



TECHNICAL GUIDANCE

FOR MULTIPOINT LEVEL ALARM DETECTION BY ONE UNIT

FP-4000 Series

FLOAT LEVEL SWITCH

GENERAL

FP-4000 series are float level switch which are installed through tank nozzle at tanks and/or pits.

Maximum 11 points level alarm detection is possible. They can be used for control of loading/unloading pumps as well as monitoring of High-high and Low-low level alarm by one unit to save total instrumentation cost.

In addition to standard material of stainless steel, PVC, HPVC, PP and ETFE lined material are ready for control of chemicals and highly corrosive liquids. Flame proof and intrinsically safe versions are available for use in hazardous area.

MAIN APPLICATIONS

- For prevention of over-flow and over-suction at various tanks.
- For automatic control of loading/unloading pumps.
- For monitoring of liquid level in under-ground tanks/pits.

STANDARD SPECIFICATION

Measuring objects : Entire liquids (ibut the density is to be less than 600 mPa.s. and there is no sticking tendency.) It is not suitable to use under such operating conditions as the liquid freezes, congeals or sticks

Minimum Sp. Gr. :

Model	Float material	Material code	Min. Density (g/cm ³)
FP-4000, FP-4100	Refer to details about float for Model FP-4000 and FP-4100.		
FP-4200	SUS316L	[0] [1] [2] [3]	0.7
	PVC,H PVC	[4] [5]	0.8
	PP	[6]	0.8
	ETFE/SUS304	[7]	1.0
	PFA/SUS304	[8]	0.9

Liquid temp. :

a. Model FP-4000 and FP-4100

Wetting part material	Material code	Liquid temp. range
SUS304,316,316L	[0] [1] [2]	-5 to 100°C or less (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

Wetting 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
ETFE/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 Refer to details about floats.
Model FP-4200 0.13MPa (Test press. 0.2MPa)

Connection :

Model FP-4000 and FP-4100 2"(50mm)flange. PFA: 80A (3B)
Model FP-4200 3"(80mm)flange
{4"(100mm)flange for ETFE lined float (Material code [7])}

Max length of guide pipe :

Refer to it for each model.

Enclosure :

Model FP-4000 Weather proof or Intrinsically safe (Safety relay to be separately provided)
Model FP-4100 and FP-4200 Weather proof, Flame proof* or Intrinsically safe (Safety relay to be separately provided)

Protection code :

Equiv. to IP65



FP-4000

FP-4100

FP-4200

*Class : ExdIIBT6 (RIIS, Japan)
Model FP-4100 TC14695~7
Model FP-4200 TC14698~700

Alarm contract : Reed switch, NO or NC

Contact operation : Designate either Going-up "ON" or Going-down "ON" for each contact point.

Contact capacity :

Model FP-4000 and FP-4100 50W
Max. switching voltage AC220V, DC110V
Max. switching current 0.7A
Model FP-4200 AC/DC 10W (Protection varistor provided)
Max. switching voltage 100V AC/DC
Max. switching current 0.5A
Surge suppressor to protect "contact" provided, but excluding flame-proof type

Model FP-4200 (IS version is excluded.)

Repeatability : Within ±5mm

Reset span : Less than 10mm

No. of alarm point :

Model Wiring	FP-4000	FP-4100	FP-4200
Independent	3	6	6
Commonreturn	5	11 ^{**}	N. A.

* Special order

Cable entry : Model FP-4000 G1/2(ISO)

Model FP-4100 and Model FP-4200 G1/2 or G3/4(ISO)

Pressure tight cable glands are available on request for Hazardous area application. The following types of cable glands are to be used by order of ex-proof regulation :

For G1/2 thread : Type SXC 16B, Shimada Electric. (Suitable cable OD 7~12mm)

For G3/4 thread : Type SXC22B, Shimada Electric. (Suitable cable OD 12.1~16mm)

Cable termination :

Model FP-4000 M4 screw
Model FP-4100 and FP-4200 M3.5 screw

Finish : Aluminum part Silver
Stainless steel No paint

FP-4000

FP-4000 is proud of its cost performance thanks to reasonable compact design.

Water tight and Intrinsically versions are available. (Refer to Model FP-4100 and FP-4200 in case pressure tight explosion proof is required.)

MODEL CODE

FP-40

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Material construction

	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

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

Enclosure

W	Weather proof
S	Intrinsically safe

Connection

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

Cable entry

1	G1/2
2	G1/2 (Cable gland provided)
Z	Others

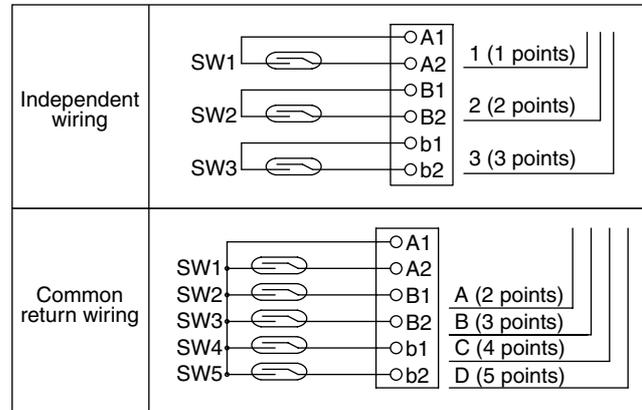
Contact capacity

5	Standard (50W)
Z	Others

Accessories

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

TERMINAL ARRANGEMENT



INTRINSICALLY SAFE RELAY (TYPE: EB3C)

In case of orders based on intrinsically safe version (Code S), intrinsically safe relay unit as shown in the table will be optionally provided on request. Specify the power supply voltage (AC 100/110V or AC200/220V).

Standard specifications

Type of protection	Intrinsic safety
Objective gas	Ex ia IIC
Intrinsic safety rated voltage	DC12V+/-10%
Intrinsic safety rated current	DC10A+/-20%
Place to be installed	Non-hazardous area
Contact configuration	1a contact
Relay output (Resistance load)	AC250V 3A
	DC24V 3A
Contact permissible power (Resistance load)	DC750VA
	DC72W
Insulation resistance	10MΩ at DC500V Mega
Withstand voltage	AV1500V, 1 minute

Model code			Contents
EB3C-	R	<input type="checkbox"/> <input type="checkbox"/>	Model name
Output type	R		Relay output
Number of point		01	For 1 point
		02	For 2 points
		03	For 3 points
Supply voltage		A	AC100 to 240V, 50/60Hz
		D	DC24V

OUTSIDE DIMENSION

Float details & outside dimension of body

Material of float		SUS316L		PVC	HPVC	PP	PFA/NBR	
Available pressure [MPa]		0.66		0.13		0.2	0.2	
(Standard) Withstand pressure test [MPa]		0.8 *4		0.2		0.3	0.3	
Available minimum liquid density [g/cm ³]		0.6	0.78	1.0	0.75	1.0	0.79	1.3
Dimension [mm]	Diameter of guide pipe (d)	13.8		18		22	16	
	Maximum diameter of float(D) *1	52	43	42	48	50	68.2	42.6
	Height of float (H)	58	50	70		60	100	50
Minimum setting interval (S) [mm]		100	90	120 *5			150	100
L dimension (shortest)		X=60		X=90			X=140	X=80
Lowest end setting 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 0 1 2 3</p>
	<p>Material code 4 5 6</p>
	<p>Material code 7</p>

*1: Confirm if it can be inserted to installation nozzle.

*2: It can be reduced depending on liquid density and contact operation. Contact factory for details.

*3: In case of smaller setting interval, the number of float and stopper may be different from figures.

*4: Carry out by 1.0MPa in case of design pressure from 0.53 to 0.66MPa.

*5: Available from 100mm on a special order. (Refer to *3.)

*6: Max length of guide pipe [mm]

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

FP-4100

FP-4100 adopts large sized terminal box in which maximum 12P terminal can be provided. Independent wiring is possible for maximum 6 points contact so that the wiring procedure as well as the creation of wired sequence circuit are easy. Water tight, Intrinsically safe (Safety relay to be separately provided) as well as Flame proof versions is ready to meet the area classification.

In case of common return wiring, maximum 11 points detection (Max. 6points for Flame proof version) by one unit is possible for multiple control of liquid or for simplified liquid level transmission.

MODEL CODE

FP-41

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Material construction				
	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	
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

*Possible to make it up to 11 points as special order. Contact factory for details.

Enclosure	
W	Weather proof
E	Flame proof
S	Intrinsically safe

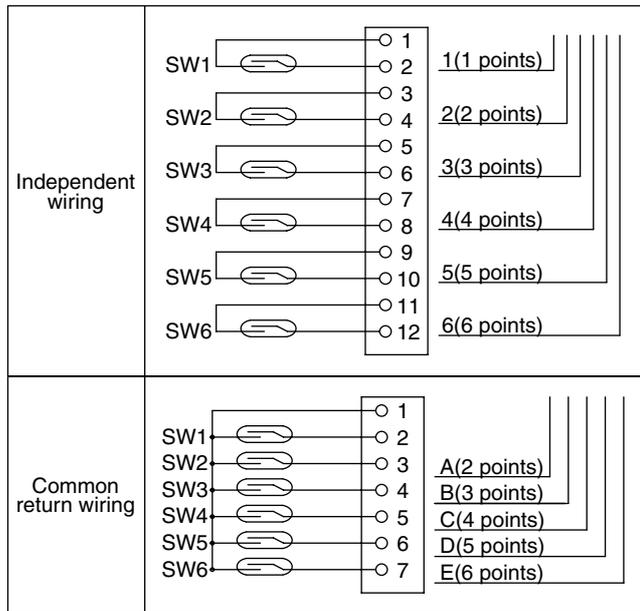
Connection	
0	JIS5K50AFF
1	JIS5K50ARF
2	JIS10K50AFF
3	JIS10K50ARF
4	2BJP#150RF
5	2"ANSI#150RF
Z	Others

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

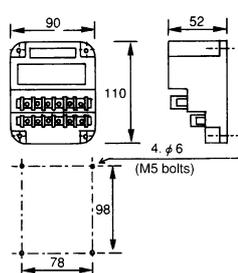
RD-1000 amplifies the contact capacity of field level switches to directly drive solenoid valves, actuators, buzzer lamps etc..

Also, the integrated sequence circuit enables automatic loading and pump control by using upper and lower limit contact of FP-4000 series level switch. (RD-1000 is not an Intrinsically safe relay.)

STANDARD SPECIFICATION

Power supply	AC100 or AC200+/-10%/50/60Hz
AMB. Temp	-10~50°C
Max. field supply voltage	DC12V
Max. field supply current	DC3mA
Max. contact voltage	AC250V,DC125V
Max. contact current	5A
Max. contact capacity	AC1100VA (Resistance load) DC120W (Resistance load)
Insulation resistance	100M with DC500V Mega
Voltage resistivity	AC1500V per Minute
Power consumption	Max. 2VA

External dimensions



Application

- ① Contact protection/Capacity increment
 - ② Loading pump control
 - ③ Unloading pump control
- Refer to separate TECHNICAL GUIDANCE of RD-1000 RELAY DRIVER [TG-L931] for further details.

OUTSIDE DIMENSION

Float details & outside dimension of body

Material of float		SUS316L		PVC	HPVC	PP	PFA/NBR	
Available pressure [MPa]		0.66		0.13		0.2	0.2	
(Standard) Withstand pressure test [MPa]		0.8 *4		0.2		0.3	0.3	
Available minimum liquid density [g/cm ³]		0.6	0.78	1.0	0.75	1.0	0.79	1.3
Dimension [mm]	Diameter of guide pipe (d)	13.8		18		22	16	
	Maximum diameter of float(D) *1	52	43	42	48	50	68.2	42.6
	Height of float (H)	58	50	70		60	100	50
Minimum setting interval (S) [mm]		100	90	120 *5			150	100
L dimension (shortest)		X=60		X=90			X=140	X=80
Lowest end setting 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 0 1 2 3</p>		<p>Material code 4 5 6</p>		<p>Material code 7</p>		

- *1: Confirm if it can be inserted to installation nozzle.
- *2: It can be reduced depending on liquid density and contact operation. Contact factory for details.
- *3: In case of smaller setting interval, the number of float and stopper may be different from figures.
- *4: Performing at 1.0MPa in case design pressure from 0.53 to 0.66MPa.
- *5: Available from 100mm as special order. (Refer to *3.)
- *6: Max length of guide pipe [mm]

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

FP-4200

FP-4200 detects multi-point liquid level by one float by using self-holding type reed switches.
Water tight, Pressure tight explosion proof as well as Intrinsically safe versions are available.

MODEL CODE

EXTERNAL DIMENSIONS

FP-42

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	ETFE/SUS304	ETFE/SUS304	ETFE/SUS304	PTFE
8	PFA/SUS304	PFA/SUS304	PFA/NBR	PTFE
Z	Others			

Material construction

Flange	Guide pipe	Float	Stopper
SS400	SUS304	SUS316L	SUS316
SUS304	SUS304	SUS316L	SUS316
SUS316	SUS316	SUS316L	SUS316
SUS316L	SUS316L	SUS316L	SUS316L
PVC	PVC/SUS304	PVC	PVC
HPVC	HPVC/SUS304	HPVC	HPVC
PP	PP/SUS304	PP	PP
ETFE/SUS304	ETFE/SUS304	ETFE/SUS304	PTFE
PFA/SUS304	PFA/SUS304	PFA/NBR	PTFE
Others			

Number of contact output

1	One point only
2	Independent 2 points
3	Independent 3 points
4	Independent 4 points
5	Independent 5 points
6	Independent 6 points
Z	Others

Enclosure

W	Weather proof
E	Flame proof
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

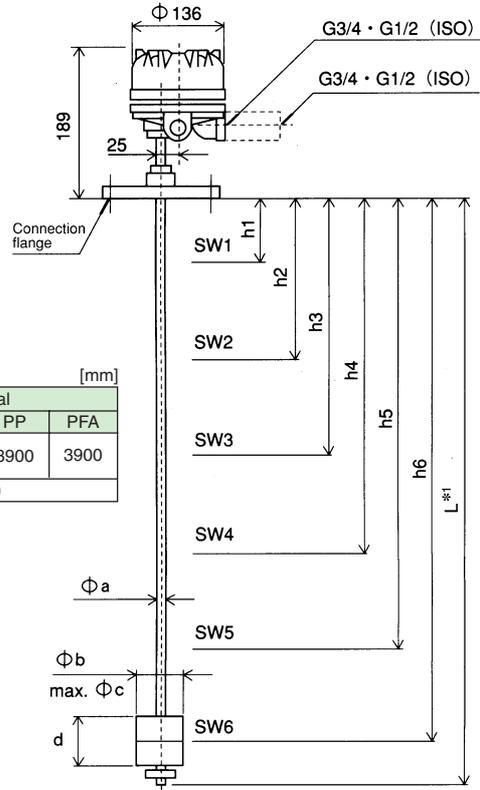
1	Standard (10W)
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Accessories

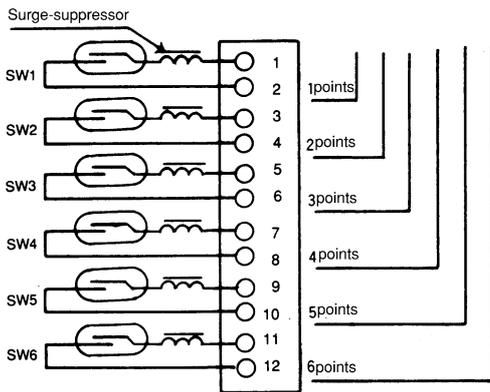
0	Not provided
1	Safety relay
2	RD-1000 relay driver
Z	Others

*1: Max length of guide pipe [mm]

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



TERMINAL ARRANGEMENT



FLOAT MATERIAL	MATERIAL CODE	DIMENSION				L dimension (Shortest)	Minimum setting interval
		φ a	φ b	φ c ※	d		
SUS316L	0 1	21.7	70	75	70	Lowest end setting point + 100mm	50mm
	2						
	3						
PVC	4	26	70	—	100	Lowest end setting point + 150mm	
H PVC	5						
PP	6	27	70	—	100		
ETFE/SUS304	7	28.8	76	—	122		
PFA	8	25	68.2	—	100		

※ φ indicates maximum diameter of welded part.

* Specification is subject to change without notice.

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