. of alarm point :

Model	FP-4000	FP-4100	FP-4200
Independent	3	6	6
Common return	5	11*2	11*2

*2: Special order

Cable entry : Model FP-4000: One entry (either G1/2 or G3/4)

Model FP-4100 and FP-4200:

One entry (G3/4) as standard

Max. two entries on request

Adapters will be provided when different sizes or NPT connection are designated.

Flameproof cable glands are available on request for use in hazardous areas. Use the following cable gland to conform to explosionproof standards.

Designated cable gland: Model SXC-22B by Shimada Electric, which is suitable for cables with a diameter of 12 to 14 mm. For other cable sizes, specify a cable diameter among 7 to 10, 10 to 12, or 14 to 16 mm to select a proper cable gland.

Cable termination :

Model FP-4000 M4 screw

Model FP-4100 and FP-4200 M3.5 screw

Finish : Aluminum part Silver
Stainless steel No paint

Approved products for High Pressure Gas Safety Act are available. Consult us for details.

OUTSIDE DIMENSION

Float details & outside dimensions of body

Material of float		SUS316L		PVC	HPVC	PP	PFA/NBR	
Allowable pressure [MPa]		0.66		0.13		0.2	0.2	
(Standard) Withstand pressure test [MPa]		0.8 *4		0.2		0.3	0.3	
Allowable minimum liquid density [g/cm ³]		0.6	0.78	1.0	0.75	1.0	0.79	1.3
Di- men- sion [mm]	Diameter of guide pipe (d)	13.8		18		22	16	
	Maximum outside diameter of float(D)*1	52	43 *7	42	48 *7	50	68.2	42.6
	Inside diameter of float	15.4		20		25	19	
	Height of float (H)	58	50	70		60	100	50
Minimum h1 dimension [mm]		60		90		140		80
Minimum interval (S) [mm]		100	90	120 *5		150	100	
Minimum L dimension Lowest end point + X [mm] *2		X=60		X=90		X=140	X=80	
Outside drawing *3 ① Terminal box ② Flange ③ Guide pipe ④ Float ⑤ Stopper		<p>Material code <input type="text" value="0"/> <input type="text" value="1"/> <input type="text" value="2"/> <input type="text" value="3"/></p>		<p>Material code <input type="text" value="4"/> <input type="text" value="5"/> <input type="text" value="6"/></p>		<p>Material code <input type="text" value="7"/></p>		

- *1: Confirm that the float can be inserted into the nozzle.
- *2: Can be reduced depending on liquid density and the operation of contacts. Contact us for details.
- *3: The number of floats and stoppers in figures may differ for smaller intervals.
- *4: The test will be carried out at 1.0 MPa for floats with a design pressure from 0.53 to 0.66 MPa.
- *5: Available from 100 mm by special order (see *3)
- *6: Max. length of the guide pipe

Structure	Material			
	SUS	PVC	PP	PFA
Weatherproof (W)	4900	3900	3900	3900
Intrinsically safe (S)	4900	3900	3900	3900
Flameproof (E)	3900			

- *7: Floats come in this size unless another size is specified.
- *8: G1/2 is applied as standard.

FP-4100

The FP-4100 uses a large terminal box which can accommodate up to 12 terminals. Up to 6 points can be used for independent wiring, making the wiring procedure and sequence easy. Weatherproof, intrinsically safe (safety relay required), and flameproof versions are available. With the common return wiring, up to 11 points can be used as alarm contacts (up to 6 points for the flameproof version). Therefore, a single unit can cover multicontrol of liquids or other special purposes such as a liquid level meter.

MODEL CODE

FP-41

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Material	
	Flange Guide pipe Float Stopper
0	SS400 SUS304 SUS316L SUS316
1	SUS304 SUS304 SUS316L SUS316
2	SUS316 SUS316 SUS316L SUS316
3	SUS316L SUS316L SUS316L SUS316L
4	PVC PVC/SUS304 PVC PVC
5	HPVC HPVC/SUS304 HPVC HPVC
6	PP PP/SUS304 PP PP
7	PFA/SUS304 PFA/SUS304 PFA/NBR PTFE
Z	Others

Number of contact output (Up to 11 points are available by special order.)	
1	One point only
2	Independent 2 points
3	Independent 3 points
4	Independent 4 points
5	Independent 5 points
6	Independent 6 points
A	Common return 2 points
B	Common return 3 points
C	Common return 4 points
D	Common return 5 points
E	Common return 6 points
Z	Others

Enclosure	
W	Weatherproof
E	Flameproof
S	Intrinsically safe

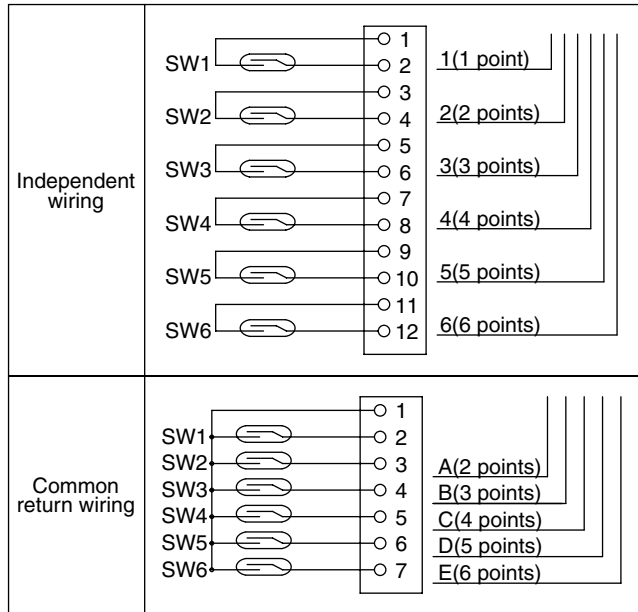
Connection	
0	JIS5K50AFF
1	JIS5K50ARF
2	JIS10K50AFF
3	JIS10K50ARF
4	2BJPI#150RF
5	2"ANSI#150RF
Z	Others

Cable entry	
1	G1/2
2	G1/2 (cable gland provided)
3	G3/4
4	G3/4 (cable gland provided)
Z	Others

Contact capacity	
5	50W
Z	Others

Accessories	
0	Not provided
1	Safety relay
2	RD-1000 relay driver
Z	Others

TERMINAL ARRANGEMENT



RD-1000 RELAY DRIVER

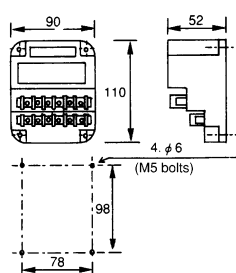
GENERAL

The RD-1000 amplifies the contact capacity of field level switches to directly drive solenoid valves, actuators, buzzer lamps, etc. Its integrated sequence circuit enables automatic loading and pump control by using the upper and lower limit contacts of the FP-4000 series level switch (note that the RD-1000 is not intrinsically safe).

STANDARD SPECIFICATION

Power supply	100 or 200V AC ±10%/60Hz
AMB. Temp	-10 to 50°C
Max. field supply voltage	12V DC
Max. field supply current	3mA DC
Max. contact voltage	250V AC, 125V DC
Max. contact current	5A
Max. contact capacity	1100V AC (Resistance load) 120W DC (Resistance load)
Insulation resistance	100MΩ at 500V DC ohmmeter
Withstand voltage	1500V AC for 1 min
Power consumption	2VA or less

External dimensions



Applications

1. Incrementing the contact capacity
 2. Controlling loading pumps
 3. Controlling unloading pumps
- For details, see the Technical Guidance for RD-1000 Relay Driver [TG-L931].

OUTSIDE DIMENSION

Float details & outside dimensions of body

Material of float		SUS316L		PVC	HPVC	PP	PFA/NBR	
Allowable pressure [MPa]		0.66		0.13		0.2	0.2	
(Standard) Withstand pressure test [MPa]		0.8 *4		0.2		0.3	0.3	
Allowable minimum liquid density [g/cm ³]		0.6	0.78	1.0	0.75	1.0	0.79	1.3
Di- men- sion [mm]	Diameter of guide pipe (d)	13.8		18		22	16	
	Maximum outside diameter of float(D)*1	52	43 *7	42	48 *7	50	68.2	42.6
	Inside diameter of float	15.4		20		25	19	
Height of float (H)		58	50	70		60	100	50
Minimum h1 dimension [mm]		60		90		140		80
Minimum interval (S) [mm]		100	90	120 *5		150		100
Minimum L dimension Lowest end point + X [mm] *2		X=60		X=90		X=140		X=80

Outside drawing *3

- ① Terminal box
- ② Flange
- ③ Guide pipe
- ④ Float
- ⑤ Stopper

Material code 0 1 2 3

Material code 4 5 6

Material code 7

*1: Confirm that the float can be inserted into the nozzle.

*2: Can be reduced depending on liquid density and the operation of contacts. Contact us for details.

*3: The number of floats and stoppers in figures may differ for smaller intervals.

*4: The test will be carried out at 1.0 MPa for floats with a design pressure from 0.53 to 0.66 MPa.

*5: Available from 100 mm by special order (see *3)

*6: Max. length of the guide pipe [mm]

Structure	Material			
	SUS	PVC	PP	PFA
Weatherproof (W)	4900	3900	3900	3900
Intrinsically safe (S)				
Flameproof (E)	3900			

*7: Floats come in this size unless another size is specified.

FP-4200

A single FP-4200 can detect a liquid level at multiple points by using its self-holding reed switches. The minimum point interval is 50 mm. Weatherproof, flame-proof, and intrinsically safe versions are available.

MODEL CODE

FP-42

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Material

	Flange	Guide pipe	Float	Stopper
0	SS400	SUS304	SUS316L	SUS316
1	SUS304	SUS304	SUS316L	SUS316
2	SUS316	SUS316	SUS316L	SUS316
3	SUS316L	SUS316L	SUS316L	SUS316L
4	PVC	PVC/SUS304	PVC	PVC
5	HPVC	HPVC/SUS304	HPVC	HPVC
6	PP	PP/SUS304	PP	PP
8	PFA/SUS304	PFA/SUS304	PFA/NBR	PTFE
Z	Others			

Number of contact output (Up to 11 points are available by special order.)

1	One point only
2	Independent 2 points
3	Independent 3 points
4	Independent 4 points
5	Independent 5 points
6	Independent 6 points
A	Common return 2 points
B	Common return 3 points
C	Common return 4 points
D	Common return 5 points
E	Common return 6 points
Z	Others

Enclosure

W	Weatherproof
E	Flameproof
S	Intrinsically safe

Connection

A	JIS5K80AFF
B	JIS5K80ARF
C	JIS10K80AFF
D	JIS10K80ARF
E	3BJP#150RF
F	3"ANSI#150RF
Z	Others

Cable entry

1	G1/2
2	G1/2 (cable gland provided)
3	G3/4
4	G3/4 (cable gland provided)
Z	Others

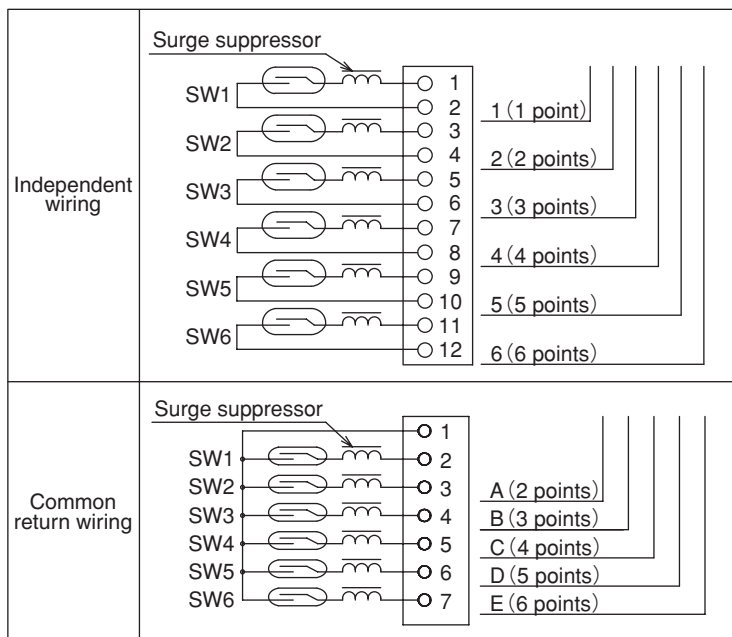
Contact capacity

1	10W
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Accessories

0	Not provided
1	Safety relay
2	RD-1000 relay driver
Z	Others

TERMINAL ARRANGEMENT



OUTSIDE DIMENSION

Float details & outside dimensions of body

Material of float		SUS316L	PVC	HPVC	PP	PFA/NBR
Allowable pressure [MPa]		0.13	0.13		0.13	0.13
(Standard) Withstand pressure test [MPa]		0.2	0.2		0.2	0.2
Allowable minimum liquid density [g/cm ³]		0.7	0.8		0.8	0.9
Dimension [mm]	Diameter of guide pipe (d)	21.7	26		27	25
	Maximum outside diameter of float(D)*1	75	70		70	68.2
	Inside diameter of float	24	29		29	27.7
	Height of float (H)	70	100		100	100
Minimum h1 dimension [mm]		100	150		150	150
Minimum interval (S) [mm]		50	50		50	50
Minimum L dimension Lowest end point + X [mm] *2		X = 100	X = 150		X = 150	
Outside drawing ① Terminal box ② Flange ③ Guide pipe ④ Float ⑤ Stopper		<p>Material code 0 1 2 3</p>	<p>Material code 4 5 6</p>	<p>Material code 8</p>		

*1: Confirm that the float can be inserted into the nozzle.

*2: Can be reduced depending on liquid density and the operation of contacts. Contact us for details.

*3: Max. length of the guide pipe [mm]

Structure	Material			
	SUS	PVC	PP	PFA
Weatherproof (W)	4900	3900	3900	3900
Intrinsically safe (S)				
Flameproof (E)	3900			

* Specification is subject to change without notice.

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