

RADIO FREQUENCY LEVEL SENSOR

# SRF - Series

Installation Manual



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# Installation Manual

## SRF-Series

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## 1. Introduction

SRF-type works on the radio frequency / capacitance principle. SRF-type can compensate for build-up by more probe than other capacitance product.

## 2. Features

- ① High-temperature type
- ② Selection time-delay for output.
- ③ Easy installation & control
- ④ High/Low Alarm selection
- ⑤ Compensation for Build-Up
- ⑥ Self operation test
- ⑦ Use Ash storage tank, precipitator hopper in power plant required high reliability.

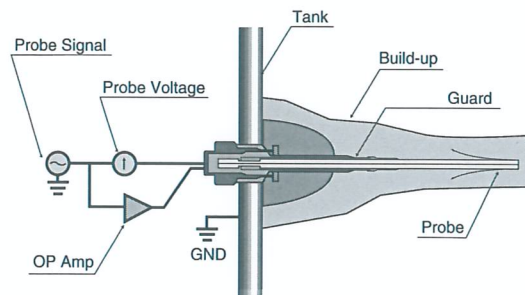


Fig. 1

SRF Type has the compensation function for 'Build-up'. In case material builded up between the tank wall and sensor, general capacitance sensor consisted of ground and one electrode cause malfunction. Radio Frequency Type Level Sensor can compensate capacitance by Build-Up by adding on more electrode (Guard). In the figure above, SRF type send frequency signal to probe and send opposite phase frequency signal to Guard weakly.

If material build-up on the wall and probe, weak signal emitting at the probe by opposite phase Guard's signal is offsetted.

If material stack to probe continually, it sense material by growing signal from probe to the wall.

## 3. Specification

DESCRIPTION		SRF-600 Series	SRF-900 Series	RF-600-10U
TYPE		Radio Frequency Level Sensor		Level Controller
POWER SUPPLY		24V DC(16 ~ 30V DC), 2-Wire	220V AC, 60Hz	220V AC, 60Hz
SIGNAL	NON DETECTION	DC 9 ~ 11mA	1 DPDT, 250V AC, 5A	INPUT : 4 ~ 19mA
	DETECTION	DC 18 ~ 21mA		INPUT : 16 ~ 21mA
CONTACT		-		1 DPDT, 250V AC, 5A
SENSITIVITY RANGE		5 ~ 30pF		-
DELAY TIME		0.5, 2, 4, 6 sec.		0.5 ~ 15 sec.
PROBE MATERIAL		304SS, 316SS & PTFE (Kynar®) Coating		-
MOUNTING		PT 1", PT 1 1/2", JIS 10K 65A Flange(General), JIS 10K 50A (High Temp. Type)		Rack Mount (DIN 19")
FUNCTION		Selectable H/L Alarm, Operating Test Switch, Sensitivity Adjustment		10 Point Detection
CABLE DISTANCE		Head & Probe Separation Distance 6m Max.		2,000m
LATERAL LOAD		10kgf		-

Process Condition (SRF-600 Series, SRF-900 Series)				
TEMPERATURE	-20 ~ +60℃	-20 ~ +240℃	-20 ~ +300℃	-20 ~ +500℃
PRESSURE	20kg/cm <sup>2</sup>		10kg/cm <sup>2</sup>	1.2kg/cm <sup>2</sup>
PROBE MATERIAL	PPS		Peek-30GF®	Ceramic
INSULATOR MATERIAL	304SS, 316SS			

Table 1

### 4. Installation

#### 4.1 Side(Horizontal) Installation

- ① If material has adhesion or high cohesion, install with 45 degree tilt based on the vessel side. (Material contact and foreign substance stacking of protection guard cause malfunction)
- ② When material insert, you should install where instrument doesn't affect.  
Insert place of material change installation place or install protection guard over 300~500mm from probe for damage probe and cause malfunction.
- ③ If tank has nozzle, compensation electrode place over more 100mm from nozzle inside vessel.

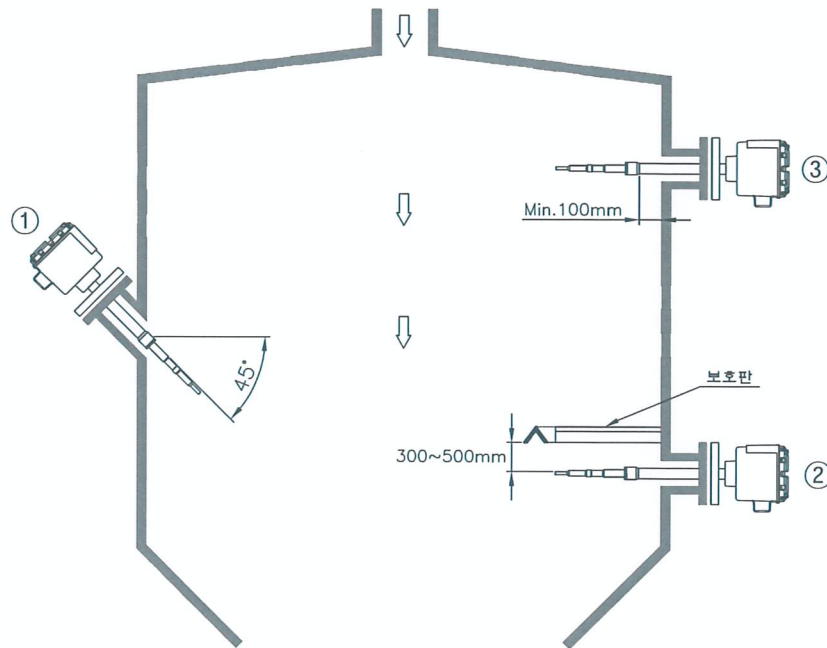


Fig. 2

- ④ Install where sensing stacking and lowering.
  - ▷ In install High Level, consider angle of repose.
  - ▷ In install Low Level, be careful about Dead Stock, Material Bridge.

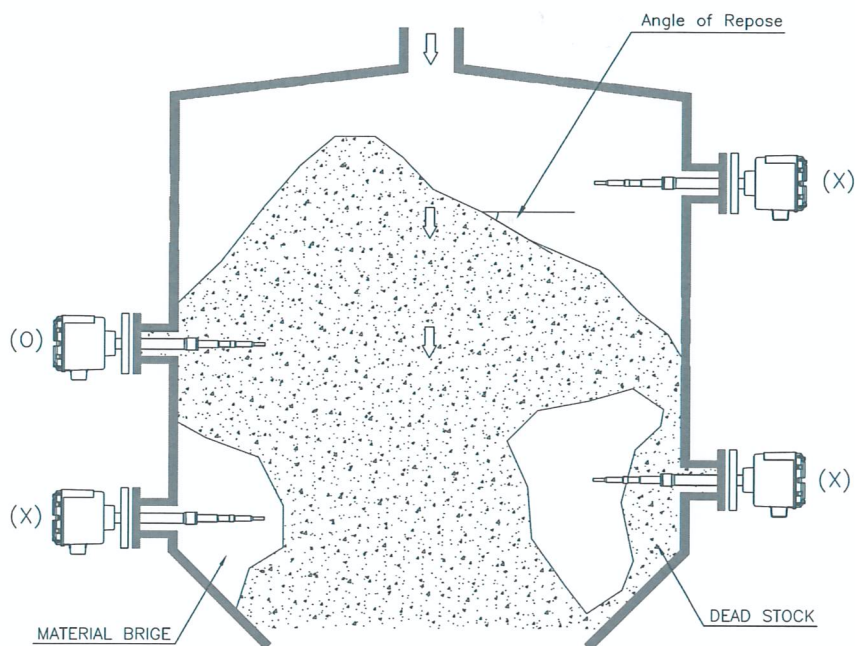


Fig. 3



### 4.2 Top(Vertical) Installation

- ① If tank has nozzle, compensation electrode place over more 100mm from nozzle inside vessel.
- ② Probe should install over more than 500mm from the side of vessel.
- ③ In case of over more than 2000mm probe, install a lower fixing bracket.
- ④ In case of installing probe, you should avoid side of material entrance.

In case of install probe to side of material entrance unavoidably, install probe 1000mm away from material entrance at least or install protection guard.

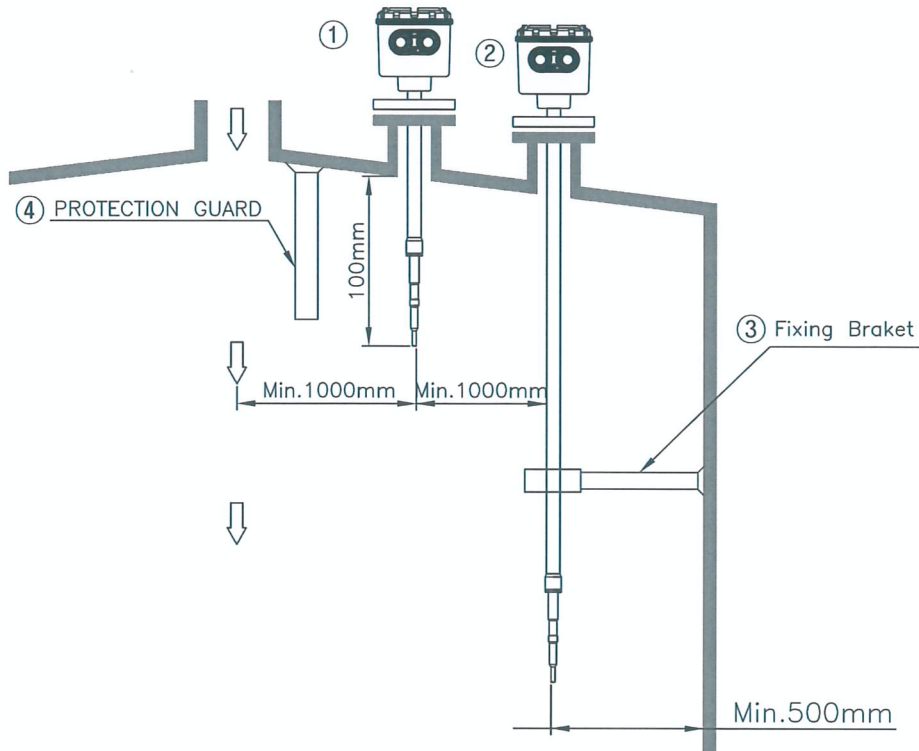


Fig. 4

### 4.3 Before Installing Check List

- ① When you installing, be careful about snow, rain. After loose Housing Fixing Bolt, tight bolt toward under direction wiring hole of head.
- ② Probe should doesn't contact protection guard and the wall in the tank.
- ③ Check temperature and pressure in tank.
- ④ In outdoor environment, avoid direct light(If you must install outdoor environment, you should install sun-light cover.)
- ⑤ In case of low relative permittivity(below 5pF), contact us for be widen diameter or surface area of probe. (Refer accessories special probe)
- ⑥ In case of weight loaded side mounted probe heavy than specification, you should install Guard.

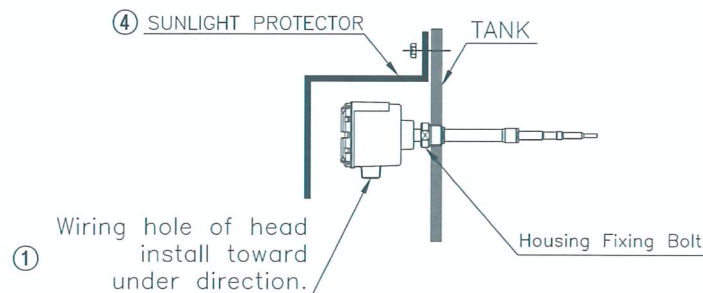
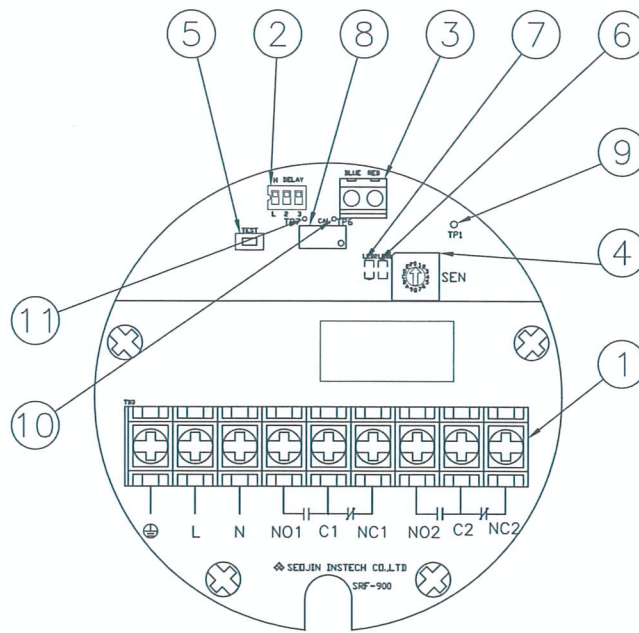


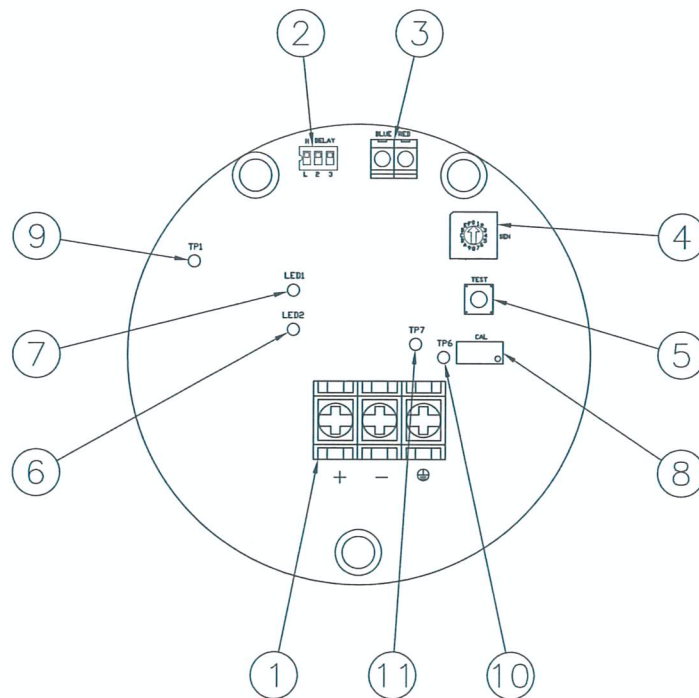
Fig. 5

### 5. Configuration



**SRF-900**

Fig. 6



**SRF-600**

Fig. 7

- |   |  |
|---|--|
| ① Power & Output port                                   | ② H/L Alarm & select switch of output delay-time |
| ③ Probe connection port                                 | ④ Digital switch for sensitivity control         |
| ⑤ Test switch   | ⑥ Output status LED, Red                         |
| ⑦ Power(SRF-600) & material sensing(SRF-900) LED, Green | ⑧ Variable resistance for sensitivity control    |
| ⑨ TP1   | ⑩ TP6  |
| ⑪ TP7   |  |

### 5.1 Configuration sensitivity

#### 5.1.1 Before configure sensitivity

- ▷ In case of probe install at tank first time, configure when it malfunctioning.
- ▷ You should configure sensitivity under mounting level sensor in tank.
- ▷ Empty out tank as far as possible (Material is below 300mm than probe.)

#### 5.1.2 In case of configure sensitivity, initialization sensor



- ②-Switch1 of H/L alarm select switch configure to H(to downward).
- ②-Switch 2, 3 of Delay Time configure 0.5 second(to downward two of both).



- ④-Configure digital switch for sensitivity control to "0" (for small size "—" driver)



- ⑧-Turn variable resistance for sensitivity control clockwise to maximum.(Turn 20 times clockwise because 20 times rotation type) or turn slowly to buzzer.

#### 5.1.3 How to configure sensitivity

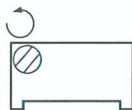


- Turn ④-Digital switch for sensitivity control to light (red) ⑦-output status LED(red) clockwise slowly.



- After ⑦-output status LED is lighted, turn ⑧-variable resistance for sensitivity control counterclockwise slowly until turn off ⑦-output status LED.

This status is primary setting. From here, follow the below final sensitivity configuration.

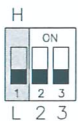


High sensitivity : counterclockwise 1 ~ 2 times  
 Mid sensitivity : counterclockwise 4 ~ 5 times  
 Low sensitivity : counterclockwise 7 ~ 8 times

\* Notice : The more turn counterclockwise, the more configure low sensitivity.

### 5.2 Configuration movement (After primary configuration sensitivity)

#### 5.2.1 Configuration High/Low Alarm (② - 1)

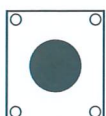


- Select Low Alarm : Situate select switch of H/L Alarm at "L".
- Select High Alarm : Situate select switch of H/L Alarm at "H".

#### 5.2.2 Configuration High/Low Alarm (② - 2, 3)

Delay time(sec)	0.5	2	4	6
Select Dip Switch				

### 5.3 Function Test



- Function test can do in situation not contacted material to probe.
- If you push ⑤-test switch, generate capacitance in probe as though material contact probe.
- And output with it show following choice.

## 6. Wiring

### 6.1 SRF-600 Series

#### 6.1.1 General Wiring

##### ① Electric Current Alarm

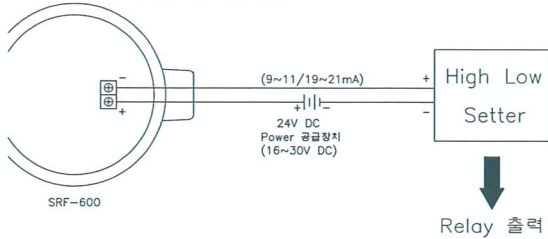


Fig. 8

##### ② RF-600-10U Remote Unit (10 Point Type)

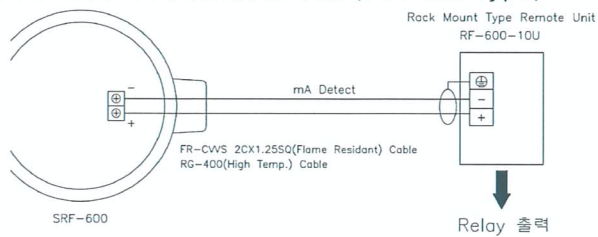


Fig. 9

#### 6.1.2 Intrinsic safety explosion proof wiring

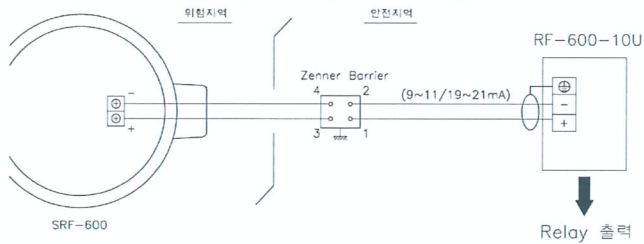


Fig. 10

### 6.2 SRF-900 Series

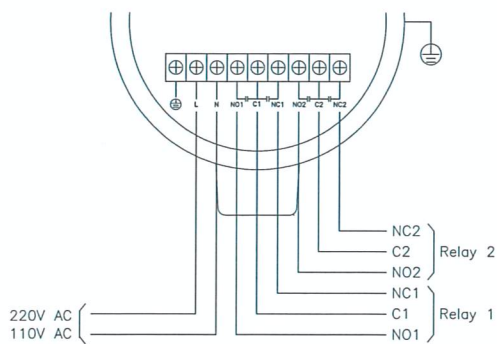


Fig. 11

#### 6.3 Head & Probe Separation Type Wiring

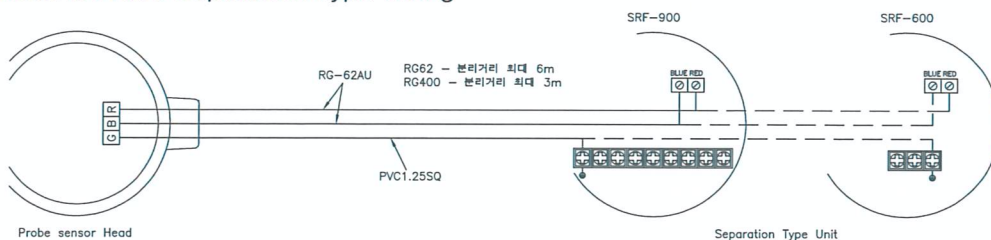


Fig. 12



## 7. Troubleshooting

- ① SRF-600 Series
  - ▷ Check the power line (24V DC)
  - ▷ Check the short of fuse (250V AC, 50mA)
- ② SRF-900 Series
  - ▷ Check the power line (220V AC) < Power 110V is option >
  - ▷ Check the Wiring of outside instrument about relay output.
- ③ In case of doesn't sense changing height of material (SRF-600, 900 Series)
  - ▷ Reconfiguration sensitivity. (Refer 5.1)
  - ▷ Check output change when alarm select switch change.
  - ▷ Check effect by mounting place (Check effect by Angle of repose, Dead stock, Material Bridge)
- ④ Clean tank and move mounted place when it affect by material (Changing Environment, Corrosion, Fixity, Short, etc.), Build-up and probe affected by contact of protection guard or tank.
- ⑤ Check relay contact output (Check contact display – LED – (red) On, Off).

## 8. Precaution

- ① Check correct contact to power port.
- ② In case of transporting, be careful about damage of sensor and circuit.
- ③ Don't operate inside switch or variable resistance arbitrarily.
- ④ Don't disassemble sensor part.
- ⑤ Be careful about insert the moisture and the dust in the probe. (Permittivity affect by the moisture.)

### 9. SRF-600, 900 Outline Dimension

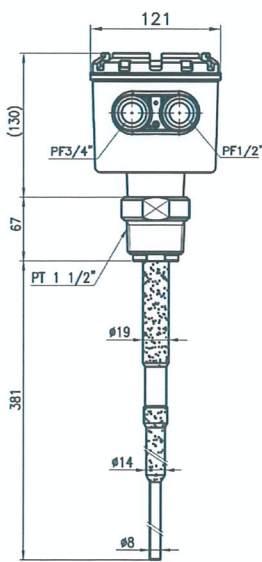
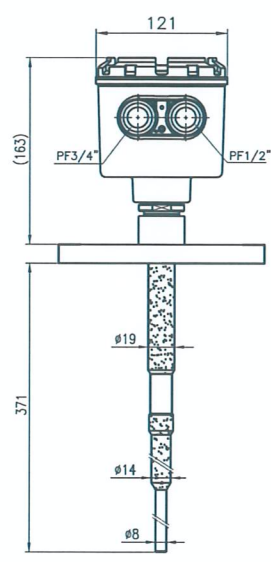
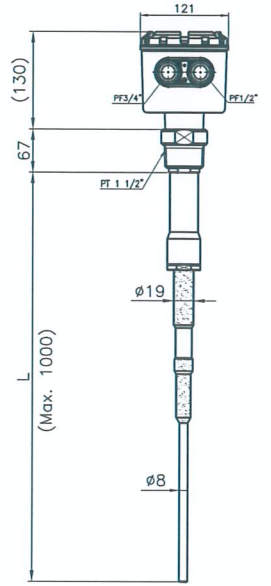
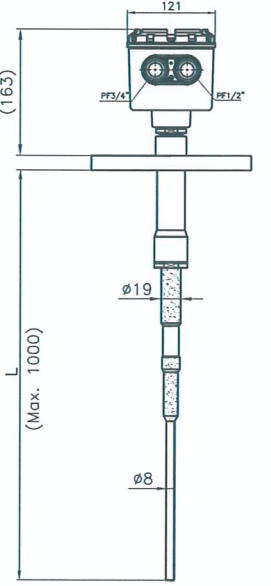
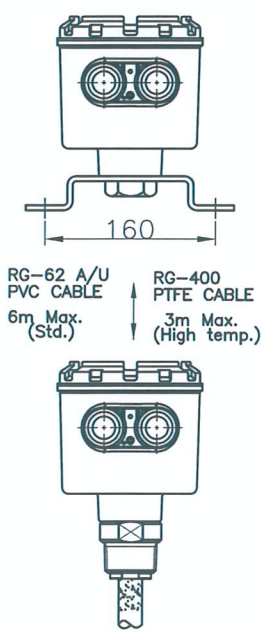
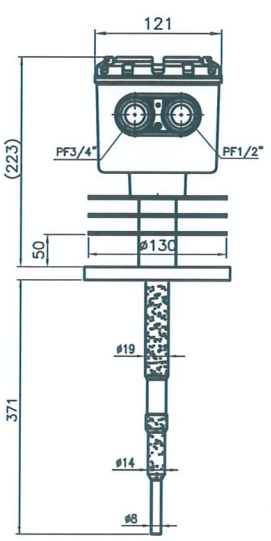
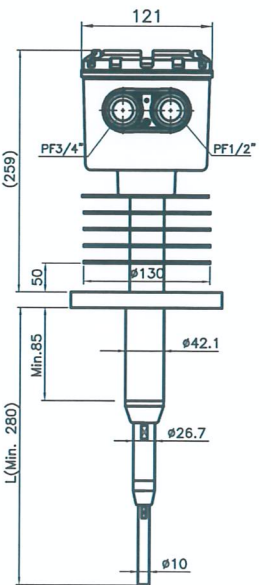
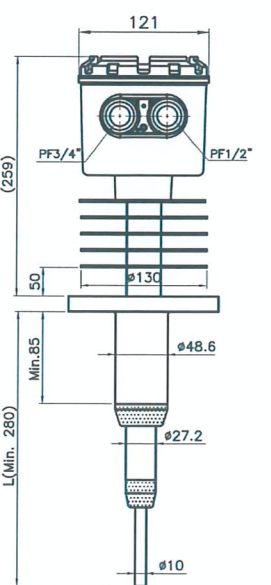
Nipple	Flange	Nipple Extension Type	Flange Extension Type
			
Head & Probe Separation	High Temperature		
	PPS – 240℃ Max	Peek-30GF® – 300℃ Max	Ceramic – 500℃ Max
			

Table 3

# Installation Manual

## SRF-Series

Head & Probe Separation Type

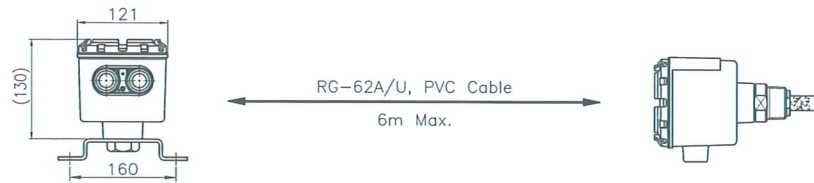
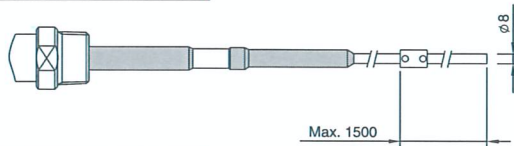


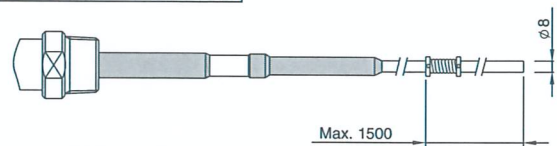
Table 4

### ▷ Accessories Special Probe

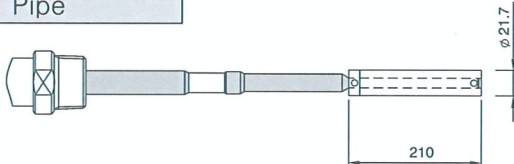
Extension



Spring Extension



Pipe



Tear Drop

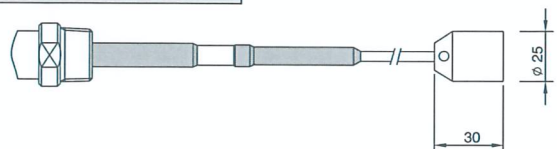


Table 5

## 10. RF-600-10U Outline Dimension

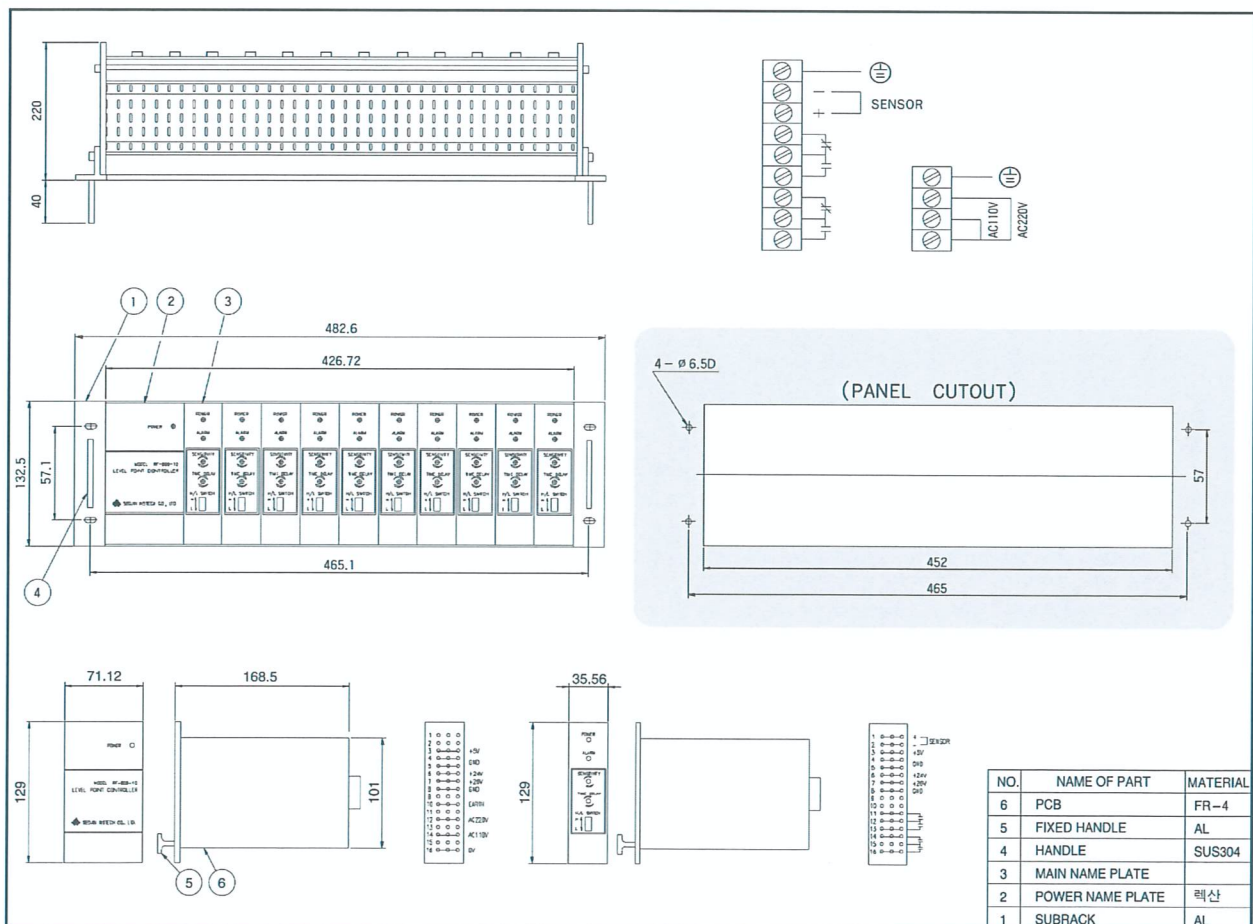


Table 6

### 11. Order Information

#### ■ Radio Frequency Type Level Switch

SRF -	900	A	1	A	1	A	1
-------	-----	---	---	---	---	---	---

#### MATERIAL OF DETECTION PROBE

- 1 = 304SS
- 2 = 316SS

#### CONDUIT CONNECTION

- A = PF 1/2" (Std.)
- B = PT 1/2"
- C = PF 3/4" Explosion proof type
- D = PT 3/4"
- E = etc.

#### ENCLOSURE

- 1 = Weather proof (Std.)
- 2 = Explosion proof (Ex d IIC T6, IP65)

#### PROBE LENGTH

- A = 381mm (Nipple Type Std.)
- B = 371mm (Flange Type Std.)
- C = 372 ~ 1000mm
- D = etc.

#### MOUNTING SIZE

- 1 = PT 1" (Std.)
- 2 = PT 1 1/2" (Extension Type Only)
- 3 = JIS 5K 65A FF Flange
- 4 = etc.

#### OPERATING TEMPERATURE & MATERIALS

- A = -20 ~ +60°C PPS (Std.)
- B = -20 ~ +240°C PPS
- C = -20 ~ +500°C Ceramic
- D = -20 ~ +300°C PEEK-30GF
- ※ C & D Type Mounting size is above 2" Only

#### POWER SUPPLY

- 600 = 16 ~ 30V DC (2-Wire Type)
- 600SS = 16 ~ 30V DC (Head & Probe Separation Type)
- 900 = 110/220V AC
- 900SS = 110/220V AC (Head & Probe Separation Type)