

# LIQUID LEAK SENSOR

# OPERATION MANUAL

(Web Site Downloaded only)

For RS-2000 Series, as following models

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Control Unit:

RS-2000C                      RS-2000CA

Detection Unit:

RS-2000P                      RS-2000PP  
RS-2000F                      RS-2000FP

\* RS-2000 series do not have such models or application to use Detection Unit as Stand-Alone.

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UL Recognized: File No. E176923  
CE Mark Compliance: EN61326

**TOYOKO KAGAKU CO., LTD.**

Components Business Division

370 Ichinotsubo, Nakahara-Ku,

Kawasaki City, Kanagawa Pref.

211-8502, JAPAN

Phone: (044)435-5860    Fax: (044)434-9091

(Patent Registered)  
MAN-RS2-06.2012 Revised

## Introduction

We appreciate that you have chosen our Liquid Leak 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.

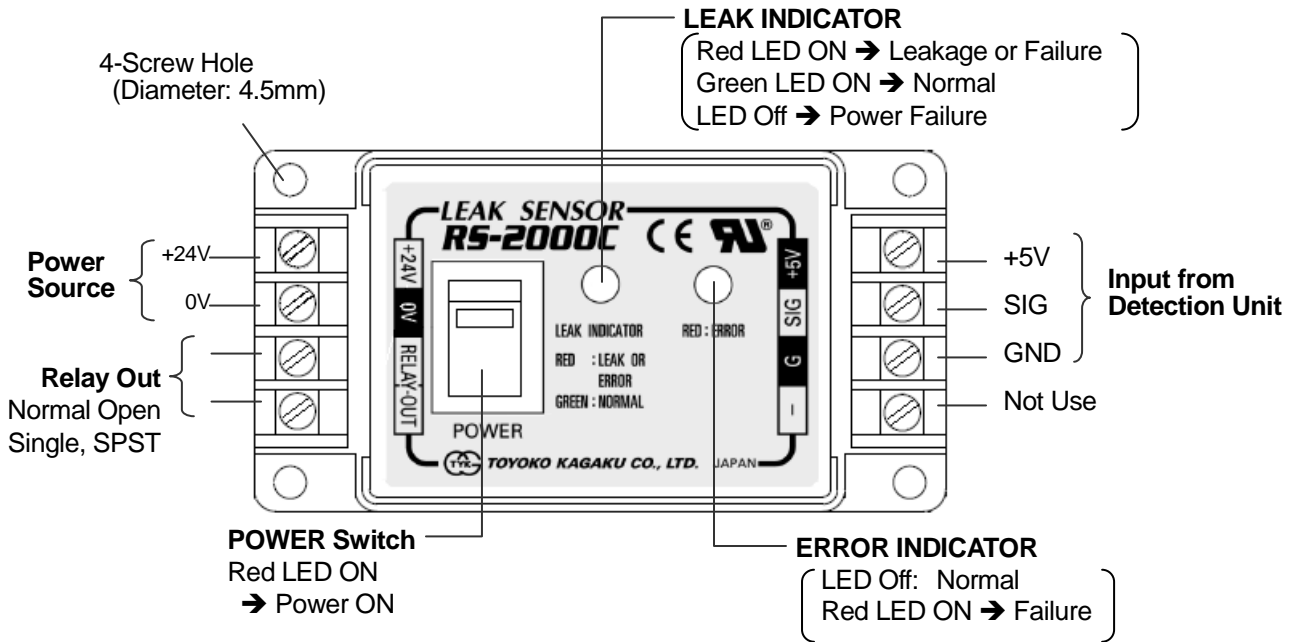
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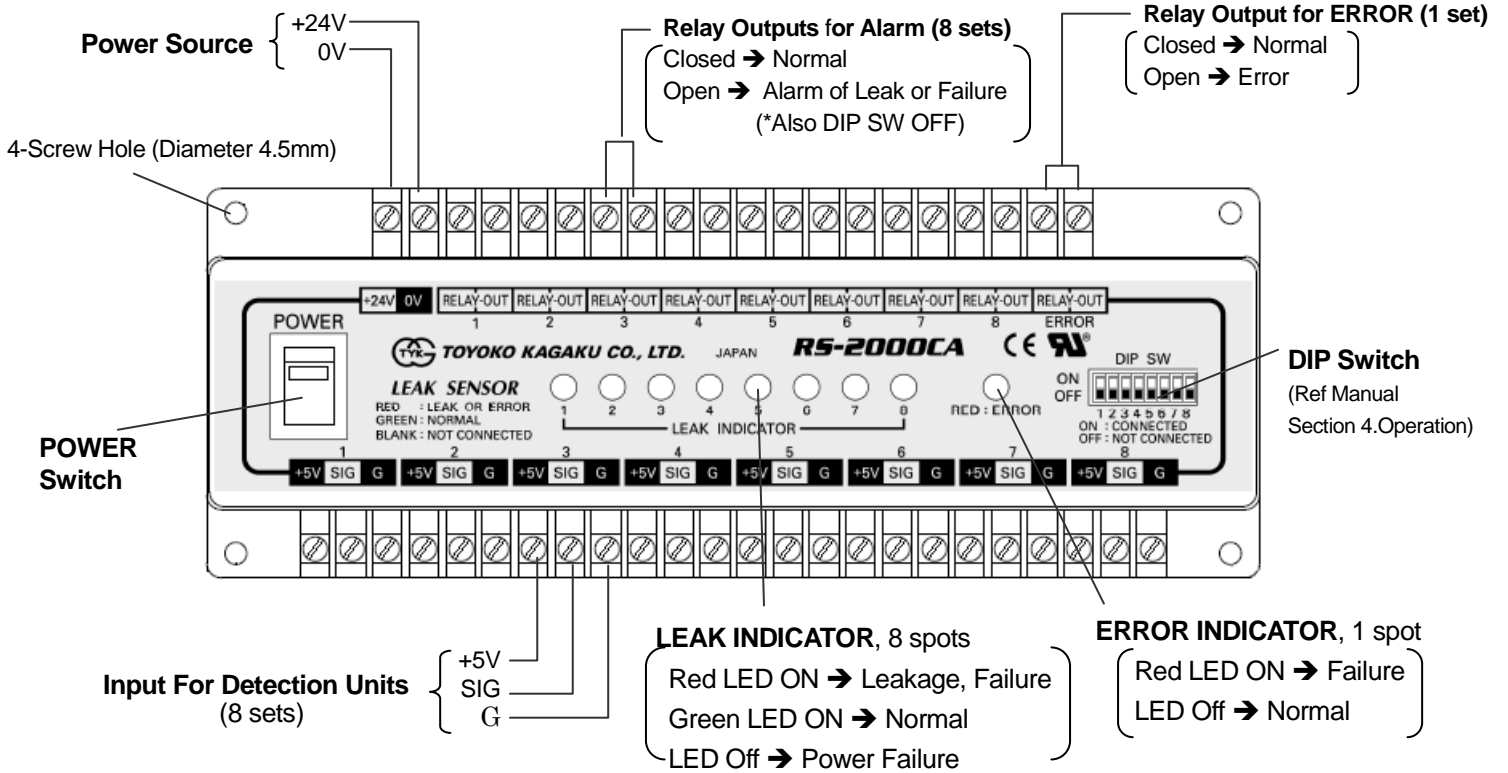
# 1. Designation of Sensors

## 1-1. Control Unit

### (1) RS-2000C (Single Input-Single Output)



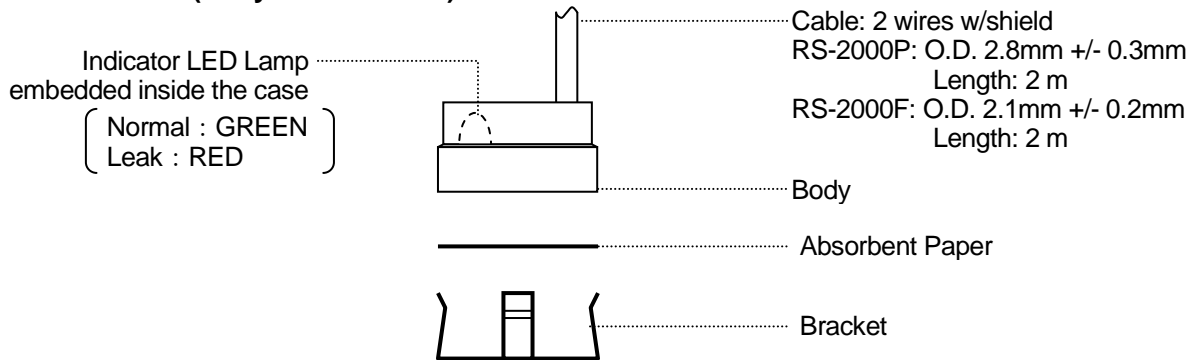
### (2) RS-2000CA (Multiple Inputs-Multiple Outputs by 8 sets)



## 1-2. Detection Unit

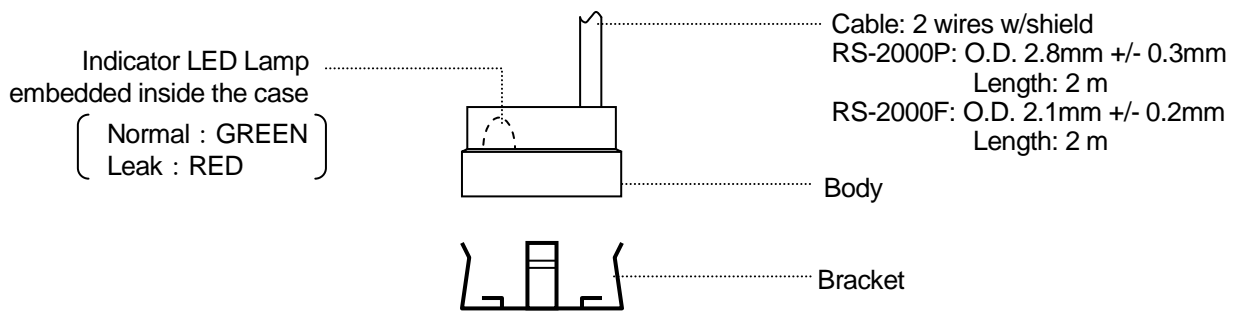
(1) **RS-2000P (Body Material: P.P.)**

**RS-2000F (Body Material: PFA)**



(2) **RS-2000PP (Body Material: P.P.)**

**RS-2000FP (Body Material: PFA)**



## 2. Installation of Detection Unit

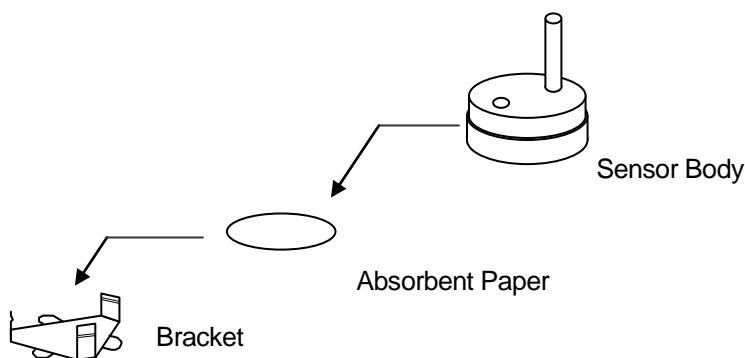
**NOTE:** Use only in combination with RS-2000 Series Controller Unit. Do not use with not specified equipment.

### 2-1. RS-2000P / RS-2000F

- (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.

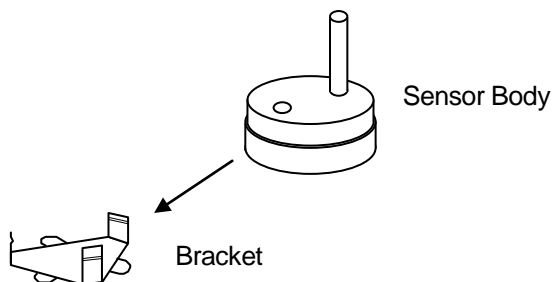
- (3) To mount the body, push it into the Bracket completely.



**NOTE:** Verify that the Body has fixed entirely and it does not hook up at intermediate height in the Bracket, making space between the bottom.

### 2-2. RS-2000PP / RS-2000FP

- (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.



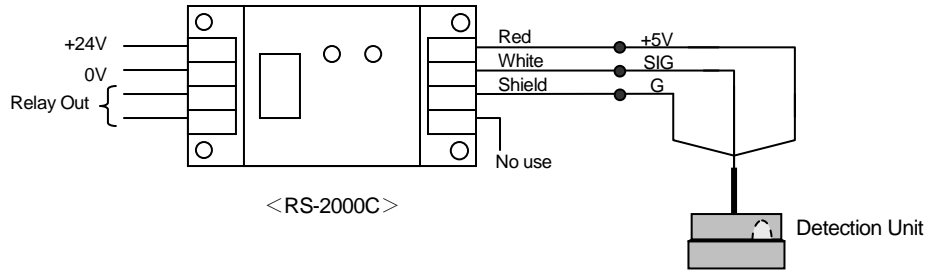
**NOTE:** Do not use any Absorbent Paper for the paperless sensors as described in section 2-2.

**NOTE:** Only use attached Bracket, P/N-6416. Other models of Brackets cannot be used with the sensors above.

### 3. Wiring Instruction

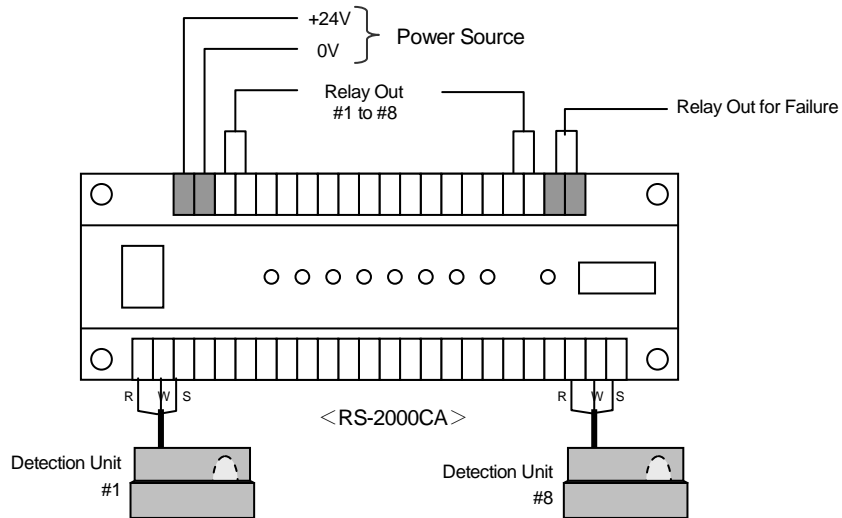
#### 3-1. RS-2000C

- (1) The Detection Unit has a 2-core shielded cable, 2 m long. When the cable needs to be 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.
- (4) Connect alarm input to the terminal of relay out.



#### 3-2. RS-2000CA

- (1) The Detection Unit has a 2-core shielded cable, 2 m long. When the cable needs to be extended to reach at Control Unit, please take care not exceeding a maximum length of 30m as distance. (EMC compliance)
- (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.
- (4) Connect an alarm input to the terminal of relay out for "leakage".
- (5) Connect an alarm input 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 before all the wiring has been completed. After wiring has completed, keep a protection cover on the terminals of control unit during operation for safe.

## 4. Operation and Function Pre-Check

**WARNING:** *The following procedure must be implemented after wiring has done and prior to actual operation in the application.*

### 4-1. RS-2000C

- (1) Verify an Absorbent Paper is located at the Bracket properly (Follow the procedure describing in Section 2. Installation of Detection Unit.). The Absorbent Paper Set is included within the sensor packaging bag for shipping from the factory.  
*\*For RS-2000PP / RS-2000 FP, these models do not use the Absorbent Paper as designed.*

- (2) Turn on "POWER" switch and make sure the Indicator LED Lamp becomes lit in red.

- (3) In this condition, the sensor should operate properly. Make sure the following appearances;
  - a. "Leak Indicator" on Control Unit: is Green
  - b. "Error Indicator" on Control Unit: is Off

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

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

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

- (4) Remove an Absorbent Paper from the Bracket and place Detection Unit on bracket.  
*\*RS-2000PP / RS-2000FP, drip a drop of a fluid, such as water, at the bottom of unit.*

- (5) In this manner, the sensor works as if detecting a leak failure. Make sure the following appearances;
  - a. "Leak Indicator" on Control Unit: becomes Red
  - b. "Error Indicator" on Control Unit: becomes Off
  - c. LED on Detection Unit becomes 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-2000PP / RS-2000FP, wipe off remaining water around the Detection Unit clearly. The procedure is completed.

#### 4-2. RS-2000CA

- (1) After installation and wiring is completed, set the DIP Switch as follows.
  - a. Respond to the terminal number that Detection Unit is connected: ON
  - b. 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".).  
For RS-2000 PP / RS-2000FP, do not use the Absorbent Paper.
- (3) Turn on "POWER" switch and make sure the indicator LED of the POWER switch is lit red.
- (4) In this stage, the sensor should work properly. Make sure the following appearances:
  - a. "Leak Indicator" on the Control Unit is Green
  - b. "Error Indicator" on the Control Unit: is 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 the Bracket.
- (6) In case of using RS-2000PP / RS-2000FP, the water may be pored at the bottom of Bracket for the sensor works detecting leakage. Make sure the following Appearances:
  - a. "Leak Indicator" on the Control Unit: is Red
  - b. "Error Indicator" on the Control Unit: is Off
  - c. LED on the Detection Unit: is Red
  - d. Relay out: is 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-2000PP / RS-2000FP. Then the procedure is completed.

**NOTE: The periodical check is recommended at least annually.**

**NOTE: The liquid detecting device in the Detection Unit is photoelectric sensitive device. When the Detection Unit receives a strong light from outside of the sensor Body (larger than 1,000lx), it may cause malfunction of detecting the leak liquid at the sensor from time to time. We recommend you to confirm that no such a strong light emitting instrument may not be located at close position to Detection Unit, or to place a screen avoiding the light may reach to the Detection Unit. The normal room lighting instrument may not effect the Detection Unit.**



## 5. Resetting after the Leak Detection

**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.*

(1) Turn off the **POWER** switch of the Control Unit RS-2000C / RS-2000CA.

(2) Take out the Detection Unit from the Bracket, and wipe the Unit to clean and dry.

### 5-1. Detection Unit: RS-2000P / RS-2000F

- a. Remove wetted Absorbent Paper and wipe a Bracket and surrounding to clean and dry.
- b. Install new Absorbent Paper and place Detection Unit properly.
- c. For RS-2000C using, follow the instruction at the Section 4-1 (2) through (6). Otherwise using RS-2000CA, follow 4-2 (3) through (7).

### 5-2. Detection Unit: RS-2000PP / RS-2000FP

- a. Wipe off the remaining liquid around the Bracket, and install Detection Unit properly.

**NOTE:** *Do not use an Absorbent Paper for these group of models..*

- b. For RS-2000C using, follow the instruction at the Section 4-1 (2) through (6). Otherwise using RS-2000CA, follow 4-2 (3) through (7).

(3) Verify the Detection Unit and the Bracket are set properly, then turn the **POWER** switch on.

**NOTE:** *The periodical check is recommended as following your factory protocol for safety standard or regulations of maintenance plan, but more than at least annually.*

**WARNING:** *The RS-2000 Sensor is not designed for explosion proof. Do not use the Sensor in the hazardous area. For this category of UL Standard, UL does not allow using in hazardous area, and UL does not evaluate for use in explosive circumstances under the present UL Category and File number.*

## 6. Definition of the Words

### 6-1. Failure

In this manual, the word of "Failure" means the condition as follows when the red "Error indicator" becomes on:

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

"Error Indicator" will not become 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 both of 'break' or 'short' of wiring between Control Unit and Detection Unit. If Detection Unit is not connected, Control Unit will function that it is failure to output the alarm.

**RS-2000CA** has a **DIP Switch** to control such alarms. If Detection Unit is not connected at a certain number(s) of the input terminal of RS-2000CA, the corresponding number of switch(s) of DIP Switch should be turned 'off' position to avoid outputting the alarm from

the Control Unit to your Factory system.

## **7. Troubleshooting (Q & A)**

### **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 some problem of broken down, short circuit or improper wiring may be generated between Detecting Unit and Control Unit. Reconfirm those wiring conditions.

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" keeps turned red always.

A: There may be lack of Absorbent Paper in the Bracket, or improper installation of the Detection Unit in the Bracket. Please check around the Detection Unit and Bracket.

### **7-2. Control Unit**

Q: "Leak Indicator" does not turn green after power switch is on.

A: DIP Switch should be set "OFF" or there is power failure.

Q: "Leak Indicator" keeps red after power is on.

A: If this occurs in the condition with no red on "Error Indicator" and no leak event, 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 may be broken down, short circuit or improper wiring between Control and Detecting Unit. Furthermore, 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: Output Relay keeps 'open' status.

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. Specification

### 8-1. Control Unit

Models		RS-2000C	RS-2000CA
Input Voltage		24V DC $\pm$ 10%	
Power Consumption		100mA below	200mA below
Indicator Lamp	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°C (14~140° F)	
Number of Input Detection Unit		1	1 to 8
Connectable Detection Unit for each pole		1	
Relay Output	Number of set	1	9 (8 for Leakage 1 for Failure)
	Capacity / set	24V DC, 1A (resistance load)	
	Type of Contact	Normally Closed	
Case Material		ABS Polymer	
Weight		100g	330g

### 8-2. Detection Unit

Models		RS-2000P	RS-2000F	RS-2000PP	RS-2000FP
Supply Voltage		5V DC $\pm$ 5%			
Power Consumption		20mA below			
Indication of LED		Red: Leakage Green: Normal Off: Failure			
Connection with Control Unit		Required			
Ambient Temp.		-10~60°C (14~140° F)			
Material	Case	PP	PFA	PP	PFA
	Cable	HT-PVC	FEP	HT-PVC	FEP
	Lamp	Epoxy (embedded)		Epoxy (embedded)	
Water Protect		Sealed, Silicon Stuffed		Sealed, Silicon Stuffed	
Weight		55g		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 diameter: 2.8mm +/- 0.3mm, // FEP Cable diameter: 2.2mm +/- 0.1mm**

### 8-3. Bracket

Models	P/N-6417	P/N-6418	P/N-6419	P/N-6416	P/N-6420B
Sensors	RS-2000D, RS-2000P, RS-2000F			RS-2000DP, RS-2000PP, RS-2000FP	
Material	SUS301 + Ni Plated	PVC	PVC	SUS301 + Ni Plated	PVC
Installation	For M3 Screw Holes		For M4 Screw	For M3 Screw Hole	For M4 Screw Hole

## 9. Condition of LED & Relay Contacts

### 9-1. RS-2000C

				LED on Detection Unit	LED on Control Unit		Relay Out
					for Leak	for Failure	for Leak
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

### 9-2. RS-2000CA

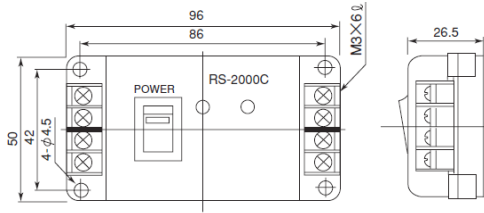
				LED on Detection Unit	LED on Control Unit		Relay Out	
					for Leakage	for Failure	for Leakage	For Failure
Normal Condition				Green	Green	Off	● Close	● Close
Leak Condition				Red	Red	Off	○ Open	● Close
Dip switch Off				N/C	Off	Off	○ Open	● Close
Improper Wiring of Detection Unit				Depending on situation	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

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.

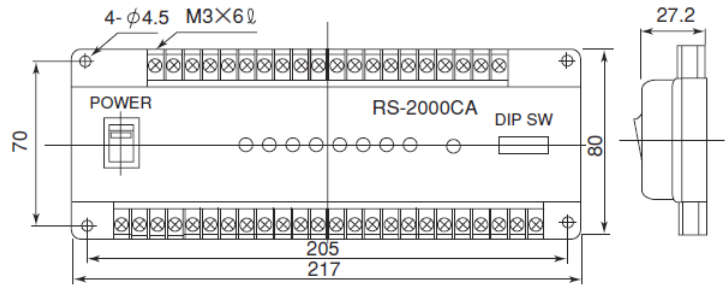
## 10. Appearances and Dimensions:

### Control Unit:

#### RS-2000C

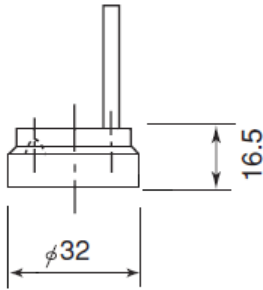


#### RS-2000CA



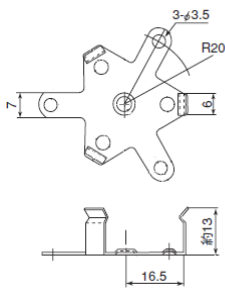
### Detection Unit:

#### RS-2000P/ RS-2000F/ RS-2000PP/ RS-2000FP

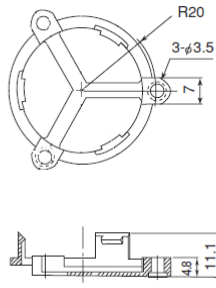


### Bracket:

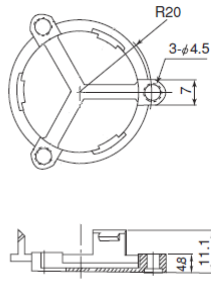
#### P/N-6417



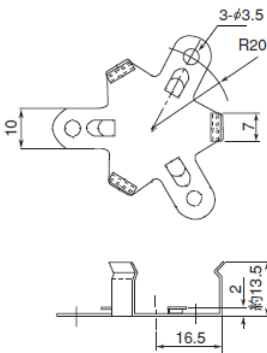
#### P/N-6418



#### P/N-6419



#### P/N-6416



#### P/N-6420B

