

## CAPATIC Series

CAPACITANCE TYPE  
LEVEL SWITCH

### GENERAL

CAPATIC is a series of Capacitance type level switches. It can detect level of different liquids even conductive and non-conductive. Also it can be used for detection and measurement of interface of two liquids having different di-electric constant. (Detection of powder and solid level is also possible by CAPATIC. Consult factory for details.)

Among the methods of detection of level, CAPATIC is relatively cost-effective and its no moving part construction meets the requirements in wide applications.

In addition to normal weatherproof construction, intrinsically safe versions (i3aG4) suitable for hazardous area are available to cover petroleum, petrochemical, chemical process etc.

### FEATURES

#### ❑ COST PERFORMANCE

Compared to other existing level detection methods, i. e. Float type, Ultrasonic type, Pressure type, total instrumentation cost is relatively low.

#### ❑ WIDE APPLICATION

Almost all liquids, irrespective of its conductivity, can be detected. Also by selecting liquid contact material, corrosive liquids can be covered.

#### ❑ HIGH RELIABILITY

No moving part for detection. Durable and stable even for long time operation.

#### ❑ EASY ADJUSTMENT/COMMISSIONING

By rotating adjusting trimers, Actuating point, Zero point and Sapn can easily be adjusted. No special tools/instruments are required for adjustment/commissioning.

#### ❑ INTRINSICALLY SAFE VERSIONS

TIIS certified Intrinsically safe versions (i3aG4) are ready for level switches covering hazardous applications.



**CA-1000**

Non-explosion-proof /  
Weatherproof type

**CA-1000S**

Intrinsically safe  
explosion-proof type

### GENERAL SPECIFICATION

#### CONFIGURATION:

- 1) Probe and transmitter integrated (Weatherproof type)
- 2) Probe and transmitter separated (Intrinsically safe type)

#### MEASURING OBJECT:

- 1) Liquid level of which dielectric constant ( $\epsilon_s$ ) is more than 2 (Conductive or Non conductive)
- 2) Two liquid interface  
Difference of dielectric constant is to be more than 10 times.  
(Lower liquid should be bigger).  
Thiekness of interface should be fixed and the interface should be formed definitely.
- 3) Powder or solids subject detailed evaluation (Consult factory).

TEMP. RANGE : -10~300°C

Temp. range	Probe design and Material	Cooling fin
-10~80°C	Bare and PFA covered (PTFE Insulator)	Not provided
80~180°C	Bare and PFA covered (PTFE Insulator)	Provided
180~300°C	Bare (metallic) (Ceramic Insulator)	Provided

PRESS. RANGE STD. MAX. 1MPa

PROBE SPECIFICATION

DESIGN : Refer to ■ PROBE DESIGN AND APPLICATION

PROCESS CONNECTION : STD. 1B JIS10K FF Flange

Contact factory for special connection.

■ PROBE DESIGN AND APPLICATION.

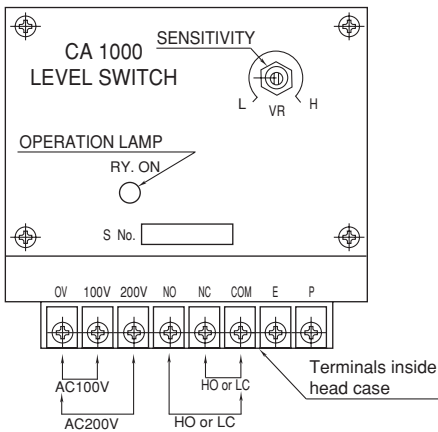
MATERIAL :

- ELECTRODE    Std. SUS304  
                  Opt. SUS316, SUS316L
  - INSULATOR    Std. PTFE  
                  Opt. Ceramics
  - COVER            PFA
  - SEALING        Std. FKM (Fluorine Rubber)  
                  Opt. NBR, VMQ (Silicone Rubber), Karletz
  - FLANGE         Std. SUS304  
                  Opt. SUS316, SUS316L
  - HEAD CASE     Aluminium Alloy (Silver painted)
  - COOLING FIN    Aluminium Alloy
- CABLE ENTRY : 1 × G3/4

WIRING

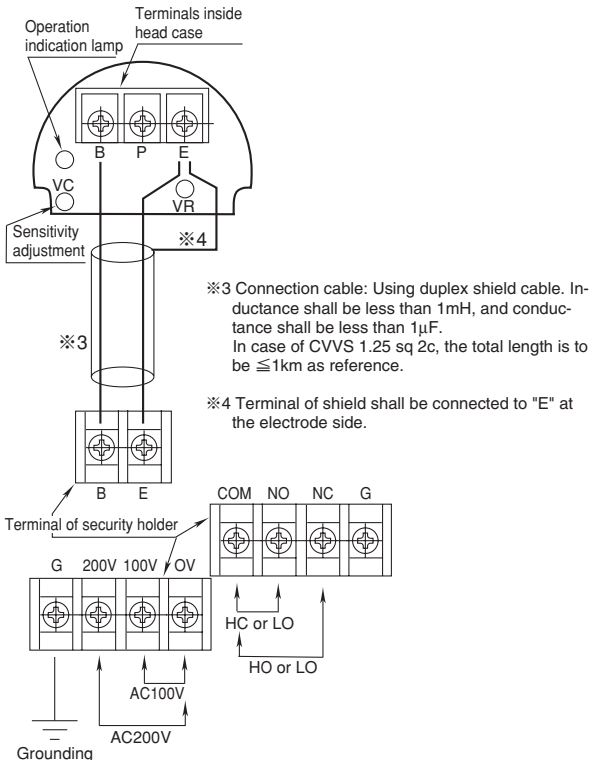
● Weatherproof Non-Ex type

CA-1 □□□ W



● Intrinsically safe type

CA-1 □□□ S



CA can also be used for pipe line empty detection.

MODEL CODE

Model code		Description	Face-to Face Dimension		
			150mm	160mm	
Type of probe	CA-1 1 1	Bare rod			
	1 2	Covered rod			
	1 3	Bare rod-High Load			
	1 5	Bare rod->180°C			
	3 1	For pipe line, bare	○		
	3 2	For pipe line, covered		○	
	9 1	Special			
	Length of probe L(mm)	1	250 *1		
		2	251~500		
3		501~750			
4		751~1000			
P		For pipe line			
9		Special			
Construction	W	Weatherproof, Non-Ex			
	S	Intrinsically safe			
Connection	- F	Flange conn.			
	- S	Screw conn.			
	- Z	Special			
Temp.	L	~ 80°C			
	H	~180°C			
	U	~300°C			

\*1 250mm or less will be special version.

TRANSMITTER SPECIFICATION

TYPE 1) Weatherproof type CA-1 □□□ W

Probe and transmitter integrated (IP54 equivalent)

2) Intrinsically safe, i3aG4 type CA-1 □□□ S

Probe and transmitter separated

Transmitter to be installed in Safe Area.

(IP20 equivalent)

Ex class ;Intrinsically Safe (i3aG4)

TIIS cert. NO. T39112

POWER SUPPLY 1) CA-1 □□□ W

AC95~115V or AC190~230V, 50/60Hz

2) CA-1 □□□ S

AC100V or AC200V, 50/60Hz

CONSUMPTION 6VA

OUTPUT 1 × SPDT, Relay Contact

CONTACT CAPACITY AC250V, 2A/DC30V, 2A

TRANSMISSION CABLE

1) CA-1 □□□ W

Standard Instrumentation cable

2) CA-1 □□□ S

Total inductance 1mH

Total capacitance 0.1 μ F

AMB. TEMP. -10~70°C (IS version -10~40°C)

AMB. HUMIDITY To be less than 95%RH (To be free from condensation)

PROBE DESIGN AND APPLICATION

WEATHERPROOF (CA-1□□□W)

MODEL	CA-111□W-FL	CA-111□W-FH	CA-115□W-FU	CA-112□W-FL	CA-112□W-FH
TEMP. RANGE	-10~80°C	~180°C	~300°C	-10~80°C	~180°C
DESIGN					

\*1: The lower end of "A" dimension is made to come out not less than 10mm from the mounting nozzle. Advise us of the length of mounting nozzle.

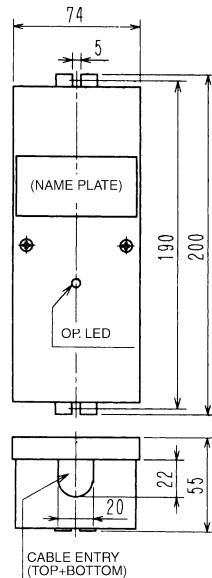
INTRINSICALLY SAFE TYPE (CA-1□□□S)

MODEL	CA-111□S-FL	CA-111□S-FH	CA-115□S-FU	CA-112□S-FL	CA-112□S-FH
TEMP. RANGE	-10~80°C	~180°C	~300°C	-10~80°C	~180°C
DESIGN					

\*1: The lower end of "A" dimension is made to come out not less than 10mm from the mounting nozzle. Advise us of the length of mounting nozzle.

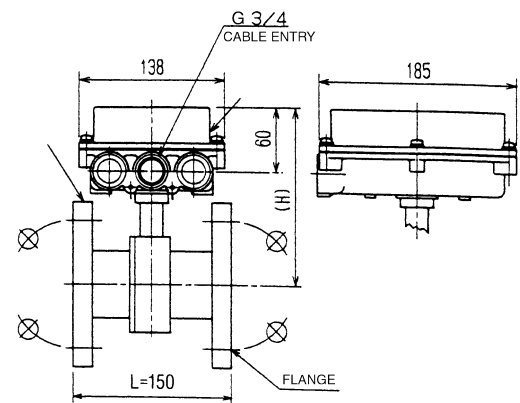
DIMENSION OF TRANSMITTER FOR INTRINSICALLY SAFE VERSION

(CA-1□□□S)



DIMENSION OF PIPE LINE DETECTOR

(CA-131PW-FL)



L=160mm for CA-132PW

## READ BEFORE USING CAPATIC SERIES

### 1. ELECTRIC CONDUCTIVITY OF MEASURING OBJECT

Keep in mind that, when the dielectric constant of the sensing object is not constant, it may cause the abnormalities of operation. The sensing element of Capacitance type Level Switch "CAPATIC" Series consists of the sensing electrode and ground electrode which are insulated mutually. The level is detected from the change of the capacitance produced between these two electrodes. The amount of change of capacitance is proportional to the dielectric constant of measuring object.

- Dielectric constant of the measured fluid is inversely proportional to the change of temperature. (For example: 0.5%/°C in case of water)
- As for the substance whose dielectric constant is lower than water, the dielectric constant of water solution changes in inverse proportion to the concentration.
- The apparent dielectric constant of powder and pellets changes, depending on the condition of layer.

Layer in high density : The dielectric constant becomes high.

Layer in low density : The dielectric constant becomes low.

- If the humidity is included in the insulated powder and pellets, they characterize the conductive substance.
- Depending on the degree of humidity contained, the apparent dielectric constant and electric conductivity of powder and pellets will change.

### 2. PHYSICAL CHARACTERISTICS OF THE MEASURING OBJECT

- Difference of dielectric constant is over 10. (Lower liquid should be bigger.) Thickness of interface should be fixed and the interface should be formed definitely.
- Existence of emulsion layer may be the cause of detection error.
- Adhesive with high viscosity liquids may stick onto the electrodes and may result in malfunction. Consult factory for availability with liquid name and characteristics.
- Powders and solids may stick onto electrodes due to static electricity.

### 3. INSTALLATION CONDITION

- In case several CAPATICS are installed onto same tank, at least 300 mm intervals are required to avoid interference each other. Consult factory for suitability.
- Mechanical stress caused by Agitator may damage an electrode. It is recommended to contact Tokyo Keiso before installation.
- The existence of strong magnetic/electric field around CAPATIC may result in wrong operation.

### 4. CAUTIONS FOR WIRING

- Conduct sealing to avoid introduction of water into terminal box after completion of wiring.
- Confirm the quality of power supply line. Line noise may cause wrong operation.
- Conduct grounding properly.
- Do not lay cables near to strong/heavy power lines to avoid noise.

### 5. EX-PROOF (INTRINSICALLY SAFE) VERSIONS

- Do not replace any parts and / or do not modify IS version.

### 6. ADJUSTMENT/COMMISSIONING

- Warming-up for more than 30 min. is recommended for adjustment.
- Use actual liquid/powder for adjustment.

### 7. Special use.

- In a nuclear plant, it cannot be used irrespective of the inside and outside of a controlled area.
- It cannot be used in the equipment for High Pressure Gas Safety Law.
- It cannot be used for medical equipment or equipment affecting human lives.

### 8. Other equipment

For the measurement of powder and pellets above all, non-contact type LEVEL GAUGE such as MICROCELL is available.

\* Specification is subject to change without notice.

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