

# LIQUID LEAK SENSOR

# OPERATION MANUAL

(Web Site Downloaded only)

For RS-3000 and RS-3500 Series,  
as following models

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Control Unit:

RS-3000C

RS-3500C

Detection Unit:

RS-3000FA

RS-3500FA

RS-3000FAP

RS-3500FAP

RS-3000FAP-S

RS-3500FAP-S

\* RS-3000 Series is designed for use in NPN configuration transistor circuit by its open-collector out put., besides RS-3500 Series is used in PNP configuration. Both Series cannot be mutually substituted each other for its out put signals.

\*\* For the Operating information of Buzzer Alarm Leak Sensor of RS-3000 Series and RS-3500 Series, please refer to the separate copy of the manuals. When Control Unit of RS-3000C/3500C will be applied for Buzzer Alarm Leak Sensor, please refer this manual for the appropriate section, too.

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# Introduction

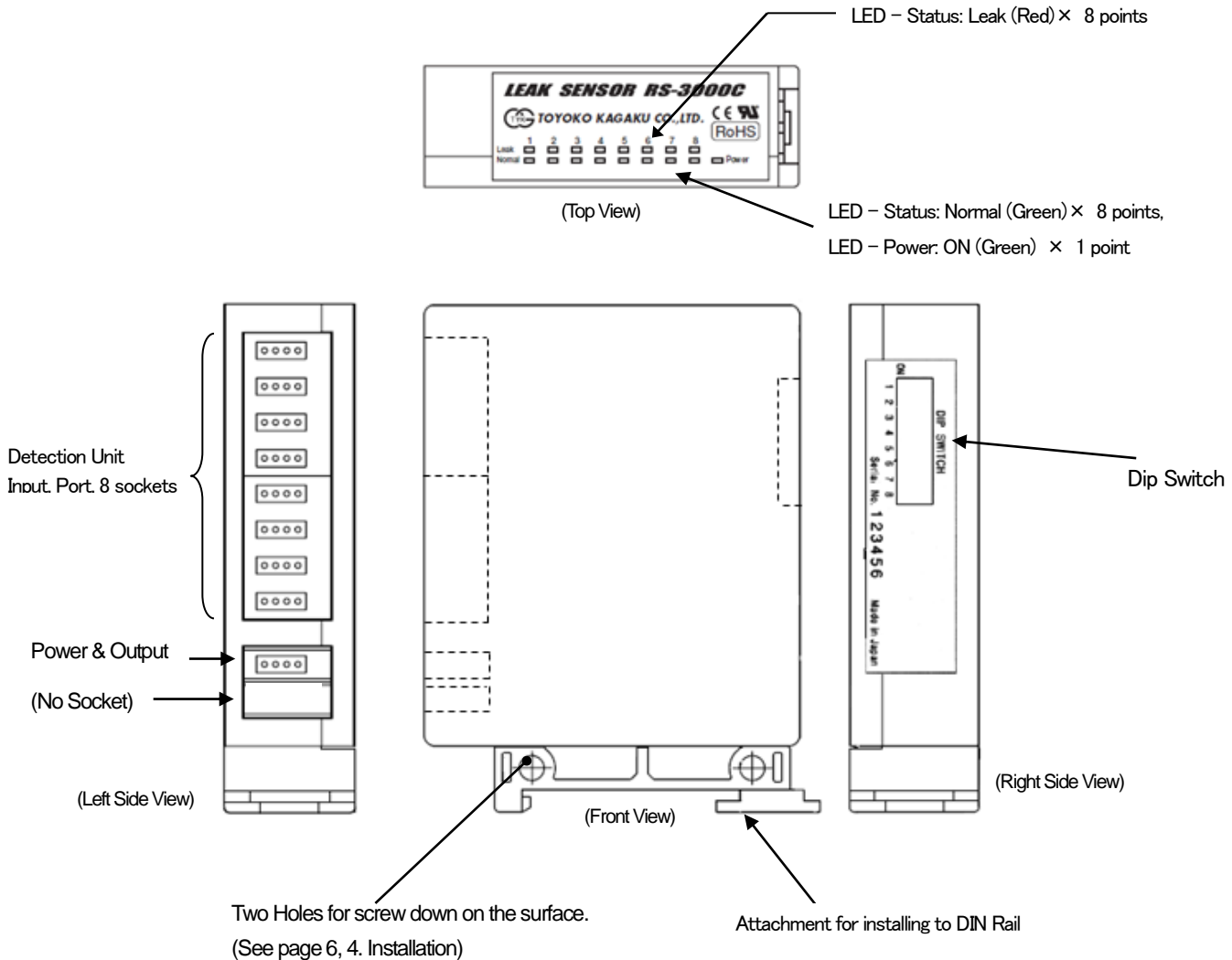
We appreciate that you have chosen our Liquid Leakage Sensor. Before you install or operate it, please read this operation manual thoroughly, and follow the instruction in order to avoid any accidents, malfunction, defects and hazards. Please keep this manual with good care as long as the sensor is being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

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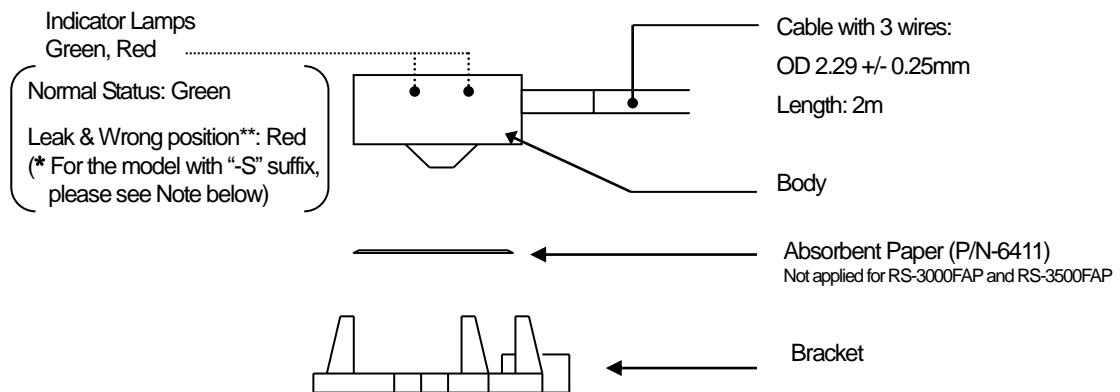
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# 1.Designation of Sensors

## 1-1. Control Unit: RS-3000C, RS-3500C



## 1-2. Detection Unit: RS3000FA/ FAP/ FAP-S\*, RS-3500FA/ FAP/ FAP-S\*



\*Note: "-S" suffix is designed to omit the feature of Wrong Position Sensing from standard features. Even all the dimensions and technical designs are identically same as standard models, but the alarming function by wrong positioning has been omitted. Then the alarm signal of this "-S" model is limited clearly generated by liquid leak detecting. This concept would be accepted by such, "Single purpose should be assigned to a single alarm signal" Therefore "-S" feature has becomes one of optional function in RS-3000 series.

## 2. Installation

### 2-1. Detection Unit: RS-3000FA / RS-3500FA

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

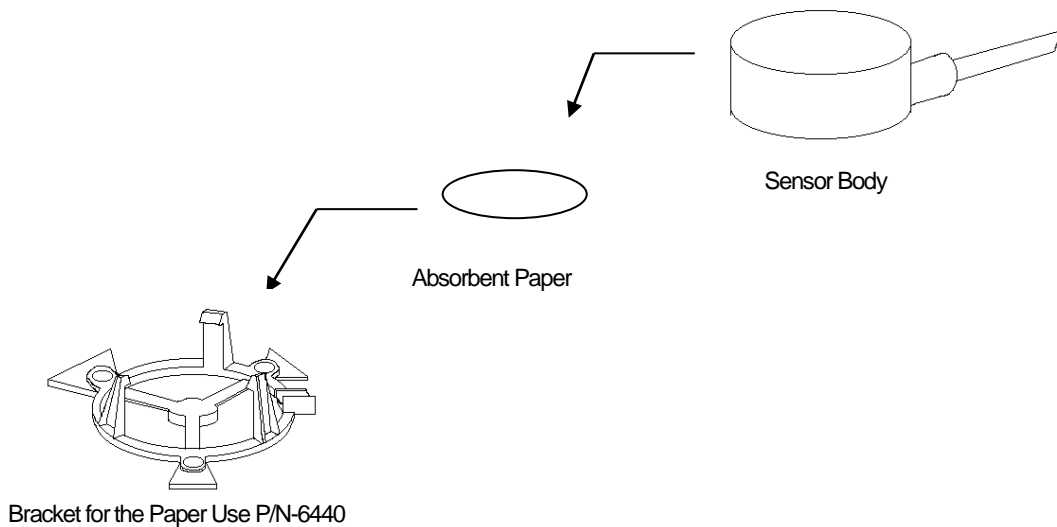
\* Use the correct Bracket for the detection Unit. Refer to page 8 [Bracket Specification].

(2) Place a piece of the Absorbent paper onto the Bracket.

**NOTE: Be assured not to use 2 or more pieces of the Paper at a time in the Bracket.**

(3) For mounting the Sensor 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. Detection Unit: RS-3000FAP / RS-3000FAP-S / RS-3500FAP / RS-3500FAP-S

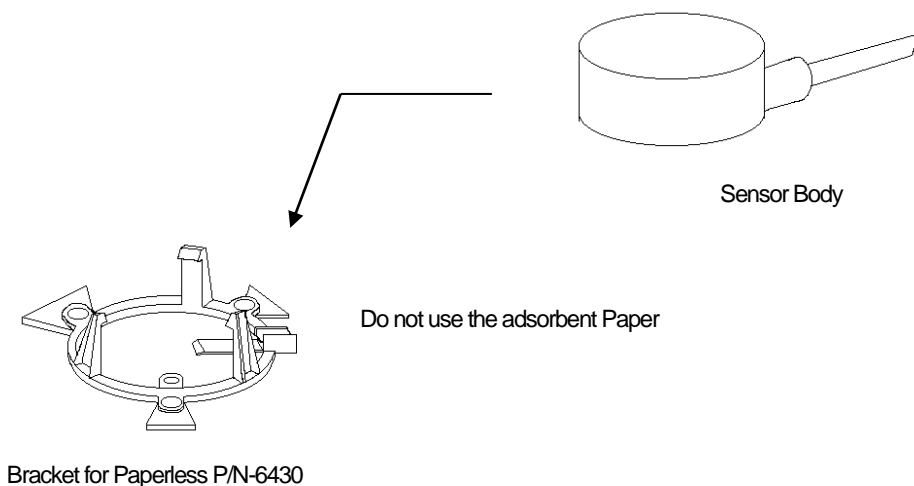
(1) Place the Bracket of the Detection Unit on the surface where you want to detect the leakage, and fix it firmly.

\* Use the correct Bracket for the detection Unit. Refer to page 12 [Bracket Specification]

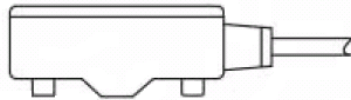
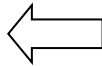
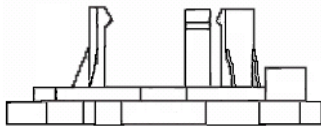
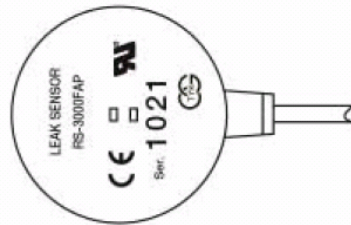
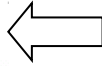
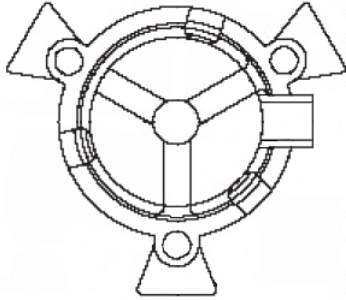
(2) For mounting the Sensor Body, push it into the Bracket completely.

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

**NOTE: Do not use any absorbent paper for these models for Paperless application.**

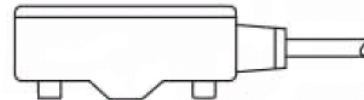
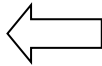
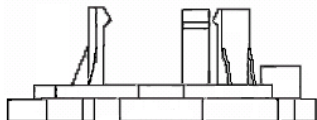
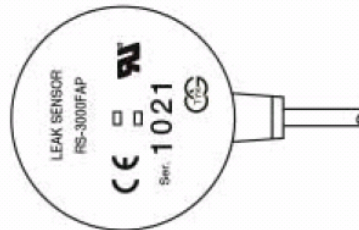
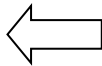
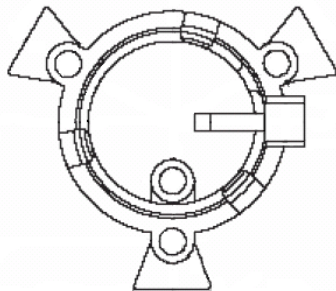


**NOTE:** When the sensor is located at the position, align the direction of the detection unit against the Bracket as described below. And make sure that the location of the sensor will not have any objections for maintenance job, or the direction of the cable heads for no obstructions where the cable may not be damaged by excessive bent or pressure.



**Bracket P/N-6440**

**For Detection Unit RS-3000FA / RS-3500FA**



**Bracket P/N-6430**

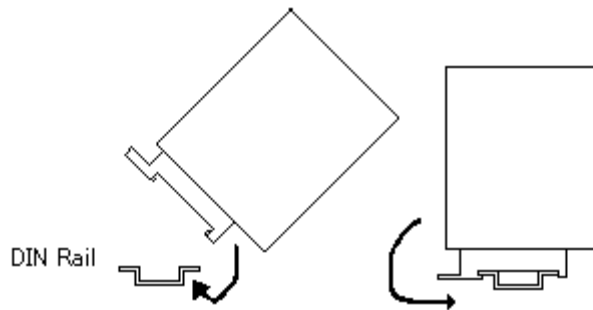
**For Detection Unit RS-3000FAP / RS-3000FAP-S / RS-3500FAP / RS-3500FAP-S**

### 2-3. Control Unit RS-3000C / RS-3500C

The Control Unit can be installed on either a DIN Rail or the plane surface.

(1) Install the Control Unit into the DIN Rail as below.

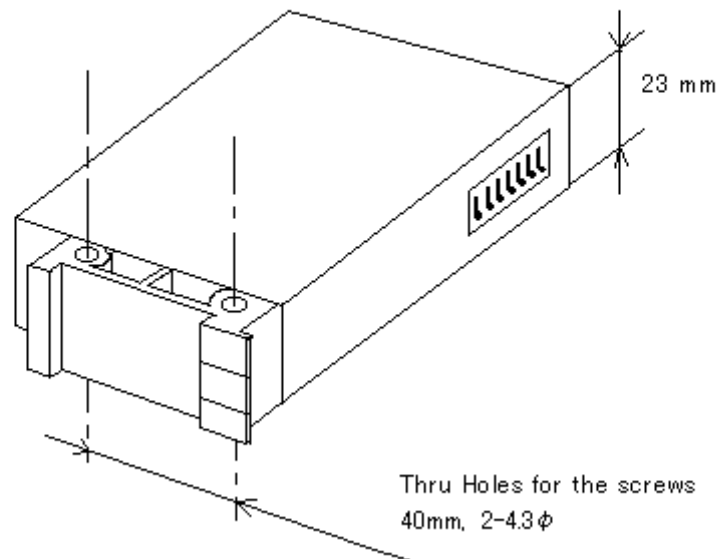
Control Unit: RS-3000C, RS-3500C



1) Put the "Fixed Hook" to one end of the DIN rail.

2) Push the "Spring Hook" down toward the other end of the DIN rail.

(2) When DIN Rail is not applied, install the unit on the surface directly to be fixed using two of the screw as below.



### 3. Wiring Instruction

#### 3-1. Detection Unit Stand-alone application without Control Unit

Both of RS-3000 and RS-3500 Detection Unit have the same wire allocation as below:

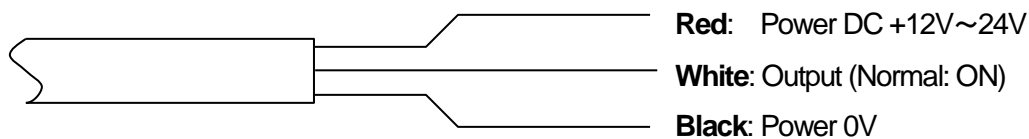
**RS-3000FA / RS-3000FAP / RS-3000FAP-S → Refer to NPN circuit configuration wiring;**

**RS-3500FA / RS-3500FAP / RS-3500FAP-S → Refer to PNP circuit configuration wiring;**

(1) The Detection Unit has a 3-wire sheath cable by 2 meters long (as a standard length)

When you extend the cable length for your electric system, do not exceed 30 meters long to comply with its technical conditions of EN61326, which is our certified test conditions, too.

Each wire will be connected as below.



(2) Connect the red wire (Positive pole) and the black wire (Negative pole) to the power source correctly.

White wire is for an open collector output.

**NOTE: Do not miswire with DC power source each other.**

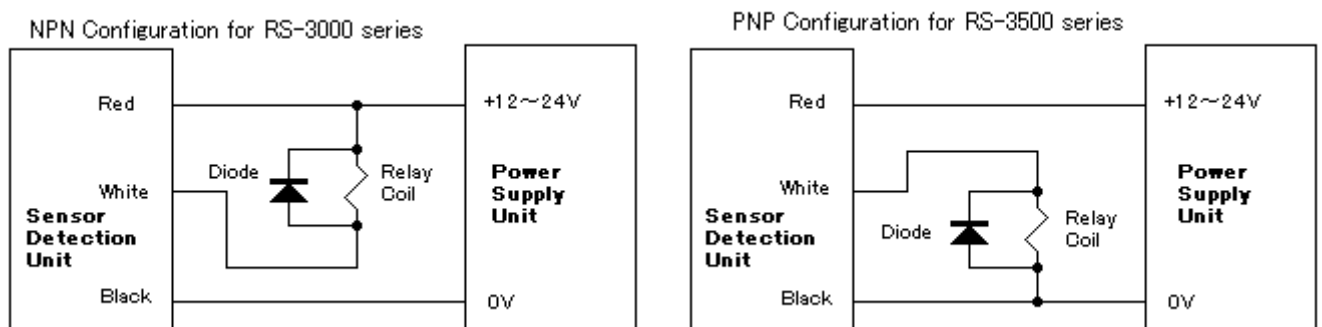
**NOTE; Use the sensor unit between the power voltages of DC12V to DC24V.**

(3) The output capacity is limited up to 50mA maximum rating. Excessive rating may damage the output circuit.

**NOTE: When an inductive load may be applied, the protective treatment for the back electromotive is recommended. The following sample chart shows a hint to add a protective diode (F14C equivalent) to a relay coil load**

#### Wiring Instruction: (Sample charts)

Please be careful to recognize the difference between both NPN and PNP wiring.



**NOTE: Avoid short circuit between each wire after the power is supplied, otherwise the damage may be happened.**

### 3-2. Detection Unit: Combination application with Control Unit

RS-3000FA / RS-3000FAP, / RS-3000FAP-S will be connected to the control unit RS-3000C.

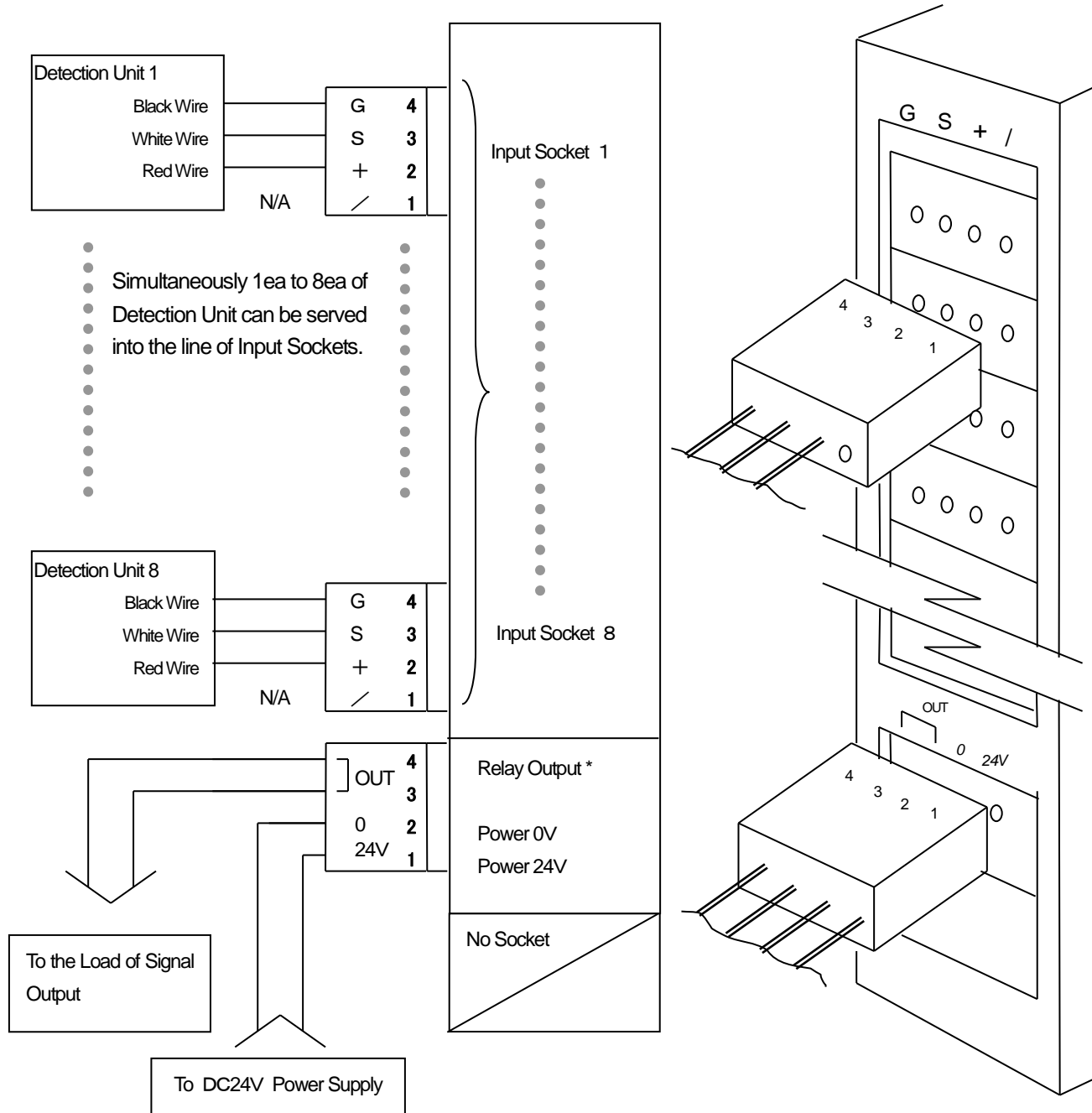
RS-3500FA / RS-3500FAP / RS-3500FAP-S will be connected to the control unit RS-3500C.

**\*Buzzer Alarm Sensor RS-3000\*-BZ can be connected with RS-3000C as the same manner instructed in manual. RS-3500\*-BZ can be connected with RS-3500C, respectively.**

Use **the Plug connectors** for wiring with the Control Unit. The Connector can be obtained in the market by the keyword of “e-con” specification associated by Japanese connector suppliers. We recommend to use OMRON, XN-2 Type connector for the connection as below:

For further information about XN-2 connectors, please visit web site of OMRON: URL [www.fa.omron.co.jp/product/family/1728/index\\_p.html](http://www.fa.omron.co.jp/product/family/1728/index_p.html)

(1) Refer to the wiring information in the illustration below.



\* The specification of the “Relay Output” of the Control Unit is one pole of SPST relay contact.



## 4. Operation

**WARNING:** *The following procedure must be implemented after wiring has been done, prior to operation.*

### 4-1. Detection Unit Stand-alone application without Control Unit

After installation and wiring works are completed, you may turn on the power for initial verification process. At this moment, Green LED on the Detection Unit will light while the other Red LED is off. Now the Sensor works as the output is ON status.

Next, you may proceed either following step of [1] Paper application, or [2] Paperless application, according to your sensor product models:

#### [1] RS-3000FA / RS-3500FA (Absorbent Paper is used)

For testing the models, the absorbent paper will be removed from the Bracket temporarily. The Detection Unit is set again to check. The Red LED of the Detection Unit will light and Green LED goes off. The output becomes OFF simultaneously. It is correct appearance.

After the verification of this check, the absorbent paper must be set again.

The sensor is now set good conditions for use.

#### [2] RS-3000FAP / RS3000FAP-S / RS-3500FAP / RS-3500FAP-S (No paper is used)

To check the alarm status, just pour a drip of water to the Detection Unit, rather to the Absorbent paper.

Upon the water is absorbed into almost whole area of the absorbent paper, the LED of the Detection Unit will be switched from Green to Red. The output will become OFF status simultaneously. This is the correct alarm status.

After the check, wipe off the water remaining completely, and set again the Detection Unit in the Bracket.

### 4-2. Detection Unit Combination application with Control Unit

(1) After installation and wiring works are completed, you may turn on the power, then, set the position of each Dip Switch of the Control Unit. The detailed function is described in the chart on next page.

#### [Adjusting of Dip Switches]

Put the adequate number of the Dip Switch ON position same as the selected number of the input port of the Control Unit. For example, 5 of the Detection Unit are connected to the input port of 1 through 5, the Dip Switch of 1 through 5 must be turn ON position and other rest of 6 to 8 must be OFF position.

In case that the selected number of the Dip Switch may be OFF in spite the Detection Unit is connected at the same input number, the output signal from the Detection Unit will not be recognized, then both of the Green and Red LED Display on the Control Unit remain unlit.

(2) Verify the status of all the Detection Unit connected in the Control Unit as the same way described in the above 4.1 section.

(3) When the Detection Unit shows Red LED on, and its output is OFF, the LED Display of the Control Unit shows Red (Alarm) on for the selected number of Input Socket, and Relay contact of the output is OFF, as the Close status of relay contact.

When all the Detection Unit shows Green LED, the Relay contact of the Control Unit is ON, as the Open status.

## Connection and Status Reference Chart

	Input No	LED Indicator of Detection Unit	Dip Switch	LED Display	Relay Out
1	n	Green ON	n=ON	n = Green ON	OFF = Close
2	n	Red ON 1) Leakage 2) Wrong position***		n = Red ON	ON = Open
3	n	Not Connected		n = Red ON	ON = Open
4	n	Not Connected	n=OFF	n = blank	OFF=Close

\* "n" represents selected input socket numbers from 1 to 8 of the Control Unit.

\*\* If the correspondent number of the Dip Switch may not be set correctly, the Relay output will not function accurately.

\*\*\*This function is not applied to the "-S" suffix models. This model only outputs the alarm when the liquid is detected.

### 4-3. Distinction of the abnormal status

- (1) When the LED of the Detection Unit will not become on, wrong wiring or the damage of the unit may be possible, which will be caused by the excessive voltage or current to the Detection Unit. Upon you may observe such error appearance, stop to use the unit, and check with the wiring and the load status.
- (2) On RS-3000FA and RS-3500FA abnormally Red LED may light on though the absorbent paper is located correctly, or Green LED may light on though the absorbent paper is not located; Or, on RS-3000FAP, RS-3000FAP-S, RS-3500FAP and RS-3500FAP-S, Green LED may be kept on, though the test water penetrates into the detecting area; For these cases, the Detection Unit may be possibly damaged. Stop using the unit immediately, and consult the vendor or the factory.
- (3) When the incorrect output status is observed though the LED functions correctly, the unit may be damaged by wrong wiring or excessively loaded output at the output transistor inside. Check the wiring and the load.
- (4) When the Detecting Unit is not placed far into the Bracket as its position, the LED will light on Red and output turns OFF status. Check the location of the Detecting unit in its Bracket again, and adjust it if placement is wrong.

**NOTE: RS-3000FAP-S and RS-3500FAP-S will not alarm by the incorrect position at the Bracket. Please be aware not to pass over the position of the Detection Unit and Bracket.**

- (5) When RS-3000C or RS-3500C Control Unit is applied, be aware that the output of the unit is provided in one pole only in spite the Detection Unit may be connected more than two. When one among those connected Detecting Units may turns the output OFF, the singular relay output of the Control Unit becomes ON=Open.

All the Dip Switch must be set at correct position as instructed before in this manual.

**NOTE: The RS-3000 series sensors utilize the optical devices, and the highly intensive light from outwards (over 1,000 luxes) may disable the function of the Detecting Unit. The normal intensity like the room light may not affects critically, however for safety, you are recommended to avoid any devices which emit the intensive light from the Detection Unit neighborhood, or to shade the light by means of anything applicable.**

## 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 the regulation, you must follow such regulations.*

- (1) Turn off the power.
- (2) Remove the Detection Unit from the Bracket, and wipe the liquid off.
- (3) Remove the wet Absorbent Paper and wipe the Bracket and surroundings. Replace with a new paper then reset to follow the process of Installation of the Detection Unit.
- (4) If the absorbent paper is not applied, wipe the unit, the Bracket and the surroundings. Then reset to follow the process of installation section in this manual.
- (5) Turn on the power again then the reset is completed..
- (6) Check the function of the sensors with the steps of the Section 4.1 to 4.2. Operation
- (7) Achieve periodical maintenance check of the sensor.

As the material of the absorbent paper is cellulose, then the material properties would become changed by the time during the service period, then a periodical replacement of the paper is recommended if the sensor is located for a respectively long time.

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

**WARNING:** *The Sensor is not designed explosion proof. Do not use in the hazardous area. For this category of UL standard does not allow to use in hazardous area, and UL does not evaluate for use in explosive circumstances.*

## 6. Specification

### 6-1. Control Unit

Model	RS-3000C	RS-3500C
Input Voltage	24V DC +/- 10%	
Power Consumption	200mA below	
Input	Simultaneously 1 to 8 ea of independent Input available	
LED Display	Independent LED Display for corresponding Input Socket Number Red LED for Alarm x 8 points, Green LED for normal status x 8 points If both LED are blank, its corresponding Input Socket is empty.	
Output	SPST Relay Output x 1, Normal Status: Close, Leakage or Alarm: Open, Power Failure: Open	
Ambient Temp.	-10 to 60 deg C (environment)	
Case Material	ABS Polymer	
Cable connection	8 ea of Socket for the Plug with Detecting Unit (Lock fix feature) Power supply & Output:: 1ea of Socket for both wirings (Lock fix feature)	
Installation	On the DIN Rail, or Screw fix up (by 2ea of M4 thread)	
Wiring Error	RS-3000 will outputs the alarm status by followings; Cut circuit conditions (no power or no signal) Wrong-wiring conditions <b>Warning: The shortage between Red cord and black cord may destroy the transistor device for output signal instantly.</b>	
Applicable Detection Unit	RS-3000FA, RS-3000FAP, RS-3000FAP-S; <i>RS-3000*-BZ Buzzer Alarm Leak Sensor is available, too.</i>	RS-3500FA, RS-3500FAP, RS-3500FAP-S; <i>RS-3500*-BZ Buzzer Alarm Leak Sensor is available, too.</i>

\*The recommended Plug for connection of the above Control Unit and the Detection Unit is **OMRON XN2A-1430** type.

### 6-2. Detection Unit

#### (1) RS-3000 series

Model	RS-3000FA	RS-3000FAP	RS-3000FAP-S
Supply Voltage	DC 12V~24V ±10%		
Current	20mA below		
Indication of LED	Leakage → Red, Wrong Position Error → Red Normal Status → Green		
Output	Single PNP open collector, 50mA max (normal; ON) When Indication of LED is Red, relay contact opens During Indicator of LED is Green, relay contact stays closed		
Ambient Temp.	-10 to 60 deg C		
Material	Case	PFA	
	Cable	FEP, 3-wire sheath	
	Lamp	Epoxy (embedded)	
Water Protect	Sealed, IP 67 equivalent (IEC)		
Weight	Approx 40g		
Absorbent Paper	Required	Not Required	
Bracket	P/N-6440	P/N-6430	
Remarks	Position Monitor	Position Monitor	No Position Monitor

## (2) RS-3500 Series

Model		RS-3500FA	RS-3500FAP	RS-3500FAP-S
Supply Voltage		DC 12V~24V ±10%		
Current		20mA below		
Indication of LED		Leakage → Red Improper location Error → Red Normal → Green		
Output		Single PNP open collector, 50mA max (normal; ON) When Indication of LED is Red, relay contact opens During Indicator of LED is Green, relay contact stays closed		
Ambient Temp.		- 10 to 60 deg C		
Material	Case	PFA		
	Cable	FEP, 3-wire sheath		
	Lamp	Epoxy (embedded)		
Water Protect		Sealed, IP 67 equivalent (IEC)		
Weight		Approx 40g		
Absorbent Paper		Required	Not Required	
Bracket		P/N-6440	P/N-6430	
Remarks		Position Monitor	Position Monitor	No Position Monitor

\*Out Diameter of the cable is as below, but the slight difference may remain as the tolerance because of the manufacturing process:  
Diameter = **2.29mm +/- 0.25mm**

### 6-3. Bracket

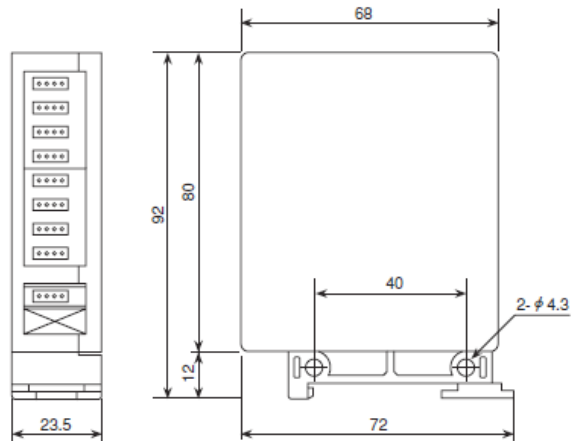
Models	P/N-6440	P/N-6430	P/N-6716
Sensors	RS-3000FA / RS-3500FA	RS-3000FAP / RS-3000FAP-S / RS-3500FAP / RS-3500FAP-S	RS-3000FAP / RS-3000FAP-S / RS-3500FAP / RS-3500FAP-S
Materials	PVC	PVC	SUS301+ Ni plated
Installation	3-M4 screw holes	3-M4 screw holes	3-M3 screw holes

\***M3, M4** is the nominal code for screw specification designated by Japanese Industrial Standard, JIS B 1101.

## 7. Outlook and Dimensions:

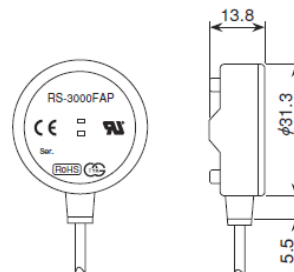
### Control Unit:

RS-3000C / RS-3500C



### Detection Unit:

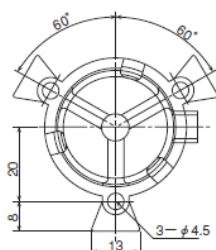
RS-3000FA / RS-3000FAP / RS-3000FAP-S  
RS-3500FA / RS-3500FAP / RS-3500FAP-S



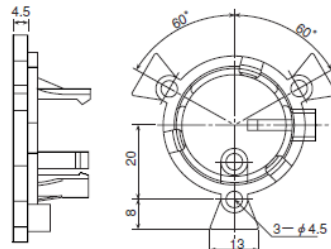
All about the dimensions of RS-3000 / RS-3500 series Detection Units are same shape and sizes.

### Bracket:

● P/N-6440 (PVC)



● P/N-6430 (PVC)



● P/N-6716 (SUS)

