LIQUID LEAKAGE SENSOR

OPERATION MANUAL

for

RS-2000 Series

Control Unit :RS-2000C / RS-2000CA
Detection Unit :RS-2000D / P / F / DP / PP / FP

CE Mark Compliance
EN55011
EN61000-6-2
EN61326

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MAN-RS2-07.2002

Introduction

- We appreciate that you have purchased our Liquid Leakage Sensor.
- Before you install or operate it, please read this operation manual thoroughly, and follow the instruction in order to avoid any accidents, malfunction, defects and hazards.
- Please keep this manual with good care as long as the sensor is being operated.

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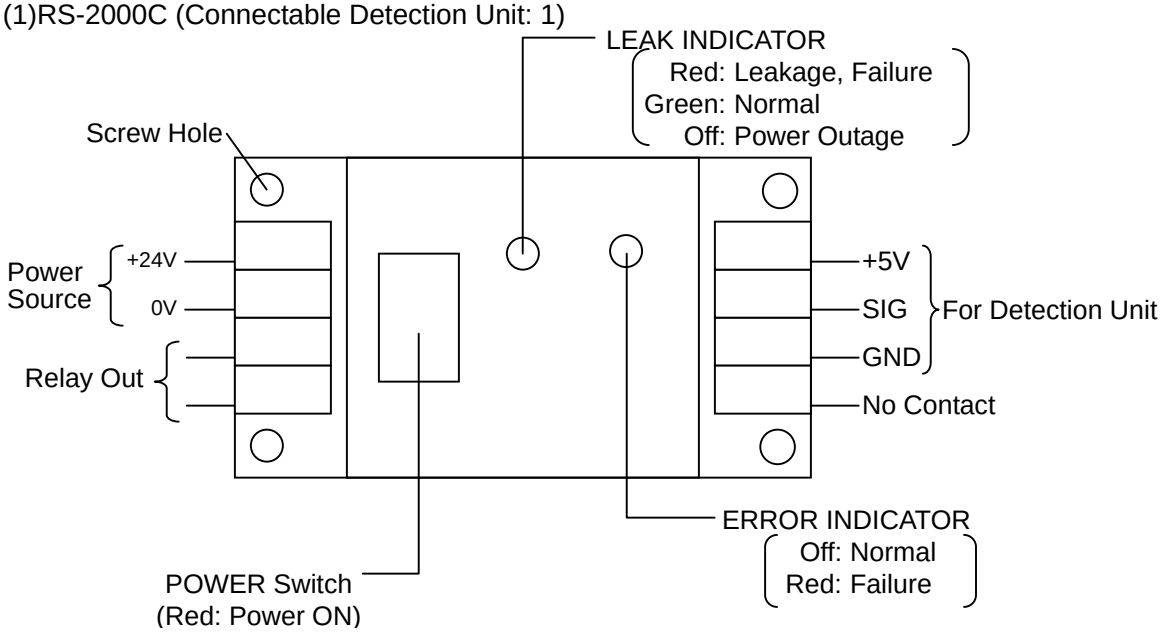
1. Designation of Sensors

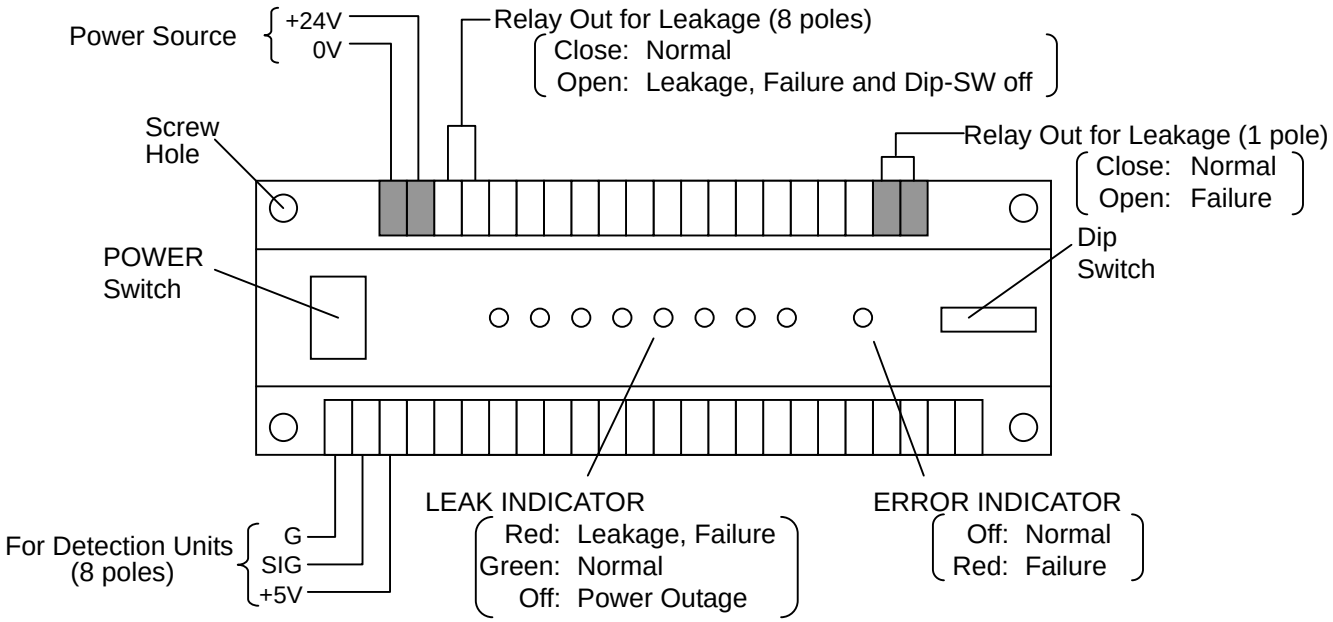
1.1. Control Unit

(1)RS-2000C (Connectable Detection Unit: 1)



WARNING: Do not attempt to connect two or more detection units into a control unit.

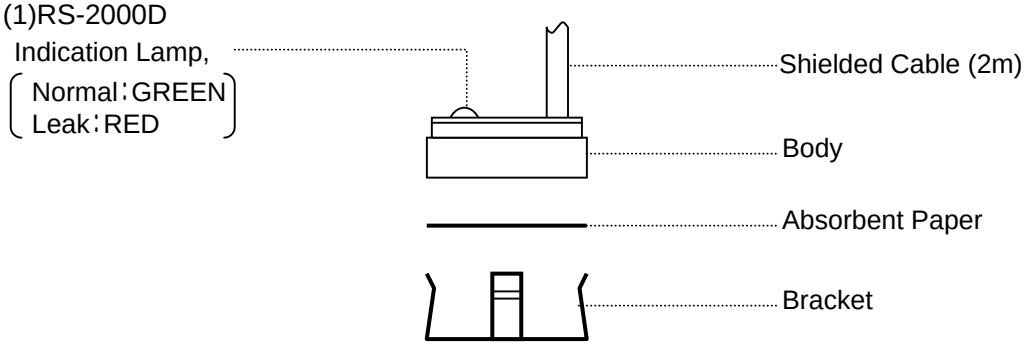
(2)RS-2000CA (Connectable Detection Unit: 8)



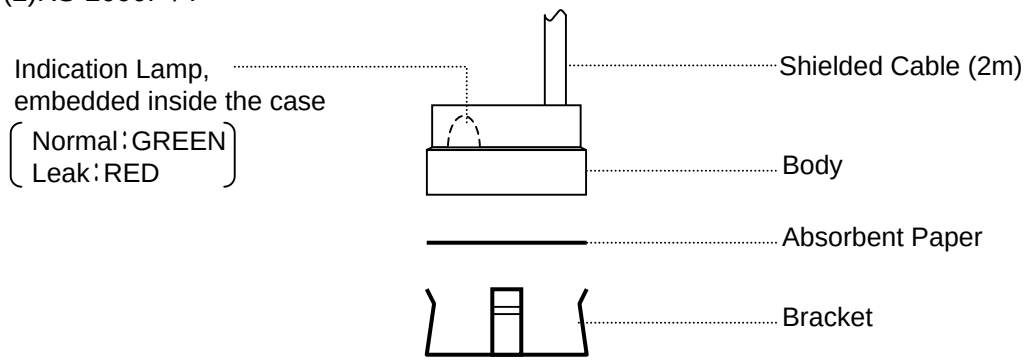
WARNING: Do not attempt to connect two or more detection units in each single pore of terminals.

1.2. Detection Unit

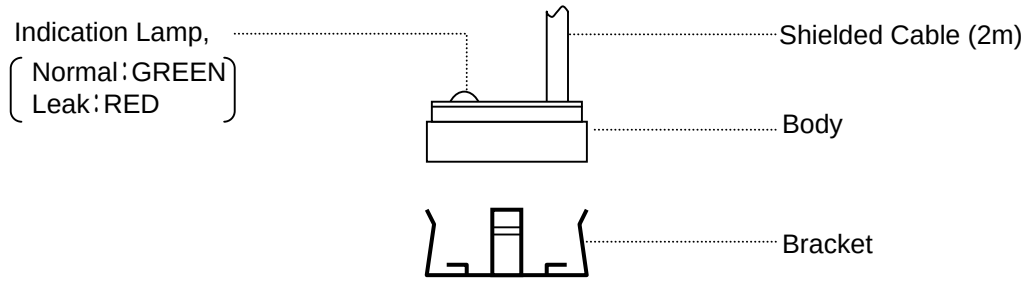
(1)RS-2000D



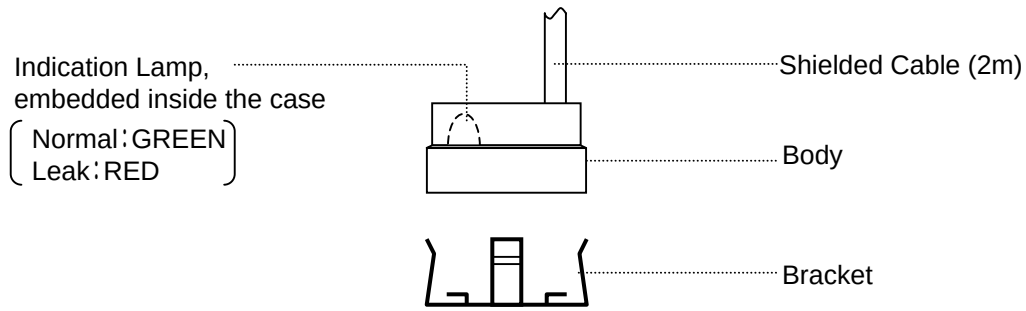
(2)RS-2000P / F



(3)RS-2000DP



(4)RS-2000PP / FP



2. Installation of Detection Unit

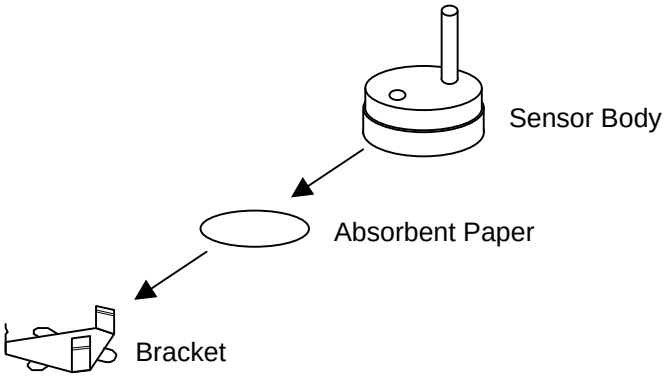
NOTE: Use only in combination with RS-2000 Series Controller Unit. Do not use with not specified equipment.

2.1. RS-2000D / P / F

(1) Place the Bracket of the Detection Unit on the surface where you want to detect the leakage, and fix it firmly.
(2) Place a piece of the Absorbent Paper on the Bracket.

NOTE: Be aware not to use 2 or more pieces of paper at a time in the Bracket.

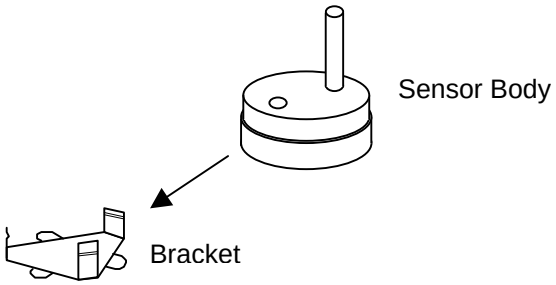
(3) To mount the body, push it into the Bracket completely.



NOTE: Verify that the Body has fixed entirely and it does not hook up at intermediate height in the Bracket.

2.2. RS-2000DP / PP / FP

(1) Place the Bracket of the Detection Unit on the surface where you want to detect the leakage, and fix it firmly.
(2) To mount the Body, push into the Bracket completely.

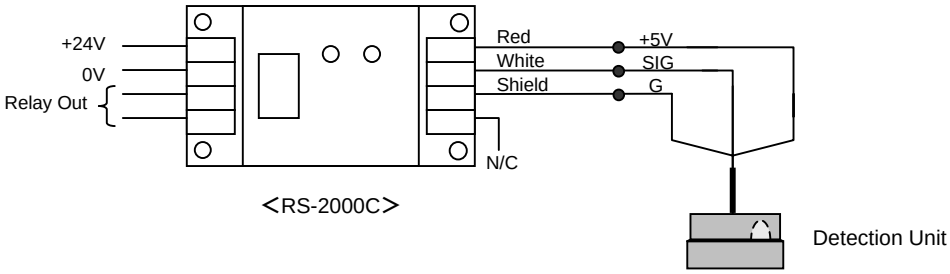


NOTE: Do not use any Absorbent Paper for the paperless sensors, such as RS-2000DP/PP/PP Detection Units.
NOTE: Only use attached Bracket, P/N-6416. Other Brackets cannot be used with the sensors. above.

3. Wiring Instruction

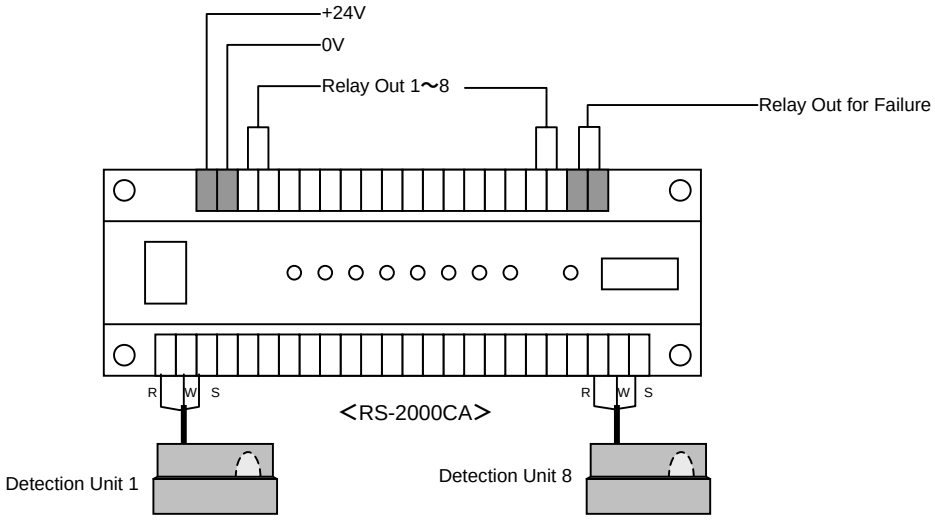
3.1. RS-2000C

(1) The Detection Unit has a 2-core shielded cable, 2 m long. When the cable needs extended, do not exceed a maximum length of 30m.
(2) Connect a red lead to the Control Unit's terminal [+5V], a white lead to [SIG] and a shield lead to [G] respectively.
(3) Connect the power source, 24VDC, to the Control Unit's terminals [+24V] and [0V]. Make sure to add a Zenner* diode at the power input, avoiding a surge hazard for compliance with EN61000-6-2.
* Recommend Zenner diode: Z6033 (Ishizuka Denshi), 2.0 W (nom), 6000 W (transit).
(4) Connect alarm output to the terminal of relay out. The maximum cable length is 30m.



3.2. RS-2000CA

(1) The Detection Unit has a 2-core shielded cable, 2 m long. When the cable needs extended, do not exceed a maximum length of 30m.
(2) Connect a red lead to the Control Unit's terminal [+5V], a white lead to [SIG] and a shield lead to [G] respectively.
(3) Connect the power source, 24VDC, to the Control Unit's terminals [+24V] and [0V]. Make sure to add a Zenner* diode at the power input, avoiding a surge hazard for compliance with EN61000-6-2.
* Recommend Zenner diode: Z6033 (Ishizuka Denshi), 2.0 W (nom), 6000 W (transit).
(4) Connect alarm output to the terminal of relay out for leakage.
(5) Connect alarm output to the terminal of relay out for failure.



WARNING: Do not attempt to connect two or more detection units in each single pole of terminals. If two or more detection units are connected, control unit cannot detect leakage.

NOTE: The capacity of relay out is limited not exceeding 24VDC. Do not use in 100VAC circuit.

NOTE: Do not supply the power source before all the wiring has been completed. After wiring has completed, put the protection covers on the control unit's terminals before using the sensors.

4. Operation

WARNING: The following procedure must be implemented after wiring has done and prior to operation. Refer to Section 1. Designation for Sensors.

4.1. RS-2000C

(1) Place an Absorbent Paper and Detection Unit properly (Follow the procedure describing in Section 2. Installation of Detection Unit.). The Absorbent Paper is not placed at the factory. For RS-2000DP / PP / FP, do not use the Absorbent Paper
(2) Turn on "POWER" switch and make sure the indicator is lit red.
(3) In this condition, the sensor should operate properly. Make sure the followings.
    a. "Leak Indicator" on Control Unit: Green
    b. "Error Indicator" on Control Unit: Off

NOTE: In case that "Error Indicator" lit red, wiring between Control Unit and Detection Unit may be broken. Make sure each connection again.

    c. LED on Detection Unit: Green
    d. Relay out: Close (Confirm using system connected.)

NOTE: System indicates that relay out is "open" even though no failure found in a. through c., wiring between relay out and system may be broken. Reconfirm each connection.

(4) Remove an Absorbent Paper from Detection Unit and place Detection Unit on bracket. For RS-2000DP / PP /FP, drip a drop of a fluid, such as water, at the bottom of unit.
(5) In this condition, the sensor is like detecting leakage. Make sure the followings.
    a. "Leak Indicator" on Control Unit: Red
    b. "Error Indicator" on Control Unit: Off
    c. LED on Detection Unit: Red
    d. Relay out: Open (Confirm using system connected.)

NOTE: System indicates that relay out is "closed" even though no failure found in a. through c., wiring between relay out and system may short. Reconfirm each connection.

(6) Place an Absorbent Paper back in its proper place. For RS-2000DP/PP/FP, wipe off a liquid at the bottom of Detection Unit clearly. Then the procedure is completed.

4-2 RS-2000CA

(1) After installation and wiring is completed, set the Dip Switch as follows.
- Respond to the terminal number that Detection Unit is connected: ON
- Respond to the terminal number that Detection Unit is not connected: OFF

WARNING: Control Unit will indicate error if Detection Unit is not connected even though Dip Switch is "ON". Control Unit cannot detect any leakage or failure if Dip Switch is "OFF".

(2) Place an Absorbent Paper and Detection Unit properly (Follow the procedure describing in "2. Installation of Detection Unit".). The Absorbent Paper is not placed at the factory. For RS-2000DP / PP / FP, do not use the Absorbent Paper.
(3) Turn on "POWER" switch and make sure the indicator is lit red.
(4) In this condition, the sensor should operate properly. Make sure the followings.
   a. "Leak Indicator" on Control Unit: Green
   b. "Error Indicator" on Control Unit: Off

NOTE: In case that "Error Indicator" lit red, wiring between Control Unit and Detection Unit may be broken or Dip Switch is not set properly. Make sure each connection or setting again.

   c. LED on Detection Unit: Green
   d. Relay out for Leakage: Close (Confirm using system connected.)
   e. Relay out for Error: Close (Confirm using system connected.)

NOTE: System indicates that relay out is "open" even though no failure found in a. through c., wiring between relay out and system may be broken or Dip Switch is not set properly. Reconfirm connection or setting.

(5) Remove an Absorbent Paper from Detection Unit and place Detection Unit on bracket. In case of using RS-2000DP / PP / FP, contact fluid, such as water, at the bottom of unit.
(6) In this condition, the sensor is like detecting leakage. Make sure the followings.
   a. "Leak Indicator" on Control Unit: Red
   b. "Error Indicator" on Control Unit: Off
   c. LED on Detection Unit: Red
   d. Relay out: Open (Confirm using system connected.)

NOTE: System indicates that relay out is "closed" even though no failure found in a. through c., wiring between relay out and system may short. Reconfirm connection.

(7) Place an Absorbent Paper in its place. Or wipe at the bottom of Detection Unit clearly for RS-2000DP / PP / FP. Then the procedure is completed.

NOTE: The periodical check is recommended at least annually.

WARNING: This sensor is not explosion proof. Do not use in the area where explosion proof is specified.

5. Resetting

WARNING: The liquid may contain hazardous acids, alkalis, or chemical substances. The following procedure has to be done by a well-trained person who is knowledgeable for that liquid.

NOTE: The protection gloves must be worn.

NOTE: In case of handling any chemicals that are obliged to wear the protection goggles, masks, etc. by regulation, must follow the regulation.

5.1. RS-2000D / P / F

(1) Remove Detection Unit and wipe the bottom clearly.
(2) Remove wetted Absorbent Paper and wipe bracket and surroundings.
(3) Install new Absorbent Paper and place Detection Unit properly.
(4) In case of using RS-2000C, follow the instruction 4-1 (2) through (6). Or using RS-2000CA, follow 4-2 (3) through (7).

5.2. RS-2000DP / PP / FP

(1) Remove Detection Unit and wipe the bottom clearly.
(2) Install Detection Unit properly.
NOTE: Do not use an Absorbent Paper.
(3) In case of using RS-2000C, follow the instruction 4-1 (2) through (6). Or using RS-2000CA, follow 4-2 (3) through (7).

6. Definition

6.1. Failure

In this manual, the word “Failure” indicates the condition as follows with the red “Error” indicator.

a. Improper wiring of Detection Unit
b. Broken wiring of Detection Unit
c. Short circuit on Detection Unit

“Error” indicator will not turn red in the case as follows.

a. Power outage of Control Unit
b. Broken wiring on power line
c. Broken both wiring of relay out
d. Decline of the IR LED inside the Detection Unit

6.2. Dip Switch

RS-2000C has a feature that can detect break or short of wiring between Control and Detection Unit. If Detection Unit is not connected, Control Unit will conclude that it is failure and output alarm.
RS-2000CA has a Dip Switch to prevent such alarm. If Dip Switch is set “OFF”, Control Unit does not detect any failure.
Additionally, the relay out on the circuit that Dip Switch is set “OFF” is keeping open. If Detection Unit is connected on that circuit, system indicates that as a failure.

7. Troubleshooting

7.1. Detecting Unit

Q: “LED” does not turn on. (In any color)
A: Make sure any indicator on Control Unit turned on red. If any of them turned red, there is break down, short, improper wiring between Detecting and Control Unit. Reconfirm wiring.
If any of them does not turned red, Dip Switch on RS-2000CA is not set properly and existing problem on wiring. Reconfirm wiring.

Q: “LED” turned red.
A: There is no Absorbent Paper in the Bracket, or improper installation.

7.2. Control Unit

Q: “Leak Indicator” does not turn green after power is on.
A: Dip Switch is set “OFF” or there is power outage.

Q: “Leak Indicator” keeps red after power is on.
A: If this occurs in the condition with no red on “Error Indicator” and no leakage, there is no Absorbent Paper in the Bracket, or improper installation.

Q: Both “Leak Indicator” and “Error Indicator” keeps red after power is on.
A: There is break down, short, or improper wiring between Control and Detecting Unit. Additionally, if two or more Detecting Unit are connected in each single terminal or Detecting Unit of non RS-2000 Series is connected, the same problem will occur.

Q: Relay keeps open.
A: Make sure the power is on. Relay keeps open without power in this Unit. Or there may be broken wiring in the relay circuit.

Q: Relay keeps close.
A: There is short circuit.

8. Specifications

8.1. Control Unit

		RS-2000C	RS-2000CA
Input Voltage		24V DC±10%	
Power Consumption		100mA below	200mA below
Indication	LED for Leakage	Red: Leakage, Failure Green: Normal Off: Power Outage	
	LED for Failure	Red: Failure Off: Normal	
Discriminative Detection		Yes	
Ambient Temp.		-10～60℃ (14～140 ° F)	
Number of Input poles		1	8
Connectable Detection Unit for each pole		1	
Relay Contact	Numbers	1	9 (8 for Leakage 1 for Failure)
	Capacity	24V DC, 1A (resistance load)	
	Type	Normally Closed	
Case Material		ABS Polymer	
Weight		100g	330g

8.2. Detection Unit

		RS-2000D	RS-2000P	RS-2000F	RS-2000DP	RS-2000PP	RS-2000FP
Supply Voltage		5V DC±5%					
Power Consumption		20mA below					
Indication of LED		Red: Leakage Green: Normal Off: Failure					
Connection with Control Unit		Required					
Ambient Temp.		-10～60℃ (14～140 ˈ F)					
Material	Case	PVC	PP	PFA	PVC	PP	PFA
	Cable	HT-PVC		FEP	HT-PVC		FEP
	Lamp	Epoxy (exposed)	Epoxy (embedded)		Epoxy (exposed)	Epoxy (embedded)	
Water Protect		Silicon Stuffed	Sealed, Silicon Stuffed		Silicon Stuffed	Sealed, Silicon Stuffed	
Weight		40g	55g		40g	55g	
Absorbent Paper		Required			Not Required		

※ Out diameter of each cable is shown below, but the value contains tolerance by manufacturing process.

HT-PVC Cable φ2.82±0.3mm, FEP Cable φ2.2±0.1mm

8.3. Bracket

	P/N-6417	P/N-6418	P/N-6419	P/N-6416
Material	SUS304	PVC	PVC	SUS304
Remarks		Diameter 3mm Screw Hole	Diameter 4mm Screw Hole	Only for Paperless sensors

9. Condition of LED & Relay Contacts

9.1. RS-2000CA

				LED on Detection Unit	LED on Control Unit		Relay Out	
					for Leakage	for Failure	for Leakage	For Failure
Normal Condition				Green	Green	Off	● Close	● Close
Leak Condition				Red	Red	Off	○ Open	● Close
Dip switch Off				N/C	Off	Off	○ Open	● Close
Improper Wiring of Detection Unit				Depending on situation	Red	Red	○ Open	○ Open
Broken Wiring on Power Line				Off	Off	Off	○ Open	○ Open
Broken Wiring of Relay Out				Green	Green	Off	See NOTE below.	
Broken Wiring of Detection Unit								
Broken Wiring	+5V			Off	Red	Red	○ Open	○ Open
		SIG		Green	Red	Red	○ Open	○ Open
			GND	Off	Red	Red	○ Open	○ Open
	+5V	SIG		Off	Red	Red	○ Open	○ Open
		SIG	GND	Off	Red	Red	○ Open	○ Open
	+5V		GND	Off	Red	Red	○ Open	○ Open
	+5V	SIG	GND	Off	Red	Red	○ Open	○ Open
Short Circuit on Detection Unit								
Short Circuit	+5V	SIG		Green	Red	Red	○ Open	○ Open
		SIG	GND	Green	Red	Red	○ Open	○ Open
	+5V		GND	Off	Red	Red	○ Open	○ Open
	+5V	SIG	GND	Off	Red	Red	○ Open	○ Open
Power Outage of Control Unit				Off	Off	Off	○ Open	○ Open
Power Outage of Detection Unit				Off	Red	Red	○ Open	○ Open
Decline of the IR LED				Red	Red	Off	○ Open	● Close

9.2. RS-2000C

				LED on Detection Unit	LED on Control Unit		Relay Out
					for Leakage	for Failure	for Leakage
Normal Condition				Green	Green	Off	● Close
Leak Condition				Red	Red	Off	○ Open
Improper Wiring of Detection Unit				Depending on situation	Red	Red	○ Open
Broken Wiring on Power Line				Off	Off	Off	○ Open
Broken Wiring of Relay Out				Green	Green	Off	See NOTE below.
Broken Wiring of Detection Unit							
Broken Wiring	+5V			Off	Red	Red	○ Open
		SIG		Green	Red	Red	○ Open
			GND	Off	Red	Red	○ Open
	+5V	SIG		Off	Red	Red	○ Open
		SIG	GND	Off	Red	Red	○ Open
	+5V		GND	Off	Red	Red	○ Open
	+5V	SIG	GND	Off	Red	Red	○ Open
Short Circuit on Detection Unit							
Short Circuit	+5V	SIG		Green	Red	Red	○ Open
		SIG	GND	Green	Red	Red	○ Open
	+5V		GND	Off	Red	Red	○ Open
	+5V	SIG	GND	Off	Red	Red	○ Open
Power Outage of Control Unit				Off	Off	Off	○ Open
Power Outage of Detection Unit				Off	Red	Red	○ Open
Decline of the IR LED				Red	Red	Off	○ Open

NOTE: When the wiring for relay out gets broken, it will be noticed by cutoff of the loop for the relay out, though relay does not work. However, when there is short circuit on the wiring for relay out, it is impossible to be noticed by this sensor system.