



# Capacitance Level Switch



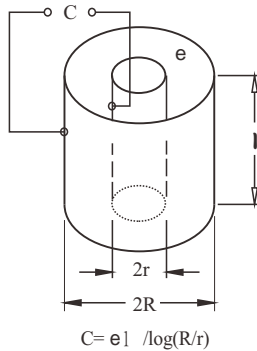
# PRODUCT INTRODUCTION

## ■ OPERATING PRINCIPLE

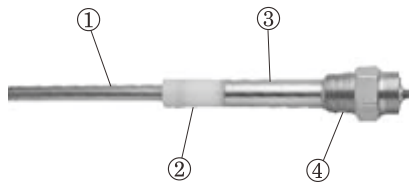
The Fine-tek Capacitance Switch for liquids and solids can be used in mediums such as liquids, pastes, syrups, powders, granules, flakes and chips. It's broad application and rugged build makes it a highly versatile across all industries.

Capacitance switches rely on electrical capacitance theory (the ability of a medium to store electrical energy). When an electrical circuit has two separated conductive plates, the space between the plates acts as a capacitor and stores the electrical energy. Mediums have differing conductivity and dielectric constants which affects their energy's storage capability. When the switch comes into contact with the medium, it can detect a change in the surroundings and this actuates the switch accordingly.

Materials with high conductivity or high dielectric constants such as water tend to have high capacitance. The opposite applies for low conductive substances such as popcorn, wax or air. Thus the switch works well in mediums with reasonably high dielectric constants or conductive solutions.



## ■ CONSTRUCTION



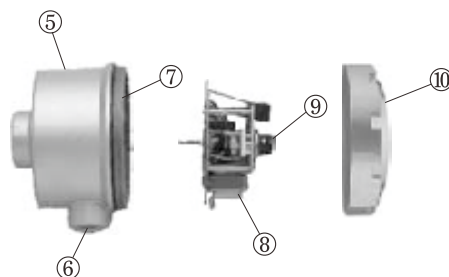
1. Probe : SUS304 or SUS316
2. Insulation : UPE or PTFE
3. Grounding Sleeve : SUS304 or SUS316
4. Connection : SUS304 or SUS316  
1"PT (default) or 3/4"PT(option)

## ■ 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.

※ When there are materials or mixtures that have multiple characteristics like having high/low dielectric and conductive characteristics simultaneously (for example; silica sand in the glass industry, etc), it must be tested on the site first, to determine whether the sensor is suitable or not. If still have measuring problems, we suggest to use our Tuning Fork Level SWitch (SC) or Rotarg Paddle Level SWitch (SE).

1. Standard Type (SA110 & SA111)  
Suitable for general use.
2. Hi-Temp Type (SA120 & SA128)  
Suitable for high temperature environment.
3. Anti-Corrosion Type (SA130 & SA132)  
Suitable for corrosive environment.
4. Remote Probe Type (SA140)  
For use with vibrator equipped with tank.
5. Wire-Probe Type (SA150)  
Suitable for silo or large-size tank.
6. Plate-Probe Type (SA160)  
Suitable for granules and at lower position of tank Side.
7. Explosion-Proof Type (SA270 ~ SA278)  
Ex d/ia II C T3~T6, DIP A20/21 TA,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) 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(Rotary knob)
10. Cover : ADC-12 Aluminum

# STANDARD MODEL

<b>Dimensions</b>			
<b>Model No.</b>	<b>[STANDARD MODEL] SA110</b>	<b>[STANDARD MODEL] SA111</b>	<b>[HI-TEMP. MODEL] SA120</b>
<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~80°C	-20°C~200°C
<b>Operation pressure</b>	20kg/cm <sup>2</sup>	20kg/cm <sup>2</sup>	20kg/cm <sup>2</sup>
<b>Prob material</b>	SUS 304/316	SUS 304/316	SUS 304/316
<b>Insulated material</b>	UPE	UPE	PEEK
<b>Connection</b>	1"PT Screw (SUS)	1"PT Screw (SUS)	1"PT Screw (SUS)
<b>Sensitivity range</b>	10pF(Rotary knob)		
<b>Weight</b>	Approx. 1.9kg	Approx. 1.9kg	Approx. 2.4kg
<b>Housing</b>	Aluminum IP65		
<b>Supply voltage</b>	100~240Vac or 110/220Vac ± 10% or 19~24Vdc		
<b>Delay time</b>	0~6 sec		
<b>Power consumption</b>	2W		
<b>Output rating</b>	Relay: SPDT 5A/250Vac/30Vdc,NPN 100mA		

Dimensions			
Model No.	[SUPER HI-TEMP. MODEL] SA128	[CORROSION-PROOF MODEL] SA130	[CORROSION-PROOF MODEL] SA132
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>
Prob 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(Rotary knob)		
Weight	Approx. 6.5kg	Approx. 2kg	—————
Housing	Aluminum IP65		
Supply voltage	100~240Vac or 110/220Vac±10% or 19~24Vdc		
Delay time	0~6 sec		
Power consumption	2W		
Output rating	Relay: SPDT 5A/250Vac/30Vdc,NPN 100mA		

Dimensions			
Model No.	[REMOTE PROBE MODEL] SA140	[WIRE-PROBE MODEL] SA150	[PLATE MODEL] SA160
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>
Prob 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(Rotary knob)		
Weight	Approx. 3kg	Approx. 4.1kg	Approx. 3.2kg
Housing	Aluminum IP65		
Supply voltage	100~240Vac or 110/220Vac ± 10% or 24Vdc ± 20%	100~240Vac or 110/220Vac ± 10% or 19~24Vdc	
Delay time	0~8 sec	0~6 sec	
Power consumption	2W		
Output rating	Relay: SPDT 5A/250Vac/30Vdc,NPN 100mA		

<b>Dimensions</b>		
<b>Model No.</b>	<b>[ANTI-STATIC MODEL] SA180</b>	<b>[HI-TEMP. ANTI-STATIC MODEL] SA181</b>
<b>Ambient temp.</b>	-20°C~60°C	-20°C~60°C
<b>Operating temp.</b>	-20°C~80°C	-20°C~200°C
<b>Operation pressure</b>	20kg/cm <sup>2</sup>	20kg/cm <sup>2</sup>
<b>Prob material</b>	UPE Coating	PTFE Coating
<b>Insulated material</b>	UPE	PTFE
<b>Connection</b>	1"PT Screw (SUS)	
<b>Sensitivity range</b>	10pF(Rotary knob)	
<b>Weight</b>	Approx. 2kg	Approx. 2.5kg
<b>Housing</b>	Aluminum IP65	
<b>Supply voltage</b>	100~240Vac or 110/220Vac ± 10% or 19~24Vdc	
<b>Delay time</b>	0~6 sec	
<b>Power consumption</b>	2W	
<b>Output rating</b>	Relay: SPTD 5A/250Vac/30Vdc,NPN 100mA	

# EXPLOSION PROOF MODEL

NEPSI Ex d/ia IIC T3~T6 Gb/Ga  
Ex tD A21 iaD 20 IP65 T85°C~T200°C



Dimensions			
Model No.	[STANDARD MODEL] SA270	[STANDARD MODEL] SA271	[HI-TEMP. MODEL] 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~195°C
Operating 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	PEEK
Connection	1"PT Screw (SUS)	1"PT Screw (SUS)	1"PT Screw (SUS)
Sensitivity range	10pF(Rotary knob)		
Weight	Approx. 1.9kg	Approx. 2.4kg	Approx. 4.1kg
Housing spec.	Aluminum IP65		
Supply voltage	110~220Vac±10% or 110/220Vac±10% or 24Vdc±20%		
Enclosure protection	Ex d/ia IIC T3~T6 Gb/Ga, Ex tD A21 iaD 20 IP65 T85°C~T200°C		
Power consumption	2W		
Output contact rating	Relay: SPDT 5A/250Vac/28Vdc		
	3 wire NPN output, max. load current 400mA		
	3 wire PNP output, max. load current 400mA		
	4 wire NPN/PNP output, max. 400mA/60Vdc		

Dimensions			
Model No.	[CORROSION-PROOF MODEL] SA273	[CORROSION-PROOF MODEL] SA274	[WIRE-PROBE MODEL] 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
Operating pressure	20kg/cm <sup>2</sup>	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	UPE	UPE
Connection	1-1/2"x10kg/cm <sup>2</sup> (PP)	1-1/2"x10kg/cm <sup>2</sup> (SUS) W / 5mm PVDF Cushion	1"PT Screw (SUS)
Sensitivity range	10pF(Rotary knob)		
Weight	Approx. 1.9kg	Approx. 2.4kg	Approx. 4.1kg
Housing spec.	Aluminum IP65		
Supply voltage	110~220Vac ± 10% or 110/220Vac ± 10% or 24Vdc ± 20%		
Enclosure protection	Ex d/ia IIC T3~T6 Gb/Ga, Ex tD A21 iaD 20 IP65 T85°C~T200°C		
Power consumption	2W		
Output contact rating	Relay: SPDT 5A/250Vac/28Vdc		
	3 wire NPN output, max. load current 400mA		
	3 wire PNP output, max. load current 400mA		
	4 wire NPN/PNP output, max. 400mA/60Vdc		

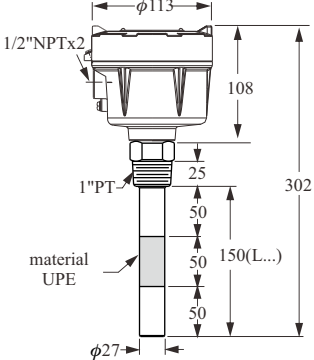
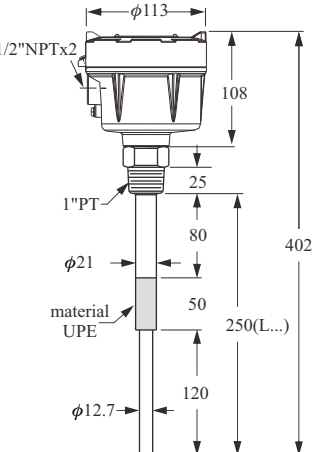
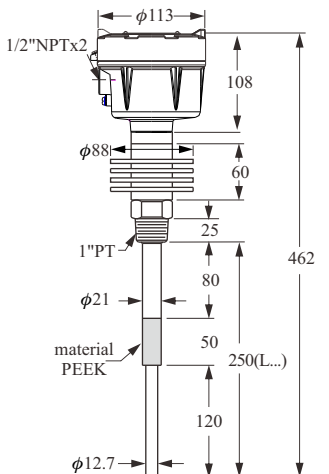


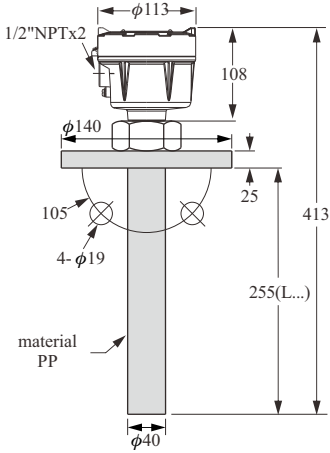
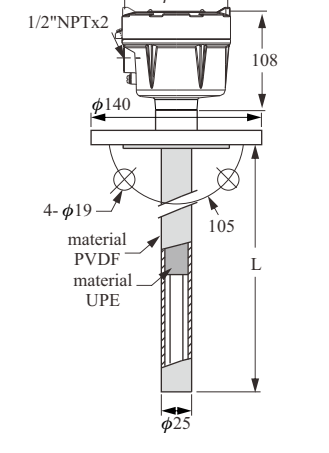
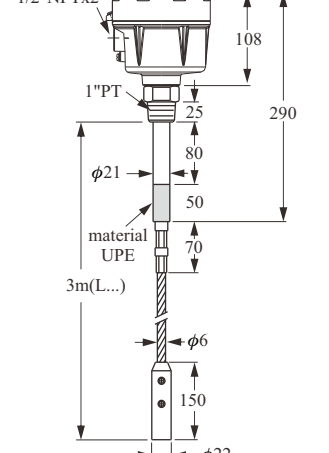
Dimensions			
<b>Model No.</b>	<b>[PLATE MODEL] SA276</b>	<b>[HI-TEMP. ANTI-STATIC MODEL] SA277</b>	<b>[ANTI-STATIC MODEL] SA278</b>
<b>Ambient temp.</b>	-20°C~60°C	-20°C~60°C	-20°C~60°C
<b>Operating temp.</b>	-20°C~80°C	-20°C~195°C	-20°C~80°C
<b>Operating pressure</b>	20kg/cm <sup>2</sup>	20kg/cm <sup>2</sup>	20kg/cm <sup>2</sup>
<b>Probe material</b>	SUS 304/316	PTFE Coating	UPE Coating
<b>Insulated material</b>	UPE	PTFE	UPE
<b>Connection</b>	2-1/2"x 5kg/cm <sup>2</sup> Flange(SUS)	1"PT Screw(SUS)	1"PT Screw(SUS)
<b>Sensitivity range</b>	10pF(Rotary knob)		
<b>Weight</b>	Approx. 3.2kg	Approx. 3.1kg	Approx. 2kg
<b>Housing spec.</b>	Aluminum IP65		
<b>Supply voltage</b>	110~220Vac ± 10% or 110/220Vac ± 10% or 24Vdc ± 20%		
<b>Enclosure protection</b>	Ex d/ia IIC T3~T6 Gb/Ga, Ex tD A21 iaD 20 IP65 T85°C~T200°C		
<b>Power consumption</b>	2W		
<b>Output contact rating</b>	Relay: SPDT 5A/250Vac/28Vdc		
	3 wire NPN output, max. load current 400mA		
	3 wire PNP output, max. load current 400mA		
	4 wire NPN/PNP output, max. 400mA/60Vdc		

# INTRINSICALLY SAFE MODEL

NEPSI Ex ia IIC T3/T4 Ga



Dimensions			
<b>Model No.</b>	[STANDARD MODEL] SA370(WITH SA-75U)	[STANDARD MODEL] SA371(WITH SA-75U)	[HI-TEMP. MODEL] SA372(WITH SA-75U)
<b>Ambient temp.</b>	-40°C~60°C	-40°C~60°C	-40°C~60°C
<b>Operating temp.</b>	-40°C~80°C	-40°C~80°C	-40°C~190°C
<b>Operation Pressure</b>	20kg/cm <sup>2</sup>	20kg/cm <sup>2</sup>	20kg/cm <sup>2</sup>
<b>Prob material</b>	SUS 304/316	SUS 304/316	SUS 304/316
<b>Insulated material</b>	UPE	UPE	PEEK
<b>Connection</b>	1"PT Screw (SUS)	1"PT Screw (SUS)	1"PT Screw(SUS)
<b>Sensitivity range</b>	10pF(Rotary knob)		
<b>Weight</b>	Approx. 1.9kg	Approx. 2.4kg	Approx. 2.4kg
<b>Housing spec.</b>	Aluminum IP65		
<b>Supply voltage</b>	16~24Vdc		
<b>Enclosure protection</b>	Ex ia IIC T3/T4 Ga		
<b>Power consumption</b>	2W		
<b>Output rating</b>	NPN 100mA		

Dimensions			
<b>Model No.</b>	[CORROSION-PROOF MODEL] SA373(WITH SA-75U)	[CORROSION-PROOF MODEL] SA374(WITH SA-75U)	[WIRE-PROBE MODEL] SA375(WITH SA-75U)
<b>Ambient temp.</b>	-40°C~60°C	-40°C~60°C	-40°C~60°C
<b>Operating temp.</b>	-40°C~80°C	-40°C~120°C	-40°C~80°C
<b>Operation Pressure</b>	20kg/cm <sup>2</sup>	20kg/cm <sup>2</sup>	20kg/cm <sup>2</sup>
<b>Prob material</b>	SUS 304/316(PP Coating)	SUS 304/316(PVDF Coating)	SUS 304/316 Cable
<b>Insulated material</b>	PTFE or UPE	UPE	UPE
<b>Connection</b>	1-1/2"x10kg/cm <sup>2</sup> (PP)	1-1/2"x10kg/cm <sup>2</sup> (SUS) W / 5 mm PVDF Cushion	1"PT Screw (SUS)
<b>Sensitivity range</b>	10pF(Rotary knob)		
<b>Weight</b>	Approx. 1.9kg	—————	Approx. 4.1kg
<b>Housing spec.</b>	Aluminum IP65		
<b>Supply voltage</b>	16~24Vdc		
<b>Enclosure protection</b>	Ex ia IIC T3/T4 Ga		
<b>Power consumption</b>	2W		
<b>Output rating</b>	NPN 100mA		



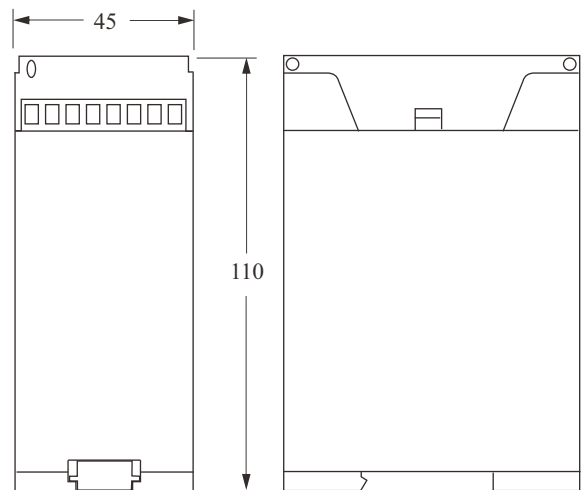
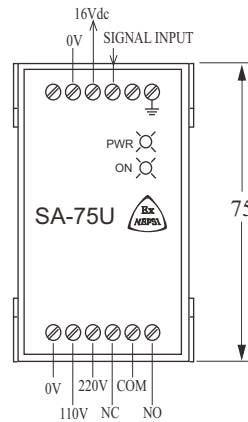
<p><b>Dimensions</b></p>			
<p><b>Model No.</b></p>	<p><b>[PLATE MODEL] SA376(WITH SA-75U)</b></p>	<p><b>[HI-TEMP. ANSI-STATIC MODEL] SA377(WITH SA-75U)</b></p>	<p><b>[ANTI-STATIC MODEL] SA378(WITH SA-75U)</b></p>
<p><b>Ambient temp.</b></p>	<p>-40°C~60°C</p>	<p>-40°C~60°C</p>	<p>-40°C~60°C</p>
<p><b>Operating temp.</b></p>	<p>-40°C~80°C</p>	<p>-40°C~190°C</p>	<p>-40°C~80°C</p>
<p><b>Operation Pressure</b></p>	<p>20kg/cm<sup>2</sup></p>	<p>20kg/cm<sup>2</sup></p>	<p>20kg/cm<sup>2</sup></p>
<p><b>Prob material</b></p>	<p>SUS 304/316</p>	<p>PTFE Coating</p>	<p>UPE Coating</p>
<p><b>Insulated material</b></p>	<p>UPE</p>	<p>PTFE</p>	<p>UPE</p>
<p><b>Connection</b></p>	<p>2-1/2"x 5kg/cm<sup>2</sup> Flange (SUS)</p>	<p>1"PT Screw (SUS)</p>	<p>1"PT Screw (SUS)</p>
<p><b>Sensitivity range</b></p>	<p>10pF (Rotary knob)</p>		
<p><b>Weight</b></p>	<p>Approx. 3.2kg</p>	<p>Approx. 3.1kg</p>	<p>Approx. 2kg</p>
<p><b>Housing spec.</b></p>	<p>Aluminum IP65</p>		
<p><b>Supply voltage</b></p>	<p>16~24Vdc</p>		
<p><b>Enclosure protection</b></p>	<p>Ex ia IIC T3/T4 Ga</p>		
<p><b>Power consumption</b></p>	<p>2W</p>		
<p><b>Output rating</b></p>	<p>NPN 100mA</p>		

# SA-75U INTRINSIC SAFE SIGNAL CONDITIONER

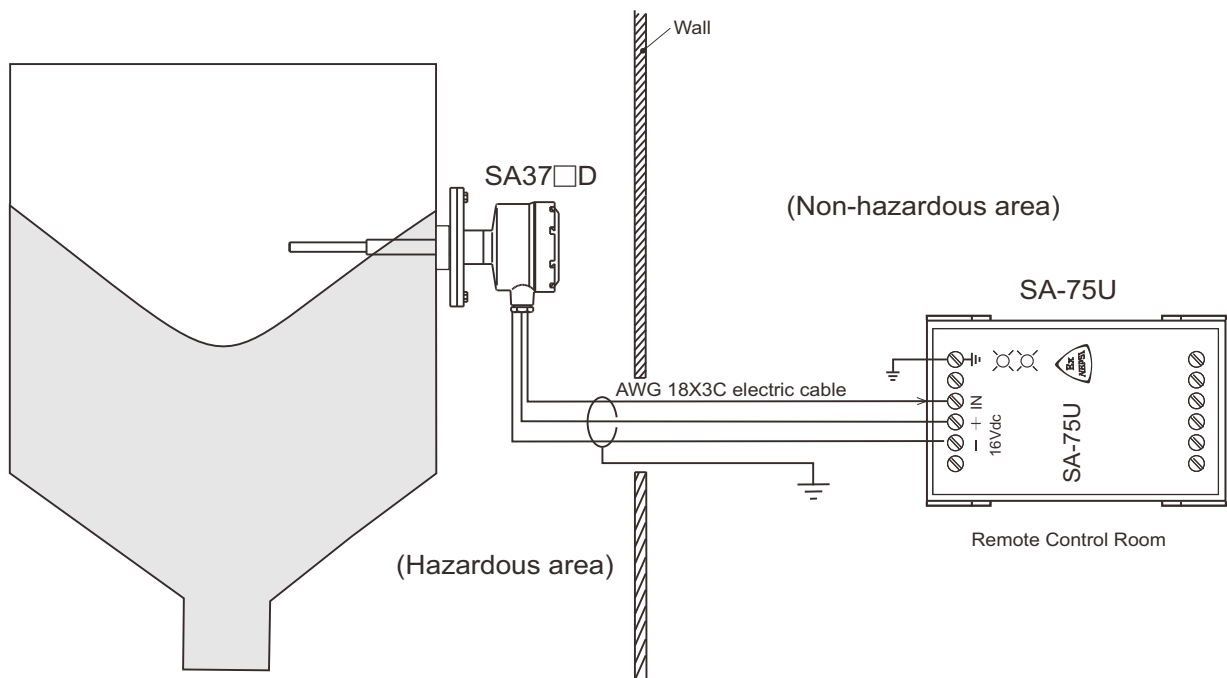
NEPSI PROOF

SA-75U Zener barriers inside provide intrinsic safety to SA37□ mole level switch. The unit works uses a current-limiting feature protecting the device from power surges, sparks and other electrical damage.

1. Supply voltage : 110 / 220Vac ± 3%
2. Power consumption : 2W
3. Input signal : NPN transistor  
resistance Ri= 500Ω
4. Output voltage : 16 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 Ga IIC



## ■ WIRING CONFIGURATION



# CALIBRATION (Rotary knob)

## INITIAL CALIBRATION

1. Turn the "SENSITIVITY" to the "H" position.
2. Place a flat screw driver in the "Coarse" hole, turn clockwise until INDICATOR turns on.  
Check whether "Indicator" light is on or not by turning the "Sensitivity Adj" knob again.
3. If not, repeat procedure then, please continue to next step "SENSITIVITY ADJUSTMENT".

## SENSITIVITY ADJUSTMENT

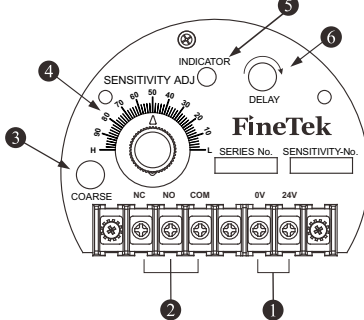
1. Initially, the "Indicator" LED will turn off when the Tank's material doesn't contact the probe.
2. When making contact with the probe, it will turn on. As soon as LED turns on, adjust the " SENSITIVITY " until the light turns off. Turn the knob " SENSITIVITY " to the middle position between where it turned off and "H"

## DELAY FUNCTION CALIBRATION

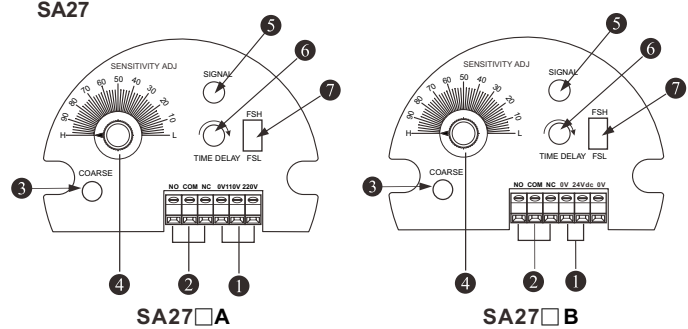
The default setting is 0 second when material comes into contact with the probe (Indicator ON)  
For setting the delay function, turn the screw clockwise. The further clockwise, the longer the delay. The delay function is suitable for mediums with agitators, splashing or level turbulence in the Tank.

## PANEL DESCRIPTION

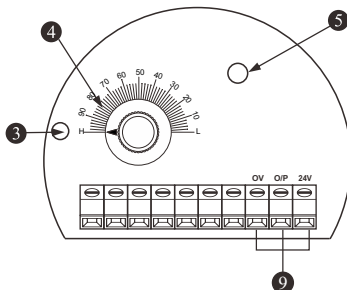
SA110,120,130,150,160,180



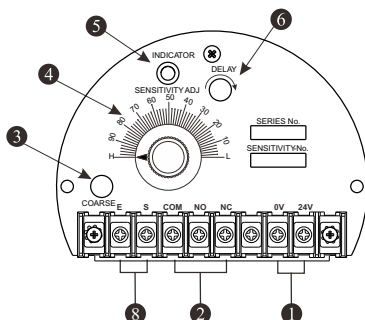
Explosion proof model  
SA27



Intrinsically safe type SA 370□



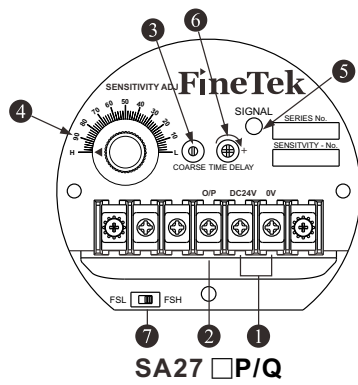
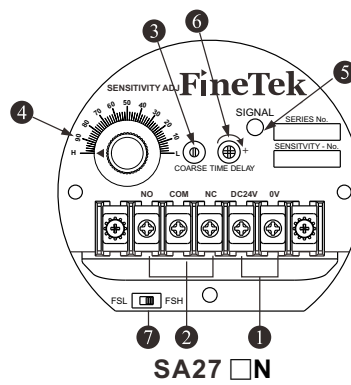
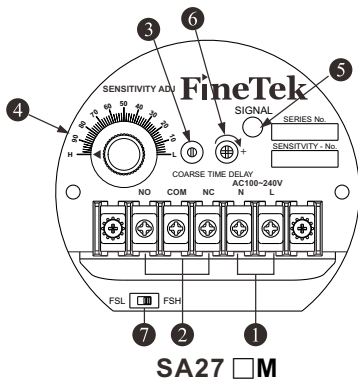
Remote probe model SA140



- ① : Power
- ② : Output
- ③ : Coarse position
- ④ : Sensitivity
- ⑤ : Level indicator
- ⑥ : Time delay setting
- ⑦ : Fail-safe switch
- ⑧ : Connect with probe connection
- ⑨ : Connect with the Intrinsically safe end of SA-75U

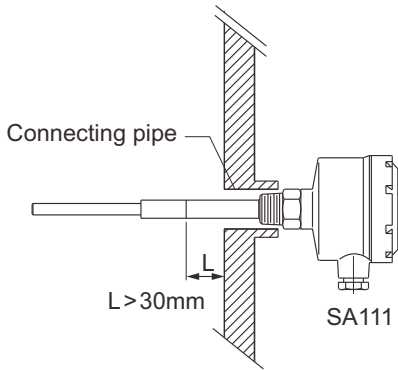
# CALIBRATION (Rotary knob)

Explosion - proof SA27 vertical module

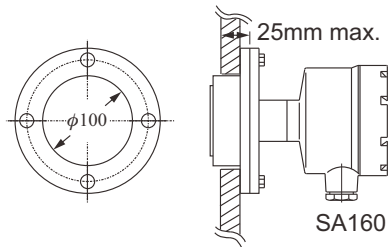


- ① : Power
- ② : Output
- ③ : Coarse position
- ④ : Sensitivity
- ⑤ : Level indicator
- ⑥ : Time delay setting
- ⑦ : Fail-safe switch

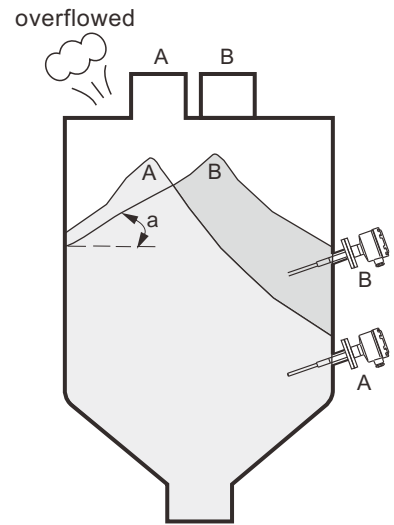
# INSTALLATION NOTICE



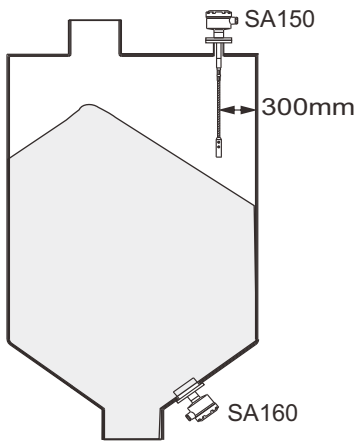
The insulation part should be mounted to protrude 30mm from the vessel wall.



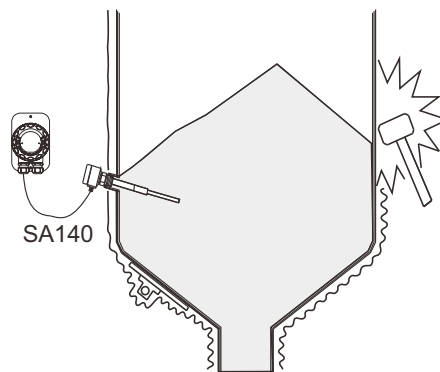
SA160 should be mounted as above.



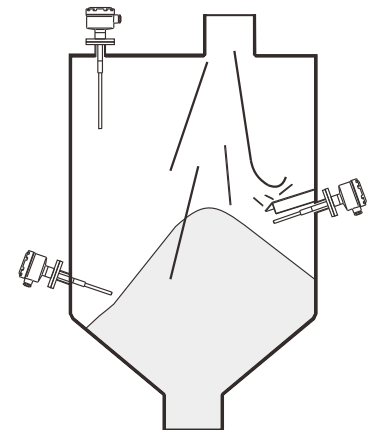
Be cautious with installation location. Angle of repose must be considered if inlet is not located in center top of the tank.



If the probe is mounted on the top, make sure the length of probe long enough to touch the highest level of medium. The SA160 model is usually installed at the lower wall of the tank.

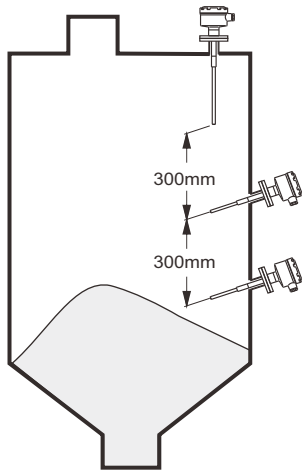


For Non-Stationary or vibrating environment, a separate control unit such as the SA140 is suggested.

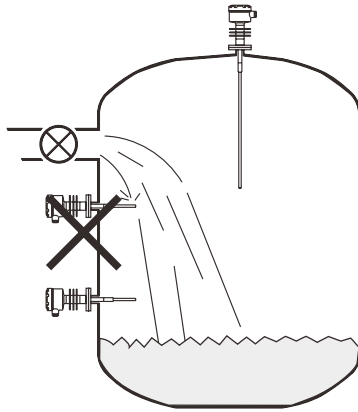


It is suggested to install the probe away from the inlet to reduce the risk of inflowing material damaging the probe. If the probe is near an inlet, it is recommended to place a protective cover 200mm above the probe. The cover should be parallel to the probe and the same length.

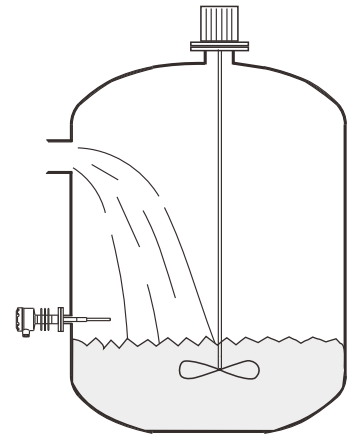




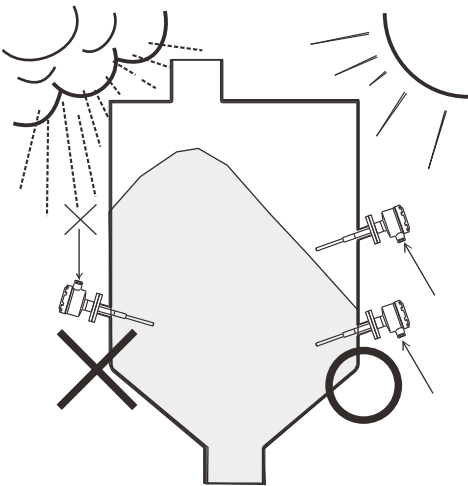
If two parallel probes are mounted, they must be installed separately at least 300 mm to minimize interference .



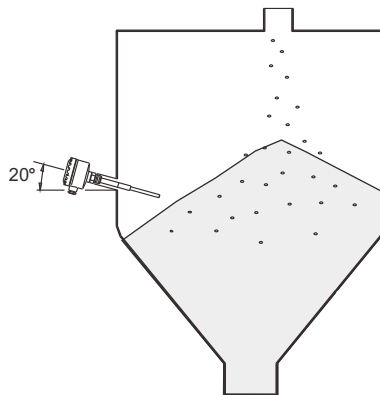
The probe should not be mounted underneath a liquid inlet, otherwise it will switch on erroneously.



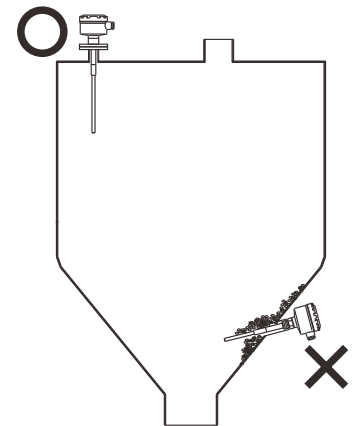
If the tank equips with agitator, please use the time-delay type to prevent fault level detection.



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.

## MODEL NUMBER / ORDER CODE COMPARISON TABLE

Model Number	Order Code
SA110	SAX10000-A
SA111	SAX10000-B
SA120	SAX10200-B
SA128	SAX10800-C
SA130	SAX10000-D
SA132	SAX10000-E
SA140	SAX10400-B
SA150	SAX10000-F
SA160	SAX10000-G
SA180	SAX10000-H
SA181	SAX10200-H

Model Number	Order Code
SA370	SAX1007B-A
SA371	SAX1007B-B
SA372	SAX1027B-B
SA373	SAX1007B-D
SA374	SAX1007B-E
SA375	SAX1007B-F
SA376	SAX1007B-G
SA377	SAX1027B-H
SA378	SAX1007B-H

Model Number	Order Code
SA270	SAX1007C-A
SA271	SAX1007C-B
SA272	SAX1027C-B
SA273	SAX1007C-D
SA274	SAX1007C-E
SA275	SAX1007C-F
SA276	SAX1007C-G
SA277	SAX1027C-H
SA278	SAX1007C-H





SAX1 <sup>05</sup> <sup>06</sup> <sup>07</sup> <sup>08</sup> - <sup>09</sup> <sup>10</sup> <sup>11</sup> <sup>12</sup> <sup>13</sup> <sup>14</sup> <sup>15</sup> <sup>16</sup> <sup>17</sup> <sup>18</sup> <sup>19</sup> <sup>20</sup> <sup>21</sup> <sup>22</sup> <sup>23</sup> <sup>24</sup> <sup>25</sup>

<sup>17</sup> Output signal

- R: Relay
- P: PNP
- N: NPN
- M: MOS
- (Ex ia only NPN optional)

<sup>18</sup> <sup>19</sup> Probe material

- MA: SUS 304
- MB: SUS 316
- 18: PP coating
- 21: PTFE coating
- 24: PVDF coating
- 33: UPE coating

<sup>20</sup> <sup>21</sup> Insulated material

- 00: None
- 13: PEEK
- 32: Ceramics
- 33: UPE

<sup>22</sup> <sup>23</sup> <sup>24</sup> <sup>25</sup> Length

Code	Probe Length
0036~3000	0036~3000mm