

INSTALLATION MANUAL



CAPACITIVE LEVEL SENSOR

MODEL **KSV-9N**

POWER RELAY UNIT

MODEL **PR2100-7U**

TS03-0011

1. PURPOSE OF USE

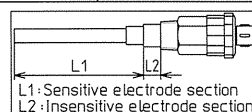
Capacitive Level Sensor KSV-9N is a level instrument to detect presence of liquids such as water and chemical, and solids such as pellet and feed to send signals utilized to give alarm output.

2. STANDARD SPECIFICATIONS

Classification		L2		
		L1	20mm	100mm
General purpose	Stainless steel electrode	150mm	KSV-9N-111	KSV-9N-113
		300mm	KSV-9N-121	KSV-9N-123
		600mm	KSV-9N-141	KSV-9N-143
Low-sensitivity	Plastic covered electrode	150mm	KSV-9N-111M	KSV-9N-113M
		300mm	KSV-9N-121M	KSV-9N-123M
		600mm	KSV-9N-141	KSV-9N-143
General purpose	Stainless steel electrode	150mm	KSV-9N-311	KSV-9N-313
		300mm	KSV-9N-321	KSV-9N-323
		600mm	KSV-9N-341	KSV-9N-343
Low-sensitivity	Plastic covered electrode	150mm	KSV-9N-311M	KSV-9N-313M
		300mm	KSV-9N-321M	KSV-9N-323M
		600mm	KSV-9N-341	KSV-9N-343

- (1) Model
- (2) Measuring Object : Liquid, Powder
- (3) Supply Power : 24 V DC $\pm 10\%$
- (4) Current Consumption : 21 mA Max.
- (5) Output Alarm : NPN transistor output
100 mA Max. (Residual voltage ; 2 V Max.)
- (6) Oscillate Frequency : Approx. 600 kHz
- (7) Operation Characteristics

General Characteristics	Sensitivity	Stable sensitivity
General Sensitivity Type	0 to 20 pF	1.5 pF Max.
Plastic Covered Type	0 to 40 pF	3.0 pF Max.
Low Sensitivity Type	0 to 100 pF	5.0 pF Max.
- (8) Withstand Pressure : 1.57 MPa Max.
- (9) Vibration proof : 10 to 25 Hz (Double amplitude 1.5mm)
- (10) Shock Resistance : 196m/s² Max.
- (11) Operating Temperature : -10 to +70 °C (Get rid of dew)
- (12) Operating Humidity : 35 to 95 % RH
- (13) Construction : Waterproof construction (IP67)
- (14) Materials : Detecting part and Housing ; 304 stainless steel, polyacetal



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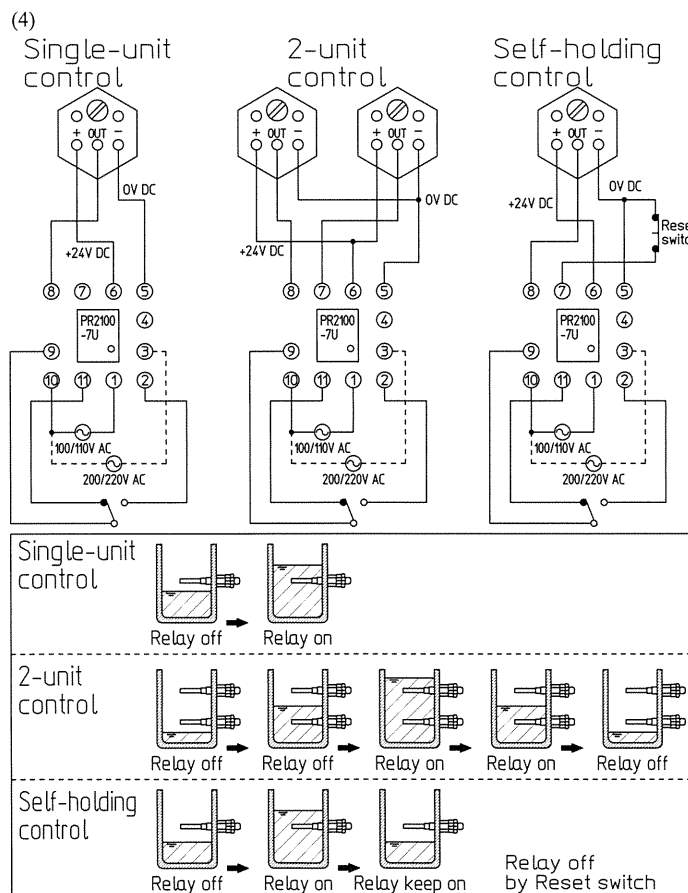
6. PR2100-7U

We recommend PR2100-7U, Power Relay Unit, for the power source of KSV-9N, available with 2-SPDT relay output and self-holding control.

- (1) Supply Power : 100 / 110 / 200 / 220 V AC $\pm 10\%$ 50 / 60 Hz
- (2) Power Consumption : 4 VA Max.
- (3) Output Power : Exclusive use of KSV-9N
- (4) Relay Output :
200V 2A AC (Resistive load)(100,000 operations (Maximum load))
12 V 10 mA DC (Resistive load)(10,000,000 operations (minimum load))
- (5) Insulation Resistance : 500V DC more than 100M Ω
(Between supply power terminals and relay output terminals)
- (6) withstand Voltage : 1500 V AC at a minute
(Between supply power terminals and relay output terminals)
- (7) Operating Temperature : -10 to +40 °C (Get rid of dew)
- (8) Operating Humidity : 45 to 85 % RH
- (9) Construction : Non drip-proof enclosure (IP40)
- (10) Operating Indication : LED lighting (Red)
- (11) Materials : ABS
- (12) Dimension : W50 × H84 × D109 mm
- (13) Mass : Approx. 300g
- (14) Mounting : Plug-in (Socket : Option)

7. WIRING

- (1) The connecting cable between KSV-9N and PR2100-7U should be separately laid with the other power/signal cable.
- (2) We recommend 3-core vinyl cab-tire cable of 0.75mm² or equivalent.
- (3) The separation distance between KSV-9N and PR2100-7U is 200m Max., and shielded cable is recommendable.

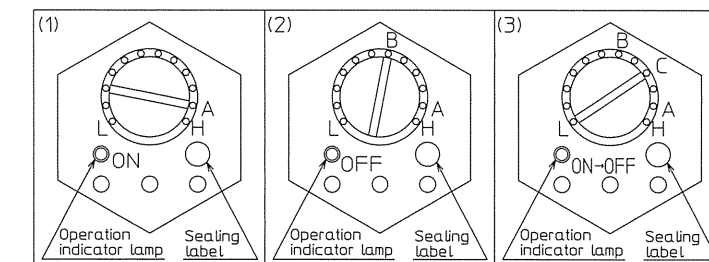


3. CAUTIONS

- (1) Do not use in any other application, otherwise the equipments may be damaged.
- (2) Do not install in hazardous location. The sensor is not explosion proof construction.
- (3) To avoid personal injury, the supply power must always be turned off while wiring or inspection.
- (4) Make sure the cable is correctly wired.
- (5) The negative power of this sensor is grounded by the mounting plug. Make sure it is not a problem, if the power is supplied independently. We recommend using our Power Relay Unit PR2100-7U.
- (6) Do not applied the conductive noise around 600kHz to the sensor, Otherwise the sensor will be malfunctioning.
- (7) To avoid physical shock, do not drop, throw, and bump the sensor.
- (8) Do not install or store the sensor in the environmental condition of corrosive gas such as NH₃, SO₂, Cl₂ and so on.
The sensor may be damaged by invaded corrosive gas.
- (9) Do not install or store the sensor where the strong vibration is occurred.
- (10) Do not install the sensor in direct sunlight, inside of the housing may be over heated. Provide the sun shade over the housing if necessary.
- (11) Make sure the housing cover and cable gland must be properly tightened. The sensor may be damaged by the invaded water or dust.
- (12) Wipe on the dry waste.
- (13) Install PR2100-7U into the control panel, and independent power supply switch for PR2100-7U should be set close position.
- (14) The independent power supply switch should be specified by solo use for PR2100-7U.

8. ADJUSTMENT

Take the following steps to adjust sensitivity with medium in the tank to be moved upward and downward.

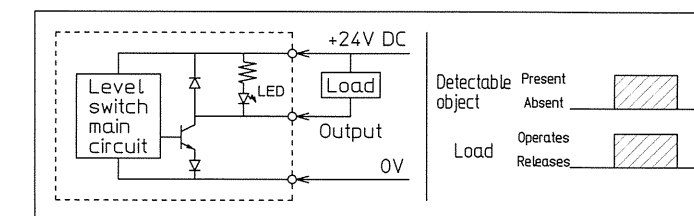


- (1) Make sure the tank is empty or the surface of the material is adequately distanced from the electrode. (Normally more than 100mm) Turn the adjusting knob clockwise to the "H" side to determine point A where the operation indicator lamp is light ON.
- (2) Filled medium in the tank to sufficiently cover the electrode. Turn the adjusting knob counter-clockwise to the "L" side to determine point B where the operation indicator lamp goes OFF.
- (3) Empty tank again and turn the adjusting knob to the "H" side to confirm the operation indicator lamp is light ON at point A. Set the adjusting knob at point C where is midpoint between point A and B.

Note

- (1) If the medium is high adhesive, the position of point A may not be steady. Recheck point A and readjust after short term operation.
- (2) If the operating indicator lamp does not go OFF while turning the adjusting knob to the "L" side, the point where the adjusting knob can no longer be turned counter clockwise may be considered point B.

4. OUTPUT STAGE CIRCUIT DIAGRAM



5. DIRECTION OF USAGE

- (1) Mounting
 - R1" plug or JIS16K25A flange is available.
 - Install the sensor in the angle of downward, if the medium is viscous liquids.
 - Take 300mm or more distance between two sensors, if the two sensors are installed in one tank. For the dielectric constant of medium is more than 2.5, distance between two sensor should be 100mm or more.
 - The sensor should be installed more than 100mm away from the tank wall.
 - (2) We recommend KSV-9N-□□□ M, plastics covered electrode type in case of conductive medium such as aqueous solution, moisturized grain, sand, metal powder, and so on.
 - (3) Do not install the sensor where the static electricity is occurred.
 - (4) KSV-9N series are not suitable for the chemicals listed below due to the chemical resistance of probe materials.
Acetone, Acrylonitrile, Ammonia, Methyl Acrylate, Ethyl Acrylate, Butyl Acrylate, Epichlorohydrin, Ethylene Oxide, Ether, Hydrochloric acid, Ammonium chloride, Beryllium chloride, Calcium chloride, Sodium hydroxide, Chloroform acid, Acetic acid, Amyl acetate, Methyl acetate, Ethyl acetate, Butyl acetate, Cellosolve acetate, Dioxane, Cyclohexane, Nitric acid, Cellosolve, Tributyl phosphate, Nitrobenzene, Pyridine, Furfural, Fluorine, Benzaldehyde, Alum, Methyl ethyl ketone, Methyl isopropyl ketone, Lacquer, Sulfuric acid, Ammonium sulfate, Phosphoric acid.
- Consider the chemical resistance of other constructed material of sensor.

9. MAINTENANCE & INSPECTION

Inspect the sensor semi-annually or annually. Since inspection intervals varies with applications and process conditions such as pressure, temperature and so on. We recommend you to inspect periodically.

- (1) Make sure that there is no damage. If necessary, replace equipments.
- (2) Clean build-up or coating on the detection parts.
- (3) Check for and clean dirt, dust, moisture and metallic substances in the mounting plug.

10. TROUBLESHOOTING

- (1) Relay de-energized when the electrode is covered by material.
 - Sensitivity sets too low: Turn the adjusting knob clockwise to the "H" to set high sensitivity.
 - Material bridge or angle of repose: Change the mounting position with the considering angle of repose.
 - Initial adjustment is not correctly done: Readjust again by taking the steps of chapter 8. Adjustment.
 - Improper wiring: Recheck wiring with the reference of chapter 7. Wiring.
- (2) Relay energized when electrode is not covered by material.
 - Sensitivity sets too high: Turn the adjusting knob counter-clockwise to the "L" to set low sensitivity.
 - Effect of build up on the electrode: Take off the build up from the electrode. Recheck point A and readjust sensitivity.
 - Material dead stock: Change mounting position without the influence of dead stock.
- (3) Sensor is not working at first stage.
 - Improper wiring: Recheck wiring with the reference of chapter 7. Wiring.