
Multi-Spectrum Flame Detector
F750 4IR
Operating Manual
Version: V1.0

Notices

Please read this manual carefully before installing, operating and maintaining the equipment.

This manual describes in detail the scope of application, installation methods and operating methods of the F750 Quadri-Spectrum IR Flame Detector, as well as the precautions associated with the safe use of flame detectors. Before designing, installing, using, operating and maintaining the flame detector, please confirm that you have read and clearly understood the contents of this manual to prevent damage to the product quality or personnel safety.

 Pay special attention to warnings and attentions:

- ✧ The installation and operation must strictly comply with the relevant national standards.
- ✧ Any operation inside the flame detector must be performed by trained personnel.

IMPORTANT

The following warnings are mentioned throughout the manual:

-  **WARNING:** Identify any hazards or unsafe hazards that could result in a major accident or personal injury.
-  **CAUTION:** Identify any hazards or unsafe hazards that could result in personal injury or loss of product or property.
-  **Note:** Identify useful/additional information.

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1. Overview

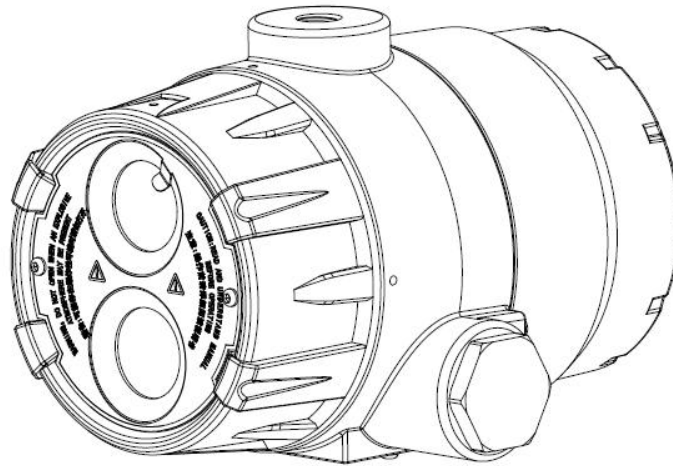


Figure 1. F750 Quadri-Spectrum IR Flame Detector

The F750 Quadri-Spectrum IR Flame Detector (hereafter referred to as the flame detector) is a quadri-spectrum IR flame detector that provides a new generation of flame detection capabilities and technical standards. The flame detector adopts a specially designed quadri-spectrum narrow-band current-type infrared pyroelectric sensor as the core. With the built-in 32-bit microprocessor and patented signal processing algorithm, it can more effectively distinguish the authentic flame radiation and interference source, and greatly reduce the impact of environmental factors on the detector; the flame detector has been greatly improved in hardware circuit and software algorithms through market research and collecting customer feedback information and a large amount of experimental data.

2. Main Features

- ✧ Built-in high-speed, low-power and high-performance 32-bit high-precision DSP chip.
- ✧ A quadri-spectrum narrow-band current type infrared pyroelectric sensor
- ✧ Automatic Optical Integrity(oi) feature.
- ✧ Tiny flame can be detected earlier.
- ✧ The detection angle of view is greater than 90 degrees.
- ✧ The detection distance is greater than 82 ft..
- ✧ The sophisticated algorithm best combines flame detection and false alarm resistance capabilities.
- ✧ It is suitable for a wide range of fuels.
- ✧ It is suitable for heavy industrial applications.
- ✧ Low maintenance costs, easy to update and improve.

3. Technical Parameters

- ✧ Working voltage: DC 24V (12~36V)

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- ✧ Working current: $\leq 100\text{mA}$ for monitoring, $\leq 150\text{mA}$ for alarm
 - ✧ Viewing angle: 90°
 - ✧ Sensitivity level: level I
 - ✧ Detection distance: $\geq 82\text{ ft.}$
 - ✧ LED display:
 - In normal working condition, the green light flashes;
 - In case of fire alarm, the red light is always on;
 - In case of fault, the yellow light is always on.
 - ✧ Outputs:
 - Relays:
 - Fire alarm relay, normally open contact output, $1\text{A}@30\text{VDC}$;
 - Fault relay, normally closed contact output, $1\text{A}@30\text{VDC}$;
 - Optical Integrity relay, normally open contact output, $1\text{A}@30\text{VDC}$.
 - Current level (0~20mA):
 - General fault condition, $\leq 1\text{mA}$;
 - Optical Integrity(oi) fault status, 2mA ;
 - Normal detection state, 4mA ;
 - Fire alarm output status, 20mA .
 - ✧ Working temperature: $-40\text{F} \sim +158(-40^\circ\text{C} \sim +70^\circ\text{C})$
 - ✧ Working humidity: $0 \sim 95\% \text{ RH}$ (no condensation)
 - ✧ Storage temperature: $-40\text{F} \sim +185\text{F}(-40^\circ\text{C} \sim +85^\circ\text{C})$
 - ✧ Design Criteria: FM 3260
 - ✧ Weight: 3KG
 - ✧ Housing material: stainless steel 316L

4. Structure and Installation

WARNING: Before installing the detector, cut off the power supply of the detector.

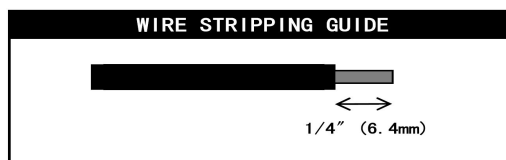
CAUTION: All wiring must comply with relevant standard regulations.

Check if the external cable has open or short circuit.

Install the detector as shown below and adjust the angle of view of the detector according to the protection range.

CAUTION: All wires shall be connected with a wire of 1.0 square or more. The end of the cable shall be stripped of an insulating sheath of approximately 6 mm and connected to the terminal of the F750 flame detector.

NOTICE: Excessive or too little exposure of the wires may cause incorrect connections.



Installation is as follows:

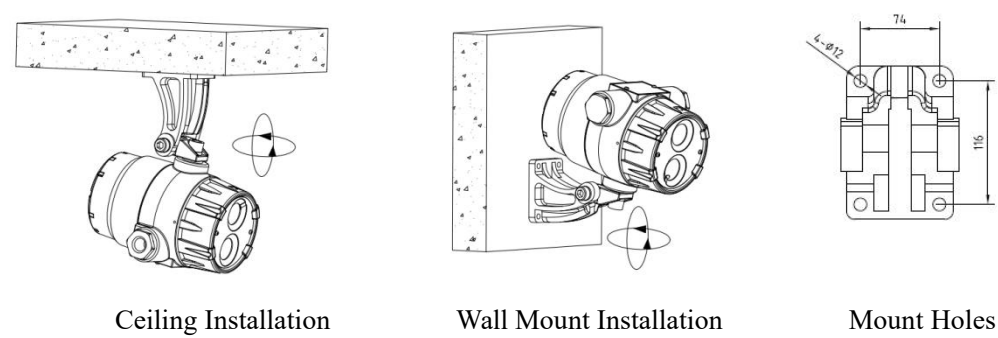


Figure 2. Installation

5. Terminal connection

5.1 Terminal instructions

端子名	端子描述
CD	COM OI FAULT
CK	NO OI FAULT
LD	COM FAULT
LK	NO FAULT
RD	COM FIRE
RK	NO FIRE
MA	0-20 mA Current Loop
RS485-A	RS 485 Interface A
RS485-B	RS 485 Interface B
24VIN	Power Supply 24V
GNDIN	Power Ground

11	CD	22	CD
10	CK	21	CK
9	LD	20	LD
8	LK	19	LK
7	RD	18	RD
6	RK	17	RK
5	MA	16	MA
4	RS485-A	15	RS485-A
3	RS485-B	14	RS485-B
2	24VIN	13	24VIN
1	GNDIN	12	GNDIN

Figure 3. Terminal instructions

5.2 Wiring schematic diagram

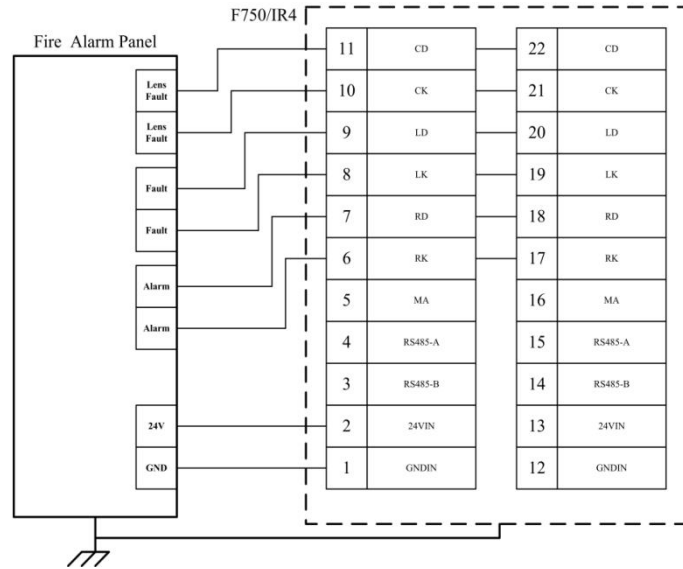


Figure 4. Wire for Relay Output

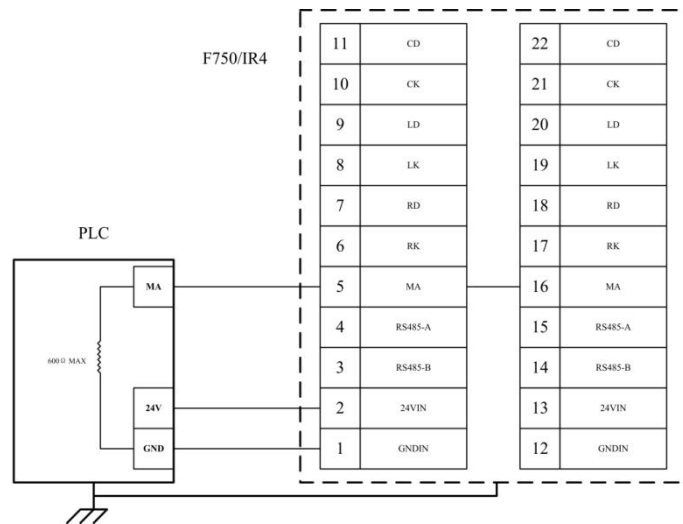


Figure 5. Wire for 0-20mA Current Output

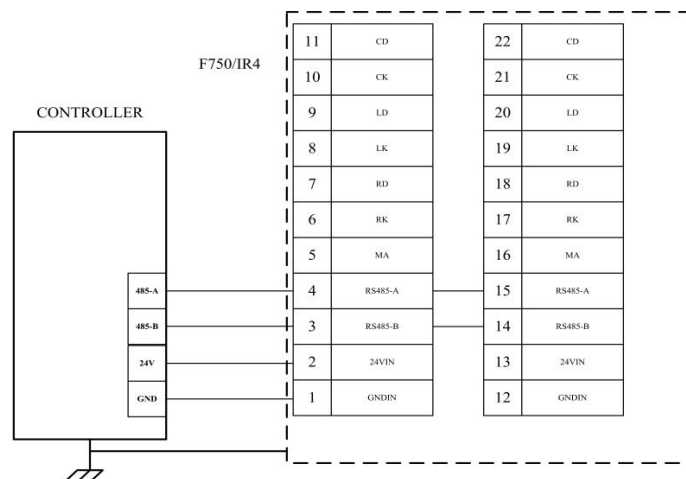


Figure 6. Wire for RS485

6. Response Characteristics

6.1 High Sensitivity

Fuel	Size(ft ² .)	Fuel volume(mL)	Distance feet (M)	Response (S)
n-Heptane*	1 × 1 ft ² .	800 mL	200(61)	10s
Ethanol*	1 × 1 ft ² .	800 mL	200(61)	11s

* Pre-burn from ignition

backup

Fuel	Size(ft ² .)	Fuel volume(mL)	Distance feet (M)	Response (S)
n-Heptane*	1 × 1 ft.	800 mL	180(55)	10s
Ethanol*	1 × 1 ft.	800 mL	180(55)	11s

* Pre-burn from ignition

6.2 Low Sensitivity

Fuel	Size(ft ² .)	Fuel volume(mL)	Distance feet (M)	Response (S)
n-Heptane	1 × 1	800	100(30)	<u>8</u>
Ethanol	1 × 1	800	100(30)	<u>10</u>

backup

Fuel	Size(ft ² .)	Fuel volume(mL)	Distance feet (M)	Response (S)
n-Heptane	1 × 1	800	82(25)	<u>8</u>
Ethanol	1 × 1	800	82(25)	<u>10</u>

7. FIELD OF VIEW

7.1 High Sensitivity

Fuel	Size(ft ² .)	Distance feet(M)	Horizontal(°)	Response(S)	Vertical(°)	Response(S)
n-Heptane*	1 × 1 ft.	150(46)	±45	10	±45	10
Ethanol*	1 × 1 ft.	150(46)	±45	11	±45	11

* Pre-burn from ignition

backup

Fuel	Size(ft ² .)	Distance feet(M)	Horizontal(°)	Response(S)	Vertical(°)	Response(S)
n-Heptane*	1 × 1 ft.	142(44)	±45	10	±45	10
Ethanol*	1 × 1 ft.	142(44)	±45	11	±45	11

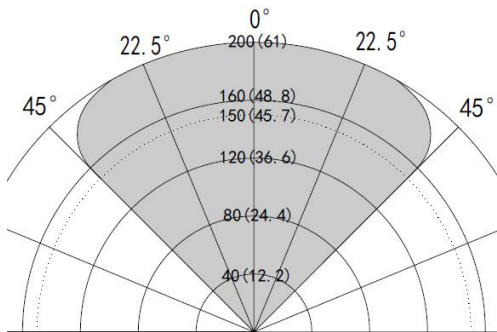
* Pre-burn from ignition

7.2 Low Sensitivity

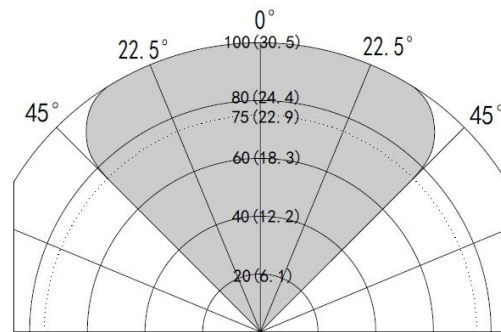
Fuel	Size(ft ² .)	Distance feet(M)	Horizontal(°)	Response(S)	Vertical(°)	Response(S)
n-Heptane	1 × 1 ft.	75(23)	±45	8	±45	8
Ethanol	1 × 1 ft.	75(23)	±45	10	±45	10

backup

Fuel	Size(ft ² .)	Distance feet(M)	Horizontal(°)	Response(S)	Vertical(°)	Response(S)
n-Heptane	1 × 1 ft.	71(22)	±45	8	±45	8
Ethanol	1 × 1 ft.	71(22)	±45	10	±45	10



Field of View at Indicated Distance in Feet (m) for **High** Sensitivity



Field of View at Indicated Distance in Feet (m) for **Low** Sensitivity

Figure 7. Field of View

8. FALSE ALARM IMMUNITY

False Alarm Immunity	Distance feet (m)		Modulated Response	Unmodulated Response
	High	Low		
Sunlight,direct,reflected	—	—	No alarm	No alarm
Vibration	—	—	No alarm	No alarm
Arc welding #7014	40 (12.2)	9(2.7)	No alarm	No alarm
Incandescent Lamp, 300 Watts	9(2.7)	3 (0.9)	No alarm	No alarm
Two Fluorescent Light, 34 Watts	9(2.7)	3 (0.9)	No alarm	No alarm
Halogen Light, 500 Watts	9(2.7)	5 (1.5)	No alarm	No alarm
Electric Heater, 1500 Watts	7(2.1)	5(1.5)	No alarm	No alarm

9. RESPONSE CHARACTERISTICS IN THE PRESENCE OF FALSE ALARM SOURCES

9.1 High Sensitivity

False Alarm Source	Distance feet (m)	Fire Source	Distance feet (m)	Average Response Time (seconds)
Sunlight, direct, unmodulated (Outdoor)	-	1ft*1ft n-Heptane 500ml	-	8s
Sunlight, direct, modulated (Outdoor)	-	1ft*1ft n-Heptane 500ml	100(30)	15s
Sunlight, reflected, unmodulated (Outdoor)	-	1ft*1ft n-Heptane 500ml	-	8s
Sunlight, reflected, modulated (Outdoor)	-	1ft*1ft n-Heptane 500ml	100(30)	15s
Arc welding, steady, #7014	40(12.2)	Φ2in Ethanol 50ml	9(2.7)	10s
Arc welding, modulated, #7014	40(12.2)	Φ2in Ethanol 50ml	9(2.7)	15s
300 w incandescent lamp, unmodulated	9(2.7)	Φ2in Ethanol 50ml	9(2.7)	9s
300 w incandescent lamp, modulated	9(2.7)	Φ2in Ethanol 50ml	9(2.7)	10s
500w Shielded quartz halogen lamp, unmodulated	9(2.7)	Φ2in Ethanol 50ml	7(2.1)	9s
500 w shielded quartz halogen lamp, modulated	9(2.7)	Φ2in Ethanol 50ml	7(2.1)	10s
1500 w electric radiant heater, unmodulated	7(2.1)	Φ2in Ethanol 50ml	7(2.1)	9s
1500 w electric radiant heater, modulated	7(2.1)	Φ2in Ethanol 50ml	7(2.1)	10s
Two 34 w fluorescent lamps, unmodulated	9(2.7)	Φ2in Ethanol 50ml	9(2.7)	9s
Two 34 w fluorescent lamps, modulated	9(2.7)	Φ2in Ethanol 50ml	9(2.7)	9s

9.2 Low Sensitivity

False Alarm Source	Distance feet (m)	Fire Source	Distance feet (m)	Average Response Time (seconds)
Sunlight, direct, unmodulated (Outdoor)	-	1ft*1ft n-Heptane 500ml	-	10s
Sunlight, direct, modulated (Outdoor)	-	1ft*1ft n-Heptane 500ml	50(15)	15s
Sunlight, reflected, unmodulated (Outdoor)	-	1ft*1ft n-Heptane 500ml	-	10s
Sunlight, reflected, modulated (Outdoor)	-	1ft*1ft n-Heptane 500ml	50(15)	15s
Arc welding, steady, #7014	9(2.7)	Φ0.22ft n-Heptane 54ml	5(1.5)	10s
Arc welding, modulated, #7014	9(2.7)	Φ0.22ft n-Heptane 54ml	5(1.5)	15s
300 w incandescent lamp, unmodulated	3(0.9)	Φ0.22ft n-Heptane 54ml	3(0.9)	10s
300 w incandescent lamp, modulated	3(0.9)	Φ0.22ft n-Heptane 54ml	3(0.9)	12s
500w Shielded quartz halogen lamp, unmodulated	5(1.5)	Φ0.22ft n-Heptane 54ml	5(1.5)	10s
500 w shielded quartz halogen lamp, modulated	5(1.5)	Φ0.22ft n-Heptane 54ml	5(1.5)	12s
1500 w electric radiant heater, unmodulated	5(1.5)	Φ0.22ft n-Heptane 54ml	3.2(1)	10s
1500 w electric radiant heater, modulated	5(1.5)	Φ0.22ft n-Heptane 54ml	3.2(1)	15s
Two 34 w fluorescent lamps, unmodulated	3(0.9)	Φ0.22ft n-Heptane 54ml	3(0.9)	10s
Two 34 w fluorescent lamps, modulated	3(0.9)	Φ0.22ft n-Heptane 54ml	3(0.9)	12s

10. IR Control

The parameters of F750 infrared flame detector can be set through the infrared remote control. When the detector successfully receives the input of the infrared remote control, the red light and green light of the detector will flash once alternately. Please note that the next operation shall be carried out after the alternate flashing. In the process of one setting, each operation should not exceed 15s. If times out, please re-run the setting operation again from the very beginning.

Function	Key Sequence			Notes
Sensitivity	LEFT <	LEFT <	1	High Sensitivity
	LEFT <	LEFT <	2	Low Sensitivity
oi Set	SET(设置)	SET(设置)	SET(设置)	oi Value Initialized
oi Test	TEST (查询)	TEST (查询)	TEST (查询)	Manual oi test
Alarm Output	UP ▲	UP ▲	0	Automatic Reset After Alarm
	UP ▲	UP ▲	1	Alarm Lock
Reset	EXIT(退出)	EXIT(退出)	EXIT(退出)	Manual Reset

11. Packaging, Transportation and Storage

The flame detector shall be packed in carton filled with damping foam.

Flame detectors can be transported by rail, road and air. In loading and unloading, It is forbidden to hit the upper surface of the carton with handling tools to avoid damage to the equipment panel.

12. Testing

Before the test, notify the relevant management department. During the testing of the flame detector system, disable the logic control function of the maintenance area or system, so as to avoid unnecessary alarm linkage. The flame detector must be tested after installation and each maintenance.

The detector shall be initialized after power-on such that the green light is always on, and off after 30 seconds. In normal operation, the number of flashes of the green light represents the current sensitivity level.

Before testing, check if the LED is flashing. If it is not flashing, it means the detector is not powered (check the connection), or it is damaged (return for repair).

The site test tool is an alcohol lamp or flame simulator, which keeps simulating the fire condition till the detector alarms. After the test is over, notify the relevant management department when the system is back to normal. If the detector fails to pass these tests, it should be returned for repair.

CAUTION: There are no user-debuggable parts inside the flame detector. Any replacement of components and adjustment of circuits without the manufacturer's consent may damage the performance of the equipment.

13. oi (OPTICAL INTEGRITY)

13.1 Automatic oi

The F750 detector includes the Automatic oi feature, a calibrated performance test that is automatically performed once 30 minutes to verify complete detector operation capabilities. No testing with an external test lamp is required. However, a successful Automatic oi test does not produce an alarm condition.

The detector signals a oi fault condition when less than half of the detection range remains. This is indicated by the Fault output, the oi Relay close, current level is 15mA and the RS485 output the oi fault. The fault condition is also evident by the yellow color of the LED on the face of the detector.

13.2 Manual oi

The F750 detector includes Manual oi features that provide the same calibrated test as the Automatic oi, and in addition actuates the Alarm output to verify operation for preventive maintenance requirements. These features can be performed at any time and eliminate the need for testing with a IR control.

The Manual oi test activates the calibrated IR emitters. If the resulting signal meets the test criteria, indicating that greater than half of the detection range remains, the fire alarm output of the detector is activated. If less than half of the detection range remains, no alarm is produced and a oi fault is generated.

14. Maintenance

IMPORTANT: Flame detectors must be regularly tested and maintained in accordance with national standards and relevant regulatory requirements. The detector should be cleaned once a year and tested and maintained once a month.

Before cleaning, notify the relevant management department that the flame detector system will be temporarily stopped for maintenance. Disable the logic control function of the area or system that will be maintained to avoid unnecessary alarm linkage.

Use vacuum or compressed air to remove dust and impurities from the face of the detector.

If there is oily dirt on the lens, use an alcohol cotton ball to wipe the lens. Do not use hard objects to avoid scratching the lens.

When all detectors are cleaned, test the detectors as described above.

15. Accessories

- An operating manual;
- A packing list;
- A pack of accessories (see packing list).