ALN

CAPACITANCE TYPE LEVEL SWITCH

USER MANUAL



KANSAI Automation Co.,Ltd.

KTC-ALN-E100215

PRECAUTIONS FOR USE

- Please read this manual prior to installation and use of the instrument, and keep it readily available for your use.
- Please take adequate precautionary measures to prevent subsequent accidents or damages from occurring in case of the instrument failure.
- Please do not use the instrument under the circumstances involving a human fatality.

Safety Precautions

The manual shows the following two marks to be observed in order for you to operate the instrument safely and efficiently.

Mark	Meaning
⚠ **Warning**	" Incorrect handling may result in a fatal or serious injury accident "
⚠ **Caution**	" Incorrect handling may result in a human injury or physical damage "

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1. Standard Specifications

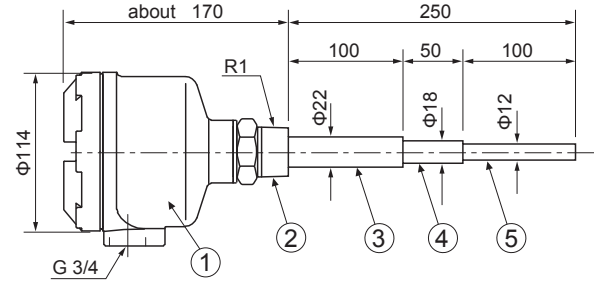
Power Source	: 105VAC / 210VAC ±10 50/60Hz
Power Consumption	: 4.5VA
Output Contact	: SPDT × 1
Contact Capacity	: 250VAC 10A 30VDC 10A (Resistance load) *Minimum current load 100mA (24VDC)
Stable Detection Range	: 1. High sensitivity : 0.5 – 20pF 2. Standard sensitivity : 2 – 50pF 3. Low sensitivity : 20 – 1,000pF 4. Ultra-low sensitivity : 5 – 35Ω
Allowable Temperature (Amplifier)	: −25°C – +60°C (No Condensation or Freez required)
Allowable Temperature (Electrode)	: −25°C – +80°C (No Condensation or Freez required)
Allowable Pressure (Electrode)	: 980kPa (10kgf/cm^2)
Allowable Lopsided Load (Electrode)	: Load at tip (L=250) 1kN (100kg)
Vibration	: 2.0mm 600 – 3,600/min. In all directions for 3 hours
Impact Shock	: Electrode : 98m/s^2 (10G)
Enclosure Rating	: IP67

*Specification for DC power source (option) [24VDC±1V, Ripple (p-p) < 1%, Negative grounding]

2. Principle of Operation

When the object to be measured touches the electrode inserted in the tank, the capacitance and conductance between the electrode and tank wall change. This impedance variation is taken out as electric signal (ON-OFF), and the inustrment detects the existence or no existence, or interface of the object.

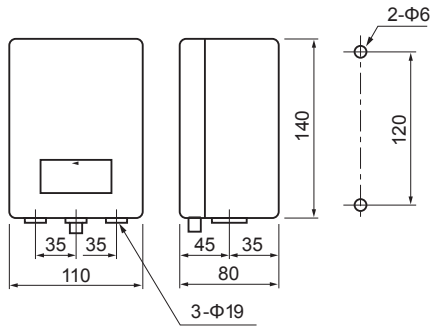
3. General Drawings



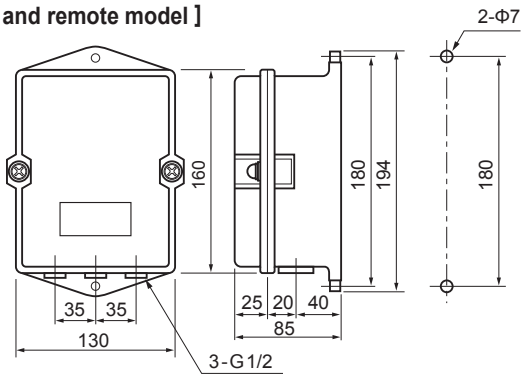
[Table-1 Parts name]

No.	Parts Name	Material	Q'TY
1	Housing	ADC	1
2	Process Connection	304SS	1
3	Earth Electrode	304SS	1
4	Insulator	Polyacetal	1
5	Main Electrode	304SS	1

[Fig-1 Outline dimensions of standard probe on both built-in and remote model]



[Fig-2 Outline dimensions of indoor remote control model]



[Fig-3 Outline dimensions of outdoor remote model]

4. Installation

4-1. Securely fix the detecting electrode onto the tank with a flange or by screwing.

4-2. Select the appropriate location spot to prevent the instrument from vibration or high ambient temperature.

4-3. The earthing electrode should protrude at least 10mm inside the tank.

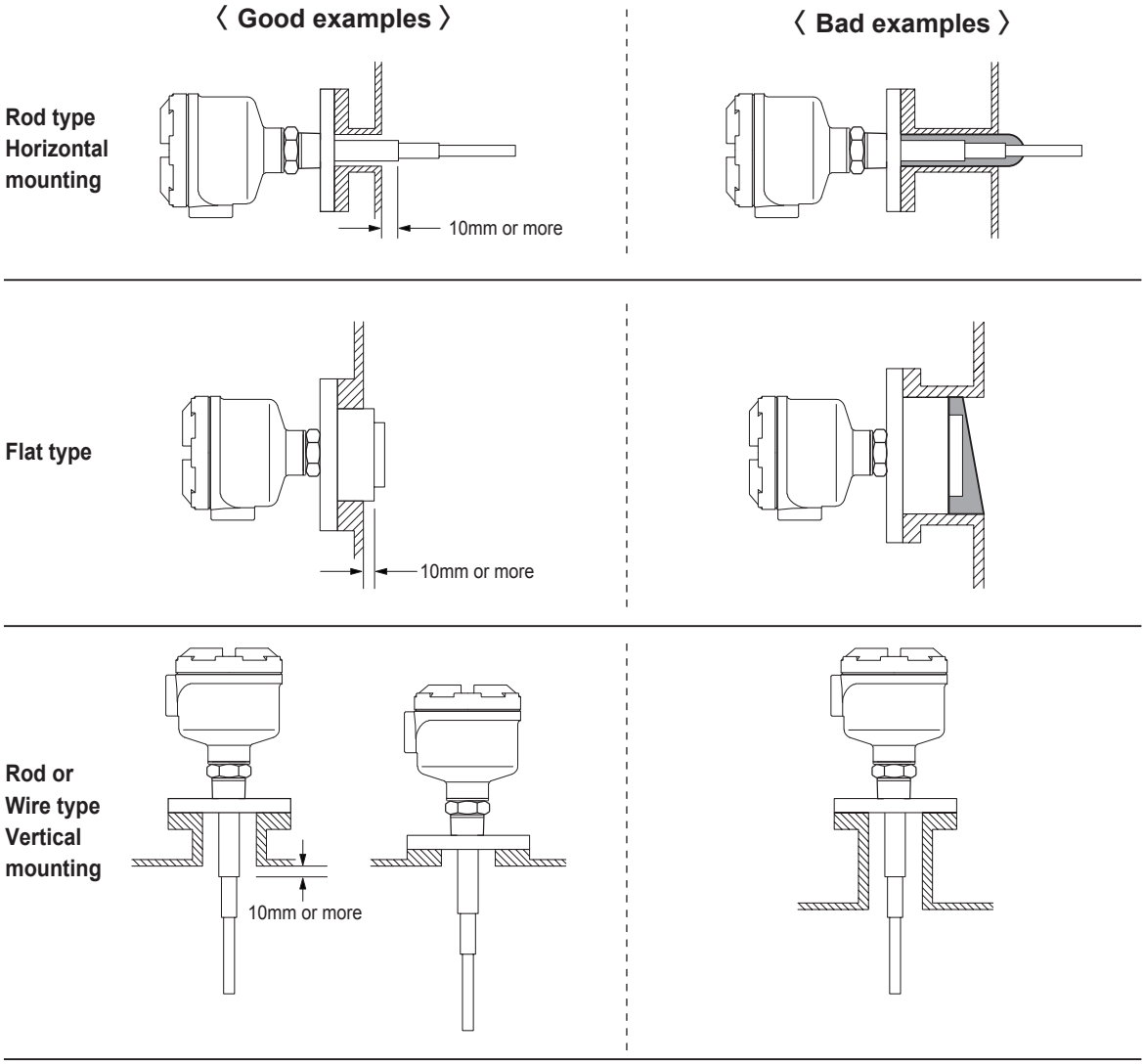
4-4. Never put dirt, dust, moisture or water drops into the housing.

4-5. The earthing electrode should be electrically shorted with the tank wall.

4-6. Special caution should be taken on the electrode surface not to damage it, if it is nonmetallic like TEFLON coated. Scratch or crack may cause failures.

4-7. On the insulated model, a TEFLON sheath composes a part of the probe. Treat it carefully not to lose or give damages on the sheath. Install the probe fixed with the sheath as it is.

4-8. Fasten the lid tightly after the wiring and or calibration.



[Fig-4 Installation examples]

⚠Caution

- ●Fasten the lid of housing and a plug of conduit tightly to prevent invasion of water. The water invasion may damage the instrument.
- ●Never use the unit as scaffold or suspend on it. These conducts may cause damage to the unit.
- ●Install the instrument correctly following the manual. Incorrect installation may cause damage to the instrument.

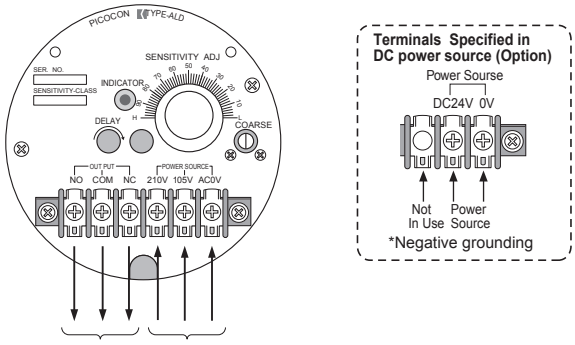
5. Connection

5-1. Use either AC105V±10% or AC210V±10% as the instrument power source.

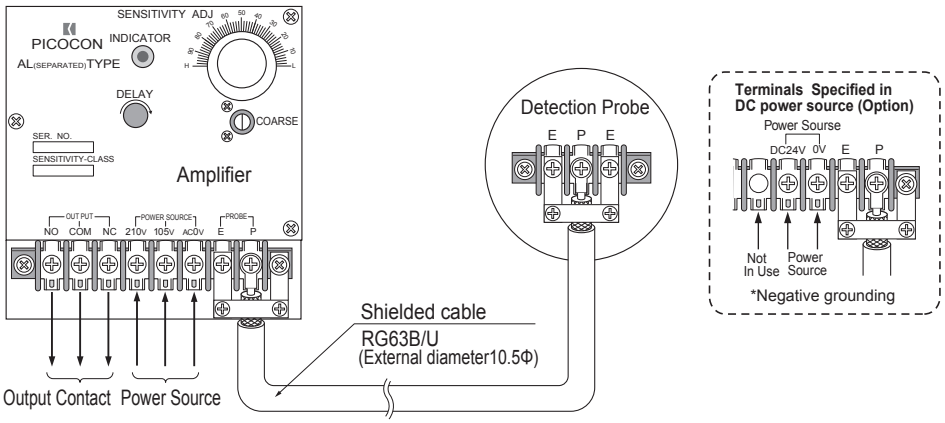
5-2. After a connection work, complete sealing on the cable gland, and securely fasten the housing lid in order to prevent dust or water.

5-3. Incase of a remote model, combine a probe with a remote control module (Amplifier) with the same serial number as that of the control module.

5-4. The remote amplifier is factory calibrated with a combination of the attached co-axial cable in specified length. Do not change the length of cable by cutting off or extending.



[Fig-5 Built-in model]



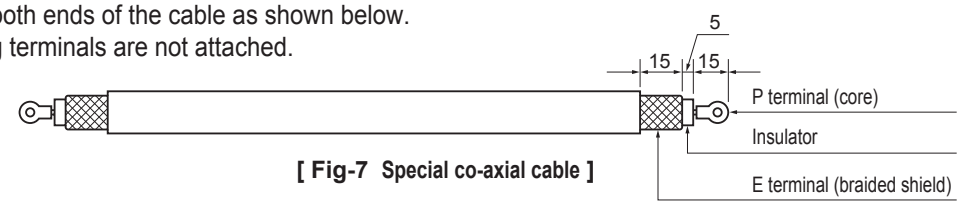
[Fig-6 Remote model]

⚠Caution

- Supply the power source with specified voltage and frequency. The instrument may be damaged if the voltage exceeds the specified rate or frequency.
- Wiring should be done correctly according to a manual. Confirm that there is no error in wiring before use. Incorrect wiring may cause damage to the instrument.

6. Connection of Special Co-axial Cable

6-1. Process both ends of the cable as shown below.
*Crimping terminals are not attached.



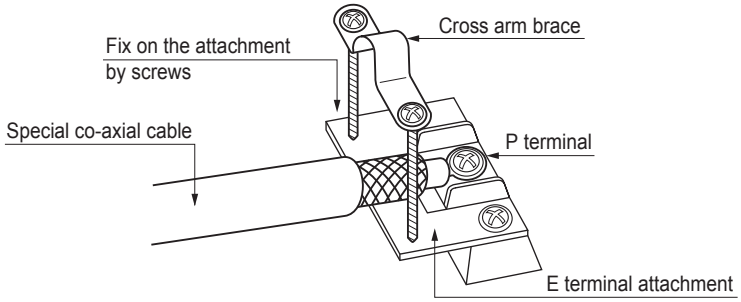
[Fig-7 Special co-axial cable]

6-2. The special co-axial cable should be directly and firmly connected to the terminals on the probe and amplifier (Do not use conjunction terminals halfway between the two).

6-2-1. Place the cable on an E terminal attachment and fix it by a cross arm brace with screws.

6-2-2. Fix the crimping terminal of core wire on the P terminal.

* Be careful not to touch fibers of the braided shield to P terminal. Otherwise, it continuously activates a built-in relay (output generated) and causes failures.



[Fig-8 Details of the terminal block]

7. Sensitivity And Delay Time Adjustment

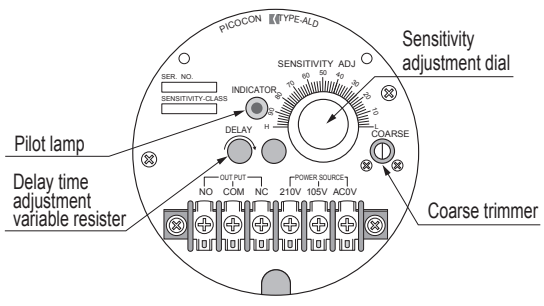
7-1. Sensitivity adjustment
(This section describes the adjustment for sensitivity 1, 2 and 3. Refer to section 7-2 in page 6 as for sensitivity 4)

7-1-1. Caution in sensitivity adjustment.

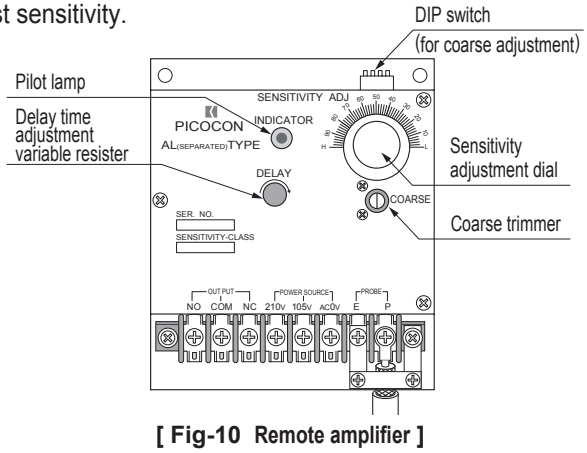
7-1-1-a) It is necessary to adjust the sensitivity depending on the characteristics of the object to be measured or the installation conditions. Adjust the sensitivity under the worst conditions like the smallest specific gravity or the driest materials.

7-1-2-b) To differentiate a liquid of lower specific dielectric constant such as air (empty) and a higher liquid substance (full), set the interface sensitivity to the higher dielectric constant. The output will close when the higher liquid touches the probe. (At ON connection : NO−COM will close, NC−COM will open).

7-1-3-c) The sensitivity adjustment dial can be set on from L to H (0 – 100)
L means the lowest and H means the highest sensitivity.

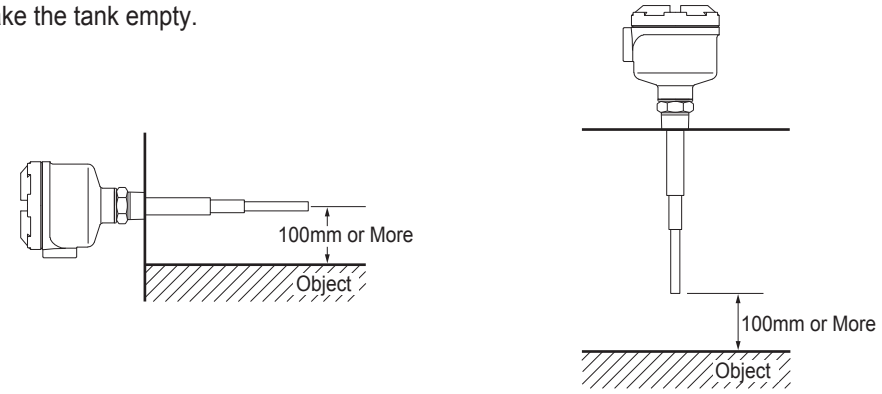


[Fig-9 Built-in amplifier]



[Fig-10 Remote amplifier]

7-1-2. Make the tank empty.



[Fig-11 empty]

7-1-3. Rotate the sensitivity adjustment dial from L to H.

7-1-4. Note the point on a scale where the pilot lamp turns on, then go to section 7-1-6. If the lamp cannot turn on or lights up at the point below 30, go to section 7-1-5.

Lighting up point : at _____

7-1.5. Please adjust a coarse trimmer dial with small minus screwdriver in case of the following conditions.

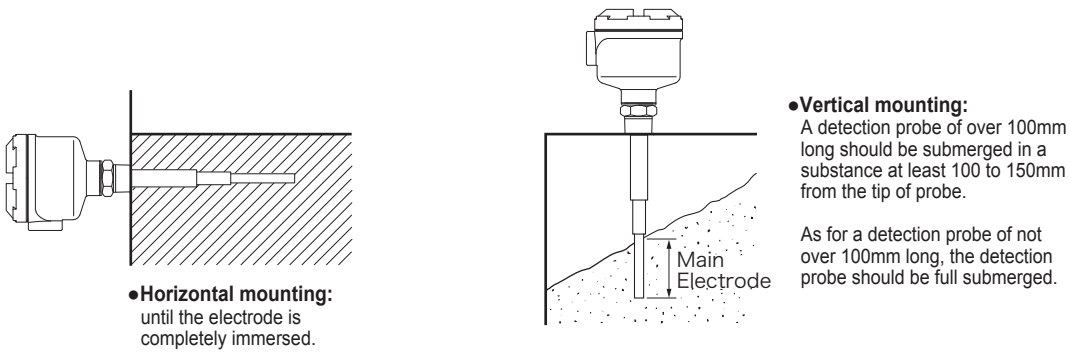
1. The pilot lamp cannot be turned on, even after rotating the dial from L to H on a empty tank.

2. The lighting point is below 30
   The coarse trimmer can rotates endlessly clockwise or counterclockwise. It comes back to the initial position after a rotation. You need not rotate it many times.

7-1-5-a) Set the sensitivity dial at 90 for the built-in model (at 80 for the remote model). Set it at 80 for wire type probes regardless it is the built-in model or remote one.

7-1-5-b) Set the coarse trimmer at the point where the lamp starts lighting up, rotating the trimmer clockwise.

7-1-6. Fill the tank with the substance until the probe can be submerged.



●**Horizontal mounting:**
until the electrode is completely immersed.

●**Vertical mounting:**
A detection probe of over 100mm long should be submerged in a substance at least 100 to 150mm from the tip of probe.

As for a detection probe of not over 100mm long, the detection probe should be full submerged.

[Fig-12 Filled]

7-1-7. Note the point where the lamp turns dark, rotating the sensitivity dial clockwise to L in the conditions stated in section 7-1-6 (filled).

Turning dark point : at _____

7-1-8. Set the sensitivity dial at the medium of the two values gotten from section 7-1-4 and 7-1-7. If the lamp cannot turn dark even to L (lowest point), then set the dial at L. Setting is now completed.

7-2. Sensitivity 4 sensitivity adjustment (detect range 5 – 35Ω)

7-2-1. Never touch or adjust the coarse trimmer !!

7-2-2. Turn the sensitivity adjustment dial from L to H while the tank is empty. The pilot lamp will not light.

7-2-3. Fill the tank with substance until the detection probe can be thoroughly immersed referring to Fig-12.

7-2-4. Keeping the conditions of tank as in above description, rotate the sensitivity dial to H to find out the point where the lamp lights up.

7-2-5. Rotate the dial to H by further 2 notches from the point gotten in above procedure. Then setting is now completed. (e.g. A lamp lights up at 30 then set the dial at 34 : one notch is equivalent to the value of two)

7-3. Delay time adjustment

You can set delay time on activating the output relay up to 10 seconds from detection (A lamp will turn on when an instrument catches substances, regardless setting delay time) Delay time can be continuously set by a built-in variable resistor at required time up to 10 seconds.
When the time contacted to the liquid is shorter than the present delay time, the output relay dose not work.

8. Adjustment for Alteration of Special Co-axial Cable Length

8-1. Use the co-axial cable with the same length as specified in the last meeting. Changing the length, in principle, will require you to send the instrument back to us and readjust it in our factory. If it is necessary to change the length a little bit, readjust the instrument following the procedure below.

8-2. Readjustment must be made, rotating the coarse trimmer with a small minus screwdriver. The coarse trimmer can rotate endlessly clockwise or counterclockwise. It will come back to the initial position after a rotation.
You need not rotate it many times.

8-3. Make the tank empty or separate the probe at least 100mm from the substance.

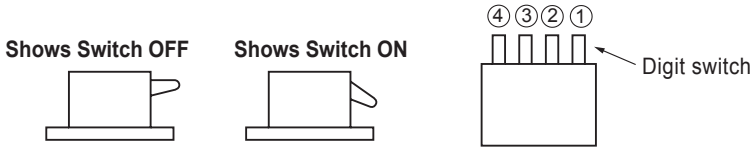
8-4. If the lamp does not light up brightly by setting the marker of the sensitivity dial at 80, then go to section 8-5.
Go to section 8-6 when the lamp lights up brightly by setting the marker within 0−80 or when the lamp does not turn dark by setting the marker to 0 (zero).

8-5. In case the lamp does not light up brightly by setting the marker of the sensitivity dial to 80

8-5-1. Set the marker of the sensitivity dial to 80 and figure out the point where the lamp starts lighting up brightly, rotating the coarse trimmer clockwise.

8-5-2. Go back to section 7-1 and make a readjustment after the procedure above is completed. If the lamp cannot turn brightly by rotating the trimmer, turn on the dip switch in turn to a smaller numeric value until the lamp lights up brightly. Then go back to section 8-5-1 to carry out the readjustment.

* The dip switch is made up of 4 digit switches shown in Fig-13. A combination of the four switches activated can produce 0 – 16 variations. When all four switches are OFF (= 0), the value becomes minimum, and when all of them are ON (= 16), it will be maximum.

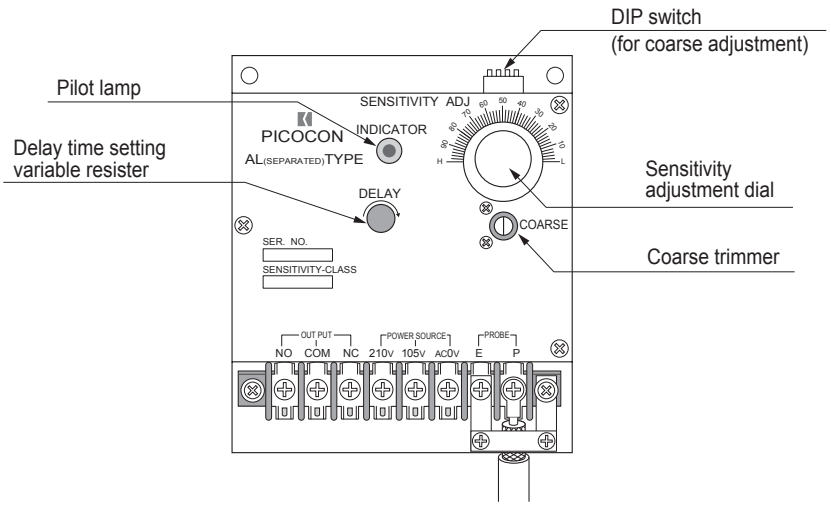


[Fig-13 Details of the dip switch (for coarse sensitivity adjustment)]

8-6. In case the lamp lights up by setting the marker within 0 – 80, or when the lamp does not go dark by setting the marker at 0 (zero).

8-6-1. Setting the marker of the sensitivity dial to 80, figure out the point where the lamp starts changing from dark to brighty by rotating the coarse trimmer clockwise.

8-6-2. Go back to section "7 Sensitivity Adjustment" and make a readjustment after the procedure above is completed. If the lamp cannot go dark by rotating the trimmer, turn on the dip switch in turn to a bigger numeric value until the lamp turns dark. If you can define the proper dip switch positions, then go one step back to the previous procedure and readjust the sensitivity as described in section 8-6-1.



[Fig-14]

9. Periodical Maintenance

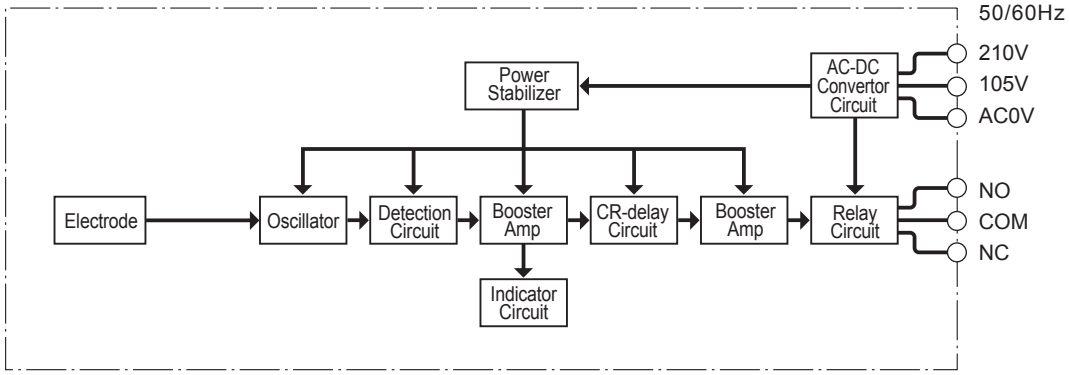
Please check the maintenance items as listed on the Table-2 below.

Warning ●When you start a manual check, be sure to turn off the power before your work. If not, you may get a lethal electric shock.

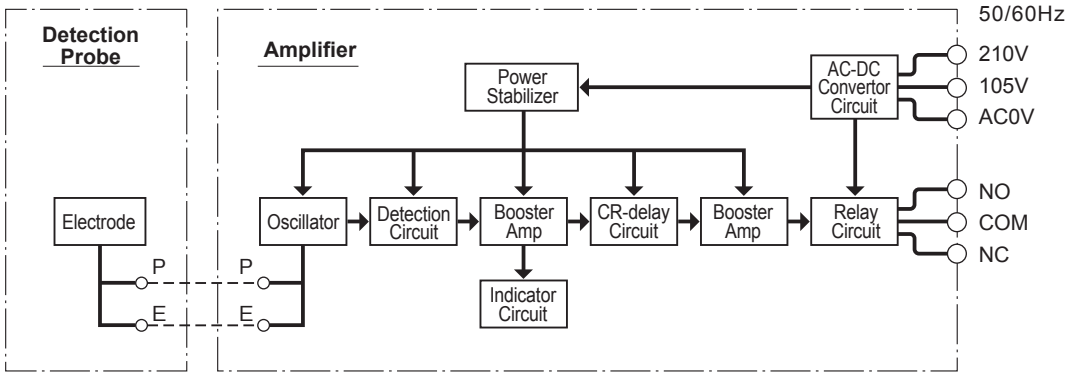
[Table-2]

Maintenance Menu						
Name		**Check Menu**	**Check Point**	**Method**	**Criteria**	**Frequency**
Equipment General	Surface	Deformation or Scratch	General	Visual	No misaligned, crack, pinhole, deformation	Once/Week
		Corrosion	General	Visual & Hand touch	No effective corrosion	Once/Month
	Bolts & Nuts	Loose & Misaligned	Bolts & Nuts	Visual & Hand touch	Tightened	Once/Month
	Housing & Internal	No corrosion & Condensation	General	Visual	No corrosion & condensation	Once/Month
	General	Operation	General	Visual, Hand touch & Listening	No abnormal noise, vibration	Once/Week
Probe Only		Insulation Resistance	Between Main & Earth Electrodes	Insulation resistance measurement by tester, etc. (make sure to remove the amplifier prior to measurement)	Insulation resistance more than 100M Ω	Once/Month
Special Co-Axial Cable Only		Insulation Resistance	Between P and E terminals	Insulation resistance measurement by tester, etc.	Insulation resistance more than 100M Ω	Once/Month
		Conductivity Measurement	Short-circuit one side of the P/E terminal, then measure conductivity on another side.	Verification of conductivity by tester, etc	Should be conductive	Once/Month
Amplifier		Sensitivity of Operation	Amplifier	Check a pilot lamp get bright, turning the dial L to H when the tank is empty	The pilot lamp get bright. (If not, then adjust the sensitivity following to this manual)	Once/Week
		Operation of Output Contact	Output Contact	When Pilot Lamp is on, Proceed a Check Shown Right	Check The Contact is Close on Operation With a Multimeter	Once/Week

10. Block Diagram



[Fig-15 Built-in model]



[Fig-16 Remote model]

11. Type Designation

[Table-3 Type Designation]

ALN－□□□－□□

Heat Blank. Standard
H . Heat-resistant

Class of the sensitivity
1. High sensitivity
2. Standard sensitivity
3. Low sensitivity
4. Ultralow sensitivity

Length of the detecting electrode
1. Up to 250 (mm)
2. 251 – 500 (mm)
3. 501 – 1000 (mm)
4. 1001 – 2000 (mm)
5. Others

Eletrode type
1. Uncovered rod shape
2. Covered rod shape
3. Flat
4. Wire
5. Others

Instrument construction
1. Built-in construction
2. Remote construction (Amplifier for indoor use)
3. Remote construction (Amplifier for outdoor use)

INQUIRY INFORMATION

Thank you very much for purchasing our products.
We are always working hard to provide you the quality products meeting your requirement.
Please feel free to call us or e-mail regarding your inquiries on our products, technical issues, etc.
Our staff will immediately contact you. Our stations are as follows;

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