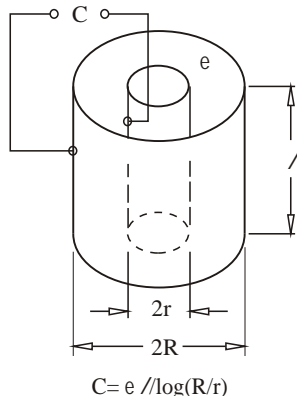


## ■ PRINCIPLE

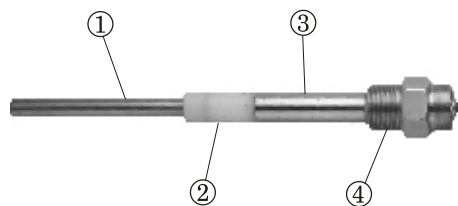
The capacitance level switch measuring principle is based on the "capacitance effects". When this level switch is set on a silo, it will form a condenser between the detector electrode and the silo wall. The capacitance of this condenser varies proportional to the change of material specific inductivity (DK value) of the material stored in the silo. When the material substances increased in the silo, the capacitance value added simultaneously, then it will let his interior circuit's resonant signal to create a bigger amplitude, and such a signal amplitude become more or less than factory default threshold value, the relay device will be energized.

The capacitance value increases as the dielectric increases. Therefore capacitance is proportional to dielectric.

When tank is empty, the dielectric of air is 1. As a tank is filled with medium, the amount of capacitance being generated will be increased. This capacitance increase will be detected by the circuit and relay will be activated.



## ■ CONSTRUCTION

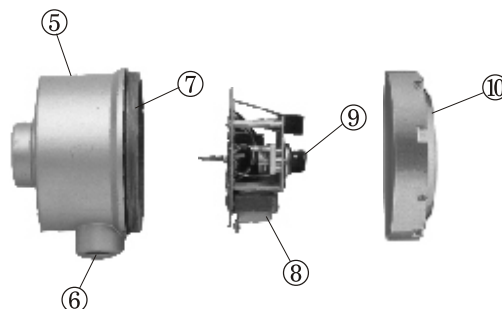


1. **Probe** : SUS304 or SUS316
2. **Insulation** : UPE or PTFE
3. **Grounding Sleeve** : SUS304 or SUS316
4. **Connection** : SUS304 or SUS316  
1"PT (default) or 3/4"PT(option)

## ■ FEATURES AND APPLICATIONS

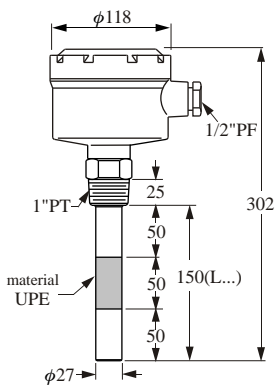
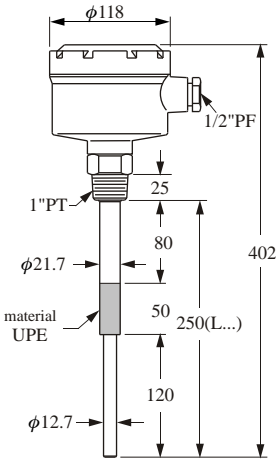
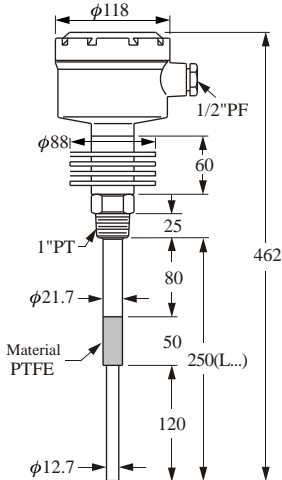
As Capacitance Level Switch has no moving parts inside the device, it will not be affected by friction. It is suitable for powder or liquid application easy to install. The customer can choose the types for his requirements.

1. **Standard Type (SA110 & SA111 A/B/C)**  
Suitable for general use.
2. **Hi-Temp Type (SA120 & SA128 A/B/C)**  
Suitable for high temperature environment.
3. **Anti-Corrosion Type (SA130 & SA132 A/B/C)**  
Suitable for corrosive environment.
4. **Remote Probe Type (SA140 A/B/C)**  
For use with vibrator equipped with tank.
5. **Wire-Probe Type (SA150 A/B/C)**  
Suitable for silo or deeper tank.
6. **Plate-Probe Type (SA160 A/B/C)**  
Suitable for granules and at lower position of tank side.
7. **Explosion-Proof Type (SA270 ~ SA279)**  
Ex dia II C T4~T6, DIP A21 T<sub>A</sub>, T3~T6
8. **Explosion-Proof Type (SA370 ~ SA378)**  
Ex ia IIC T3~T6  
Equipped with SA-75U signal conditioner can be used in hazardous areas.
9. **Anti-Static Type (SA180 & SA181 A/B/C)**  
Suitable for electrostatic environment  
(It won't be damaged by the electrostatic discharge)



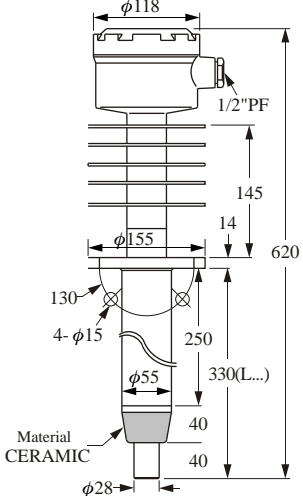
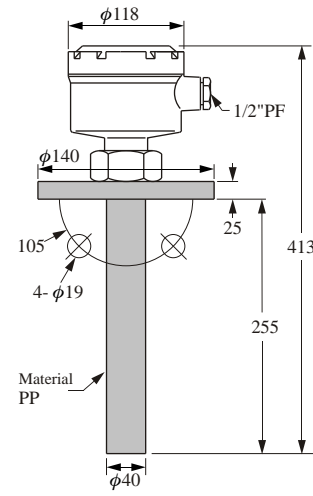
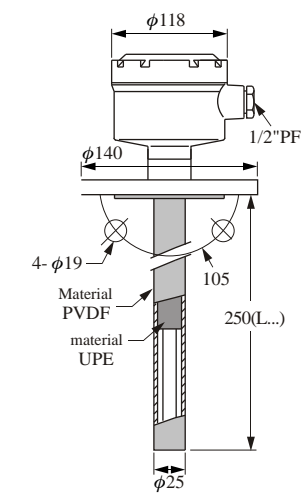
5. **Housing** : ADC-12 Aluminum IP65
6. **Conduit opening** : 1/2"PF or 3/4"PF
7. **O-RING** : NBR
8. **PC board** : A, B, C, D Type
9. **Sensitivity adjustment** : 10pf (std.), 20pf, 40pf
10. **Cover** : ADC-12 Aluminum

# STANDARD TYPE

Dimension			
Order No.	[ STANDARD TYPE ] SA110 A/B/C	[ STANDARD TYPE ] SA111A/B/C	[ HI-TEMP. TYPE ] SA120 A/B/C
Ambient Temp.	-20°C~60°C	-20°C~60°C	-20°C~60°C
Operating Temp.	-20°C~80°C	-20°C~80°C	-20°C~200°C
Operation Pressure	20kg/cm <sup>2</sup>	20kg/cm <sup>2</sup>	20kg/cm <sup>2</sup>
Probe Material	SUS 304/316	SUS 304/316	SUS 304/316
Insulated Material	UPE	UPE	PTFE
Connection	1"PT Screw (SUS)	1"PT Screw (SUS)	1"PT Screw (SUS)
Sensitivity Range	10pf (std.) 20pf, 40pf (option)	10pf (std.) 20pf, 40pf (option)	10pf (std.) 20pf, 40pf (option)
Weight	Approx. 1.9kg	Approx. 1.9kg	Approx. 2.4kg
Housing Spec.	Aluminum IP65		
Supply Voltage	110/220Vac ± 10% or 16~24Vdc		
Delay Time	0~6 sec		
Power Consumption	2W		
Output Rating	Relay: 5A/250Vac or 5A/30Vdc, NPN 100mA		

If length of sensing probes is longer than 3 meters, please choose 20pf or 40pf sensitivity type.

# STANDARD TYPE

Dimension			
Order No.	[SUPER HI-TEMP. TYPE] SA128 A/B/C	[CORROSION-PROOF TYPE] SA130 A/B/C	[CORROSION-PROOF TYPE] SA132 A/B/C
Ambient Temp.	-20°C~60°C	-20°C~60°C	-20°C~60°C
Operating Temp.	-20°C~800°C	-20°C~80°C	-20°C~120°C
Operation Pressure	ATM	20kg/cm <sup>2</sup>	20kg/cm <sup>2</sup>
Probe Material	SUS 304/316	SUS 304 Coating PP	SUS304 Coating PVDF
Insulated Material	CERAMIC	UPE	UPE
Connection	2-1/2"x5kg/cm <sup>2</sup> Flange(SUS)	1-1/2"x10kg/cm <sup>2</sup> Flange(PP)	1-1/2"x10kg/cm <sup>2</sup> Flange(SUS) (5mm PVDF)
Sensitivity Range	10pf (std.) 20pf, 40pf (option)	10pf (std.) 20pf, 40pf (option)	10pf (std.) 20pf, 40pf (option)
Weight	Approx. 6.5kg	Approx. 2kg	_____
Housing Spec.	Aluminum IP65		
Supply Voltage	110/220Vac ± 10% or 16~24Vdc		
Delay Time	0~6 sec		
Power Consumption	2W		
Output Rating	Relay: 5A/250Vac or 5A/30Vdc, NPN 100mA		

If length of sensing probes is longer than 3 meters, please choose 20pf or 40pf sensitivity type.

# STANDARD TYPE

Dimension			
Order No.	[ REMOTE PROBE TYPE ] SA140 A/B/C	[ WIRE-PROBE TYPE ] SA150 A/B/C	[ PLATE TYPE ] SA160 A/B/C
Ambient Temp.	-20°C~60°C	-20°C~60°C	-20°C~60°C
Operating Temp.	-20°C~80°C	-20°C~80°C	-20°C~80°C
Operation Pressure	20kg/cm <sup>2</sup>	20kg/cm <sup>2</sup>	20kg/cm <sup>2</sup>
Probe Material	SUS 304/316	SUS 304/316 cable	SUS 304/316
Insulated Material	UPE	UPE	UPE
Connection	1"PT Screw (SUS)	1"PT Screw (SUS)	2-1/2"x 5kg/cm <sup>2</sup> Flange (SUS)
Sensitivity Range	10pf (std.)	10pf (std.) 20pf, 40pf (option)	10pf (std.) 20pf, 40pf (option)
Weight	Approx. 3kg	Approx. 4.1kg	Approx. 3.2kg
Housing Spec.	Aluminum IP65		
Supply Voltage	110/220Vac±10% or 16~24Vdc		
Delay Time	0~6 sec		
Power Consumption	2W		
Output Rating	Relay: 5A/250Vac or 5A/30Vdc, NPN 100mA		

If length of sensing probes is longer than 3 meters, please choose 20pf or 40pf sensitivity type.

## STANDARD TYPE

Dimension		
Order No.	[ ANTI-STATIC TYPE ] SA180 A/B/C	[ HI-TEMP ANTI-STATIC TYPE ] SA181 A/B/C
Ambient Temp.	-20°C~60°C	-20°C~60°C
Operating Temp.	-20°C~80°C	-20°C~200°C
Operation Pressure	20kg/cm <sup>2</sup>	20kg/cm <sup>2</sup>
Probe Material	UPE Coating	PTFE Coating
Insulated Material	UPE	PTFE
Connection	1"PT Screw (SUS)	1"PT Screw (SUS)
Sensitivity Range	10pf (std.) 20pf (option)	10pf (std.) 20pf (option)
Weight	Approx. 2kg	Approx. 2.5kg
Housing Spec.	Aluminum IP65	
Supply Voltage	110/220Vac ± 10% or 16~24Vdc	
Delay Time	0~6 sec	
Power Consumption	2W	
Output Rating	Relay: 5A/250Vac or 5A/30Vdc, NPN 100mA	

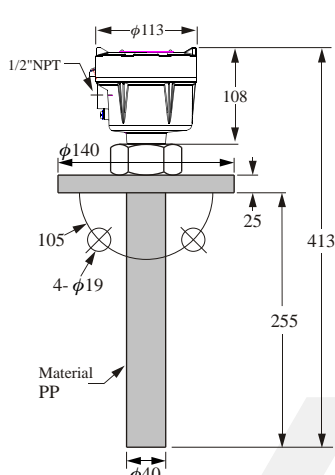
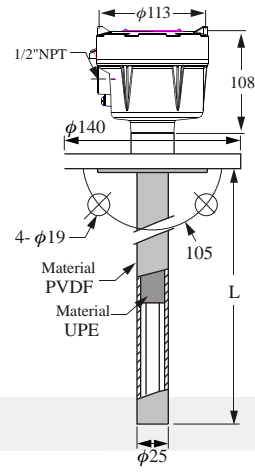
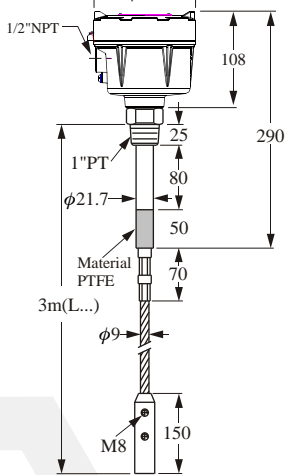
If length of sensing probes is longer than 3 meters, please choose 20pf or 40pf sensitivity type.

# EXPLOSION PROOF TYPE

Dimension			
Order No.	[ STANDARD TYPE ] SA270	[ STANDARD TYPE ] SA271	[ HI-TEMP. TYPE ] SA272
Ambient Temp.	-20°C~60°C	-20°C~60°C	-20°C~60°C
Operating Temp.	-20°C~80°C	-20°C~80°C	-20°C~200°C
Operation Pressure	20kg/cm <sup>2</sup>	20kg/cm <sup>2</sup>	20kg/cm <sup>2</sup>
Probe Material	SUS 304/316	SUS 304/316	SUS 304/316
Insulated Material	UPE	UPE	PTFE
Connection	1"PT Screw (SUS)	1"PT Screw (SUS)	1"PT Screw (SUS)
Sensitivity Range	10pf (std.) 20pf, 40pf (option)	10pf (std.) 20pf, 40pf (option)	10pf (std.) 20pf, 40pf (option)
Weight	Approx. 1.9kg	Approx. 2.4kg	Approx. 4.1kg
Housing Spec.	Aluminum IP65		
Supply Voltage	110/220Vac ± 10% or 16~24Vdc		
Enclosure Protection	Ex dia II C T4~T6, DIP A21 T <sub>A</sub> , T3~T6		
Power Consumption	2W		
Output Rating	Relay: 5A/250Vac or 5A/30Vdc, NPN 100mA		

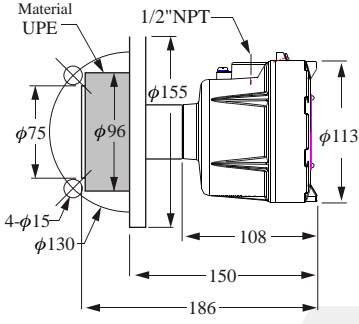
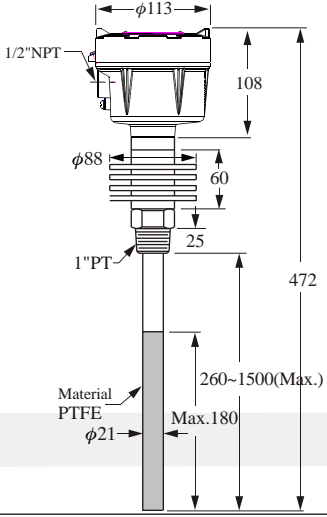
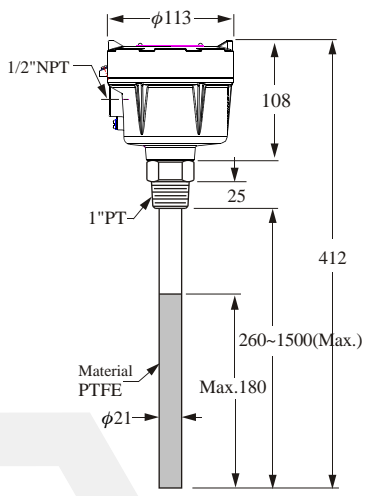
If length of sensing probes is longer than 3 meters, please choose 20pf or 40pf sensitivity type.

# EXPLOSION PROOF TYPE

Dimension			
Order No.	[ CORROSION-PROOF TYPE ] SA273	[ CORROSION-PROOF TYPE ] SA274	[ WIRE-PROBE TYPE ] SA275
Ambient Temp.	-20°C~60°C	-20°C~60°C	-20°C~60°C
Operating Temp.	-20°C~80°C	-20°C~120°C	-20°C~80°C
Operation Pressure	ATM	20kg/cm <sup>2</sup>	20kg/cm <sup>2</sup>
Probe Material	SUS 304/316(PP Coating)	SUS 304/316(PVDF Coating)	SUS 304/316 Cable
Insulated Material	UPE	PTFE	PTFE
Connection	1-1/2"x10kg/cm <sup>2</sup> (PP)	1-1/2"x10kg/cm <sup>2</sup> (SUS) W / PVDF Coating	1"PT Screw (SUS)
Sensitivity Range	10pf (std.) 20pf, 40pf (option)	10pf (std.) 20pf, 40pf (option)	10pf (std.) 20pf, 40pf (option)
Weight	Approx. 1.9kg	_____	Approx. 4.1kg
Housing Spec.	Aluminum IP65		
Supply Voltage	110/220Vac±10% or 16~24Vdc		
Enclosure Protection	Ex dia II C T4~T6, DIP A21 T <sub>A</sub> , T3~T6		
Power Consumption	2W		
Output Rating	Relay: 5A/250Vac or 5A/30Vdc,NPN 100mA		

If length of sensing probes is longer than 3 meters, please choose 20pf or 40pf sensitivity type.

# EXPLOSION PROOF TYPE

Dimension			
Order No.	[ PLATE TYPE ] SA276	[ HI-TEMP ANTI-STATIC TYPE ] SA277	[ ANTI-STATIC TYPE ] SA278
Ambient Temp.	-20°C~60°C	-20°C~60°C	-20°C~60°C
Operating Temp.	-20°C~80°C	-20°C~200°C	-20°C~80°C
Operation Pressure	20kg/cm <sup>2</sup>	20kg/cm <sup>2</sup>	20kg/cm <sup>2</sup>
Probe Material	SUS 304/316	PTFE or UPE Coating	PTFE or UPE Coating
Insulated Material	PTFE or UPE	PTFE or UPE	PTFE or UPE
Connection	2-1/2"x 5kg/cm <sup>2</sup> Flange (SUS)	1"PT Screw (SUS)	1"PT Screw (SUS)
Sensitivity Range	10pf (std.) 20pf, 40pf (option)	10pf (std.) 20pf, 40pf (option)	10pf (std.) 20pf (option)
Weight	Approx. 3.2kg	Approx. 3.1kg	Approx. 2kg
Housing Spec.	Aluminum IP65		
Supply Voltage	110/220Vac±10% or 16~24Vdc		
Enclosure Protection	Ex dia II C T4~T6, DIP A21 T <sub>A</sub> , T3~T6		
Power Consumption	2W		
Output Rating	Relay: 5A/250Vac or 5A/30Vdc, NPN 100mA		

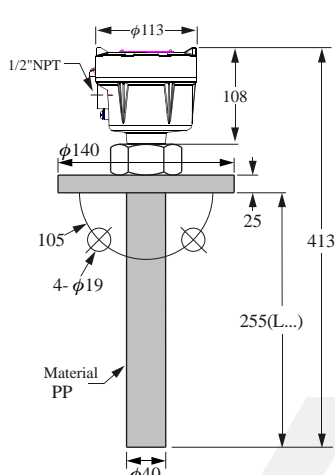
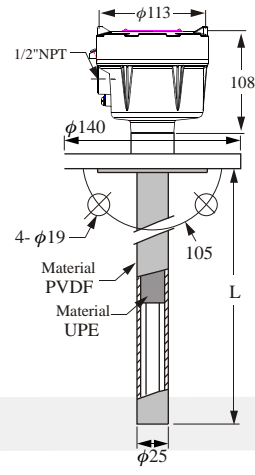
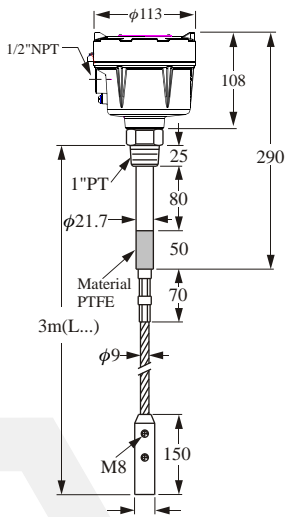
If length of sensing probes is longer than 3 meters, please choose 20pf or 40pf sensitivity type.

# INTRINSICALLY SAFE EXPLOSION PROOF TYPE

Dimension			
Order No.	[ STANDARD TYPE ] SA370 (WITH SA-75U)	[ STANDARD TYPE ] SA371 (WITH SA-75U)	[ HI-TEMP. TYPE ] SA372 (WITH SA-75U)
Ambient Temp.	-20°C~60°C	-20°C~60°C	-20°C~60°C
Operating Temp.	-20°C~80°C	-20°C~80°C	-20°C~200°C
Operation Pressure	20kg/cm <sup>2</sup>	20kg/cm <sup>2</sup>	20kg/cm <sup>2</sup>
Probe Material	SUS 304/316	SUS 304/316	SUS 304/316
Insulated Material	UPE	UPE	PTFE
Connection	1"PT Screw (SUS)	1"PT Screw (SUS)	1"PT Screw (SUS)
Sensitivity Range	10pf (std.) 20pf, 40pf (option)	10pf (std.) 20pf, 40pf (option)	10pf (std.) 20pf, 40pf (option)
Weight	Approx. 1.9kg	Approx. 2.4kg	Approx. 2.4kg
Housing Spec.	Aluminum IP65		
Supply Voltage	16~24Vdc		
Enclosure Protection	Ex ia IIC T3~T6		
Power Consumption	2W		
Output Rating	NPN 100mA		

If length of sensing probes is longer than 3 meters, please choose 20pf or 40pf sensitivity type.

# INTRINSICALLY SAFE EXPLOSION PROOF TYPE

<b>Dimension</b>			
<b>Order No.</b>	[ CORROSION-PROOF TYPE ] SA373 (WITH SA-75U)	[ CORROSION-PROOF TYPE ] SA374 (WITH SA-75U)	[ WIRE-PROBE TYPE ] SA375 (WITH SA-75U)
<b>Ambient Temp.</b>	-20°C~60°C	-20°C~60°C	-20°C~60°C
<b>Operating Temp.</b>	-20°C~80°C	-20°C~120°C	-20°C~80°C
<b>Operation Pressure</b>	ATM	20kg/cm <sup>2</sup>	20kg/cm <sup>2</sup>
<b>Probe Material</b>	SUS 304/316(PP Coating)	SUS 304/316 W / PVDF Coating	SUS 304/316 Cable
<b>Insulated Material</b>	UPE	PTFE	PTFE
<b>Connection</b>	1-1/2"x10kg/cm <sup>2</sup> (PP)	1-1/2"x10kg/cm <sup>2</sup> (SUS) W / PVDF Coating	1"PT Screw (SUS)
<b>Sensitivity Range</b>	10pf (std.) 20pf, 40pf (option)	10pf (std.) 20pf, 40pf (option)	10pf (std.) 20pf, 40pf (option)
<b>Weight</b>	Approx. 1.9kg	_____	Approx. 4.1kg
<b>Housing Spec.</b>	Aluminum IP65		
<b>Supply Voltage</b>	16~24Vdc		
<b>Delay Time</b>	Ex ia IIC T3~T6		
<b>Power Consumption</b>	2W		
<b>Output Rating</b>	NPN 100mA		

If length of sensing probes is longer than 3 meters, please choose 20pf or 40pf sensitivity type.

# INTRINSICALLY SAFE EXPLOSION PROOF TYPE

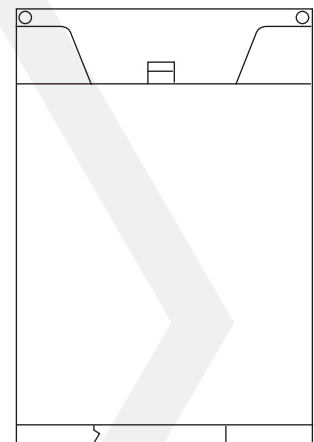
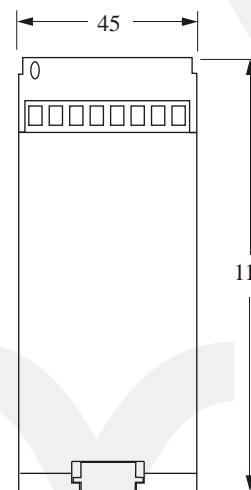
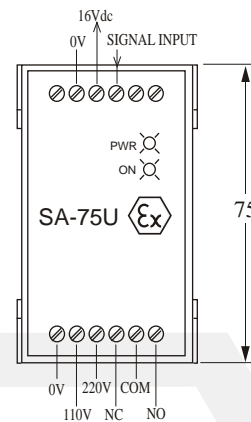
Dimension			
Order No.	[ PLATE TYPE ] SA376 (WITH SA-75U)	[ HI-TEMP ANTI-STATIC TYPE ] SA377 (WITH SA-75U)	[ ANTI-STATIC TYPE ] SA378 (WITH SA-75U)
Ambient Temp.	-20°C~60°C	-20°C~60°C	-20°C~60°C
Operating Temp.	-20°C~80°C	-20°C~200°C	-20°C~80°C
Operation Pressure	20kg/cm <sup>2</sup>	20kg/cm <sup>2</sup>	20kg/cm <sup>2</sup>
Probe Material	SUS 304/316	PTFE Coating	UPE Coating
Insulated Material	UPE	PTFE	UPE
Connection	2-1/2"x 5kg/cm <sup>2</sup> Flange (SUS)	1"PT Screw (SUS)	1"PT Screw (SUS)
Sensitivity Range	10pf (std.) 20pf, 40pf (option)	10pf (std.) 20pf, 40pf (option)	10pf (std.) 20pf (option)
Weight	Approx. 3.2kg	Approx. 3.1kg	Approx. 2kg
Housing Spec.	Aluminum IP65		
Supply Voltage	16~24Vdc		
Delay Time	Ex ia IIC T3~T6		
Power Consumption	2W		
Output Rating	NPN 100mA		

If length of sensing probes is longer than 3 meters, please choose 20pf or 40pf sensitivity type.

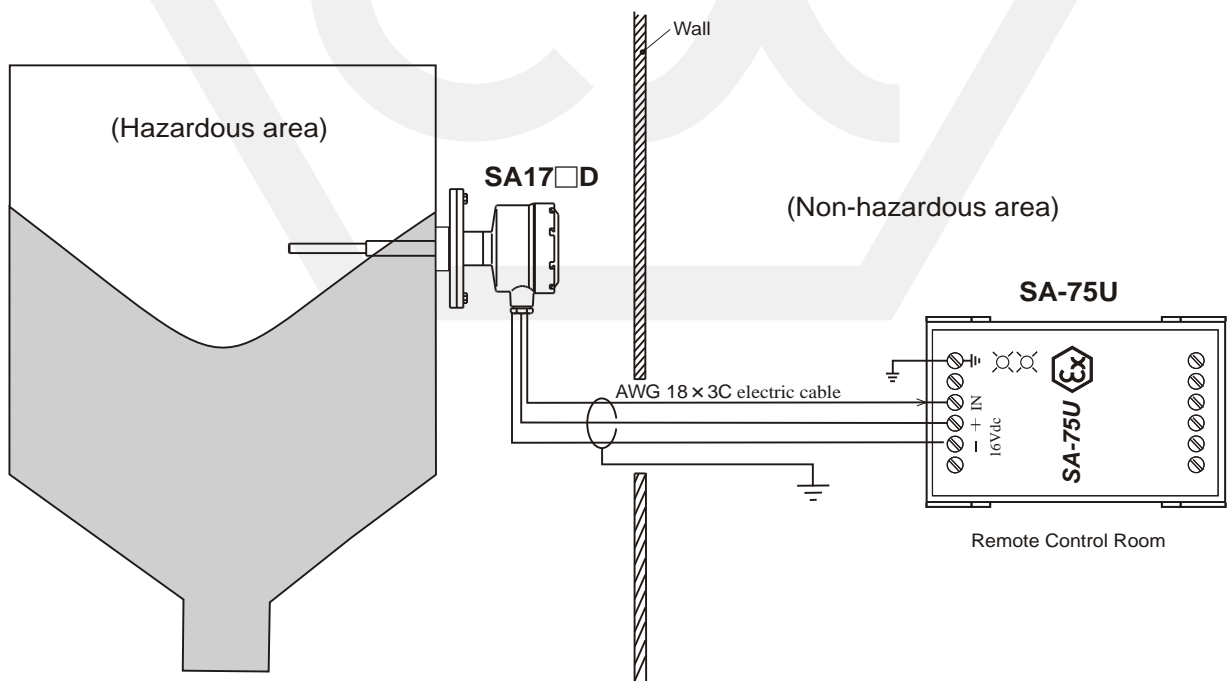
# SA-75U INTRINSIC SAFE SIGNAL CONDITIONER

SA-75U Zener barriers inside provide intrinsic safety to SA37□ type level switch. The unit works via a current-limiting feature which protects the device from damage by emission of sparks.

1. Supply voltage : 110 / 220Vac
2. Power consumption : 2W
3. Input signal : NPN transistor  
resistance  $R_i = 500\Omega$
4. Output voltage : 16~24 Vdc
5. Short circuit current : 25mA max.
6. Relay output : SPDT  
10A /30Vdc  
10A /220Vac
7. Operating temp. : -20°C ~ 60°C
8. Weight : 0.3 kg
9. Enclosure rating : Ex (ia) IIC T6



## ■ WIRING CONFIGURATION



# ADJUSTMENT

## ■ COARSE CALIBRATION

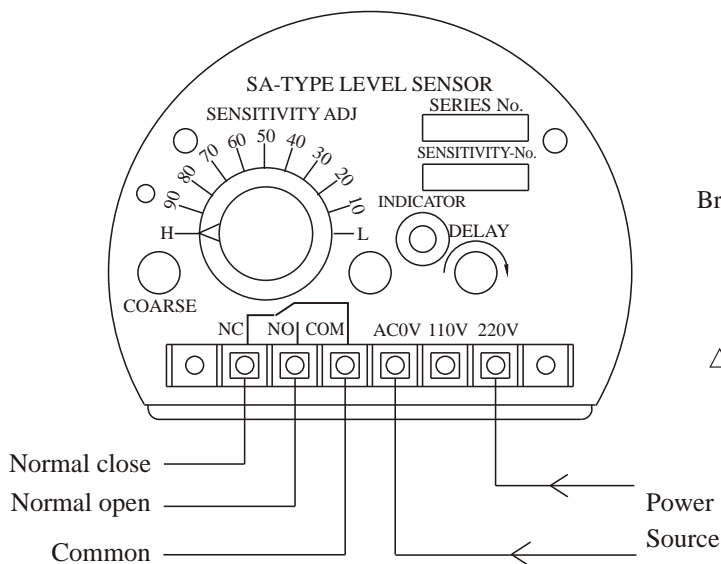
Set the "Sensitive ADJ. " to the "H" position. Then use a screw driver to adjust the "Coarse" until indicator is lighted. At last check "Indicator" is light or not by adjust the "Sensitivity Adj" knob, if not, repeat procedure.

## ■ SENSITIVITY ADJUSTMENT

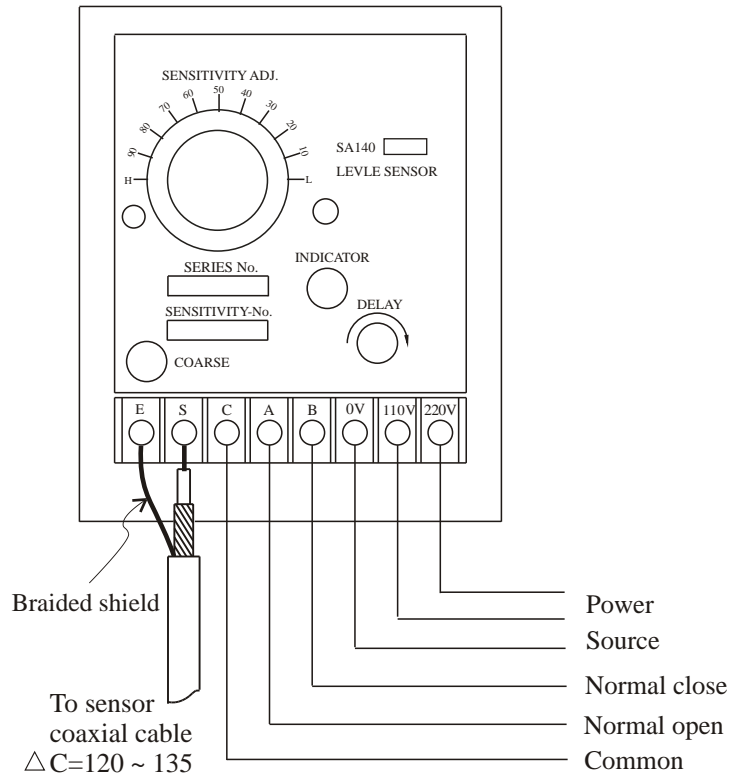
When the material is out of contact with probe will extinguish the "Indicator". When the material is in contact with probe will illuminated the "Indicator " lamp, at this time please adjust "Sensitivity ADJ." until lamp is in extinction. And then set "Sensitivity ADJ." in the middle between "H" and extinction position. e.g. If extinction position is 10p, you should set "Sensitivity ADJ." in "75" position.

## ■ DELAY FUNCTION CALIBRATION

The default setting is 0 second, here at the material is in contact with probe will illuminate "Indicator" lamp and energize relay. When the user need to use this delay function, please set timer in clockwise. The relay will energized after "Indicator" illuminate for several seconds if set timer more than 0 second. The delay function is suitable for variable material level. e.g. liquid tank equip with agitator.

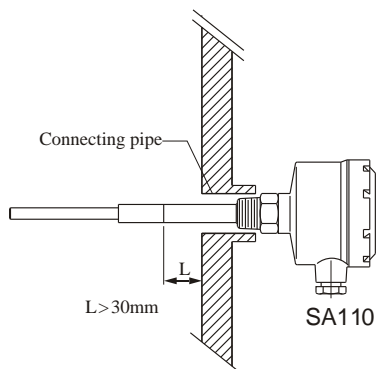


**SA110, 120, 130, 150, 160, 17□, 180 A/B/C/D**

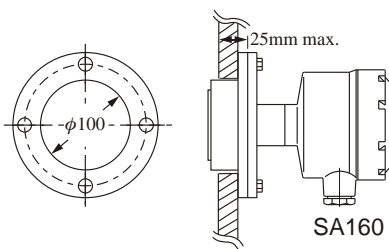


**Remote Probe Type (SA140 A/B/C)**

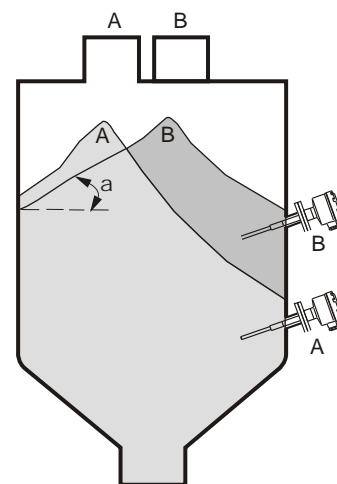
# INSTALLATION NOTICE



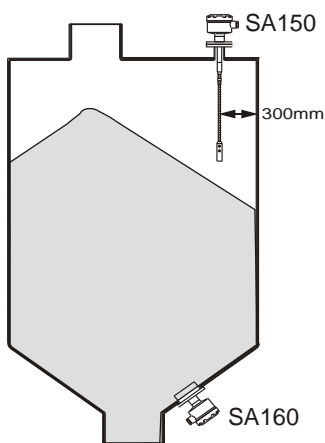
The insensible portion should be mounted to protrude 30mm from the vessel wall. That's to prevent malfunction from a fill material or an insufficient clearance between probe and connection pipe.



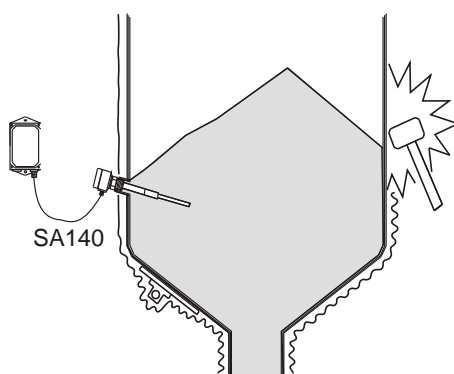
SA160 to be mounted properly, the vessel walls should not exceed 25mm.



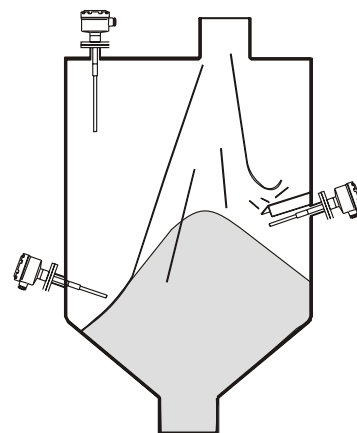
To prevent false readings, users have to make sure the material flows symmetrically. If the inlet is not located in the center portion of the tank roof, check the flow pattern ( $\alpha$  angle) of your material and place the probe in the appropriate location.



If the probe is mounted on the top, make sure the length of probe long enough to touch the highest level of raw material. SA150 type must have at least 300mm from the electrode probe to the silo wall. SA160 type is usually installed at the lower of tank side.

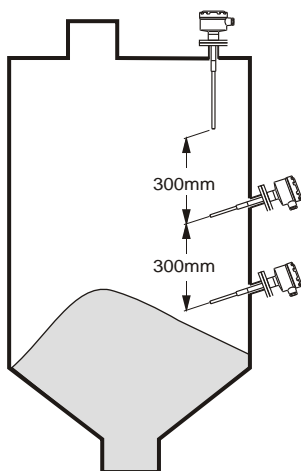


For Non-Stationary or vibrating environment, a separate control unit such as the SA140 is suggested.

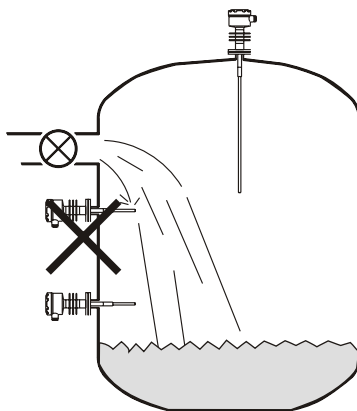


It is suggested to install the probe away from the inlet to reduce the risk of inflowing material damaging the probe. If the probe is near an inlet, it is recommended to place a protective cover 200mm above the probe. The cover should be parallel to the probe and the same length.

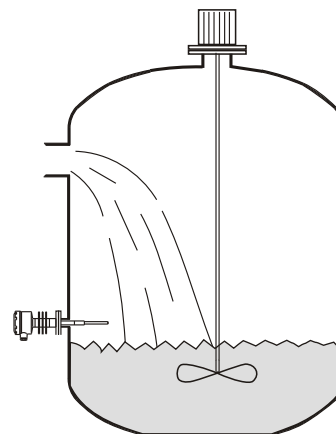
# INSTALLATION NOTICE



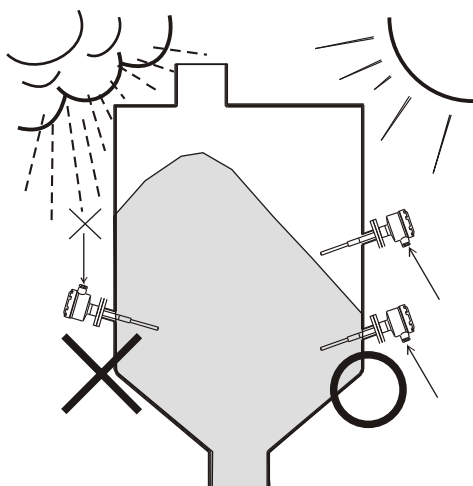
If two parallel probes are mounted, they must be installed separately at least 300 mm to minimize interference .



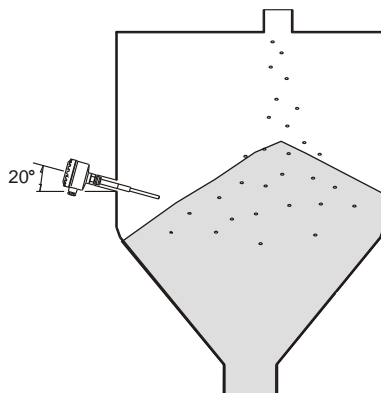
The probe should not be mounted underneath a liquid inlet, otherwise it will switch on erroneously.



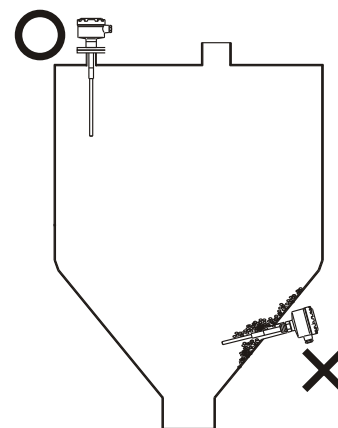
If the tank equips with agitator, please use the time-delay type (SA□□□ -A~D) to prevent fault level detection.



The cable inlet should face downward to avoid rain damage. Tighten the cable with the connecting part.



Mounting the probe at a 20° incline will optimize the results and increase sensitivity. It also won't be damaged by the inflowing material.



Mounting the probe at top of tank can avoid material bridges from forming. It's helpful to record accurate measurements.

# ORDER INFORMATION

SA 1 1 0 A DQ (1 0 0 0)

## Model

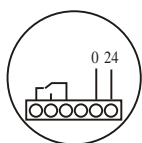
110 --- Standard Type  
 120 --- Hi-temp. Type  
 130 --- Corrosion Proof Type  
 140 --- Remote Probe Type  
 150 --- Wire Probe Type  
 160 --- Plate Type  
 180 --- Anti-Static Type  
 27□ --- Explosion Proof Type  
 37□ --- Explosion Proof Type

## Terminal Arrangement

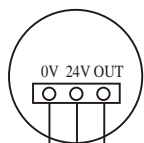
A---110/220Vac, Relay output  
 B---24Vdc, Relay output  
 C---24Vdc, NPN transistor output  
 D---Designed for use with SA-75U



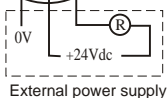
SA□□□ A  
 110V/220VAC  
 Relay output



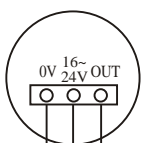
SA□□□ B  
 DC24V  
 Relay output



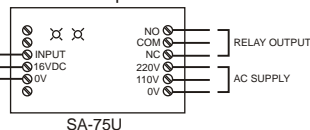
SA□□□ C  
 DC24V  
 Transistor npn output



External power supply



SA37□ D  
 Ex (ia) IIC  
 Control unit output



SA-75U

## Connection

C---3/4"(20A)	M---5kg/cm <sup>2</sup>	W---PN 10
D---1"(25A)	N---10kg/cm <sup>2</sup>	X---PN 16
E---1-1/2"(40A)	O---150 Lbs	Y---PN 25
F---2"(50A)	P---300 Lbs	Z---PN 40
G---2-1/2"(65A)	Q---PT	
H---3"(80A)	R---PF(G)	
I---4"(100A)	T---BSP	
J---5"(125A)	U---NPT	
K---6"(150A)	S---Others	
S---Others		

## Probe Length (mm)

0500: 50cm (01~50) ※ 50cm per Unit  
 1000: 100cm (51~100)  
 1500: 150cm (101~150)

\* Tolerance of the total product length is ±5mm.  
 \* Characteristics, specifications and dimensions are subject to change without notice.  
 \* Please contact your nearest distributor office for further informations.