

Flame detector (Triple IR)
RFD-3000X User's Manual

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1. Product Overview

1.1 Product Introduction

Model RFD-3000X from Rezontech Co., Ltd. is Triple IR Band type flame detector. It activates alarm signal or fire extinguishing system via fire or flame detection. This function is available directly on output terminal of detector or via connected control circuit.

Various output methods are available for choice:

- Dry contact Relays (Fire, Fault, Warning)
- 4~20mA Current Output
- RS485 Communication

RFD-3000X is a product with additional Internal/External recovery feature which enables it to be widely used in various applications.

1.2 Contents of User Manual

This operating manual describes detector and its features.

Its contents of 7 different sections as per stated on [Table 1] below .

Title	Content
1. Product Overview	General introduction, products overview, brief introduction on each part
2. Technical Specification	Electrical, mechanical and environmental specifications
3. Installation	Wiring, mode select, proper installation
4. Operation	Operation mode and user interface display
5. Maintenance & Troubleshooting	Maintenance and technical support procedure
6. Customer Support	About This product will be customer service will describe the information
7. Appendix	Abbreviations, authentication, and parts will be describe information about products

[Table 1] Contents of User Manual

1.3 Revision History

Revision	Date of Revision	Content	Remarks
1	June, 2009	Registration of document	
2	November, 2009	3.3.4.2 Sensitivity setting	Dip SW setting order fix
3	November, 2011	2.2 Mechanical spec	Amendment
4	March, 2012		

[Table 2] Revision of User Manual

1.4 Warranty

Rezontech warrants the Models RFD-3000X to be free from defects in workmanship or material under normal use and service within two years from the date of shipment.

Rezontech will repair or replace without charge any such product found to be defective during the warranty period. Full determination of the nature of, and responsibility for, defective or damaged product will be made by Rezontech' personnel.

Defective or damaged product must be shipped to Rezontech' plant or representative from which the original shipment was made. In all cases this warranty is limited to the cost of the product supplied by Rezontech. The customer will assume all liability for the misuse of this product by its employees or other personnel.

All warranties are contingent upon proper use in the application for which the product was intended and does not cover products which have been modified or repaired without Rezontech's approval, or which have been subjected to neglect, accident, improper installation or application, or on which the original identification marks have been removed or altered.

Except for the express warranty stated above, Rezontech disclaims all warranties with regard to the products sold, including all implied warranties of merchantability and fitness and the express warranties stated herein are in lieu of all obligations or liabilities on the part of Rezontech for damages including, but not limited to, consequential damages arising out of, or in connection with, the performance of the product.

2. Technical Specifications

2.1 Electrical Specifications

2.1.1 Operating Voltage and Power Consumption

- Recommended Operating Voltage : 24VDC
- Rating Voltage : 18VDC ~ 30VDC
- Max Input Voltage : 30VDC
- Max Consumption Power : 4.5W (at 30VDC)
- Normal Average Current : approximate 100mA (at 24VDC)
- Max Operating Current : approximate 150mA
(at 18VDC~30VDC, during detection of fire or self-diagnosis test)

2.1.2 Relay Output

- 3A 30VDC, 3A 277VAC
- Dry contact
- A(Normal Open) or B(Normal close)

2.1.3 0-20mA Current Output

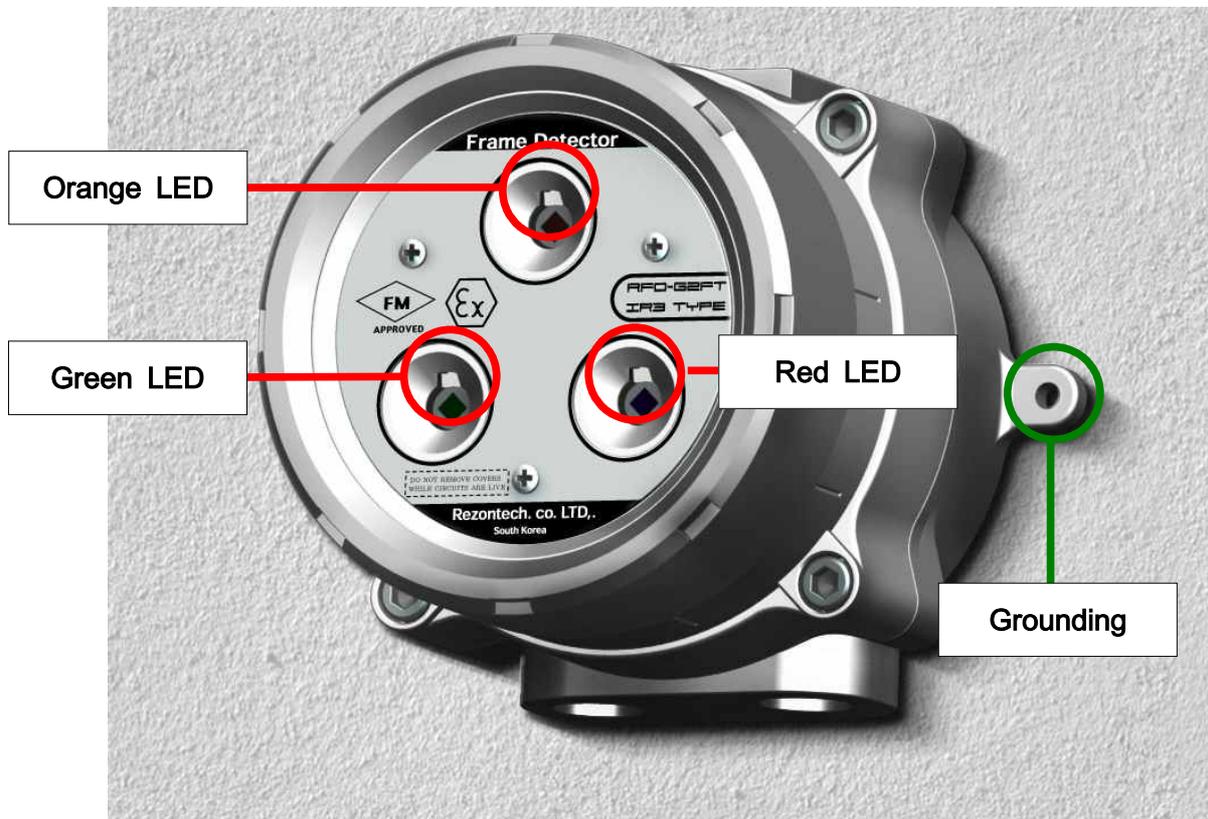
- Non-isolation output, Common GND(-Power)
- Max. Terminating Resistance : 400Ω
- 0mA (+0.5mA) : Connection Fault, Low Power Fault
- 2mA (±0.5mA) : Self-diagnosis test Fault
- 4mA (±0.5mA) : Normal
- 8mA (±0.5mA) : Initialize Circuit Fault
- 12mA (±0.5mA) : Self-diagnosis Test Execution
- 16mA (±0.5mA) : Warning
- 20mA (±0.5mA) : Fire Detection

2.1.4 RS485 Communication

- Non-isolation output (2 wiring)
- Communication Speed : 4800, 9600, 19200, 38400bps (dip-switch selectable.)
Detector must be reset after change communication speed.

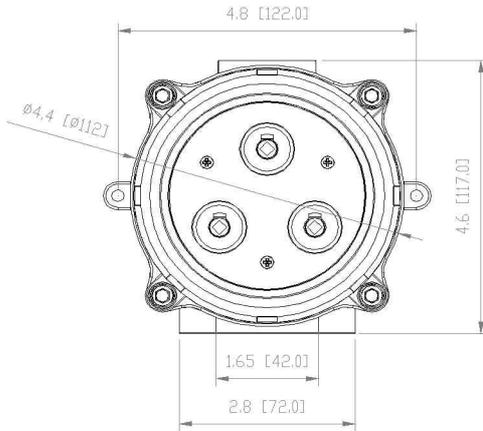
2.1.5 LED Indicator

- Three LEDs(Green, Red, Orange) indicator
- Product reset and initializing process : Any of LEDs(Orange → Red → Green) blink repeatedly and sequentially(counter-clockwise 3 sec)
- Normal : Green LED lighting
- Power supply fault : Orange LED blinking (2Hz)
- Self-diagnosis test fault : Any of LEDs simultaneously blinking (1Hz) at where the channels having detection problem
- Initializing Circuit fault : Any of LEDs simultaneously blinking (2Hz) with delay (0.5 sec) at where the channels having sensing circuit problem
- Warning : Red LED blinking (2Hz)
- Alarm : Red LED Lighting

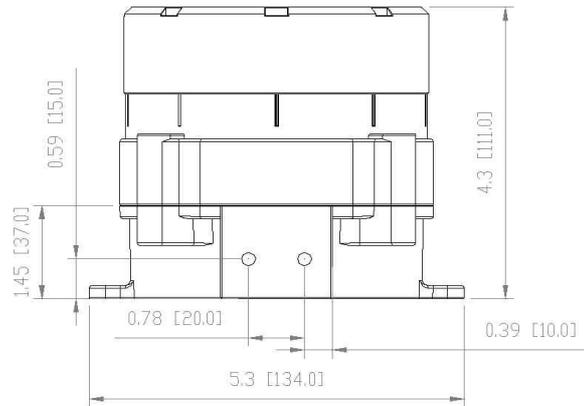


[Figure 1] Detector Exterior and LED indicator, its location

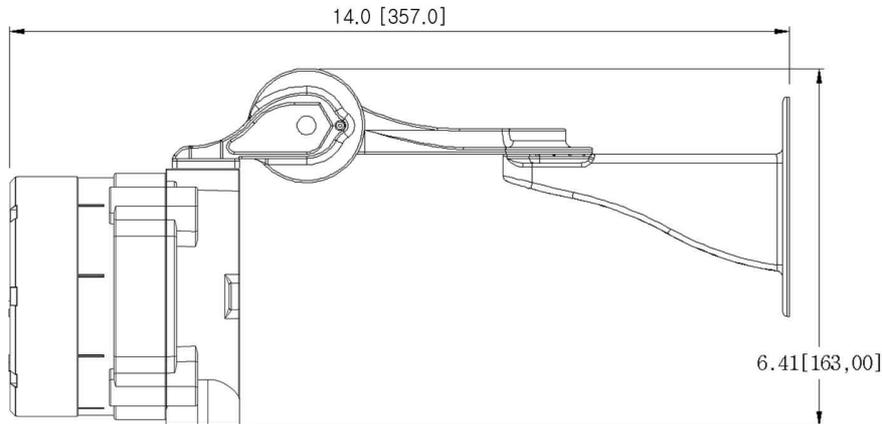
2.2 Mechanical Specifications



[Figure 2] Front view, inch[mm]



[Figure 3] Side view, inch[mm]



[Figure 4] Combination of Detector with Bracket, inch[mm]

- Enclosure (Material) : 316 Stainless Steel
- Weight : Body - approximate 3.5 kg, Overall - approximate 4.5 kg
- Dimension(Body) : W5.3[134] × H4.6[117] × D4.3[112] (inch[mm])
- Dimension(Overall) : W5.3[134] × H6.41[163] × D14.0[356] (inch[mm])
- Color : Metal
- Electrical connection (External) : 1/2 inch NPT-14, M20 X 1.5
- Wire gauge (Power supply & Signal) : AWG #14 (2.08 mm²) ~ #24(0.205 mm²)
- Hazardous Area Approvals : Class I Div.1 Groups B,C and D
Class II Div.1 Groups E,F and G
Class III
- Explosion proof : ATEX Ex db IIB+H2 T5
- Water and Dust Tight : IP66/67, NEMA Type 4X

2.3 Environmental Specifications

- Operating Temperature : -40°C ~ +75 °C
- Storage Temperature : -50°C ~ +80 °C
- Humidity : Relative humidity 95%

3. Installation

3.1 Unpacking & Checking

Please check carefully on the external condition of the detector when unpacking the product. If there is any damage, please contact the local's distributor immediately. And If there are any troubles in used product, please send product to A/S center with fee applied.

3.1.1 Product Compositions

- RFD-3000X Flame Detector, 1 EA
- BK-02 (Bracket), 1 EA
- Spare Bolt, 1 set
- Tools

3.1.2 Components

3.1.2.1 Fundamental components

Component	standard	Q'ty (pcs)	Description
Hexagon wrench Bolt	M6×10	2	Join the Detector and Bracket
Hexagon wrench Bolt	M6×35 (OEM)	4	Join the Detector
Metric button screw (+)	M5×30	4	Install the Bracket

[Table 3] Fundamental components

3.1.2.2 Spare components

Component	Standard	Q'ty (pcs)	Description
Hexagon wrench Bolt	M6×10	2	Join the Detector and Bracket
Hexagon wrench Bolt	M6×35 (OEM)	4	Join the Detector
Metric button screw (+)	M5×30	4	Install the Bracket

[Table 4] Space Components

3.1.3 Necessary tools

Tool name	Standard	Q'ty (pcs)	Description
Hexagon wrench driver	Metric,5M	1	Join the detector, bracket
Screw driver	+	1	Install the Bracket

[Table 5] Necessary tools

3.2 Selection of Installation Location

This section describe the minimum necessary to install detectors in proper position for its essential function which is detection of fire. According to the purpose for which user want to use, please use the information.

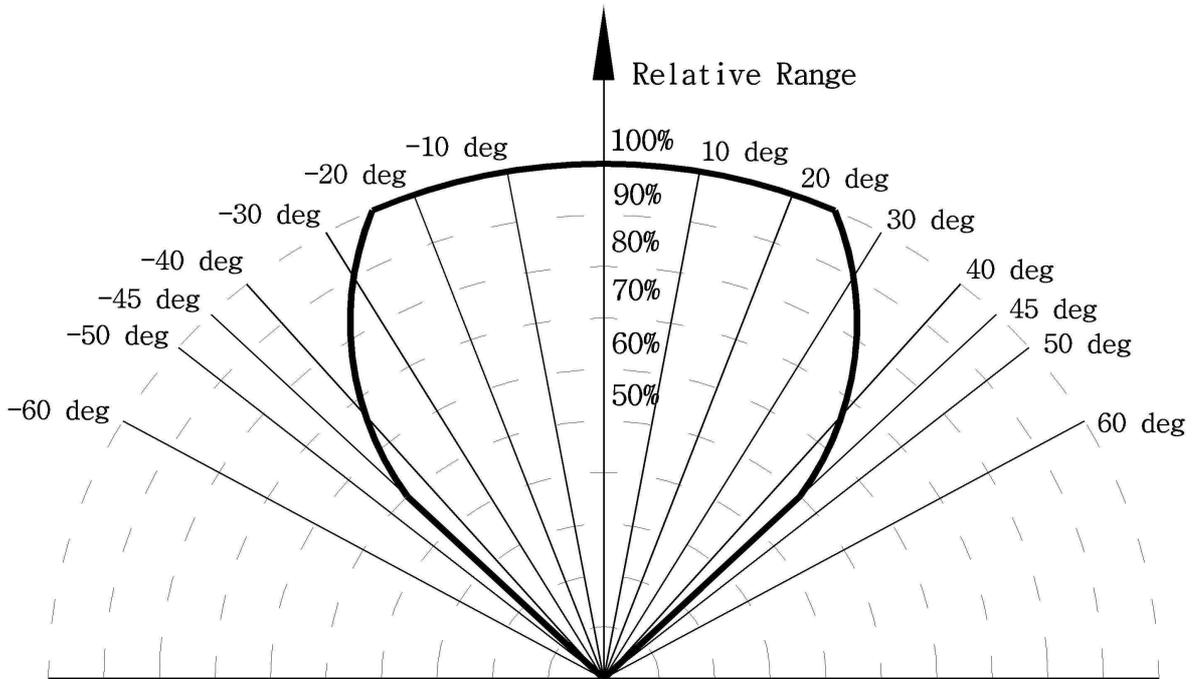
3.2.1 Cone of Vision

3.2.1.1 Fuel

- N-Heptane

3.2.1.2 Cone of Vision

- Horizontal / Vertical : 90° (45° up, down, left, right at 50% of detection range)



[Figure 5] Cone of Vision

3.2.2 Range of Detection

The detection distance for the alarm level is 197ft(60m) from the standard fire.

The detector has two response levels.

- Warning
- Alarm

3.2.2.1 Detection Range of Fuels

Type Of Fuel	Maximum Distance ft(m)
N-Heptane	197(60)

[Table 6] Range of Fuels Detection

3.2.2.2 Detection Range of False Alarm

The detector is immune to a variety of false alarm sources. False alarm sources in [Table 7] are representative samples of detector response in the presence of false stimuli.

Radiation Source		Immunity Distance ft(m)	
reflected sunlight, reflector at		10(3)	
Incandescent lamp 100W		No fire alarm	
Fluorescent light 40W		No fire alarm	
Resistive electric heater 1500W		No fire alarm	
Blue, Green dome light XXXW		No fire alarm	
Hot plate (200°C)		No fire alarm	
Halogen lamp 500W (Glass)		No fire alarm	
Halogen lamp 1000W (Quartz lamp)		No fire alarm	
Grinding metal		3.3(1)	
Arc welding (5mm, 200A)	Detection Range	15m	16(5)
		30m	23(7)
		45m	30(9)
		60m	59(18)

[Table 7] False Alarm source and Immunity of Detector

3.2.3 Environment Points to be Considered when Use

- Installation places and availability of fuels (related the family of Hydrocarbon flame detection)
- Install product according to its Installation space and it areas of dangerous (internal/external etc)
- Selecting place of installation according to detection distance and angle
- Range of Temperature(Min/Max) of place usage/installation
- Avoid those area which have obstructed object during the installation
- Select the place of installation according to the false alarm status as it does not affect detection of fire

Note. The points of considerations described above are based on basic *standard. And they may be different standards according to nations, installation environment, usage, users and etc.

3.3 Installation and Electrical Wiring

3.3.1 Selection of Cable and Wiring Conduit

3.3.1.1 Conduit installation

- Use 1/2 inch NPT-14 or M20X1.5 conduit connection or suitable explosion-proof gland to assemble the cable and conduit to the detector.
- When using conduit connection for Division installation, conduit seals must be installed within 18 inches (450mm) from the enclosure.
- When using conduit connection for ATEX installation, conduit seals must be placed at enclosure.
- Install the conduit including drain holes facing downward to avoid water condensation in the detector.
- Any conduit entry not used during installation shall be plugged with suitably rated and approved conduit/blanking plug.
- Specific Conditions of Safe Use : Consult the manufacturer for dimensional information on the flameproof joint for repair.

3.3.1.2 Standard for Electrical Wiring

- Wire gauge for detectors' power supply wires

AWG No.	Diameter(mm)	Cross section(mm ²)
24	0.511	0.205
23	0.573	0.258
22	0.644	0.326
21	0.723	0.410
20	0.812	0.653
19	0.912	0.653
18	1.02	0.823
17	1.15	1.04
16	1.29	1.31
15	1.45	1.65
14	1.63	2.08

[Table 8] American Wire Gauge Standard

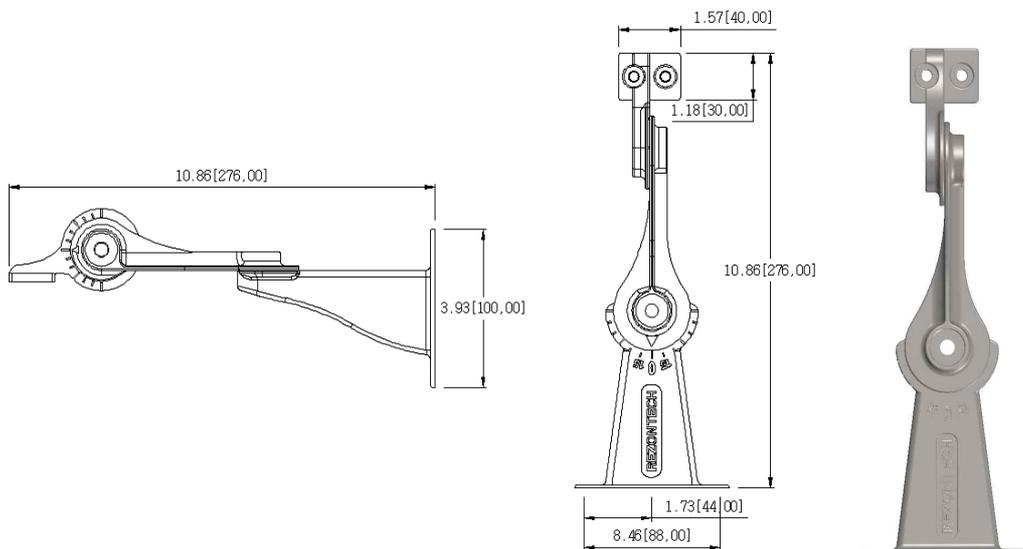
3.3.1.3 Cable Gland Specification

- Cable Conduit Standard : 1/2 inch NPT-14, M20 X 1.5
- Water and Dust : IP66/67, NEMA Type 4X

3.3.2 Using of bracket during installation

3.3.2.1 Bracket Specification

- Adjustable Angle : Horizontal 180° , Vertical 180°, Scale indications 15° each
When you arrange the angle, M4 Set Screw and M10-25 Hexagon Wrench Bolt has to be released first and tighten again with 24 (N·m) Torque for Hexagon Wrench Bolt and 1.5 (N·m) Torque for set Screw.
- Enclosure Material : 316 Stainless Steel
- Weight : Body - approximate 3.5 kg, Overall - approximate 4.5 kg
- Dimension(Body) : W5.3[134] × H4.6[117] × D4.3[112] (inch[mm])
- Dimension(Overall) : W5.3[134] × H6.4[163] × D14.0[356] (inch[mm])
- Color : Metal
- Wall mounted size : 6Φ × 4 (5 mm bolt)

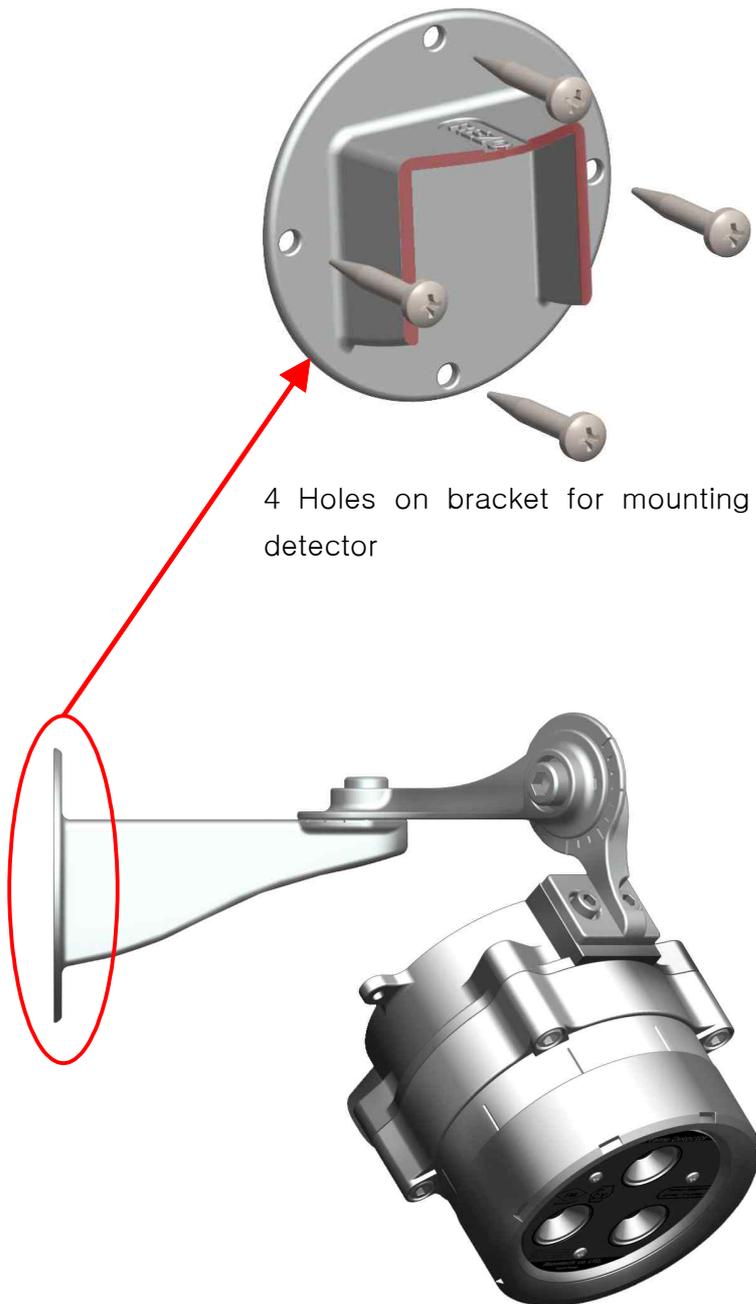


[Figure 6] Bracket BK-02

3.3.2.2 Installation of detector with bracket to the wall or the ceiling

- Necessary tool : Hexagon Wrench Driver, Screw Driver
- component : Metric M6-10 × 2 pcs, Metric M5-30 × 4pcs
- Flame detector's body and cover has to be combined with M6-35 Hexagon Wrench Driver at 5(N·m) Torque.
- Flame detector and bracket is connected with Hexagon Wrench Bolt at 5(N·m) Torque.

- Mount the bracket with M5-30 × 4pcs bolts. Refer to Figure 7
- Detector can be installed on the wall or the ceiling with bracket. Refer to Figure 7



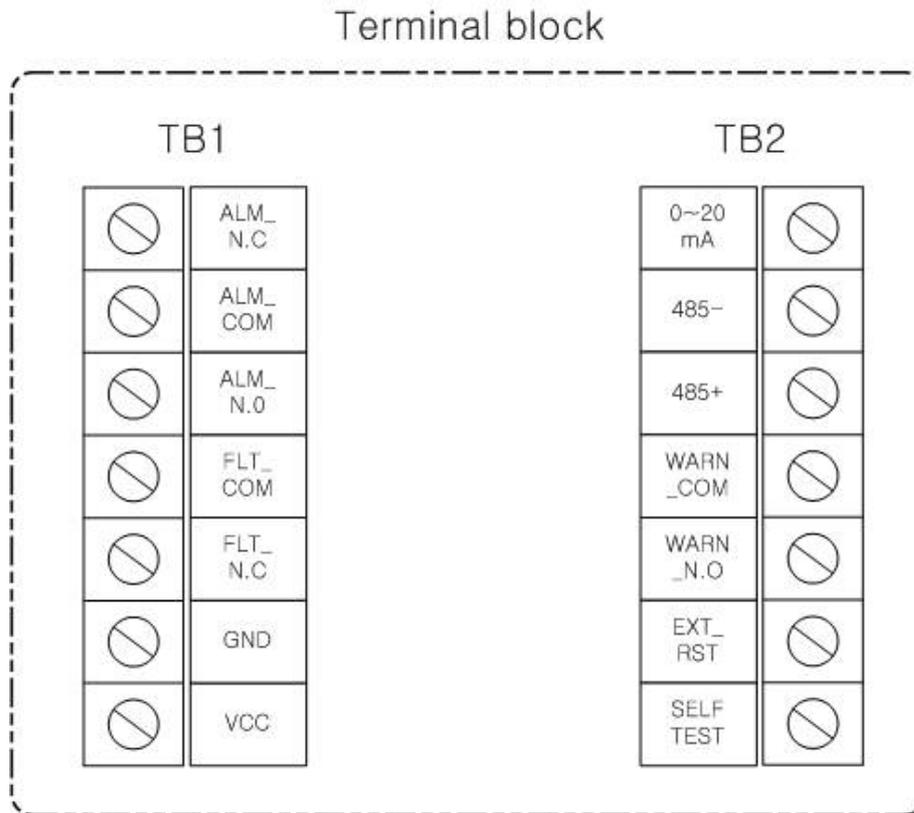
[Figure 7] Combination of Product & Bracket

3.3.3 Electrical Wiring

This is the reference for the user on how all the connection of the electrical wiring are connected to each system or product as stated below.

3.3.3.1 Terminal blocks

The detector has terminal blocks TB1, TB2 as shown in [Figure 8]. Each of terminals in terminal blocks has the label which indicates its proper connection. For proper wiring of detector, refer to [Table 9]



[Figure 8] Terminal block and indication label

3.3.3.2 Terminal Label and Connection

TERMINAL BLOCK	TERMINAL LABEL	CONNECTION
TB1	VCC	Detector power line
	GND	Detector ground line
	FLT_N.C	Fault loop line normal close
	FLT_COM	Fault loop line common
	ALM_N.O	Alarm loop line normal open
	ALM_COM	Alarm loop line common
	ALM_N.C	Alarm loop line normal close
TB2	SELF TEST	Self diagnosis input
	EXT_RST	External reset input
	WARN_N.O	Warning loop line normal open
	WARN_COM	Warning loop line common
	485+	RS485 communication A
	485-	RS485 communication B
	0-20mA	Current output line

[Table 9] Terminal Labels and their connection description

3.3.3.3 Relay Output

- Alarm Relay

[Table 10] indicates alarm signal output when detector is in the alarm state.

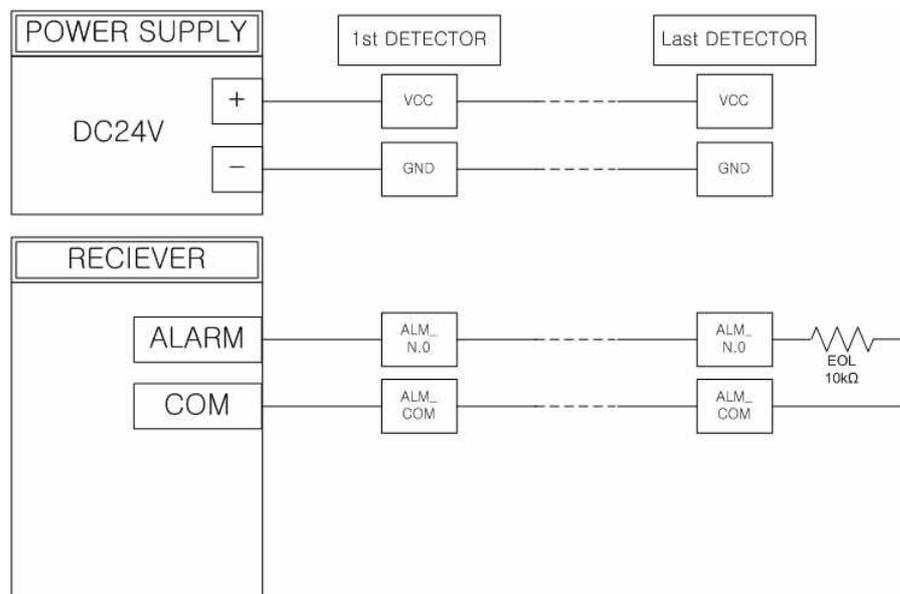
- Alarm Relay operated according to detector's condition

Terminal Block	Terminal Label	Relay status	
		Normal (De-Energized)	Alarm (Energized)
TB1	ALM_N.C	Normally Closed(N.C)	Normally Open(N.O)
	ALM_N.O	Normally Open(N.O)	Normally Closed(N.C)
	ALM_COM	Common	Common

- 3A@30VDC, 3A@277VAC

[Table 10] Alarm Relay operated

- Interlink wiring of Power Supply, Alarm Relay, Disconnection error check with EOL.



[Figure 9] Wiring diagram for fire detection only

- Fault Relay

If detector has some faults, it can be detected with fault output. [Table 11] indicates detectable fault state.

· Fault Relay Operated

Type of Fault	Descriptions
Power Supply	The error status of external and internal power supply
Self Testing	The error status of basic function (fire detection)

[Table 11] Fault Relay Operated

· Fault Relay operated according to detector's condition

Terminal Block	Terminal Label	Relay Status	
		Normal (Energized)	Fault (De-Energized)
TB1	FLT_N.C	Normally Closed(N.C)	Normally Open(N.O)
	FLT_COM	Common	Common

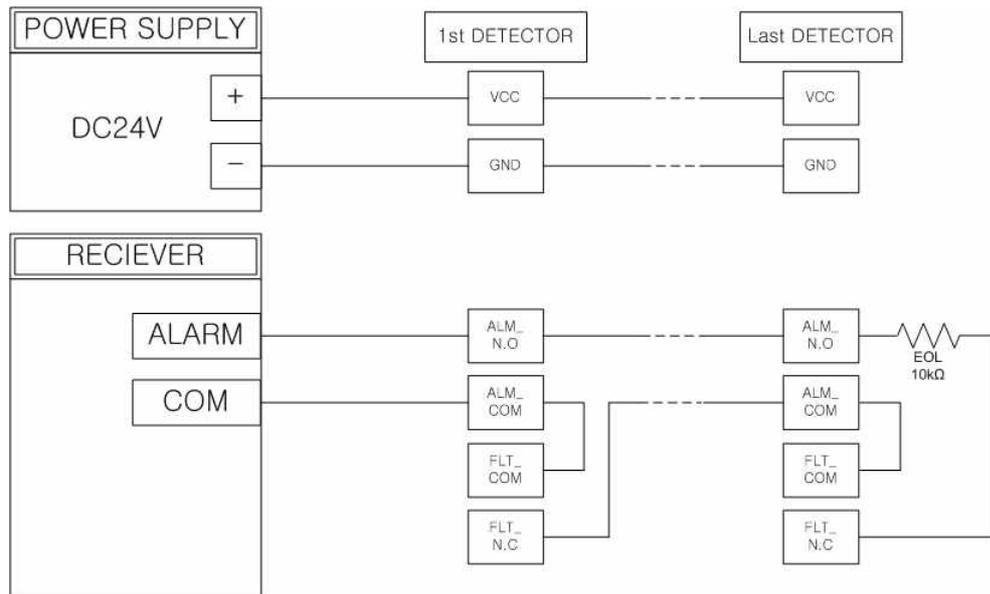
- 3A@30VDC, 3A@277VAC

- FLT_N.C is Default (If SW1-8 is ON, fault output is disabled)

[Table 12] Fault Relay Operating Status

Note. RFD-3000X supports the selectable fault relay output option either N.C or N.O at the normal state. When Dip SW1-8 is set to the OFF state, fault relay output is N.C at the normal state and N.O at the fault state. And If Dip SW1-8 is set to the ON state, the fault relay output is opposite to that of Dip SW1-8 OFF. For power saving, fault relay output can be selected to N.O at the normal state by setting Dip SW1-8 to ON state. However, on this setting of fault output, RFD-3000X cannot detect the power down fault. For more information, see [Table 24].

- Interlink wiring of Power Supply, Alarm and fault Relay, Disconnection error check with EOL.



[Figure 10] Typical wiring for fault and fire detection

- Warning Relay

Detector can be indicate warning or pre-alarm state of detector. To use warning relay output, Warning Relay Enable switch (SW1-7) must be set ON. (This signal indicate when fire is detected at primary stage before the real fire is confirmed. This signal only occurs within delay time.

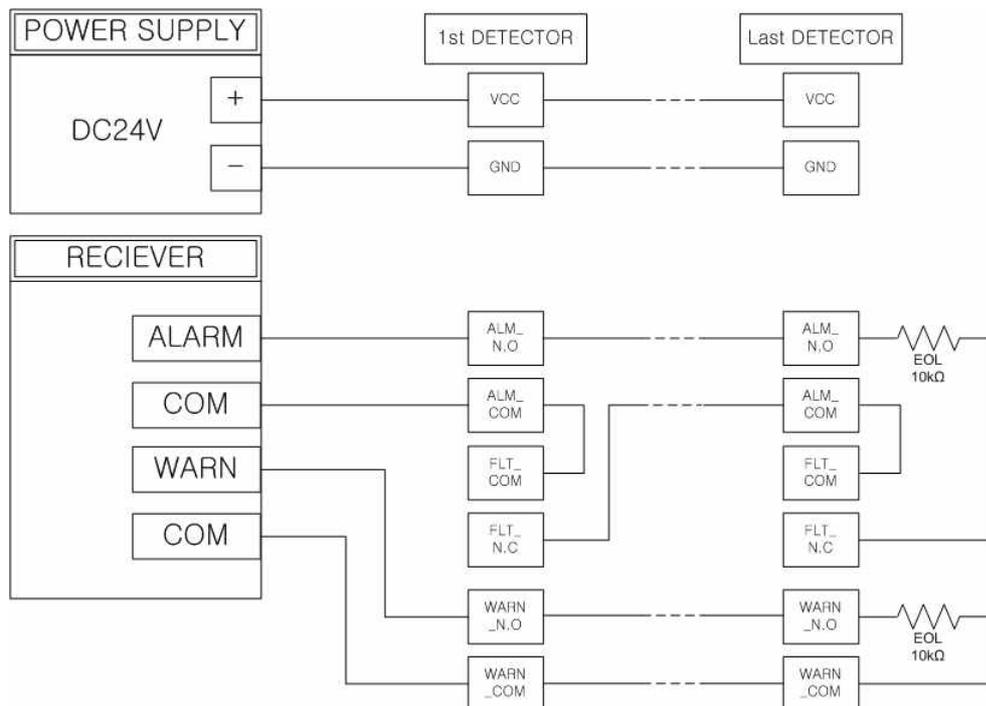
- Warning Relay operated according to detector's condition

Terminal Block	Terminal Label	Relay status	
		Normal (De-Energized)	Warning (Energized)
TB2	WARN_N.O	Normally Open(N.O)	Normally Closed(N.C)
	WARN_COM	Common	Common

- 3A@30VDC, 3A@277VAC

[Table 13] Warning Relay Operating Status

- Interlink electrical wiring of power, alarm relay, fault relay, and warning relay.



[Figure 11] Wiring diagram for alarm, fault and warning.

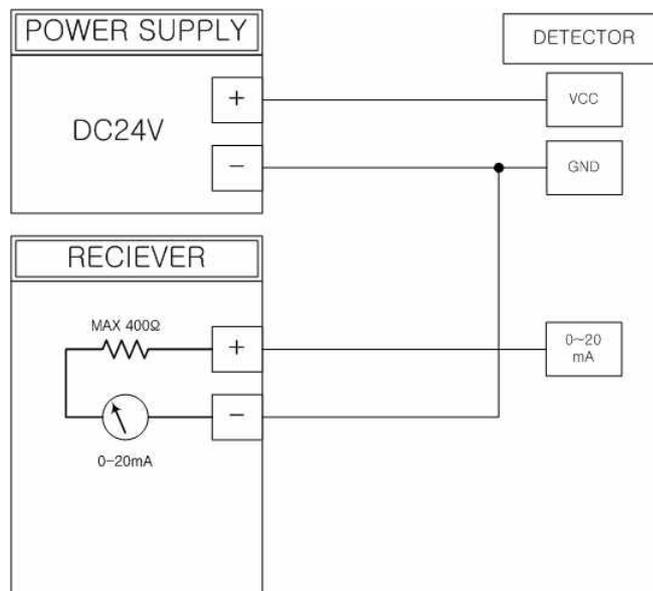
3.3.3.4 0-20mA Current output

Current output can transmit various recorded information according to the current status of detector. Refer to [Table 14] for using current output and its status.

Terminal Block	Terminal Label	Detector Status	Current Output(mA)
TB2	0-20mA	Connection fault	0
		Self diagnosis fault	2
		Normal(standby)	4
		Initializing Circuit fault	8
		Self diagnosis Test	12
		Warning	16
		Alarm	20

[Table 14] Current output

- Non-isolation output, Common GND(-Power)
 - Max. Terminating Resistance : 400Ω
- Signal of electrical wiring (3 Lines-Sourcing)



[Figure 12] Current output wiring diagram

3.3.3.5 RS485 Communication

This signal(RS485) inform not only product status but also supports of changing and controlling in variable setting value. This can use through interlinking remote control machine or other system

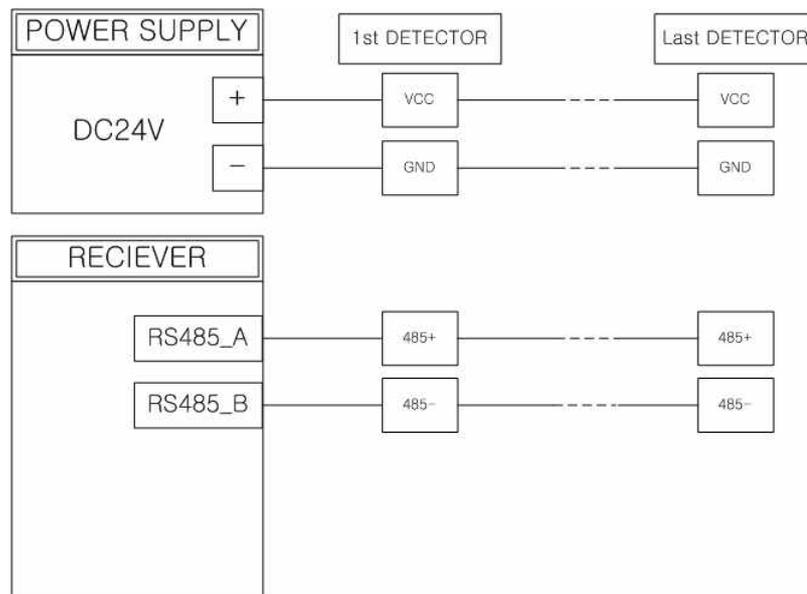
Terminal Block	Terminal Label	Connection
TB2	485+	RS485 A
	485-	RS485 B

[Table 15] RS485 Terminals and their Connection description

- Communication Specification

- Non-isolation communication
- Half-duplex
- 4800, 9600, 19200, 38400bps are available(dip-switch selectable)
- 1:N support (slave)
- support protocol : manufacturer protocol

- Signal of Electrical Wiring



[Figure 13] RS485 Network wiring diagram

3.3.3.6 External Recovery

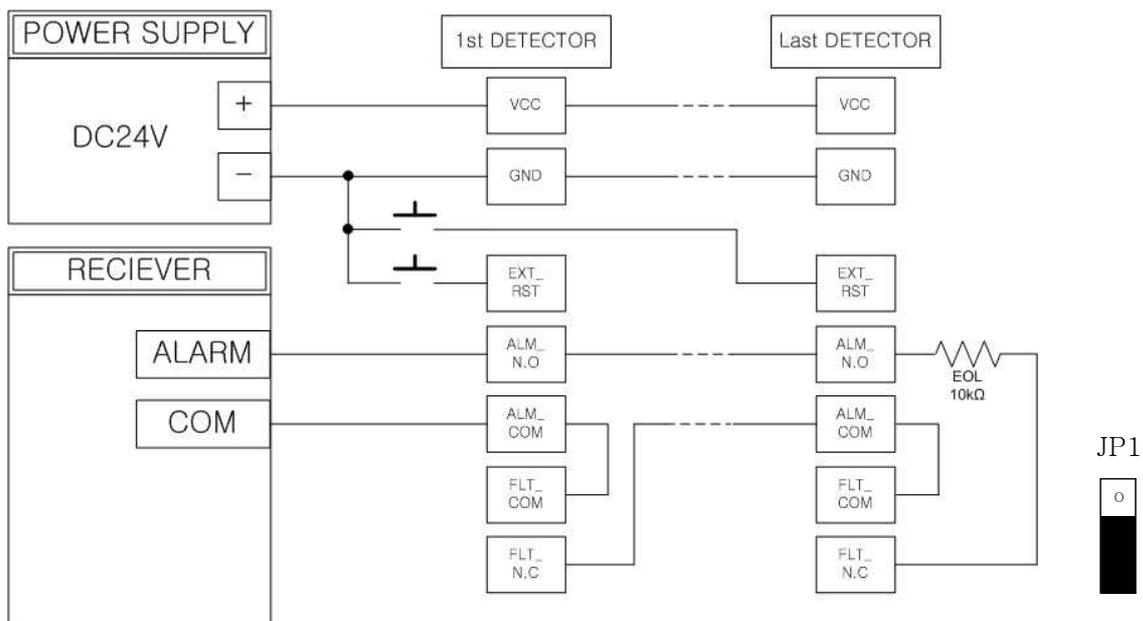
Detector supports an external recovery method needs to recovery to its standby status after any alarm detection, etc. Hence, it is similar to reset product via power on/off.

Terminal Block	Terminal Label	Connection
TB2	EXT_Rst	External recovery signal line

[Table 16] External recover connection

- Signal Specification
- Operating Signal : Short circuit (1second) to GND and then Open circuit
- Operating delayed time : 1 second
- Recovery time : After cancelling operating signal + initializing time

- Signal of electrical wiring



[Figure 14] External recovery signal electrical wiring diagram

Note. JP1 must be set to use external recovery like in wiring diagram. See [Figure 16]

3.3.3.7 External Self-Diagnosis Test

Terminal Block	Terminal Label	Connection
TB2	SELF TEST	External self diagnosis signal line

[Table 17] External self diagnosis connection

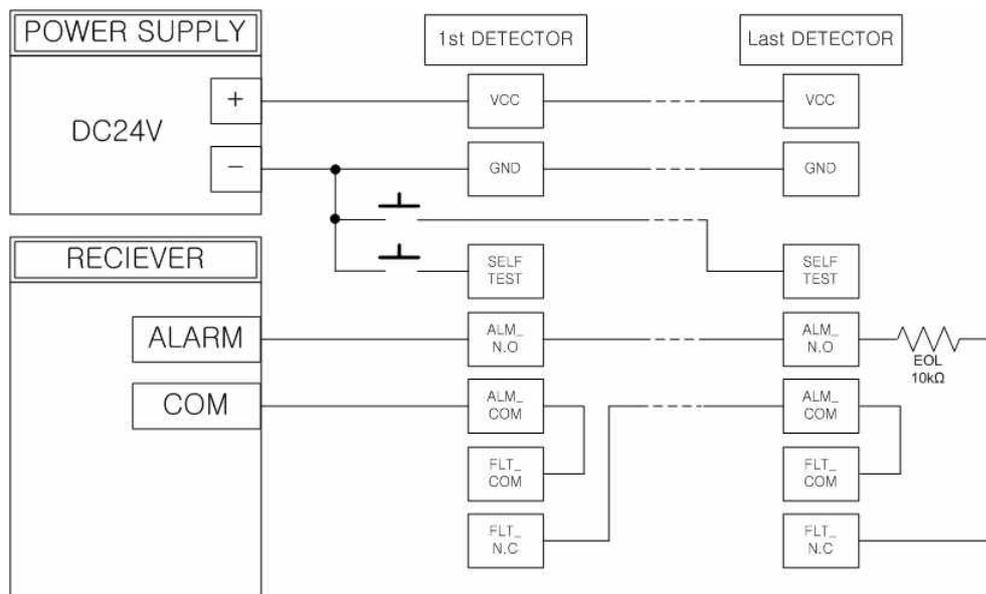
- Signal Specification

- Operating signal : Short circuit to GND
- Operating delayed time : 1 seconds
- Operating continuous time : operating delayed time + 10 secs. (approx. 20 secs.)
- The result of signal

Result signal	
Normal	Fault
Normal output for all signals	<ul style="list-style-type: none"> - Fault relay output (De-Energized) - 2mA (±0.5mA) : self-test error signal - Any of LEDs simultaneously blinking (1Hz) at where the channels having detection problem - Response of communication self-test faulty signal

[Table 18] External self-test signal table

- Signal of electrical wiring

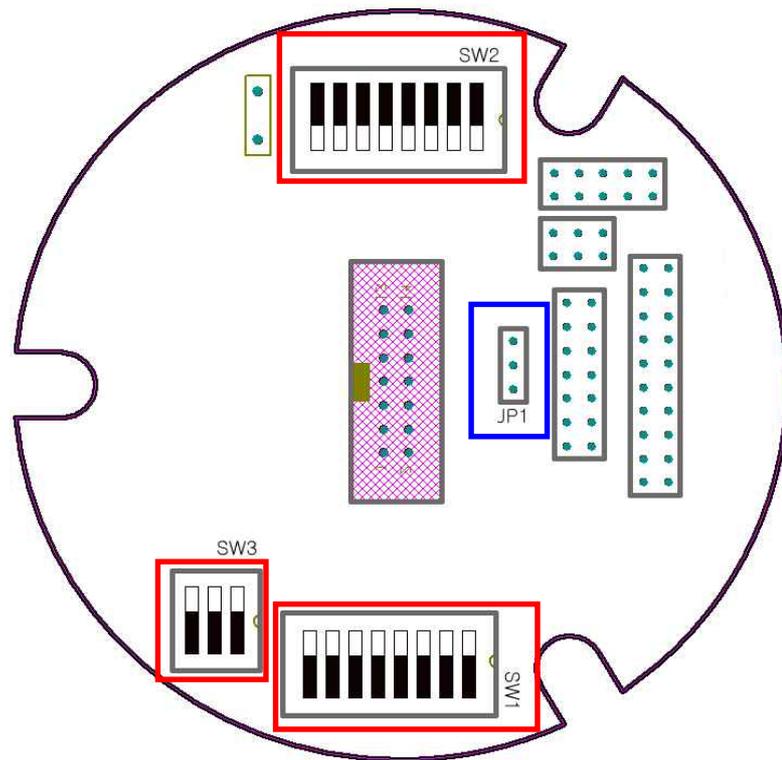


[Figure 15] External self test wiring diagram

3.3.4 Setting Product

The Detector has 3 programmable(SW1, SW2 and SW3) dip switches which can set and change various detector functions. See [Figure 16]

3.3.4.1 Programmable switches and jumper.



[Figure 16] Programmable Dip switches and external reset Jumper

Switch	Description
SW1	Controls and sets Sensitivity, Delay time, and output relay
SW2	Set detector address and Baud rate related RS485 communication
SW3	Controls other output functions
JP1	Connect external recovery signal

[Table 19] Programmable dip switch and Jumper their description

3.3.4.2 Sensitivity setting

This function can be changed by the user according to various environment conditions. Due to differences in law of various countries, this function may not be applicable and we are not responsible in this case.

- Setting method of sensitivity
 - Turn off the power during switch setting.
 - Turn on the power after changing the switch.

- SW1-1, SW1-2

SW1			
Setting		Sensitivity	Range of Sensitivity ft(m)
SW1-1	SW1-2		
OFF	OFF	high sensitivity *	197(60m)
ON	OFF	medium sensitivity	150(45m)
OFF	ON	low sensitivity	100(30m)
ON	ON	very low sensitivity	50(15m)

- Reference Source is 30cm×30cm N-Heptane Pan fire
- “ * ” marked setting is the only sensitivity approved by FM Approval.

[Table 20] Sensitivity range of N-Heptane

3.3.4.3 Setting Delay Time

The detector is equipped with an Alarm Delay option, which provides programmable time delays with settings. If the Alarm level is still present, the Alarm outputs are activated. If this condition no longer exists, the detector returns to its standby state. The Alarm delay option affects the output relays and the 0-20mA (If current output is available, SW3-1 is ON). The LEDs and outputs indicate warning level during the delay time only if the fire condition exists.

SW1		
Switch setting		Delay time(sec)
SW1-3	SW1-4	
OFF	OFF	3
ON	OFF	6
OFF	ON	9
ON	ON	12

[Table 21] Sensitivity range of N-Heptane

※ When setting of delay time to 3, the average response time is about 12 second for 1X1 feet heptane pan flame at 197 feet (60 m) from FM approval results.

3.3.4.4 Setting Output Signals

- Setting Alarm Signal Latch

The detector can latch alarm signal when the detector is in the alarm state. In this setting, user can recover the detector output status to the standby with three kinds of recovery method. One is through POWER OFF and POWER ON manually, another is using EXT_Rst terminal short to GND(See Figure 14 and 16) and the other is using RS485 communication.

SW1	
Switch Setting	Function
SW1-5	
OFF	Automatic Recover
ON	Alarm Latch

[Table 22] Switch setting for recovering signal of fire detection

- Setting Warning RELAY Output

The detector can indicate a warning state with a warning relay output. In the warning relay enabling setting, if the detector is in the warning state, the warning relay contacts. If warning signal is not needed, user can disable a warning relay output for power saving.

SW1	
Switch Setting	Function
SW1-7	
OFF	Warning Relay Disabled(default)
ON	Warning Relay Enabled

[Table 23] Switch setting for WARNING RELAY

- Setting fault RELAY Output

This is a feature to enable the fault relay and energize(N.C) the relay in standby state. For power saving, fault relay output can be set to N.O at the normal state if power down fault detection or all kinds fault detection not needed by setting the SW1-8 to ON.

SW1	
Switch Setting	Function
SW1-8	
OFF	Fault Relay Output N.C (default)
ON	Fault Relay Output N.O

[Table 24] Switch setting for FAULT RELAY

- Setting Current Output

This is a feature to enable the 0-20mA current output signal. Without using current output, set the switch to OFF for power saving.

SW1	
Switch Setting	Function
SW3-1	
OFF	Current Output Disabled(default)
ON	Current Output Enabled

[Table 25] Switch setting for Current Output

3.3.4.5 Setting Self Diagnosis Function

The detector has the self diagnosis function checking whether sensors are detectable (defect of internal circuit or sensor itself) for radiant energy as well as cleanness of transmission windows. If there are some fault on internal circuit or decrease of transmission intensity with obscured glass from oil vapor or dust, detector output self diagnosis fault signals.

SW1	
Switch Setting	Function
SW1-6	
OFF	Self diagnosis function "OFF"(default)
ON	Self diagnosis function "ON"

- Period of self testing : Every 12 hours

[Table 26] Switch setting for self-diagnosis test

3.3.4.6 Setting Communication Configuration

- Setting RS485 Communication Enable

This is a feature to enable the RS485 communication between Master(server) and Slave(detector). Without using RS485 communication, set the switch to OFF for power saving.

SW1	
Switch Setting	Function
SW3-2	
OFF	RS485 COMMUNICATION disabled(default)
ON	RS485 COMMUNICATION enabled

[Table 27] Setting of RS485 Communication Enable

-Setting Detector Address

This is a feature to set the address of detectors to identify each of them when the user use RS485 communication. Available range of addresses are from 1 to 63. If communication enabling switch (SW3-2) is OFF, address setting is not applicable.

SW2						
ADDRESS	Switch setting (SW2-1 ~ SW2-6)					
	SW2-1	SW2-2	SW2-3	SW2-4	SW2-5	SW2-6
1	ON	OFF	OFF	OFF	OFF	OFF
2	OFF	ON	OFF	OFF	OFF	OFF
.
.
.
62	OFF	ON	ON	ON	ON	ON
63	ON	ON	ON	ON	ON	ON

[Table 28]Setting of Detector Address

NOTE. Troubles can occur on the communication status, if two or more detectors have the same address.

- Setting Baud Rate

The detector can change the RS485 communication baud rate. If communication is not available (SW3-2 is OFF), the baud rate setting is not applicable. After changing baud rate, detector must be reset before using communication.

SW2		
Switch Setting		BAUD RATE
SW2-7	SW2-8	
OFF	OFF	9600 bps(default)
ON	OFF	4800 bps
OFF	ON	19200 bps
ON	ON	38400 bps

[Table 29] Setting of BAUD Rate

3.3.5 Ground Connection

For proper operation of the detector, the RFD-3000X must be grounded through a wire to the chassis.

Failure to establish a ground connection can lead to greater susceptibility of the detector to electric surges, electromagnetic interference, and ultimately damage to the instrument.

3.3.5.1 Internal Grounding Method

Connect Hole in the internal "Board01" and PCB to enclosure connection bolt with electrical line.

3.3.5.2 External Grounding Method

Ground with connection line located in right side of enclosure.

4. Operation

The contents of this page describe "operation". It explains the importance of following the right procedures and installation issues to be taken note. The another part of operation "Maintenance and Troubleshooting" will be discussed separately in another chapter in detail.

- Product Inspection
- Initial Operation of Product
- Safety Handling
- Product Testing

4.1 Product Inspection

In order to be installed and operated the product properly, there are a few issues to be inspected or taken into account as stated below.

4.1.1 Inspection of Installation Conditions

If there are any inferior or bad installation, points as stated below are recommended for references as they influence the product life span.

- Product Fixing Conditions.
- Inspection of Product Assembly Conditions (Internal Wiring and Joining).
- Installation height and angle of different products are vary accordingly.
- The conditions of product assembly and connection with others product. (Explosive-proof and water proof, other electrical conditions).
- Consult the manufacturer for dimensional information on the flameproof joints for repair.

4.2 Initial Operation of Product

The product operated based on the assumption that the power supply of product (24VDC) and signals are properly wired or connected as stated below:

Initial Operation	
Status	Operational or Output Status
Before connecting power	- Fault Relay signal open (de-energized) - All LED OFF
After connecting power supply	connecting power - Fault Relay signal open (de-energized) - After LED blinking sequentially 3 second (Orange → Red → Green, clockwise), 10 seconds of self diagnosis test.
	Normal - Fault Relay signal close (energized) - All output, "normal" signal output - Green LED light ON
	Fault - Fault Relay signal open (Energized) - LED "Fault" signal output - Current output "'Fault" signal (When SW3-1 is ON) - RS485 Communication "Fault" signal (When SW3-2 is ON)

[Table 30] Initial Operation of Product

4.3 Safety Handling

There are few points to be taken into account when using the product after inserting power supply

- Please refer to the diagrams and specifications in the user manual
- Do not open the product while the power supply is 'On'.
- Do not use or change any internal electrical parts of the product which supply by other supplier except the manufacturer. In those cases, the manufacturer are not liable for such actions and warranty will become invalid.
- When trying to detached the product from its installation point(including full system), please detach the product after checking if the signal relation to each other or connected to other system is removed rightly or not to avoid any mis-operation.

4.4 Product Testing

4.4.1 Product Testing by using : TL3000

TL3000 is a product which radiate the light similar to flame by electrical lamp output. It has an individual build in internal power supply hence it can move and use easily. It can be continuously using up to 30 minutes. For more details kindly refer to the user manual.

※ If everything is fine without any problem during the testing period by using the test lamp, the detector will detect the fire and output various type of 'Fire' signal. Error may occurs during the operation hence, kindly inspect and managed the equipment before testing.



[Figure 17] TL3000 Fire simulator

• Testing Sequences

1. Please wait for about 10seconds after the power is supplied.
Check if Green LED is turn on.
2. Face and 'Turn On' the TL3000 in front of the flame detector
3. The recommended distance between the test lamp and the product shall be within 5M .
4. When the 'Red' LED of detector is lighting on, it is detector's alarm state.
5. If the detector is set to be recovering manually, recover the detector by turn OFF and ON the detector power. If external recovery line is wired user can recover with this line to short to ground.
6. During the test of point NO. 2 and 3 if the RED LED of detector does not light on, adjust the distance from the detector to test point and re-test again. If the same problem persists and the lighting part is in good conditions after inspecting (as stated below), the product may have defect. Please contact the manufacturer or A/S center.

Scope of Inspection	
Power supply status checking	<ul style="list-style-type: none"> - If a bulb of the test lamp no.1 or no. 2 is not functioning, it means the test lamp is defected. - A bulb of the test lamp no.1 is not flashing, weaker the intensity of radiation. If lamp no. 2 is not functioning please re-charge it and use thereafter.

[Table 31] Lighting Status of the test lamp

Product Operation Status Vary According to Testing Conditions		
Status	Operate or Output Status	
Before connecting power	<ul style="list-style-type: none"> - Fault Relay signal open (de-energized) - All LED OFF 	
After connecting power	connecting power	<ul style="list-style-type: none"> - Fault Relay signal open (de-energized) - After LED blinking sequentially 3 second (Orange → Red → Green, clockwise),10 seconds of self diagnosis test.
	Normal	<ul style="list-style-type: none"> - Fault Relay signal close (energized) - All output, "normal" signal output - Green LED light ON
	Fire	<ul style="list-style-type: none"> - All output "Alarm" signal

Note. Except alarm relay output of signals, all output signals depend on programmable dip-switch setting.

[Table 32] Product Operation Status Vary According to Testing Conditions

5. Maintenance & Troubleshooting

This chapter deals with preventive maintenance, describes possible faults in detector operation and indicates corrective measures. Ignoring these instructions may cause problems with the detector and may invalidate the warranty. Whenever a unit requires service, please contact Rezontech or its authorized distributor for assistance.

5.1 Tools of Maintenance and Products Training

Basic tools are necessary and the person in-charge who has been trained in order to maintain the detector. The setting issues and its related issue, regulations shall be well trained or familiar with.

5.2 Maintenance Procedures

5.2.1 Cleaning the Detector

The detector must be kept as clean as possible. Clean the viewing window and the reflector of the Flame Detector periodically. The frequency of cleaning operations depends upon the local environmental conditions and specific applications.

The fire detection system designer will give his recommendations.

1	Disconnect power to the detector before proceeding with any maintenance including window/lens cleaning.
2	Use detergency liquid for view window on detector, and must rinse it with clean water.
3	Where dust, dirt or moisture accumulates on the window, first clean it with a soft brush. and use the detergency soft optical cloth. and then rinse it with clean water.

5.2.2 Periodic Maintenance Procedures

As a prevention the cleaning should be performed from time to time. The function checking should be performed every 6 months. This checking should be performed during "opened wiring status.

5.2.3 Maintenance Recording

Please record the maintenance process for the detector in the maintenance book. Device name, date of installation, name of supplier and those necessary information should be recorded accordingly. If there are any services needed, the maintenance record should be sent together to the respective parties for reference.

5.3 Troubleshooting

If there is any error occurs, kindly refer to the solutions as stated below and please contact the manufacturer or authorized A/S center if the problem proceed.

5.3.1 The LED is not responding after the power supply is connected.

- Check if the product is bound rightly or not.
- Check if product is connected with correct polarity.
- Check if the power supply connection condition to the product is within the voltage range or not.
- Check if short circuit occurs due to foreign substance after internal electronically wiring of product.

5.3.2 Orange LED blinking (2Hz)

- Check the input voltage for product, if there is any error in power supply or it fall below operation range of operation.
- The product may be polluted by foreign substances on the connector during the combination. Please check the internal wired connector.
- Please contact the manufacturer or authorized A/S center if there is any error occurs on the internal operating voltage while the input voltage for product is functioning.

5.3.3 Any of LEDs blinking (1Hz) or blinking (2Hz) with delay(0.5sec) repeatedly

- Please contact the manufacturer or authorized A/S center.

5.3.4 When receiver unable to detect various signal

- Check if the product is bound rightly or not.
- Check if the wiring is binding rightly or not according to the user manual
- All fire related signal, can be measured after fire signal is detected. Check if the signal is measured or not after fire signal is detected.
- Check the programmable dip switch setting which user wants to use signal type.
- Check if the electrical wiring is cut off or well connected conditions.

6. Customer Support

6.1 Contacts Information

Rezontech Office

Address	Phone, Fax, E-Mail
South Korea 805, Megavally, Gwanyang-dong, Dongan-gu, Anyang-si, Gyeonggi-do, Korea	TEL : +82-1544-9108 FAX : +82-31-420-0800 E-Mail : yacht@rezontech.com

[Table 33] Information of Contact

7. Appendix

7.1 Abbreviation

Abbreviation	Description
ATEX	Atmosphere Explosives
AWG	American Wire Gauge
EOL	End Of Line
FOV	Field Of View
IECEX	International Electrotechnical Commission Explosion
IR	Infrared
UV	Ultraviolet
Latching	Refers to relays remaining in the ON state even after the ON condition has been removed
LED	Light Emitting Diode
mA	Milli Ampere (0.001 ampere)
N.C	Normal Close
N.O	Normal Open

[Table 34] Various Types of Abbreviation

7.2 Choosing of Wiring

Kindly consider the electric wiring standard as stated below during the product wiring.

7.2.1 Reference : Standard Chart for Power Supply Electrical Wiring during setting (AWG Standard)

AWG #	mm ²	Max. Resistance Value at 68°F (20°C)	
		Ohm per 100m	Ohm per 100ft
24	0.16 ~ 0.24	3.42	11.22
22	0.30 ~ 0.38	1.71	5.60
20	0.51 ~ 0.61	1.07	3.50
18	0.81 ~ 0.96	0.67	2.20
16	1.22 ~ 1.43	0.27	0.88
14	1.94 ~ 2.28	0.27	0.88

[Table 35] Standard of Electrical Wiring

7.2.2 Things to be consider when choosing electrical wiring for power supply

- The number of product to connect to one circuit
- Wiring length for installation (overall space or partly space)
- The necessary voltage range for product
- The minimum range of power supply voltage
- Setting of electrical wiring in order for the product to function.

7.3 Certification & Approvals

- FM 3260
- FM 3615
Class I, Division 1, Groups B, C and D, T5 (Ta = -40°C to +75°C)
FM 3616
Class II, III, Division 1, Groups E, F and G, T5 (Ta = -40°C to +75°C)
- ATEX CE1725 Ex II G, Ex db IIB+H2 T5 (-40°C ≤Ta ≤ +75°C)
- IECEx FMG 14.0013X