www.fine-tek.com

Capacitance Level Switch

FineTek

Innovation · Quality · Sharing

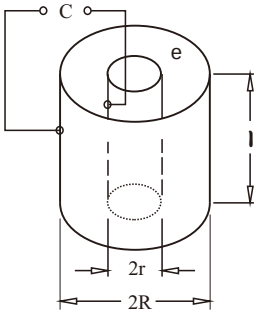
PRODUCT INTRODUCTION

■ 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.



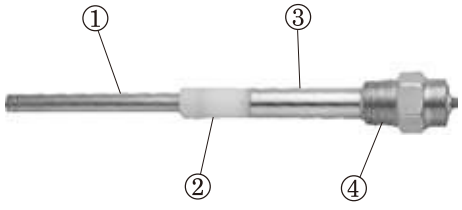
$C = e\,l\ /\log(R/r)$

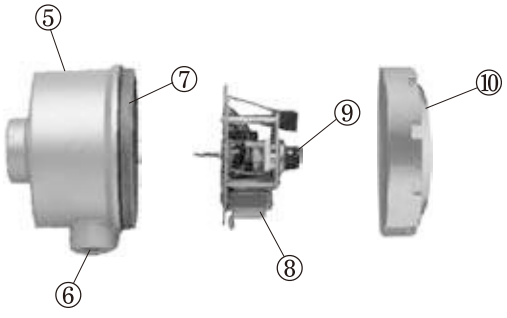
■ FEATURES AND APPLICATIONS

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)**
   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 T_A,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)

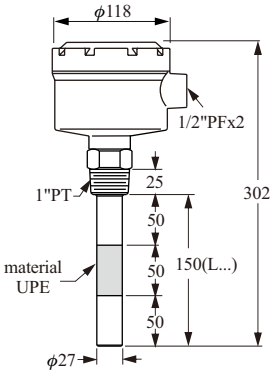
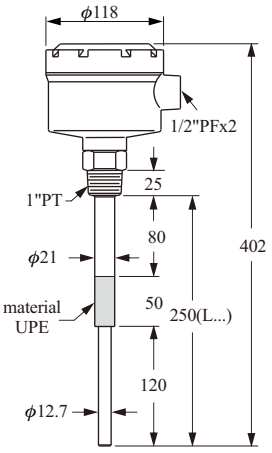
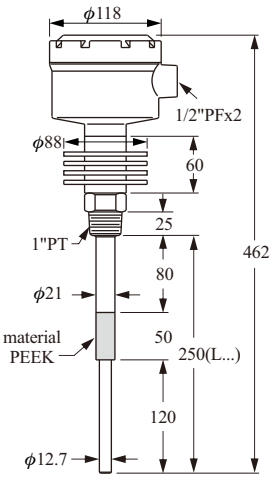
■ CONSTRUCTION





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)
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 : 14.6pF
10. Cover : ADC-12 Aluminum

STANDARD MODEL

Dimensions			
Order No.	**[STANDARD MODEL] SA110**	**[STANDARD MODEL] SA111**	**[HI-TEMP. MODEL] SA120**
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^2	20kg/cm^2	20kg/cm^2
Prob 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	14.6pF (std.)		
Weight	Approx. 1.9kg	Approx. 1.9kg	Approx. 2.4kg
Housing	Aluminum IP65		
Supply voltage	110/220Vac±10% or 19~24Vdc		
Delay time	0~6 sec		
Power consumption	2W		
Output rating	Relay: 5A/250Vac/30Vdc,NPN 100mA		

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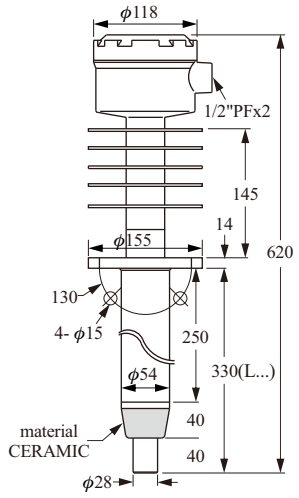
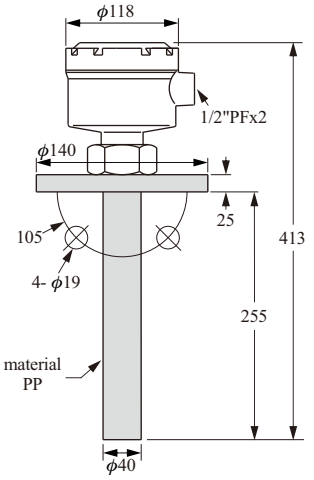
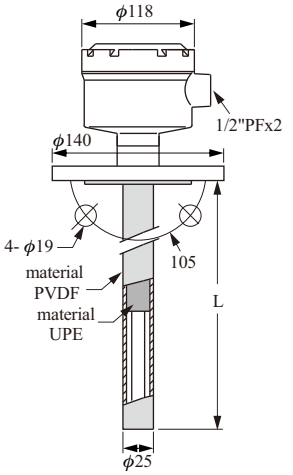
Dimensions			
Order No.	**[SUPER HI-TEMP. MODEL] SA128**	**[CORROSION-PROOF MODEL] SA130**	**[CORROSION-PROOF MODEL] SA132**
Ambient temp.	-20°C~60°C	-20°C~60°C	-20°C~60°C
Operating temp.	-20°C~800°C	-20°C~80°C	-20°C~120°C
Operation Pressure	ATM	20kg/cm^2	20kg/cm^2
Prob material	SUS 304/316	SUS 304 Coating PP	SUS304 Coating PVDF
Insulated material	CERAMIC	UPE	UPE
Connection	2-1/ 2"x5kg/cm^2 Flange(SUS)	1-1/2"x10kg/cm^2 Flange(PP)	1-1/2"x10kg/cm^2 Flange(SUS) (5mm PVDF)
Sensitivity range	14.6pF (std.)		
Weight	Approx. 6.5kg	Approx. 2kg	————
Housing	Aluminum IP65		
Supply voltage	110/220Vac±10% or 19~24Vdc		
Delay time	0~6 sec		
Power consumption	2W		
Output rating	Relay: 5A/250Vac/30Vdc,NPN 100mA		

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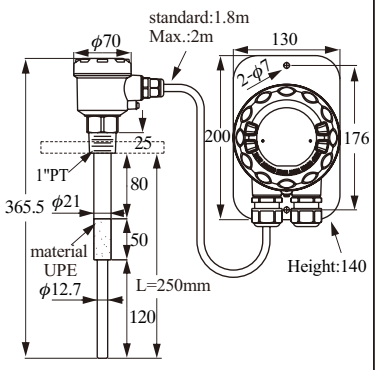
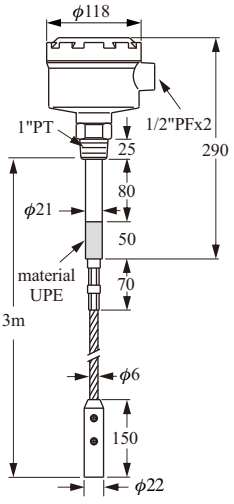
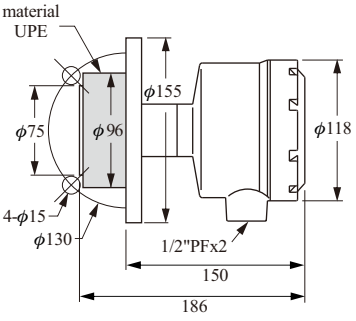
Dimensions			
Order No.	**[REMOTE PROBE MODEL] SA140**	**[WIRE-PROBE MODEL] SA150**	**[PLATE MODEL] SA160**
Ambient temp.	-20°C~60°C	-20°C~60°C	-20°C~60°C
Operating temp.	-20°C~80°C	-20°C~80°C	-20°C~80°C
Operation Pressure	20kg/cm^2	20kg/cm^2	20kg/cm^2
Prob material	SUS 304/316	SUS 304/316 cable	SUS 304/316
Insulated material	UPE	UPE	UPE
Connection	1"PT Screw (SUS)	1"PT Screw (SUS)	2-1/2"x 5kg/cm^2 Flange(SUS)
Sensitivity range	14.6pF (std.)		
Weight	Approx. 3kg	Approx. 4.1kg	Approx. 3.2kg
Housing	Aluminum IP65		
Supply voltage	110/220Vac±10% or 24Vdc±20%	110/220Vac±10% or 19~24Vdc	
Delay time	0~8 sec	0~6 sec	
Power consumption	2W		
Output rating	Relay: 5A/250Vac/30Vdc,NPN 100mA		

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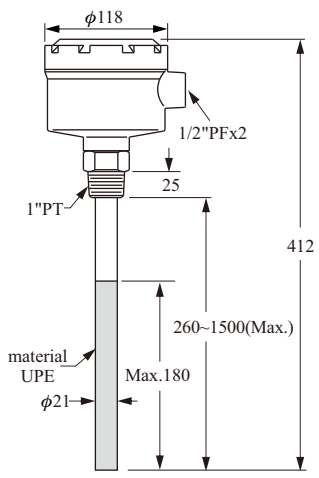
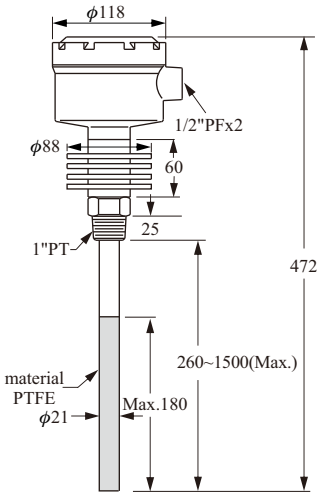
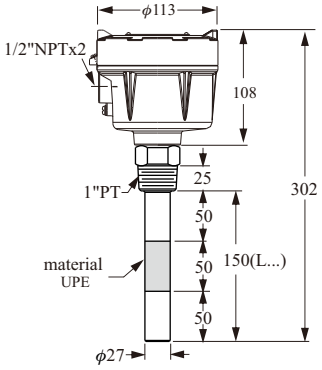
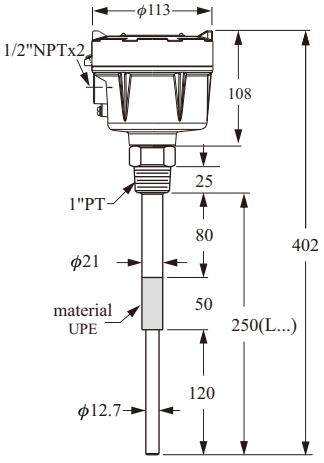
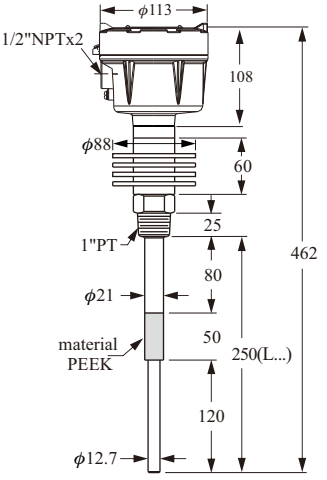
Dimensions		
Order No.	**[ANTI-STATIC MODEL] SA180**	**[HI-TEMP. ANTI-STATIC MODEL] SA181**
Ambient temp.	-20°C~60°C	-20°C~60°C
Operating temp.	-20°C~80°C	-20°C~200°C
Operation Pressure	20kg/cm^2	20kg/cm^2
Prob material	UPE Coating	PTFE Coating
Insulated material	UPE	PTFE
Connection	1"PT Screw (SUS)	
Sensitivity range	14.6pF (std.)	
Weight	Approx. 2kg	Approx. 2.5kg
Housing	Aluminum IP65	
Supply voltage	110/220Vac±10% or 19~24Vdc	
Delay time	0~6 sec	
Power consumption	2W	
Output rating	Relay: 5A/250Vac/30Vdc,NPN 100mA	

EXPLOSION PROOF MODEL

NEPSI Ex d/ia IIC T3~T6 Gb/Ga
DIP A20/A21 T_A, T3~T6

Dimensions			
Order 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~200°C
Operating pressure	20kg/cm^2	20kg/cm^2	20kg/cm^2
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	14.6pF (std.)		
Weight	Approx. 1.9kg	Approx. 2.4kg	Approx. 4.1kg
Housing spec.	Aluminum IP65		
Supply voltage	110/220Vac±10% or 24Vdc±20%		
Enclosure protection	Ex d/ia IIC T3~T6 Gb/Ga, DIP A20/A21 T_A ,T3~T6		
Power consumption	2W		
Output contact rating	Relay: 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		

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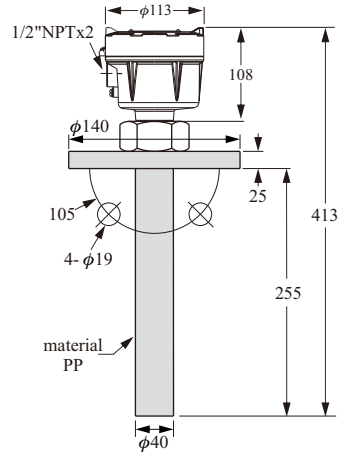
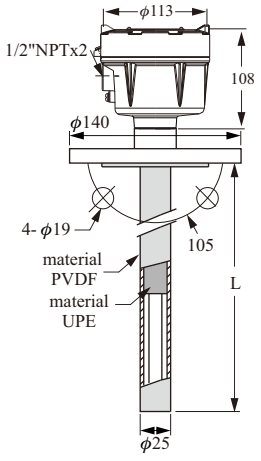
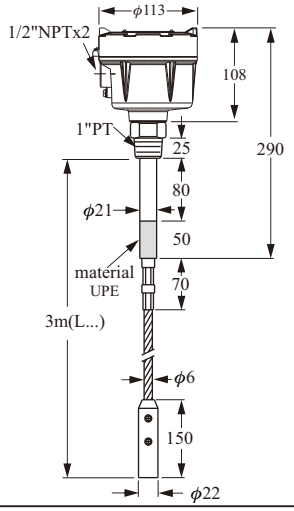
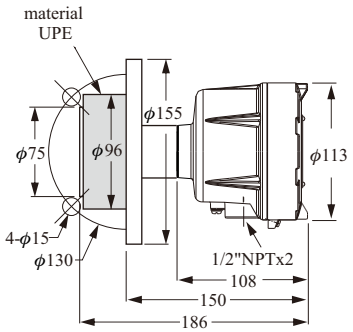
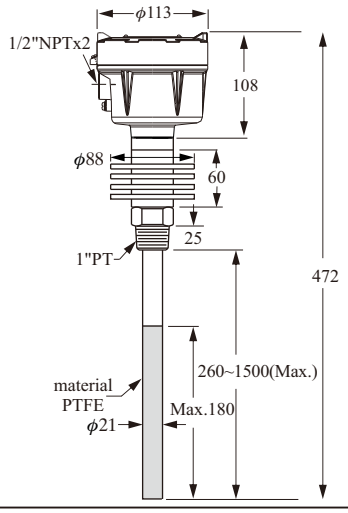
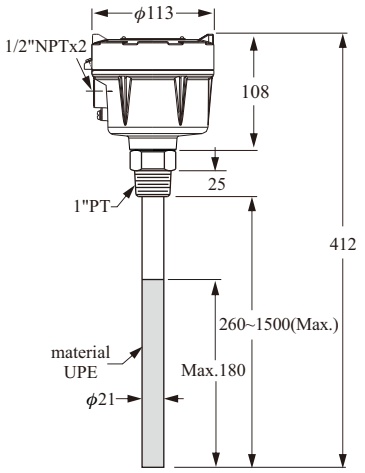
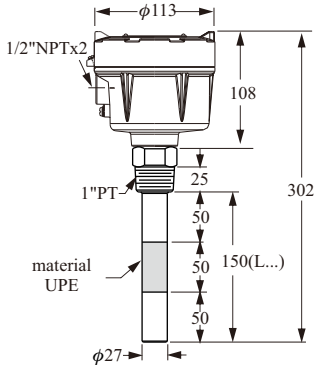
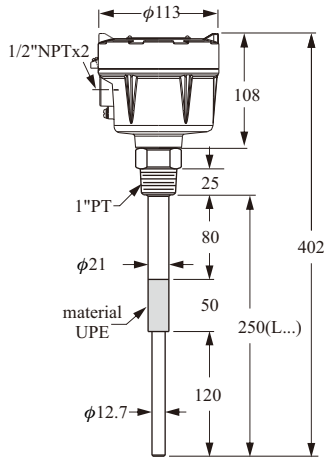
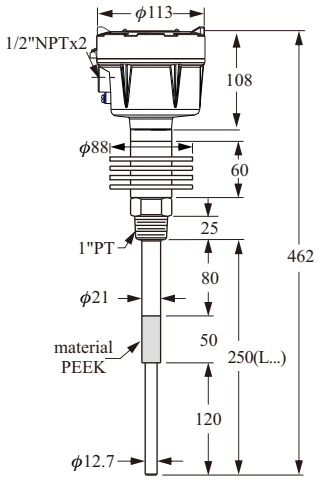
Dimensions			
Order No.	**[CORROSION-PROOF MODEL] SA273**	**[CORROSION-PROOF MODEL] SA274**	**[WIRE-PROBE MODEL] SA275**
Ambient temp.	-20°C~60°C	-20°C~60°C	-20°C~60°C
Operating temp.	-20°C~80°C	-20°C~120°C	-20°C~80°C
Operating pressure	20kg/cm^2	20kg/cm^2	20kg/cm^2
Probe material	SUS 304/316(PP Coating)	SUS 304/316(PVDF Coating)	SUS 304/316 Cable
Insulated material	UPE	UPE	UPE
Connection	1-1/2"x10kg/cm^2 (PP)	1-1/2"x10kg/cm^2 (SUS) W / 5mm PVDF Cushion	1"PT Screw (SUS)
Sensitivity range	14.6pF (std.)		
Weight	Approx. 1.9kg	Approx. 2.4kg	Approx. 4.1kg
Housing spec.	Aluminum IP65		
Supply voltage	110/220Vac±10% or 24Vdc±20%		
Enclosure protection	Ex d/ia IIC T3~T6 Gb/Ga, DIP A20/A21 T_A ,T3~T6		
Power consumption	2W		
Output contact rating	Relay: 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			
Order No.	**[PLATE MODEL] SA276**	**[HI-TEMP. ANTI-STATIC MODEL] SA277**	**[ANTI-STATIC MODEL] 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
Operating pressure	20kg/cm^2	20kg/cm^2	20kg/cm^2
Probe material	SUS 304/316	PTFE Coating	UPE Coating
Insulated material	UPE	PTFE	UPE
Connection	2-1/2"x 5kg/cm^2 Flange (SUS)	1"PT Screw (SUS)	1"PT Screw (SUS)
Sensitivity range	14.6pF (std.)		
Weight	Approx. 3.2kg	Approx. 3.1kg	Approx. 2kg
Housing spec.	Aluminum IP65		
Supply voltage	110/220Vac ± 10% or 24Vdc ± 20%		
Enclosure protection	Ex d/ia IIC T3~T6 Gb/Ga, DIP A20/A21 T_A ,T3~T6		
Power consumption	2W		
Output contact rating	Relay: 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			
Order No.	**[STANDARD MODEL] SA370(WITH SA-75U)**	**[STANDARD MODEL] SA371(WITH SA-75U)**	**[HI-TEMP. MODEL] 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^2	20kg/cm^2	20kg/cm^2
Prob 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	14.6pF (std.)		
Weight	Approx. 1.9kg	Approx. 2.4kg	Approx. 2.4kg
Housing spec.	Aluminum IP65		
Supply voltage	16~24Vdc		
Enclosure protection	Ex ia IIC T3/T4 Ga		
Power consumption	2W		
Output rating	NPN 100mA		

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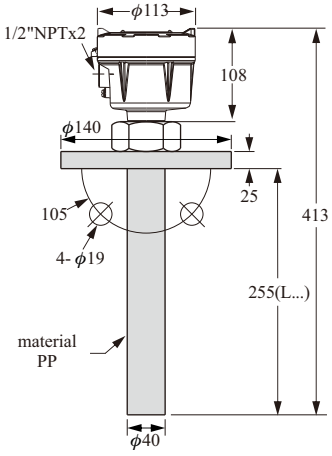
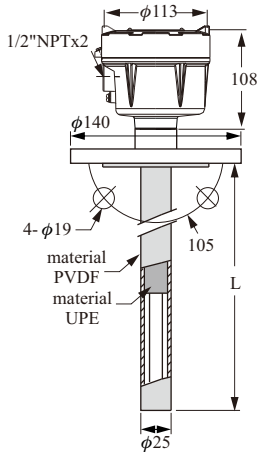
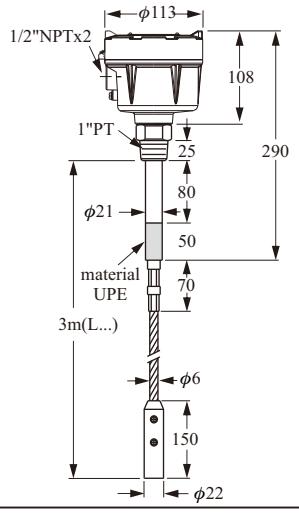
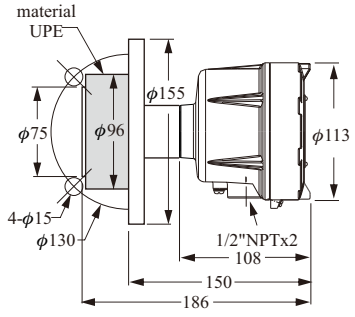
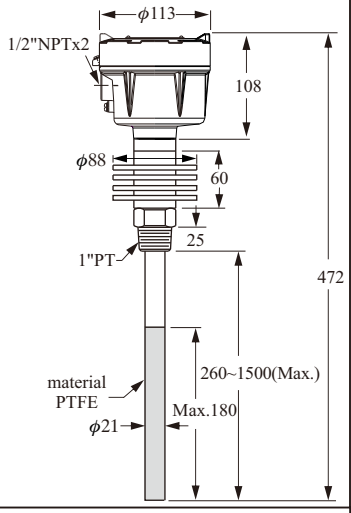
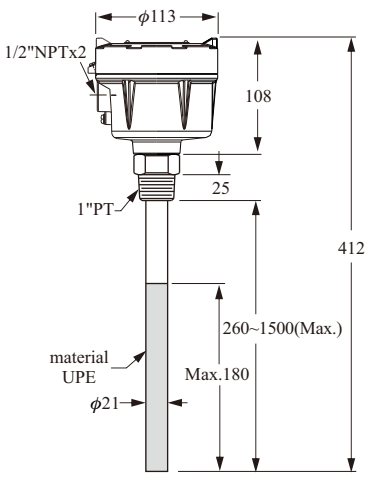
Dimensions			
Order No.	**[CORROSION-PROOF MODEL] SA373(WITH SA-75U)**	**[CORROSION-PROOF MODEL] SA374(WITH SA-75U)**	**[WIRE-PROBE MODEL] SA375(WITH SA-75U)**
Ambient temp.	-20°C~60°C	-20°C~60°C	-20°C~60°C
Operating temp.	-20°C~80°C	-20°C~120°C	-20°C~80°C
Operation Pressure	20kg/cm^2	20kg/cm^2	20kg/cm^2
Prob material	SUS 304/316(PP Coating)	SUS 304/316(PVDF Coating)	SUS 304/316 Cable
Insulated material	PTFE or UPE	UPE	UPE
Connection	1-1/2"x10kg/cm^2 (PP)	1-1/2"x10kg/cm^2 (SUS) W / 5 mm PVDF Cushion	1"PT Screw (SUS)
Sensitivity range	14.6pF (std.)		
Weight	Approx. 1.9kg	————	Approx. 4.1kg
Housing spec.	Aluminum IP65		
Supply voltage	16~24Vdc		
Enclosure protection	Ex ia IIC T3/T4 Ga		
Power consumption	2W		
Output rating	NPN 100mA		

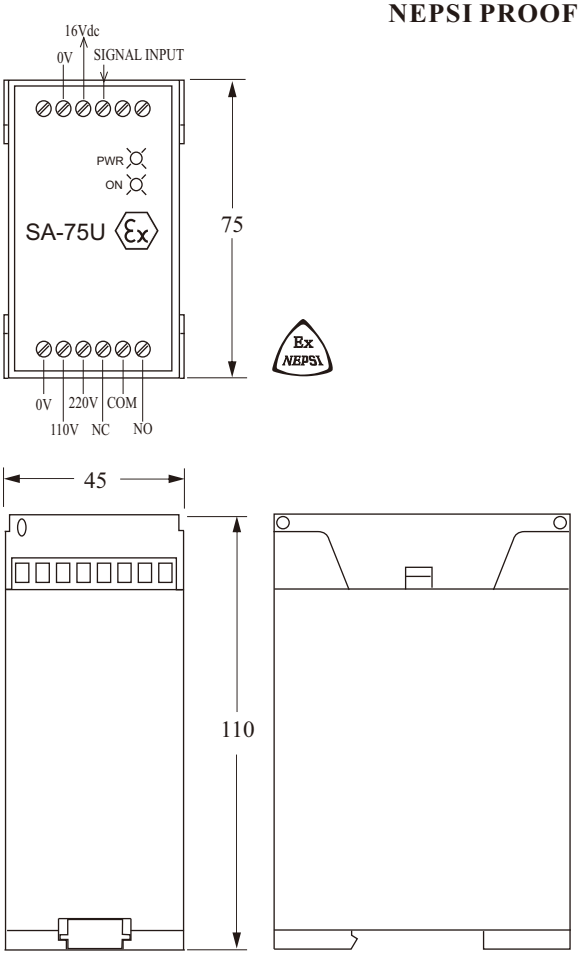
Dimensions			
Order No.	**[PLATE MODEL] SA376(WITH SA-75U)**	**[HI-TEMP. ANSI-STATIC MODEL] SA377(WITH SA-75U)**	**[ANTI-STATIC MODEL] SA378(WITH SA-75U)**
Ambient temp.	-20°C~60°C	-20°C~60°C	-20°C~60°C
Operating temp.	-20°C~80°C	-20°C~200°C	-20°C~80°C
Operation Pressure	20kg/cm^2	20kg/cm^2	20kg/cm^2
Prob material	SUS 304/316	PTFE Coating	UPE Coating
Insulated material	UPE	PTFE	UPE
Connection	2-1/2"x 5kg/cm^2 Flange (SUS)	1"PT Screw (SUS)	1"PT Screw (SUS)
Sensitivity range	14.6pF (std.)		
Weight	Approx. 3.2kg	Approx. 3.1kg	Approx. 2kg
Housing spec.	Aluminum IP65		
Supply voltage	16~24Vdc		
Enclosure protection	Ex ia IIC T3/T4 Ga		
Power consumption	2W		
Output rating	NPN 100mA		

SA-75U INTRINSIC SAFE SIGNAL CONDITIONER

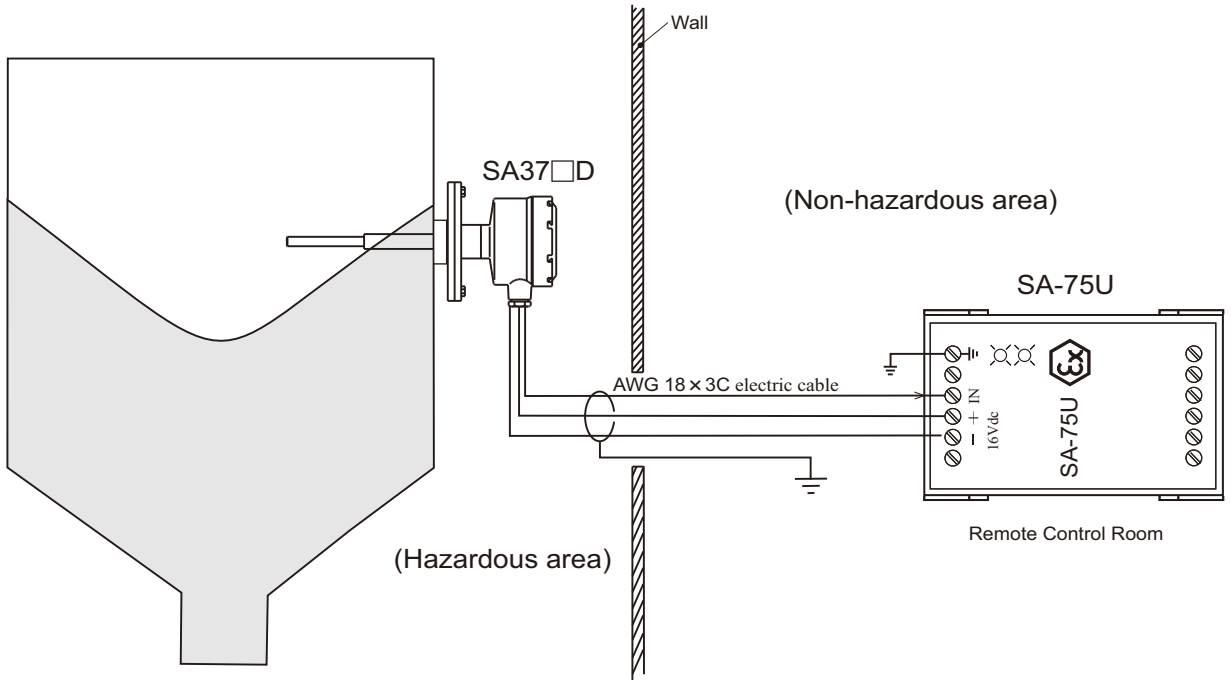
NEPSI PROOF

SA-75U Zener barriers inside provide intrinsic safety to SA37□ molel 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



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CALIBARATION

SENSITIVITY ADJUSTMENT

1. After installation or hold this sensor in hand, connect with power and make sure there is no material within 300 mm around the probe.
2. Fine adjustment, switch “SENSITIVITY ADJ 1~6” to “OFF” position.
3. Use flat-head screwdriver to turn “Coarse” clockwisely for rough adjustment until LED indicator is “ON”.
4. Switch “SENSITIVITY ADJ 1” to “ON” . Check if LED indicator is OFF. If yes, rough adjustment is complete.
5. switch “SENSITIVITY ADJ 3 and 4” to “ON”.

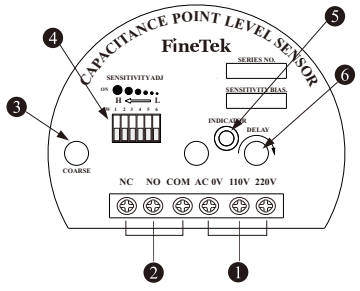
※ “SENSITIVITY ADJ 1~6” represent its dielectric value, 1=0.3pF, 2=0.5pF, 3=1pF, 4=2pF, 5=4pF, 6=6.8pF total 14.6pF. Increase the dielectric value to decrease the sensitivity. Decrease the dielectric value to Increase the sensitivity.

DELAY FUNCTION CALIBRATION

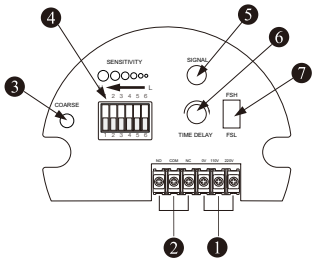
The default setting is 0 second when material comes into contact with the probe (Indicator ON)
For setting the delay function, turn the screw clockwise. The further clockwise, the longer the delay. The delay function is suitable for mediums with agitators, splashing or level turbulence in the tank.

PANEL DESCRIPTION

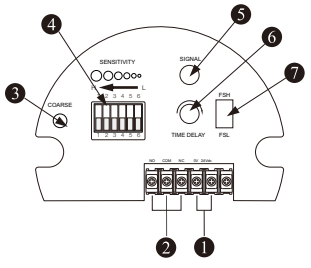
SA110,120,130,150,160,180



Explosion proof model
SA27

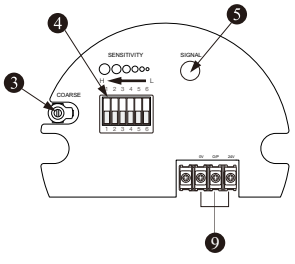


SA27□A

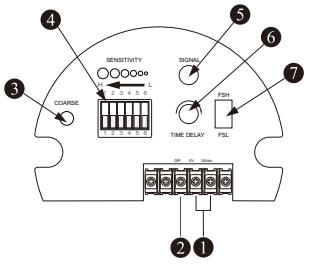


SA27□B

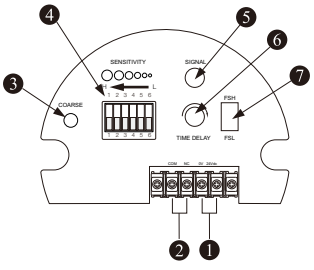
Intrinsically safe type
SA 370



SA37□(SAX10□7B)

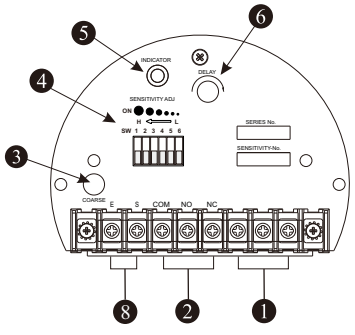


SA27□C/E



SA27□F

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

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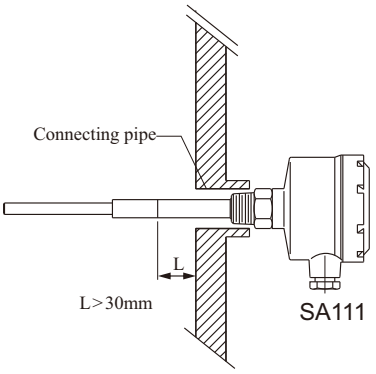
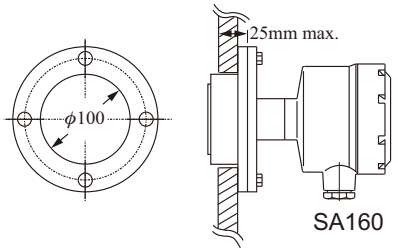
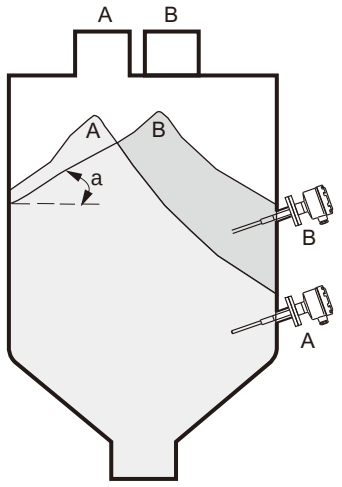
INSTALLATION NOTICE



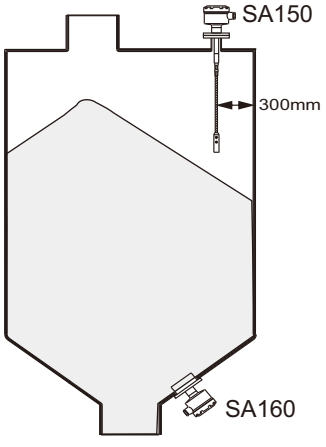
The insulation part should be mounted to protrude 30mm from the vessel wall.



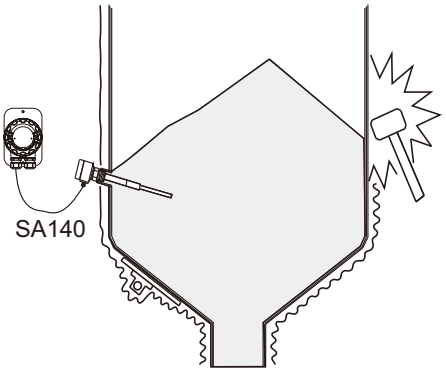
SA160 should be mounted as above.



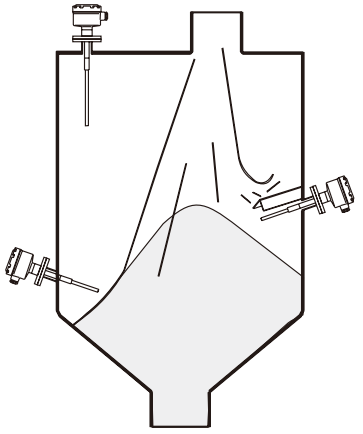
To prevent false readings,check the flow pattern (angle a) of the material and place the probe in the appro-priate location.



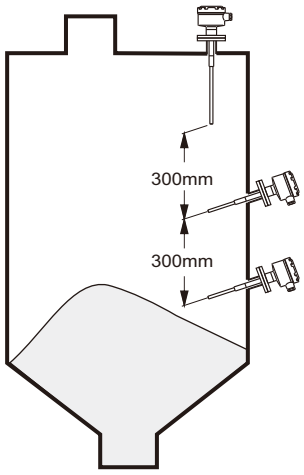
If the probe is mounted on the top, make sure the length of probe long enough to touch the highest level of medium.
The SA160 MODEL is usually installed at the lower wall of the tank.



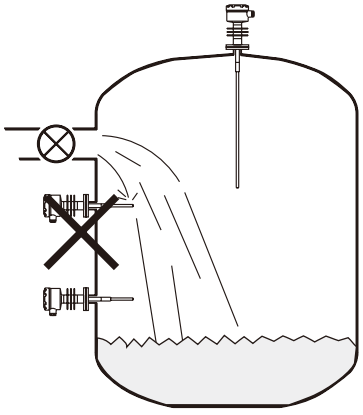
For Non-Stationary or vibrating environment, a separate control unit such as the SA140 is suggested.



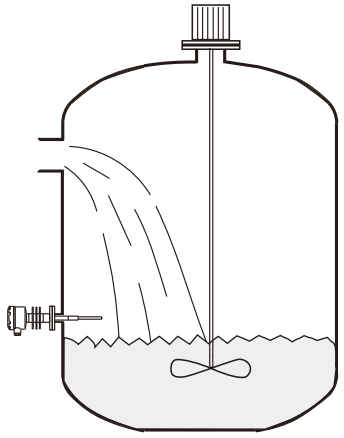
It is suggested to install the probe away from the inlet to reduce the risk of inflowing material damaging the probe. If the probe is near an inlet, it is recommended to place a protective cover 200mm above the probe. The cover should be parallel to the probe and the same length.



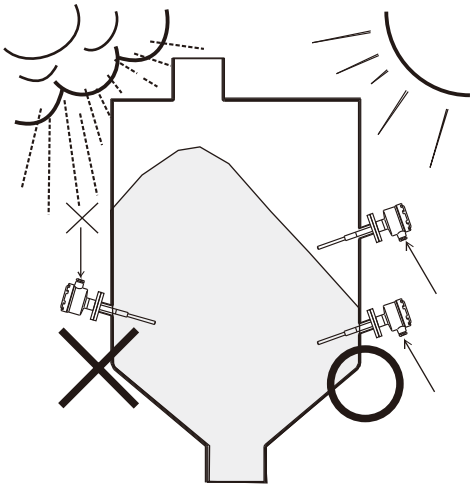
If two parallel probes are mounted, they must be installed separately at least 300 mm to minimize interference .



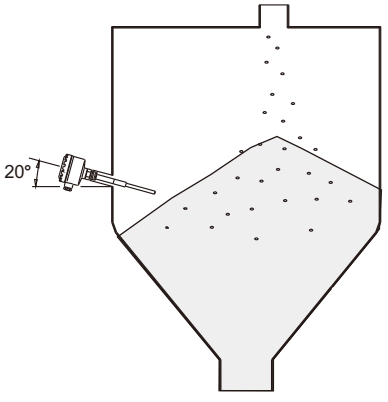
The probe should not be mounted underneath a liquid inlet, otherwise it will switch on erroneously.



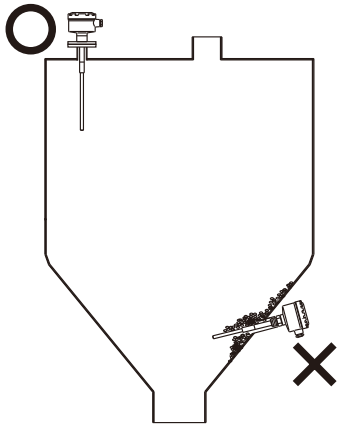
If the tank equips with agitator, please use the time-delay type to prevent fault level detection.



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.

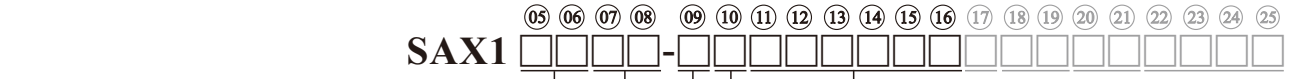
MODEL NUMBER / ORDER CODE COMPARISON TABLE

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	SAX1007B-H
SA378	SAX1027B-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

ORDER INFORMATION



⑤⑥ Model

00：Standard
02：Hi-temperature
04：Remote probe
08：Super Hi-temperature

⑦⑧ Certification

00：None
7B：NEPSI-Ex ia
7C：NEPSI-Ex d

(Next page)

⑨ Type

A：ϕ27 Standard type
B：ϕ12.7 Standard type
C：Hi-temperature type
D：Corrosion probe standard type
E：Corrosion probe Hi-temperature type
F：Wire probe type
G：Plate type
H：Anti- Static type

⑩ Power supply

A：AC110V/220V
B：DC24V
C：DC16~24V(NEPSI-Ex ia Only)

Connection

⑪⑫	⑬⑭	⑮⑯
Flange item	A7：3/4"	01：PT male
AK：JIS-FF	A8：1"	03：PF male
AN：ANSI-RF	B1：1-1/2"	07：NPT male
AS：DIN-FF	B2：2"	40：5 kg/cm^2
	B4：2-1/2"	42：10 kg/cm^2
Thread item	D7：DN20	48：150 Lbs
AC：ANSI	D8：DN25	49：300 Lbs
AA：JIS	D9：DN32	57：PN10
	E1：DN40	58：PN16
	E2：DN50	
	E3：DN65	

⑰ Output signal

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

⑱⑲ Probe material

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

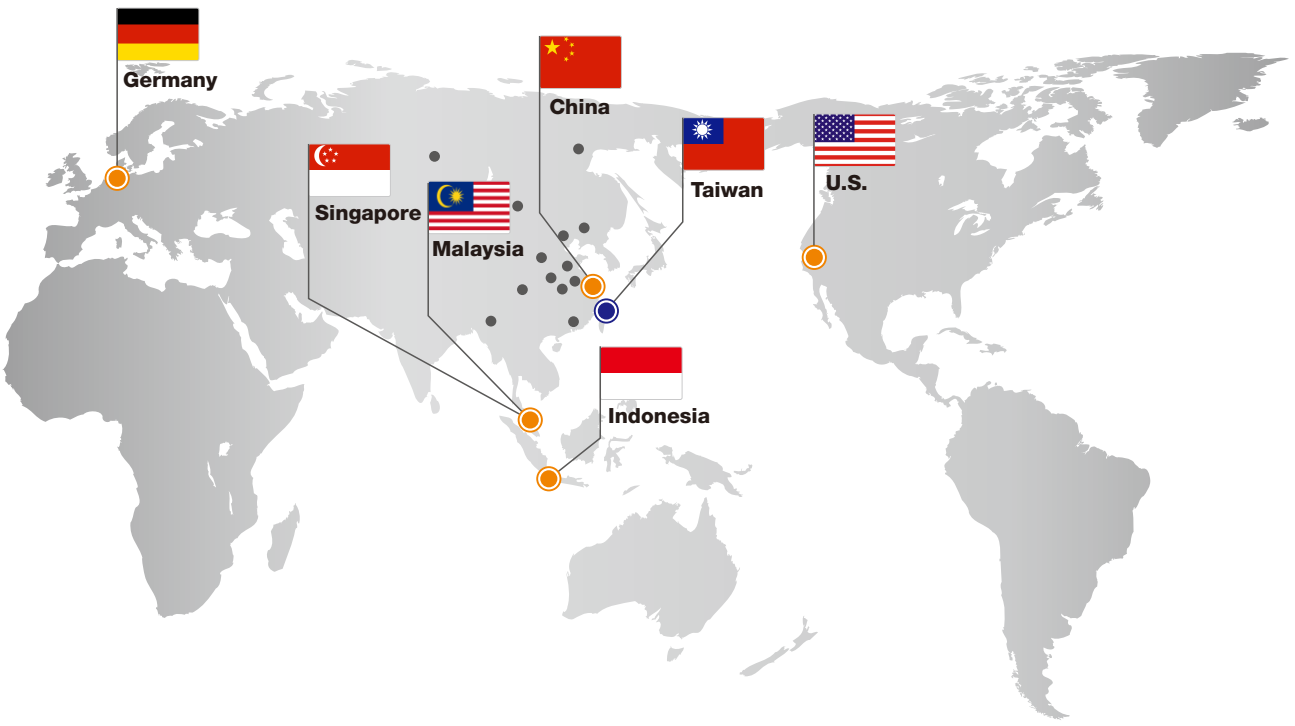
⑳㉑ Insulated material

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

㉒㉓㉔㉕ Length

Code	Probe Length
0036~3000	0036~3000mm

Global Network



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