



# Instructions

# 95-8480-03

Protect•ir Multispectrum IR Flame Detector  
X3300

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**IMPORTANT**

Be sure to read and understand the entire instruction manual before installing or operating the flame detection system.

**WARNING**

Do not open the detector assembly in a hazardous area when power is applied. The detector contains no user serviceable components and should never be opened. Doing so could disturb critical optical alignment and calibration parameters, possibly causing serious damage. This type of damage could be undetected and could result in failure to see a fire and/or false alarm.

**CAUTION**

The wiring procedures in this manual are intended to ensure proper functioning of the device under normal conditions. However, because of the many variations in wiring codes and regulations, total compliance to these ordinances cannot be guaranteed. Be certain that all wiring complies with the NEC as well as all local ordinances. If in doubt, consult the authority having jurisdiction before wiring the system. Installation must be done by a properly trained person.

**CAUTION**

To prevent unwanted actuation or alarm, extinguishing devices must be disconnected prior to performing detection system tests or maintenance.

**ATTENTION**

Remove protective cap from front of the detector before activating the system.

**ATTENTION**

Observe precautions for handling electrostatic sensitive devices.

**ATTENTION**

The X3300 includes the Automatic Optical Integrity (**oi**) feature — a calibrated performance test that is automatically performed once per minute to verify complete detector operation capabilities. **No testing with an external test lamp is required.**

\***oi** is Detector Electronics' Trademark for its patented Optical Integrity Systems, U.S. Patent 3,952,196, United Kingdom Patent 1,534,969, Canada Patent 1,059,598.

**Protect•ir****Multispectrum IR Flame Detector****X3300****DESCRIPTION**

The X3300 Protect•ir is a multispectrum infrared (IR) flame detector. It provides unsurpassed detection of fires from light to heavy hydrocarbon fuels combined with the highest degree of false alarm rejection. The detector is suitable for use in indoor and outdoor applications with NEMA 4X classification as well as Class I, II and III explosion-proof ratings.

The X3300 contains three IR sensors, signal processing circuitry, and fire and fault relays. A tricolor LED on the detector faceplate indicates normal, fire alarm, and fault conditions. Factory configurable options include:

- Automatic or Manual Optical Integrity (**oi**)
- Fire and Fault Relay Operation
  - Normally Open (N.O.) or Normally Closed (N.C.) Contacts
  - Normally Energized or Normally De-Energized (Fire relay)
  - Latching or Non-latching.
- Optional 4 to 20 mA output.

The X3300 is available in aluminum or stainless steel and features multiple mounting options, including:

- Integral EEx d e aiming Swivel (for use with GRP EEx e certified junction box)
- Direct to flexible conduit with the use of a Q9001 swivel mount
- Direct to junction box
- Direct to conduit elbow mount.

Table 1—Detector Status Indicator

Detector Status	LED Indicator
Power On/Normal Operation (no fault or fire alarm)	Green
Fault	Yellow
Fire (Alarm)	Red
Medium Sensitivity	Two Yellow Flashes During Power-up
Very High Sensitivity	Four Yellow Flashes During Power-up

Table 2—Factory Configuration Options (Not Changeable in the Field)

Option	Available Configurations	
Sensitivity	<ul style="list-style-type: none"> <li>• Detects 1 square foot gasoline fire at 210 feet (very high sensitivity) or 100 feet (medium sensitivity).</li> </ul>	
Optical Integrity ( <b>oi</b> )	<ul style="list-style-type: none"> <li>* Automatic <b>oi</b> - Automatically checks internal circuitry and cleanliness of viewing windows to ensure proper operation. If a fault condition exists, the amber Fault LED lights.</li> <li>• Manual <b>oi</b> - Cleanliness of viewing windows test can be manually initiated by closing an external switch that is electrically connected between the <b>oi</b> lead and circuit ground. <b>Warning:</b> Successful Manual <b>oi</b> test results in fire alarm relay activation and red Alarm LED lights.</li> <li>• Internal circuitry is automatically tested independent of the Manual <b>oi</b> test</li> </ul>	
Fire Relay	Latching/Non-Latching	<ul style="list-style-type: none"> <li>• Latching - Relay remains in "Fire" condition after fire has been detected until X3300 power is cycled.</li> <li>* Non-latching - Relay remains in "Fire" condition only as long as a fire is being detected.</li> </ul>
	Normally Energized/De-Energized	<ul style="list-style-type: none"> <li>• Normally Energized - Fire relay is energized in non-alarm (no fire) condition.</li> <li>* Normally De-Energized - Fire relay is de-energized in non-alarm (no fire) condition.</li> </ul>
	Contacts Normally Open/Closed	<ul style="list-style-type: none"> <li>* Normally Open - Fire relay contacts are open in non-alarm (no fire) condition.</li> <li>• Normally Closed - Fire relay contacts are closed in non-alarm (no fire) condition.</li> </ul>
Fault Relay	Latching/Non-Latching	<ul style="list-style-type: none"> <li>• Latching - Relay remains in "Fault" condition after fault has been detected until X3300 power is cycled.</li> <li>* Non-latching - Relay remains in "Fault" condition only as long as a fault is being detected.</li> </ul>
	Normally Energized	<ul style="list-style-type: none"> <li>* Normally Energized - Fault relay is energized with no fault present.</li> </ul>
	Contacts Normally Open/Closed	<ul style="list-style-type: none"> <li>* Normally Open - Fault relay contacts are open when fault is present.</li> <li>• Normally Closed - Fault relay contacts are closed when fault is present.</li> </ul>
4 to 20 mA Output	<ul style="list-style-type: none"> <li>• Current output level indicates detector status condition.</li> </ul>	

\* Standard Configuration

Refer to the "Ordering Information" section for a complete list of available options and accessories.

Table 1 indicates the condition of the LED for each detector status. The LED is non-latching. Fire and Fault relay condition for each detector status varies according to the factory configuration.

## FACTORY CONFIGURATION OPTIONS

The X3300 is configured at the factory to operate as specified when ordered. Refer to the descriptions in Table 2 for a functional explanation of each configuration option.

### NOTE

*Factory configurable options cannot be changed in the field.*

### 4 TO 20 MA OUTPUT (Optional)

This option provides a 4 to 20 mA dc current output for transmitting detector status information to other devices. The circuit can be wired in either an isolated or non-isolated configuration and can drive a maximum loop resistance of 500 ohms from 18 to 19.9 volts dc and 600 ohms from 20 to 32 volts dc. Table 3 indicates the detector status conditions represented by the various current levels. The output is calibrated at the factory, with no need for field calibration.

### NOTE

*The output of the 4 to 20 mA current loop is not monitored by the fault detection circuitry of the X3300. Therefore, an open circuit on the loop will not cause the fault relay to change state or the detector status LED to indicate a fault. The status of the LED will always follow the status of the relays.*

## GENERAL APPLICATION INFORMATION

### RESPONSE CHARACTERISTICS

Response is dependent on the type of fuel, the temperature of the fuel, and the time required for the fire to come to equilibrium. As with all fire tests, results must be interpreted according to an individual application.

See Appendix A for fire test results.

Table 3—Detector Status Conditions Indicated by Current Level

Current Level	Detector Status
0 mA	Open Circuit
1 mA	General Fault
2 mA	Oi Fault
3 mA	Hi Background IR
4 mA	Normal Operation
20 mA	Alarm

## IMPORTANT APPLICATION CONSIDERATIONS

In applying any type of sensing device as a fire detector, it is important to know of any conditions that can prevent the device from responding to fire, and also to know what other sources besides fire can cause the device to respond.

### Welding

Arc welding should not be performed within 40 feet of the very high sensitivity detector (10 feet for medium sensitivity detector). It is recommended that the system be bypassed during welding operations in situations where the possibility of a false alarm cannot be tolerated. Gas welding mandates system bypass, since the gas torch is an actual fire. Arc welding rods can contain organic binder materials in the flux that burn during the welding operation and are detectable by the X3300. Welding rods with clay binders do not burn and will not be detected by the X3300. However, system bypass is always recommended, since the material being welded may be contaminated with organic substances (paint, oil, etc.) that will burn and possibly trigger the X3300.

### Artificial Lighting

The X3300 should not be located within 3 feet of artificial lights. Artificial lights should not be positioned so that they are pointed directly at the detector.

### EMI/RFI Interference

The X3300 is resistant to interference by EMI and RFI, and is EMC Directive compliant. It will not respond to a 5 watt walkie-talkie at distances greater than 1 foot. Do not operate a walkie-talkie within 1 foot of the X3300.

### Non-Carbon Fires

The X3300 is a multiple spectrum IR device with detection limited to carbonaceous fuels. It should not be used to detect fires that do not contain carbon, such as hydrogen, sulfur and burning metals.

## INSTALLATION

### DETECTOR POSITIONING

Detectors should be positioned to provide the best unobstructed view of the area to be protected. The following factors should also be taken into consideration:

- Identify all high risk fire ignition sources.
- Be sure that enough detectors are used to adequately cover the hazardous area.
- Locate and position the detector so that the fire hazard(s) are within both the field of view and detection range of the device. Refer to Appendix A for specific information.
- Be sure that the unit is easily accessible for cleaning and other periodic servicing.
- For outdoor applications, the detector should be aimed downward at least 10 to 20 degrees to allow lens openings to drain. See Figure 1. The detector should be positioned so that its field of view does not cover areas outside the hazardous area. This will minimize the possibility of false alarms caused by activities outside the area requiring protection.
- For best performance, the detector should be mounted on a rigid surface in a low vibration area.
- Dense fog, rain or ice can absorb IR radiation and reduce the sensitivity of the detector.

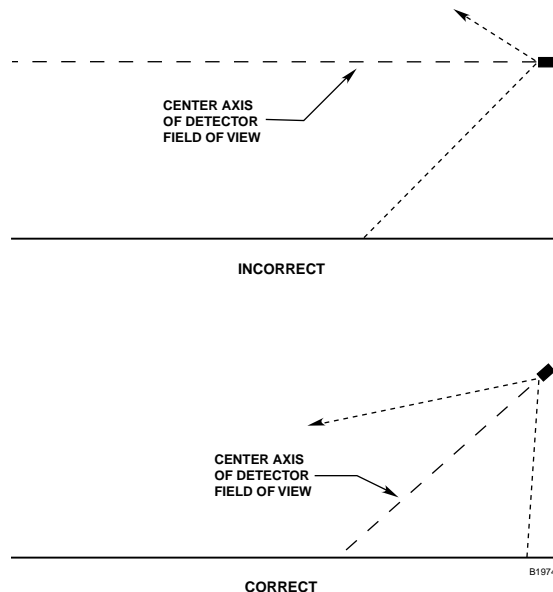


Figure 1—Detector Orientation Relative to Horizon

- Although IR detectors are less affected by smoke than other detectors, the X3300 should not be placed where rising combustion products can obscure its vision. If smoke is expected before fire, smoke or other alternative detectors should be used in conjunction with the X3300. For indoor applications, if dense smoke is expected to accumulate at the onset of a fire, mount the detector on a side wall at least a few feet (approximately 1 meter) down from the ceiling.
- If possible, fire tests should be conducted to verify correct detector positioning and coverage.

### WIRING REQUIREMENTS

#### WIRE SIZE AND TYPE

The system should be wired using a 14 to 22 gauge (1.3 to 0.5 mm<sup>2</sup>) cable. The wire size selected should be based on the number of detectors connected, the supply voltage and the cable length. A minimum input voltage of 18 vdc must be present at the X3300.

The use of shielded cable is recommended to protect against interference caused by EMI and RFI. When using cables with shields, terminate the shields as shown in Figures 7 through 10. Consult the factory if not using shielded cable.

In applications where the wiring cable is installed in conduit, the conduit should not be used for wiring to other electrical equipment.

#### CAUTION

*Installation of the detector and wiring should be performed only by qualified personnel.*

### PROTECTION AGAINST MOISTURE DAMAGE

It is important to take proper precautions during installation to ensure that moisture will not come in contact with the electrical connections or components of the system. The wiring pigtail for the X3300 is factory sealed for easy installation onto a junction box where electrical connections are made. The integrity of the system regarding moisture protection must be maintained for proper operation and is the responsibility of the installer.

If conduit is used, drains must be installed at water collection points to automatically drain accumulated moisture. Conduit breathers should be installed at upper locations to provide ventilation and allow water vapor to escape. At least one breather should be used with each drain.

Table 4—Wiring Identification and Notes

Wire Color	Function	Notes
Green	Chassis (Earth) Ground	Connect to junction box ground screw.
Black	(-) Negative	Connect to external 24 vdc power supply negative.
Red	(+) Positive	Connect to external 24 vdc power supply positive.
Blue and Pink**	Alarm Relay Common	<ul style="list-style-type: none"> <li>Two conductors provided for parallel wiring of alarm relay contacts.</li> </ul>
Brown and Tan**	Alarm Relay *Normally Open (N.O.) OR Normally Closed (N.C.)	<ul style="list-style-type: none"> <li>Two conductors provided for parallel wiring of alarm relay contacts.</li> <li>Factory configured. Specify Normally Open or Normally Closed operation when ordering.</li> <li>Normally Open = Relay contacts are normally open (no fire) and close when a fire is detected.</li> <li>Normally Closed = Relay contacts are normally closed (no fire) and open when a fire is detected.</li> </ul>
Purple	Fault Relay Common	<ul style="list-style-type: none"> <li>Fault relay common wire.</li> </ul>
Clear (gray)	Fault Relay *Normally Open (N.O.) OR Normally Closed (N.C.)	<ul style="list-style-type: none"> <li>Factory configured. Specify Normally Open or Normally Closed operation when ordering.</li> <li>Normally Open = Relay contacts are closed during normal operation and open when a fault is detected.</li> <li>Normally Closed = Relay contacts are open during normal operation and closed when a fault is detected.</li> </ul>
White	Manual <b>oi</b> Test	Connect to external switch to initiate Manual <b>oi</b> Test.
Orange	Data -	Not in use. (Terminate or protect from connection)
Yellow	Data +	Not in use. (Terminate or protect from connection)

\* Standard Configuration

\*\* Red/White striped wire may be substituted for solid pink; Brown/White for solid tan.

Conduit raceways should be inclined so that water will flow to low points for drainage and will not collect inside enclosures or on conduit seals. If this is not possible, install conduit drains above the seals to prevent the collection of water or install a drain loop below the detector with a conduit drain at the lowest point of the loop.

The detector is factory sealed. Conduit seals are not required for compliance with explosion-proof installation requirements. Units with M25 thread must use an IP66 washer to prevent water ingress.

### MOUNTING AND WIRING PROCEDURE

Refer to the procedure below and the listed table and figures to mount and wire the X3300.

Table 4 – X3300 Wiring Identification and Notes

Figure 1 – Detector Orientation Relative to Horizon

Figure 2 – Direct to Junction Box Mounting Option

Figure 3 – X3300 with Integral Swivel Mount

Figure 4 – X3300 with Q9001L Swivel Mount

Figure 5 – Front View of the X3300

Figure 6 – X3300 with Integral Swivel Mount Installation

Figure 7 – Typical System Wiring, Single Detector

Figure 8 – Typical System Wiring, Multiple Detector

Figure 9 – A Typical System, X3300 Detector with Isolated 4 to 20 mA Output

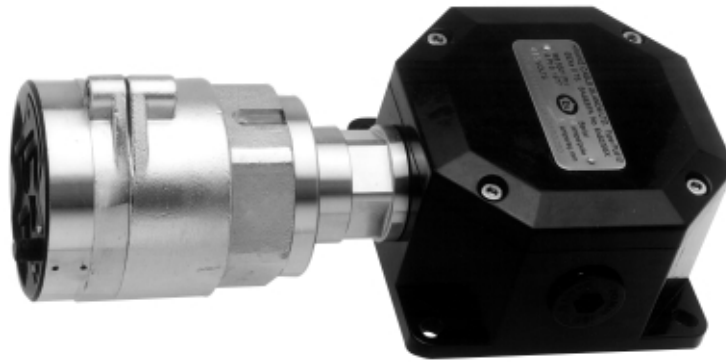
Figure 10 – A Typical System, X3300 Detector with Non-Isolated 4 to 20 mA Output

### **oi** PLATE ORIENTATION

Refer to Figure 5 and insure that the **oi** plate will be oriented as shown when the X3300 is mounted and sighted. This will ensure proper operation of the **oi** system and will also minimize the accumulation of moisture and contaminants between the **oi** plate and the viewing windows. The **oi** plate includes an arrow, which should be pointed in the up direction, indicating that the **oi** plate and detector are correctly oriented.

#### **IMPORTANT**

*The **oi** plate must be securely tightened to ensure proper operation of the **oi** system (40 oz./inches recommended).*



(JUNCTION BOX SHOWN NOT INCLUDED WITH ASSEMBLY) A1925

Figure 2—Direct to Junction Box Mounting Option

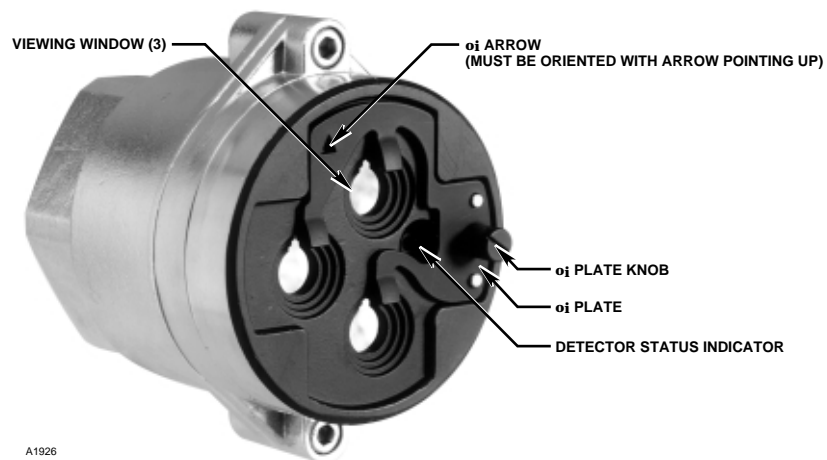


(JUNCTION BOX SHOWN NOT INCLUDED WITH ASSEMBLY) A1924

Figure 3—X3300 Detector/Controller Assembly with Integral Swivel



Figure 4—X3300 with Q9001L Swivel Mount



A1926

Figure 5—Front View of the X3300 Detector/Controller



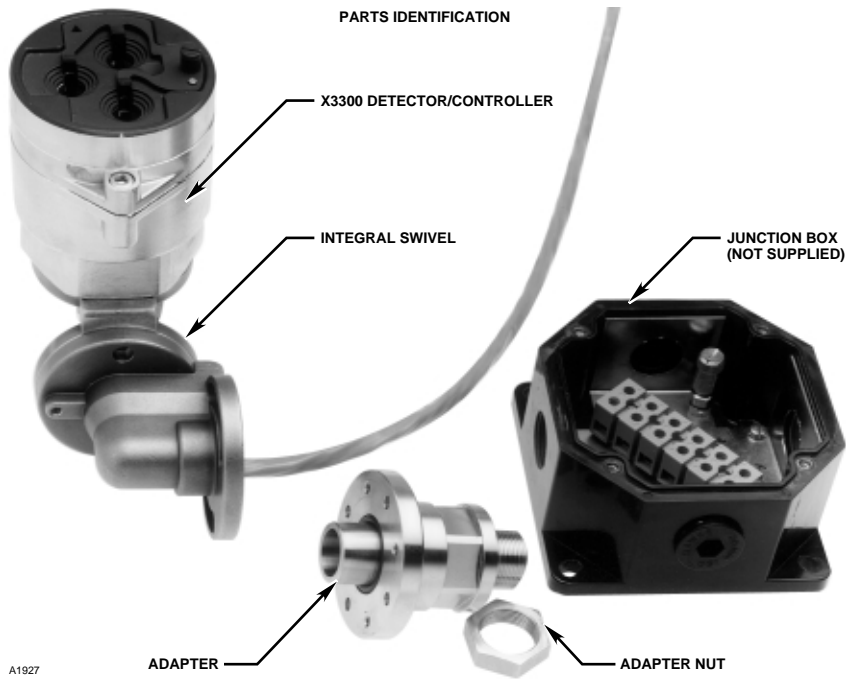


Figure 6A—X3300 with Integral Swivel Mount Installation

### INSTALLATION OF X3300 WITH INTEGRAL SWIVEL MOUNT

Refer to Figures 6A, 6B, 6C and 6D and follow the instructions below to install the X3300 with Integral Swivel Mount. Perform steps 1 through 4 on a workbench before installing the unit on the wall or ceiling.

#### NOTE

*The greatest mechanical stability will be achieved if the device is installed such that the weight of the device tends to tighten the adapter (see Figures 6C and 6D).*

1. Install the adapter on the appropriate junction box conduit entry. Remove the nut, then thread the adapter onto the junction box.
2. Thread the X3300 wires through the adapter and into the junction box.
3. Connect the X3300 to the adapter using the two allen head screws to fasten the integral swivel mount to the adapter.

4. Estimate the orientation and sighting of the X3300 to best view the hazardous area while still on the workbench, then tighten the adapter nut and the sighting screws.
5. Install the junction box on the wall or plate and route the field wiring through the appropriate conduit entry.

**INSTALL THE ADAPTER ON THE APPROPRIATE JUNCTION BOX CONDUIT ENTRY. REMOVE THE NUT, THEN THREAD THE ADAPTER ONTO THE JUNCTION BOX.**

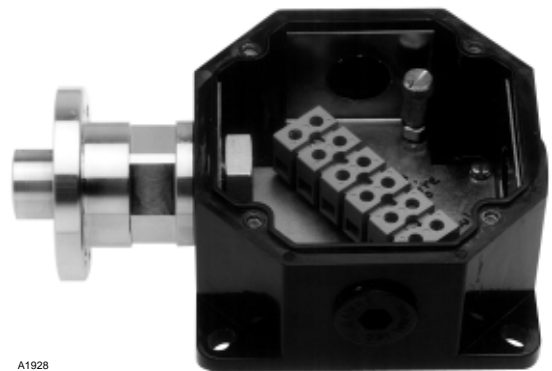


Figure 6B—X3300 with Integral Swivel Mount Installation

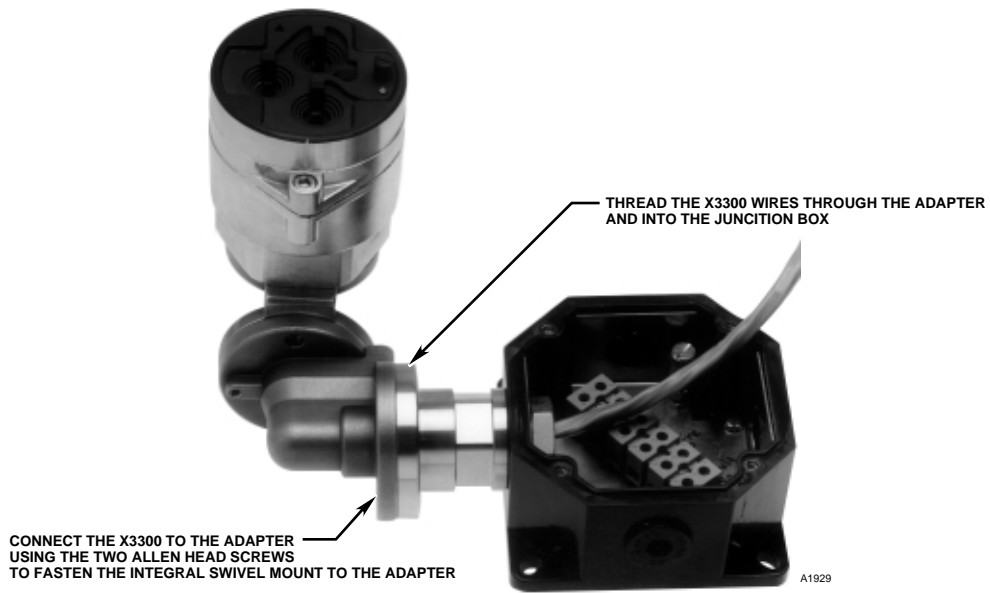


Figure 6C—X3300 with Integral Swivel Mount Installation

ESTIMATE THE ORIENTATION AND SIGHTING OF THE X3300 TO BEST VIEW THE HAZARDOUS AREA WHILE STILL ON THE WORKBENCH, THEN TIGHTEN THE ADAPTER NUT AND THE SIGHTING SCREWS.

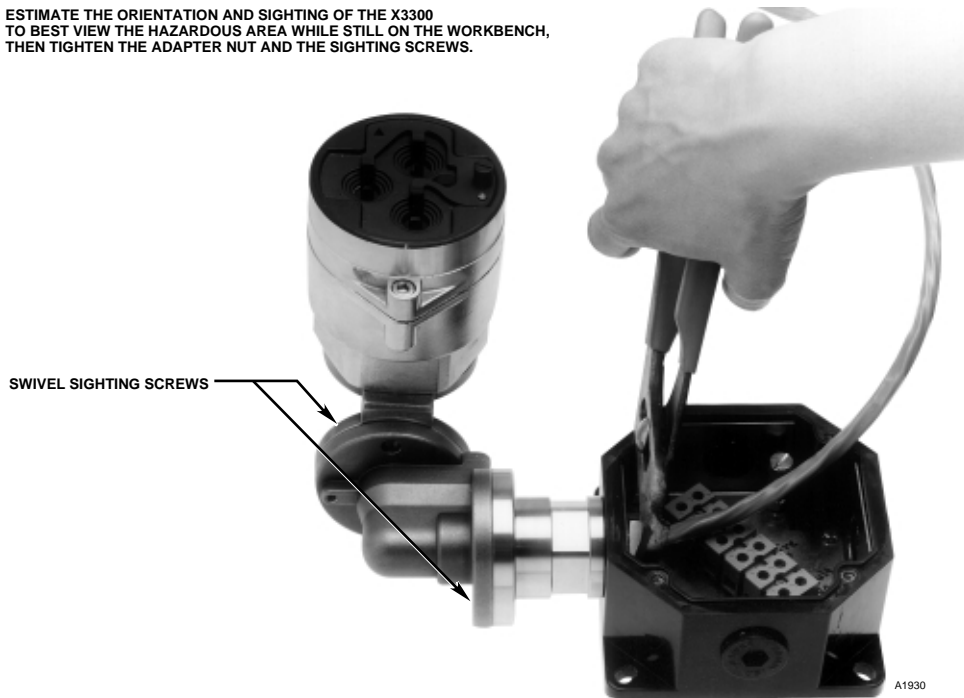
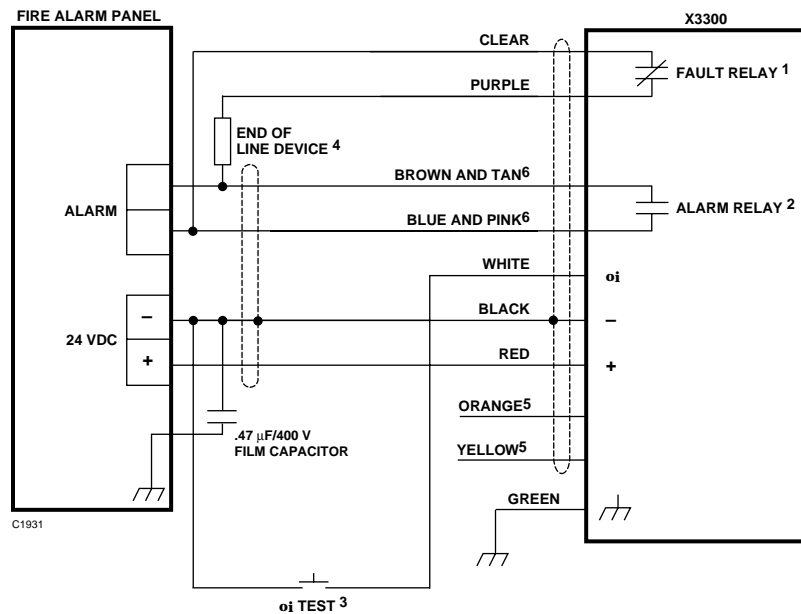


Figure 6D—X3300 with Integral Swivel Mount Installation



**WIRING NOTES:**

- 1 FAULT RELAYS SHOWN HAVE BEEN SPECIFIED (WHEN ORDERED) TO HAVE NORMALLY CLOSED CONTACTS AND TO BE NORMALLY ENERGIZED WITH NO FAULT PRESENT.
- 2 ALARM RELAYS SHOWN HAVE BEEN SPECIFIED (WHEN ORDERED) TO HAVE NORMALLY OPEN CONTACTS AND TO BE NORMALLY DE-ENERGIZED WITH NO ALARM CONDITION PRESENT.
- 3 INDIVIDUAL MANUAL TEST SWITCHES CAN BE INSTALLED REMOTELY OR A DETECTOR SELECTOR AND ACTIVATION SWITCH CAN BE INSTALLED AT THE FIRE PANEL. TEST SWITCHES ARE NOT SUPPLIED.
- 4 END OF LINE DEVICE SUPPLIED BY PANEL.
- 5 PROTECT ORANGE AND YELLOW WIRES FROM CONNECTION. TERMINATE IN LOCAL JUNCTION BOX.
- 6 RED/WHITE STRIPED WIRE MAY BE SUBSTITUTED FOR SOLID PINK; BROWN/WHITE FOR SOLID TAN.

**X3300 COLOR LEGEND**

COLOR	FUNCTION
GREEN	CHASSIS GROUND
BLACK	DC -
RED	DC +
BLUE AND PINK (2)	ALARM RELAY COMMON
BROWN AND TAN (2)	ALARM RELAY NO OR NC
PURPLE	FAULT RELAY COMMON
CLEAR	FAULT RELAY NO OR NC
WHITE	MANUAL TEST
ORANGE	DATA - 5
YELLOW	DATA + 5

Figure 7—A Typical System, Single Detector

6. Make field connections following local ordinances and guidelines in this manual. Refer to Table 4 and Figures 7 and 8. If the detector is equipped with the optional 4 to 20 mA output, wire the device as shown in Figure 9 for an isolated output or Figure 10 for a non-isolated output.
7. Check all field wiring to be sure that the proper connections have been made.

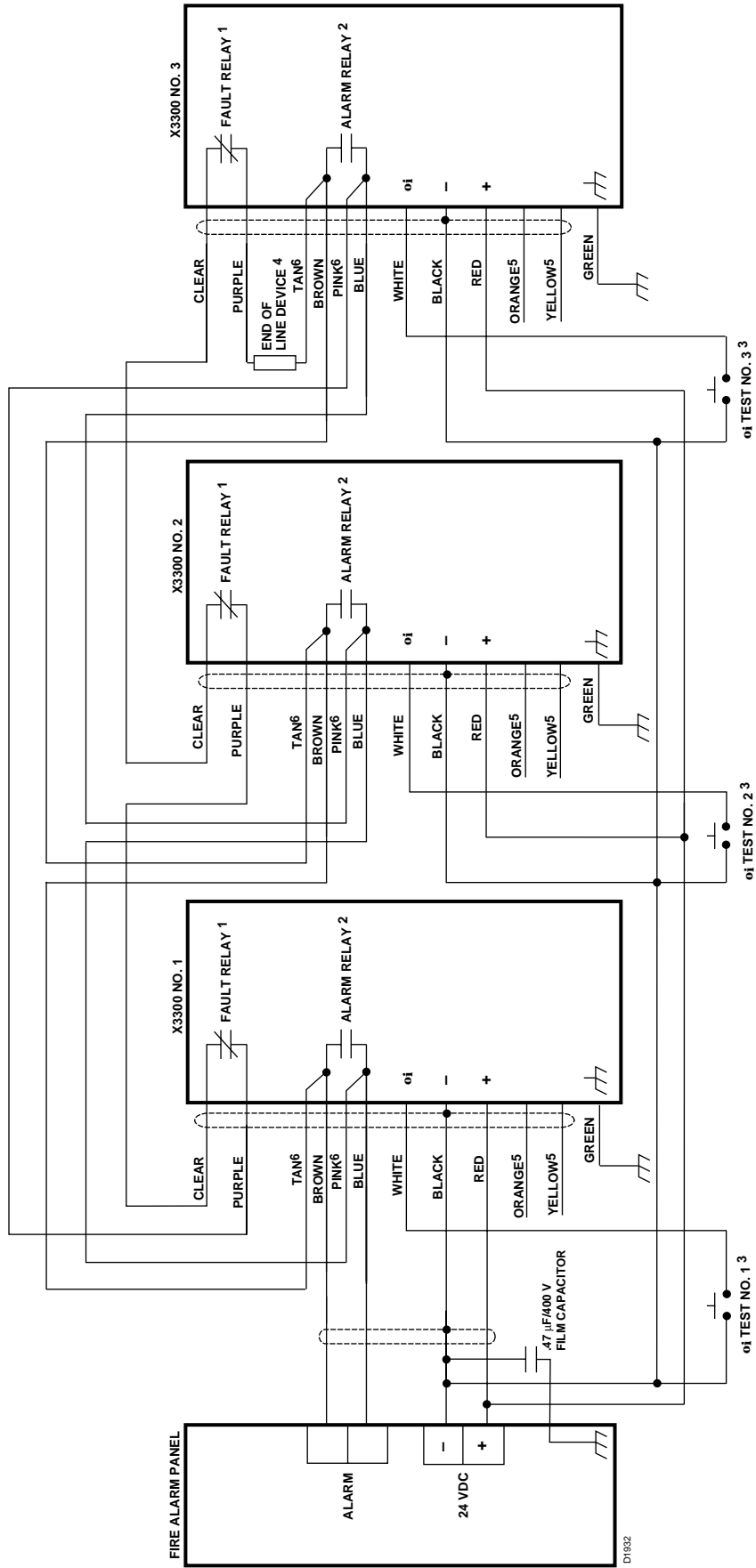
**IMPORTANT**

*Do not test any wiring connected to the detector with a meg-ohmmeter. Disconnect wiring at the detector before checking system wiring for continuity.*

**NOTE**

*Connect the shield to power supply minus (circuit ground) at the detector end. At the fire panel end, connect the shield and power supply minus to chassis ground through a 0.47 μF 400 Volt non-polarized capacitor (not supplied).*

8. Make the final sighting adjustments and ensure that the adapter nut and sighting screws are tight, then replace the junction box cover.



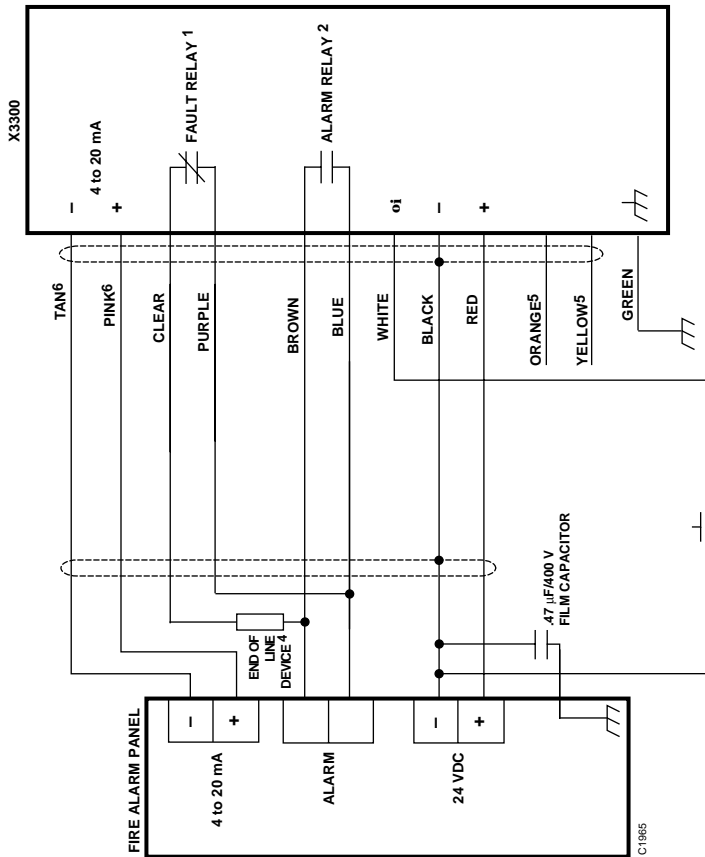
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- 4 END OF LINE DEVICE SUPPLIED BY PANEL.
- 5 PROTECT ORANGE AND YELLOW WIRES FROM CONNECTION. TERMINATE IN LOCAL JUNCTION BOX.
- 6 RED/WHITE STRIPED WIRE MAY BE SUBSTITUTED FOR SOLID PINK; BROWN/WHITE FOR SOLID TAN.

**X3300 COLOR LEGEND**

COLOR	FUNCTION
GREEN	CHASSIS GROUND
BLACK	DC -
RED	DC +
BLUE AND PINK (2)	ALARM RELAY COMMON
BROWN AND TAN (2)	ALARM RELAY NO OR NC
PURPLE	FAULT RELAY COMMON
WHITE	FAULT RELAY NO OR NC
ORANGE	MANUAL oi TEST
ORANGE	DATA - 5
YELLOW	DATA + 5

Figure 8—A Typical System, Multiple Detectors



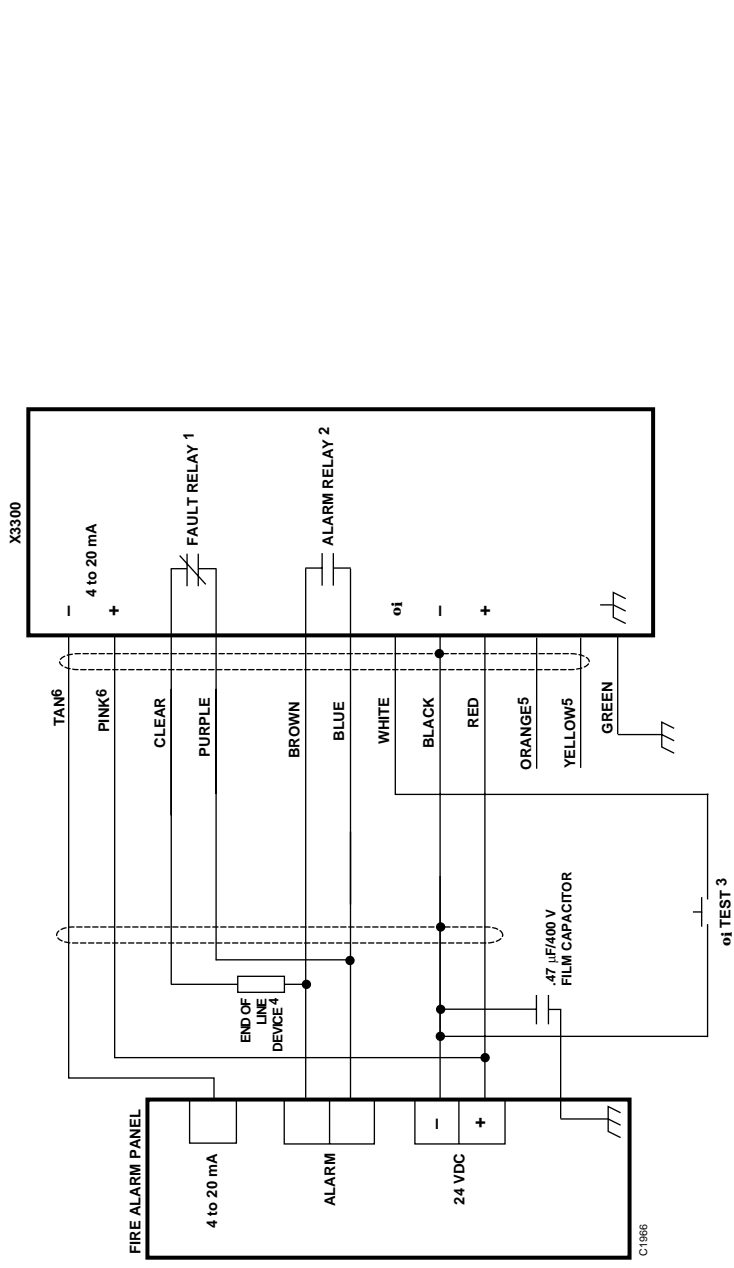
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**X3300 COLOR LEGEND**

COLOR	FUNCTION
GREEN	CHASSIS GROUND
BLACK	DC -
RED	DC +
TAN	4 to 20 mA -
PINK	4 to 20 mA +
BROWN	ALARM RELAY COMMON
BLUE	ALARM RELAY NO OR NC
PURPLE	FAULT RELAY COMMON
CLEAR	FAULT RELAY NO OR NC
WHITE	MANUAL oi TEST
ORANGE	DATA - 5
YELLOW	DATA + 5

Figure 9—A Typical System, X3300 Detector with Isolated 4 to 20 mA Output and Relay Connections



**X3300 COLOR LEGEND**

COLOR	FUNCTION
GREEN	CHASSIS GROUND
BLACK	DC +
RED	DC -
TAN	4 to 20 mA -
PINK	4 to 20 mA +
BLUE	ALARM RELAY COMMON
BROWN	ALARM RELAY NO OR NC
PURPLE	ALARM RELAY NC OR NO
CLEAR	FAULT RELAY COMMON
WHITE	FAULT RELAY NO OR NC
ORANGE	MANUAL <sub>1</sub> TEST
YELLOW	DATA <sub>2</sub>
	DATA + 5

- WIRING NOTES:**
- 1 FAULT RELAYS SHOWN HAVE BEEN SPECIFIED (WHEN ORDERED) TO HAVE NORMALLY CLOSED CONTACTS AND TO BE NORMALLY ENERGIZED WITH NO FAULT PRESENT.
  - 2 ALARM RELAYS SHOWN HAVE BEEN SPECIFIED (WHEN ORDERED) TO HAVE NORMALLY OPEN CONTACTS AND TO BE NORMALLY DE-ENERGIZED WITH NO ALARM CONDITION PRESENT.
  - 3 INDIVIDUAL MANUAL<sub>01</sub> TEST SWITCHES CAN BE INSTALLED REMOTELY OR A DETECTOR SELECTOR AND ACTIVATION SWITCH CAN BE INSTALLED AT THE FIRE PANEL. TEST SWITCHES ARE NOT SUPPLIED.
  - 4 END OF LINE DEVICE SUPPLIED BY PANEL.
  - 5 PROTECT ORANGE AND YELLOW WIRES FROM CONNECTION. TERMINATE IN LOCAL JUNCTION BOX.
  - 6 RED/WHITE STRIPED WIRE MAY BE SUBSTITUTED FOR SOLID PINK; BROWN/WHITE FOR SOLID TAN.

Figure 10—A Typical System, X3300 Detector with Non-Isolated 4 to 20 mA Output and Relay Connections

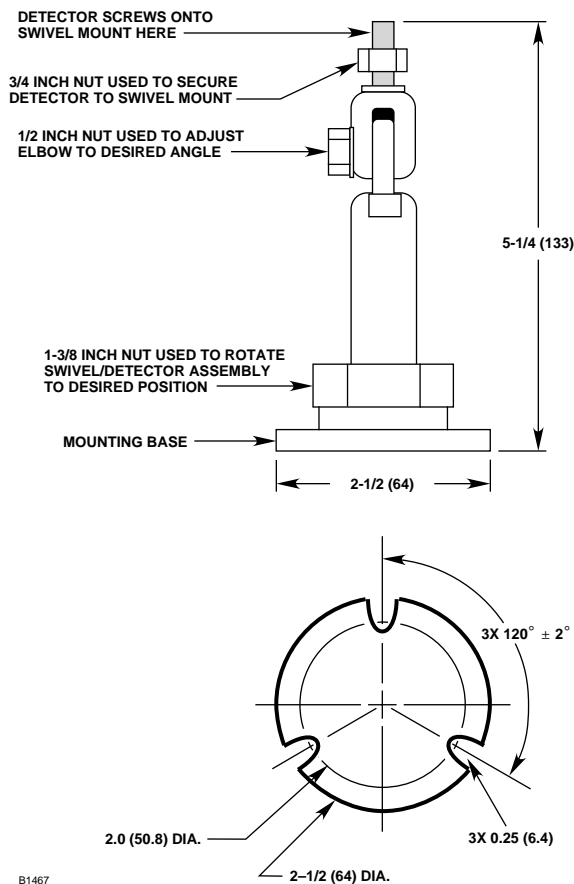


Figure 11—Q9001L Swivel Mount Dimension in Inches (mm)

## INSTALLATION USING Q9001L SWIVEL MOUNT

1. Install the swivel mounting bracket assembly on the wall. The installation surface should be free of vibration and suitable to receive 1/4 inch (M6) screws with a length of at least 1 inch (25 MM).
2. Attach the detector/controller to the swivel mounting bracket and tighten the 3/4 inch nut to secure it in place. Refer to Figure 11 for dimensions of the Q9001L swivel mount.

## OPTICAL INTEGRITY (oi)

### AUTOMATIC oi

The X3300 includes the Automatic Optical Integrity (oi) feature — a calibrated performance test that is automatically performed once per minute to verify complete detector operation capabilities. No testing with an external test lamp is required. The detector automatically performs the same test that a maintenance person with a test lamp would perform — once every minute, 60 times per hour. A successful automatic oi test **does not** produce an alarm condition.

The Protect•ir signals a fault condition when less than 50% of the detection range remains. This is indicated by the Fault relay and is evident by the amber color of the LED on the face of the detector. See the “Troubleshooting” section for further information.

### MANUAL oi

The detector also incorporates a manual oi feature that provides the same test as the automatic oi, and in addition actuates the Alarm relay to verify output operation. The manual oi feature is available in all models and can be performed at any time. **This test requires bypass of all extinguishing devices to avoid release resulting from a successful test.**

The manual oi test is activated by connecting the white lead to power supply minus. This places the detector in a special operating mode. First, the device de-latches any latching outputs. Next, the IR emitters are activated. If the resulting signals meet the test criteria, the Alarm relay changes state and the indicating LED changes to red. This condition remains until the white lead is disconnected from dc minus. If the test criteria are not met, no alarm is produced and no fault is generated. See the “Troubleshooting” section for further details.

## STARTUP PROCEDURE

When installation of the equipment is complete, perform the “Fire Alarm Test” below.

Allow 20 to 30 minutes for the detector optics to reach equilibrium. Housing will be warm to the touch.

### FIRE ALARM TEST

1. Disable any extinguishing equipment that is connected to the system.
2. Apply input power to the system.

3. Connect the **oi** test line to dc minus for 5 to 10 seconds or perform a pan fire test. The alarm relay will change states and the red alarm LED will illuminate when the device goes into an alarm condition.
4. Disengage the **oi** test line or extinguish the test fire. If the Alarm relay is configured for the standard non-latching operation, it will change states and the red LED will turn off. If the unit has latching relays, they can be reset by removing input power (0.1 second minimum).
5. Repeat this test for all detectors in the system. If a unit fails the test, refer to the "Troubleshooting" section.
6. Verify that all detectors in the system are properly aimed at the area to be protected.
7. Enable extinguishing equipment when the test is complete.

Table 5—Troubleshooting Guide

Current Level	Status	Action
0 mA	Open Circuit	Check wiring connections.
1 mA	General Fault	Cycle power.
2 mA	Oi Fault	Clean windows.
3 mA	Hi Background IR	Remove IR source or aim detector away from IR source.
4 mA	Normal Operation	
20 mA	Alarm	

6. If all wiring checks out and cleaning of the **oi** plate/window did not correct the fault condition, check for high levels of background IR radiation by covering the detector with the factory supplied cover or aluminum foil. If the fault condition clears within 6 minutes or less, extreme background IR is present. Re-adjust the view of the detector away from the IR source or relocate the detector.

## TROUBLESHOOTING

### **WARNING**

*The detector contains no user serviceable components and should never be opened.*

1. Disable any extinguishing equipment that is connected to the unit.
2. Inspect the viewing windows for contamination and clean as necessary. The detector is relatively insensitive to airborne contaminants, however, thick deposits of ice, dirt, or oil will reduce sensitivity. (Refer to the "Maintenance" section for complete information regarding cleaning of the detector viewing window.)
3. Check input power to the unit.
4. If the fire system has a logging function, check the fire panel log for relay status and/or 4 to 20 mA output information. See Table 5.
5. Turn off the input power to the detector and check all wiring for continuity. **Important:** Disconnect wiring at the detector before checking system wiring for continuity.

If none of these actions corrects the problem, return the detector to the factory for repair.

### **NOTE**

*Since the entire unit must be returned to the factory for repair, it is highly recommended that a complete spare be kept on hand for field replacement to ensure continuous protection.*

## **PERIODIC CHECKOUT PROCEDURE**

Periodic testing is not required when the detector is configured for automatic optical integrity testing. If the X3300 is configured for manual **oi** operation, a checkout of the system using the **oi** feature should be performed on a regularly scheduled basis to ensure that the system is operating properly. To test the system, perform the "Fire Alarm Test" as described in the "Startup Procedure" section of this manual.

## MAINTENANCE

### **IMPORTANT**

*Periodic flamepath inspections are not recommended since the product is not intended to be serviced and provides proper ingress protection to eliminate potential deterioration of the flamepaths.*

### **WARNING**

*The detector contains no user serviceable components and should never be opened.*



To maintain maximum sensitivity, the viewing windows of the X3300 must be kept relatively clean. Refer to the procedure below for instructions.

## CLEANING PROCEDURE

### CAUTION

*Disable any extinguishing equipment that is connected to the unit to prevent unwanted actuation.*

To clean the window and **oi** plate, use Det-Tronics window cleaner (part number 001680-001) and a soft cloth or tissue and refer to the procedure below.

1. **Disable any extinguishing equipment that is connected to the unit.**
2. Since the X3300 is less affected by contamination than other detectors, removal of the **oi** plate is needed only under extreme conditions. In addition, it is not necessary to achieve perfect cleanliness, because IR is not significantly absorbed by slight films of oil and/or salt. If a fault condition is still indicated after cleaning, remove and clean the **oi** plate using the procedure below.
3. Clean all three viewing windows and reflector surfaces thoroughly using a clean cloth, cotton swab or tissue and Det-Tronics window cleaning solution. If a stronger solution is needed, isopropyl alcohol may be used.

## O<sub>i</sub> PLATE REMOVAL

1. Remove the **oi** plate from the detector by loosening the **oi** plate knob.
2. Thoroughly clean the **oi** plate reflective surfaces, holding it by its edges to avoid leaving fingerprints on the inside reflective surface.
3. Re-install the **oi** plate. Ensure that the plate is flat on the detector surface. Tighten the **oi** plate knob securely (40 oz/inches).

### NOTE

*If the **oi** plate is removed, be sure to install the original **oi** plate. **oi** plates are not interchangeable and should not be mixed with **oi** plates from other detectors.*

### NOTE

*If corrosive contaminants in the atmosphere cause the **oi** plate surface to deteriorate to the extent that it is no longer possible to restore it to its original condition, it must be replaced. Consult factory for **oi** plate replacement procedure.*

## FEATURES

- Long detection range to carbonaceous fires.
- Unequaled false alarm rejection.
- Responds to a fire in the presence of modulated blackbody radiation (i.e. heaters, ovens, turbines) without false alarm.
- Heated optics for increased resistance to moisture and ice.
- Factory sealed device eliminates need for explosion-proof conduit seal.
- Automatic and manual optical integrity (**oi**) testing.
- Easily replaceable **oi** plate.
- Fire and fault relays standard.
- 4 to 20 mA isolated output.
- Tricolor LED indicates normal operation, fire and fault conditions.
- Factory available fire and fault relay operation: latching/non-latching, energized/de-energized (fire relay only), normally open/normally closed.
- X3300 with integral swivel installs on most junction boxes and allows easy sighting.
- Other mounting options include mounting directly onto most junction boxes using a simple adapter, or the use of a swivel union or swivel mount available from Det-Tronics.
- Operates under adverse weather conditions and in dirty environments.
- Explosion-proof/flame-proof detector housing. Meets FM, CSA and CENELEC certification requirements.
- Class A wiring per NFPA-72.
- Meets NFPA-33 response requirement for under 0.5 second (available when model selected).
- 5 year warranty.

## SPECIFICATIONS

### OPERATING VOLTAGE—

24 volts dc nominal (18 vdc minimum, 32 vdc maximum).

### POWER CONSUMPTION—

7.5 watts at 24 volts dc nominal; 9.0 watts at 32 volts dc maximum.

### POWER UP TIME—

Fault indication clears after 0.5 second; device is ready to indicate an alarm condition after 30 seconds.

## OUTPUT RELAYS—

Fire Alarm relay, Form C, 5 amperes at 30 vdc:

The Fire Alarm relay is factory configurable for normally open or normally closed contacts, normally energized or normally de-energized operation, and latching or non-latching operation.

Fault relay, Form C, 5 amperes at 30 vdc:

The Fault relay is factory configurable for normally open or normally closed contacts, normally energized operation, and latching or non-latching operation.

## CURRENT OUTPUT (Optional)—

4 to 20 milliampere dc current, with a maximum loop resistance of 500 ohms from 18 to 19.9 volts dc and 600 ohms from 20 to 32 volts dc.

## TEMPERATURE RANGE—

Operating: -40°F to +167°F (-40°C to +75°C).

Storage: -67°F to +185°F (-55°C to +85°C).

Hazardous location ratings from -55°C to +125°C available on extended temperature model.

## HUMIDITY RANGE—

0 to 95% relative humidity, can withstand 100% condensing humidity for short periods of time.

## CONE OF VISION—

The detector has a 90° cone of vision (horizontal) with the highest sensitivity lying along the central axis. Unlike conventional detectors, the X3300 provides full coverage at a minimum of 70% of the maximum detection distance.

Perfect cone of vision for methane fire detection — 100 feet on and off axis. See Figures 12A to 12K.

Refer to Appendix A for FM Approved cone of vision data.

## RESPONSE TIME—

Typical response times are under 10 seconds. Models are available that can respond to automotive paint gun fires in under 0.5 seconds. See Appendix A for actual response times.

## ENCLOSURE MATERIAL—

Aluminum (red-painted) or 316 stainless steel.

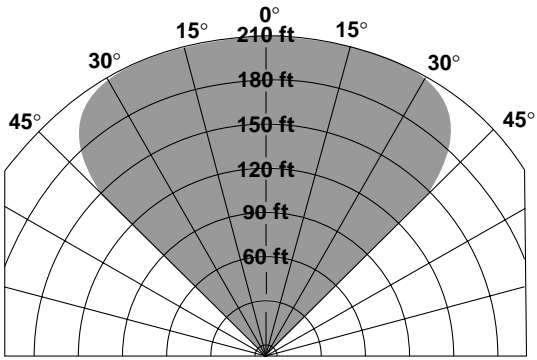
## DIMENSIONS—

See Figures 13 and 14.

## WIRING—

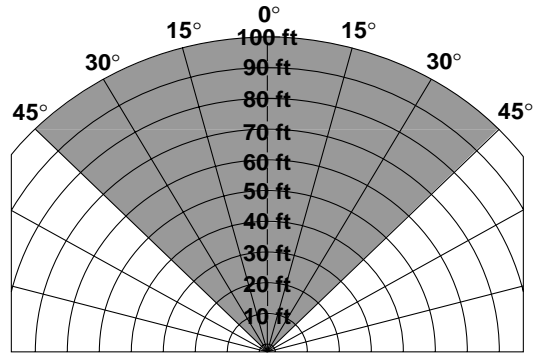
14 AWG (1.5 mm<sup>2</sup>) to 22 AWG (0.3 mm<sup>2</sup>) shielded cable is recommended.

**Important:** 18 vdc minimum must be available at the detector.



**DETECTOR VERTICAL FIELD OF VIEW WITH DETECTOR AT 45° FROM HORIZONTAL.**

Figure 12A—Field of View at Indicated Distance in Feet for **Gasoline** at **Very High** Sensitivity



**DETECTOR VERTICAL FIELD OF VIEW WITH DETECTOR AT 45° FROM HORIZONTAL.**

Figure 12B—Field of View at Indicated Distance in Feet for **Methane** at **Very High** Sensitivity

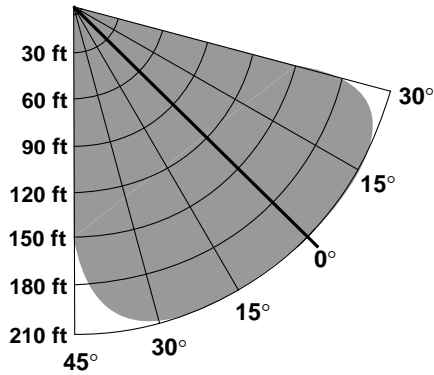


Figure 12C—Field of View at Indicated Distance in Feet for **Methanol** at **Very High** Sensitivity

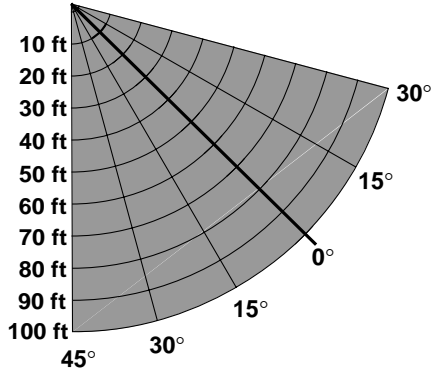


Figure 12D—Field of View at Indicated Distance in Feet for **Diesel** at **Very High** Sensitivity

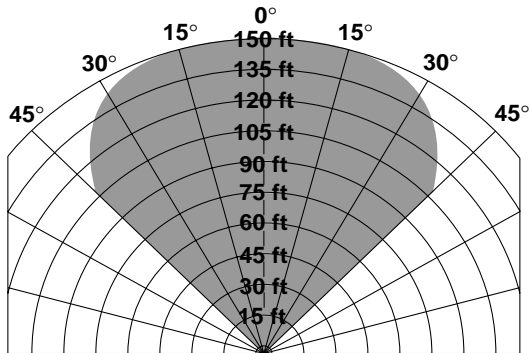


Figure 12E—Field of View at Indicated Distance in Feet for **JP-5** at **Very High** Sensitivity

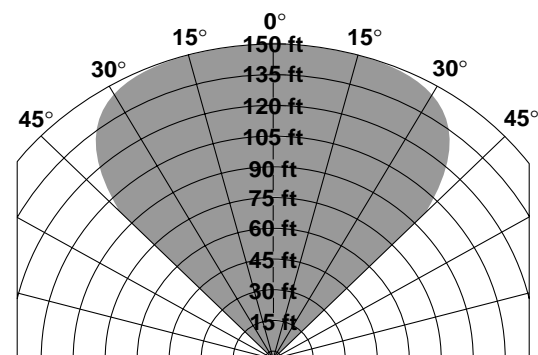


Figure 12F—Field of View at Indicated Distance in Feet for **Gasoline** at **Medium** Sensitivity

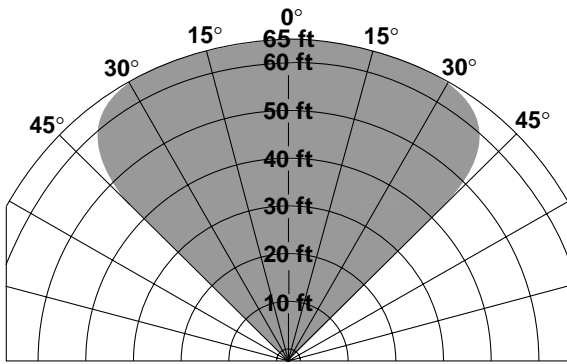


Figure 12G—Field of View at Indicated Distance in Feet for **Methane** at **Medium** Sensitivity

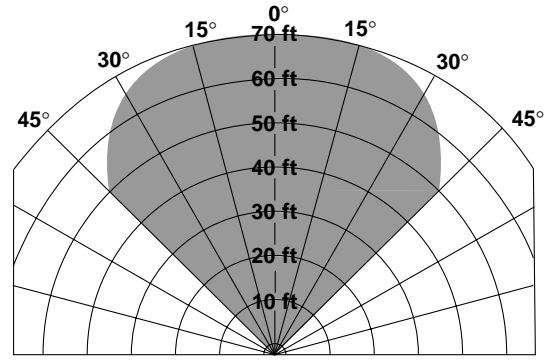


Figure 12H—Field of View at Indicated Distance in Feet for **Methanol** at **Medium** Sensitivity

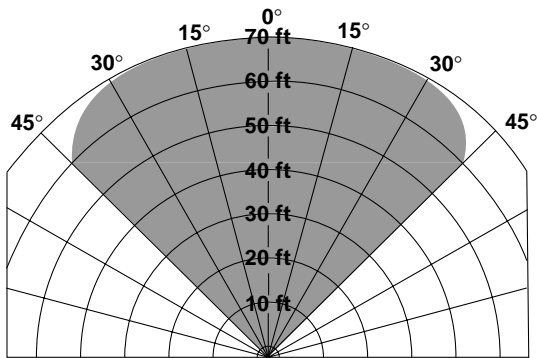


Figure 12J—Field of View at Indicated Distance in Feet for **Diesel** at **Medium** Sensitivity

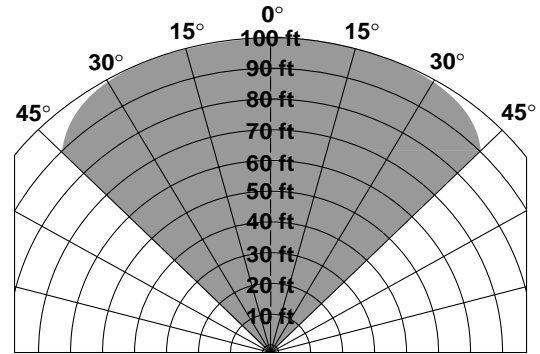
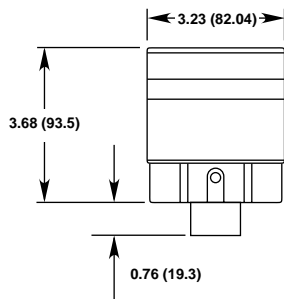
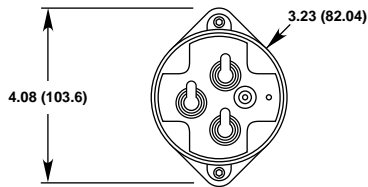
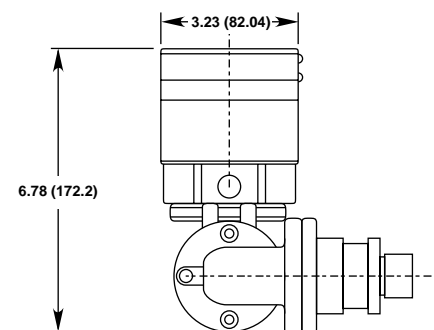
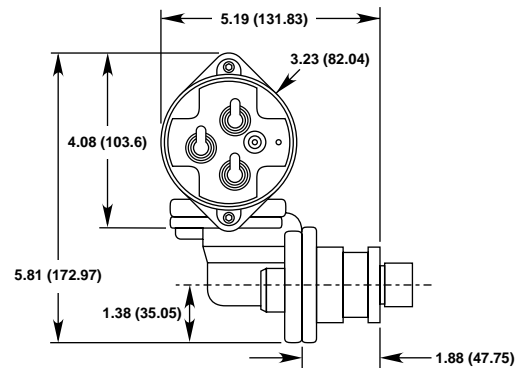


Figure 12K—Field of View at Indicated Distance in Feet for **JP-5** at **Medium** Sensitivity



A1941

Figure 13—X3300 Dimensions in Inches (mm)



A1942

Figure 14—X3300 with Integral Swivel Dimensions in Inches (mm)

## THREAD SIZE—

Conduit connection: 3/4 inch NPT or M25.

## SHIPPING WEIGHT (Approximate)—

Aluminum: 2.4 pounds (1.1 kilograms).

Stainless Steel: 4.8 pounds (2.2 kilograms).

## CERTIFICATION—

FMR: Reference Appendix A.

CSA: Class I, Div. 1, Groups B, C and D;  
Class II, Div. 1, Groups E, F, and G;  
Class III (T4A).  
Class I, Div. 2, Groups A, B, C and D;  
Class II, Div. 2, Groups F and G;  
Class III (T3C).  
Enclosure Type 4X.  
Explosion-proof Ambient Temperature  
Limits: -55°C to +125°C.

CENELEC: Standard Temperature Model  
EEx d IIC T6, EEx d e IIC T6  
(T<sub>amb</sub> = -40°C to +60°C).  
EEx d IIC T5, EEx d e IIC T5  
(T<sub>amb</sub> = -40°C to +75°C).  
IP66.

Extended Temperature Model  
EEx d IIC T6, EEx d e IIC T6  
(T<sub>amb</sub> = -55°C to +60°C).  
EEx d IIC T5, EEx d e IIC T5  
(T<sub>amb</sub> = -55°C to +75°C).  
EEx d IIC T4, EEx d e IIC T4  
(T<sub>amb</sub> = -55°C to +100°C).  
IP66.

## Special Conditions for Safe Use ("X"):

The extended temperature model can withstand repeated exposures to +125°C for periods of up to 12 hours while maintaining its explosion-proof rating. It is recommended that the unit housing be replaced after 500 hours of exposure to the +125°C temperature condition to maintain flame-proof ratings.

CE: Conforms to all relevant European norms.

### NOTE

*Operational performance verified from -40°C to +75°C.*

## WARRANTY PERIOD—

**5 years, sensor and electronics.**

## REPLACEMENT PARTS

The detector is not designed to be repaired in the field. If a problem should develop, refer to the Troubleshooting section. If it is determined that the problem is caused by an electronic defect, the device must be returned to the factory for repair.

## DEVICE REPAIR AND RETURN

Prior to returning devices, contact the nearest local Detector Electronics office so that a Service Order number can be assigned. A written statement describing the malfunction must accompany the returned device or component to expedite finding the cause of the failure.

Pack the unit properly. Use sufficient packing material in addition to an antistatic bag or aluminum-backed cardboard as protection from electrostatic discharge.

Return all equipment transportation prepaid to the factory in Minneapolis.

### NOTE

*Since the entire unit must be returned to the factory for repair, it is highly recommended that a complete spare be kept on hand for field replacement to ensure continuous protection.*

## ORDERING INFORMATION

When ordering, refer to Table 6, Ordering Factory Configuration. For further information on the function of each configuration option, refer to Table 2.

Table 6—Ordering Factory Configuration Options

Option	Available Configurations
Optical Integrity (oi)	* Automatic oi/manual oi • Manual oi (only)
Fire Relay	• Latching * Non-latching
	• Normally Energized * Normally De-Energized
	* Normally Open • Normally Closed
Fault Relay	• Latching * Non-latching
	* Normally Energized
	* Normally Open • Normally Closed
4 to 20 mA Output	• With Fire and Fault Relay

\* Standard Configuration

## ACCESSORIES

**Q9001L Swivel Mount Assembly** is recommended for mounting the detector when using flexible electrical conduit.

**Swivel Union** is recommended for mounting the detector to a junction box and allows detector sighting.

## REPLACEMENT PARTS

<b>Part Number</b>	<b>Description</b>
001680-001	Window cleaner squeeze bottle (package of six bottles)
006967-001	<b>oi</b> plate kit
107427-049	O-ring
400525-006	Bolts (2)
005143-001	Silicone-free grease

For assistance in ordering a system to fit your application, please contact:

Detector Electronics Corporation  
6901 West 110th Street  
Minneapolis, Minnesota 55438 USA  
Operator: (952) 941-5665 or (800) 765-FIRE  
Customer Service: (952) 946-6491  
Fax: (952) 829-8750  
Web site: [www.detrronics.com](http://www.detrronics.com)  
E-mail: [detrronics@detrronics.com](mailto:detrronics@detrronics.com)

## APPENDIX A [Factory Mutual Research (FMR) Approval Description]

THE FOLLOWING ITEMS, FUNCTIONS AND OPTIONS DESCRIBE THE FMR APPROVAL:

- Explosion-proof for Class I, Div. 1, Groups B, C and D (T4A) Hazardous (Classified) Locations per FM 3615.
- Dust-ignition proof for Class II/III, Div. 1, Groups E, F and G (T4A) Hazardous (Classified) Locations per FM 3615.
- Non-incendive for Class I, Div. 2, Groups A, B, C and D (T3C) Hazardous (Classified) locations per FM 3611.
- Suitable for Class II/III, Div. 2, Groups F and G (T3C) Hazardous (Classified) locations per FM 3611.
- Enclosure rating NEMA Type 4X per NEMA 250.
- Ambient Temperature Limits: -40°F to +167°F (-40°C to +75°C).
- Automatic Fire Alarm Signaling Performance verified per FM 3260.

The following performance criteria were verified:

### RESPONSE CHARACTERISTICS:

#### Very High Sensitivity

Fuel	Size	Distance (feet)	Average Response Time (seconds)
Gasoline	1 x 1 foot	210*	8.4
Gasoline	1 x 1 foot	100	1.4
Diesel**	1 x 1 foot	150*	9.6
Methanol	1 x 1 foot	150*	5.7
Methane	30 inch plume	100	2.5
JP-5**	2 x 2 foot	210*	8.5
JP-5**	2 x 2 foot	100	2.6
Office Paper 0.5 lb.	18" x 16" x 10"	100	4.5
Corrugated Panel	18" x 36"	100	15.8

\* Outdoor test condition.

\*\* 10 second pre-burn from ignition.

#### Medium Sensitivity

Fuel	Size	Distance (feet)	Average Response Time (seconds)
Gasoline	1 x 1 foot	100	6.0
Gasoline	1 x 1 foot	50	3.8
Diesel**	1 x 1 foot	70	7.4
Methanol	1 x 1 foot	70	9.7
Methane	30 inch plume	65	2.4
Methane	30 inch plume	55	0.8
JP-5**	2 x 2 foot	100	5.7

\*\* 10 second pre-burn from ignition.

**RESPONSE CHARACTERISTICS — AUTOMOTIVE APPLICATIONS:**

*X3300 Response Characteristics (0.5 Sec. Response Max.)				
Fuel	Size	Medium Sensitivity		
		Distance Ft. (M)	Ave. Response Time, Sec.	
			On Axis (0°)	Off Axis (45°)
Methanol	Atomized Fuel Fire 10 CC Per Sec.	50 (15)	.35	.36
Isopropanol	Atomized Fuel Fire 10 CC Per Sec.	50 (15)	.43	.44
Acetone	Atomized Fuel Fire 10 CC Per Sec.	50 (15)	.37	.40
Heptane	Atomized Fuel Fire 10 CC Per Sec.	50 (15)	.38	.38

\*Available when model selected.

*X3300 Response Characteristics (0.5 Sec. Response Max.)				
Fuel	Size	Very High Sensitivity		
		Distance Ft. (M)	Ave. Response Time, Sec.	
			On Axis (0°)	Off Axis (45°)
Methanol	Atomized Fuel Fire 10 CC Per Sec.	50 (15)	.35	.38
Isopropanol	Atomized Fuel Fire 10 CC Per Sec.	50 (15)	.43	.42
Acetone	Atomized Fuel Fire 10 CC Per Sec.	50 (15)	.38	.37
Heptane	Atomized Fuel Fire 10 CC Per Sec.	50 (15)	.38	.38

\*Available when model selected.

X3300 Response Characteristics				
Fuel	Size	Medium Sensitivity		
		Distance Ft. (M)	Ave. Response Time, Sec.	
			On Axis (0°)	Off Axis (45°)
Methanol	36 Sq. In. (0.023 Sq. M.)	20 (6)	6.9	9.9
Isopropanol	36 Sq. In. (0.023 Sq. M.)	35 (10.5)	3.3	7.3
Heptane	36 Sq. In. (0.023 Sq. M.)	40 (12)	4.4	11.5



**OPTICAL FAULT:**

The detector generated an optical fault in the presence of contamination on any single or combination of lens surfaces verifying that the detector performs an optical integrity (oi) test for each sensor. Upon removal of the contaminant the detector fault was cleared and the detector was verified to detect a fire.

**RESPONSE CHARACTERISTICS IN THE PRESENCE OF FALSE ALARM SOURCES:****Very High Sensitivity**

False Alarm Source	Distance (feet)	Fire Source	Distance (feet)	Average Response Time (seconds)
Sunlight, direct, modulated, reflected	—	6-inch propane	6	< 4
Vibration	N/A	6-inch propane	6	< 10
Radio frequency interference	1	6-inch propane	12	< 1
Arc welding	40	1 x 1 foot gasoline	40	3.1
6 kw heater, modulated	100	1 x 1 foot gasoline	100	1.9
6 kw heater, unmodulated	10	1 x 1 foot gasoline	100	5.3
250 w vapor lamp, modulated	3	1 x 1 foot gasoline	100	2.7
300 w incandescent lamp, modulated	3	1 x 1 foot gasoline	100	3.6
500 w unshielded quartz halogen lamp, modulated	8	1 x 1 foot gasoline	100	2.7
1500 w electric radiant heater, modulated	10	1 x 1 foot gasoline	100	4.2
Two 34 w fluorescent lamps, modulated	3	1 x 1 foot gasoline	100	1.7

**Medium Sensitivity**

False Alarm Source	Distance (feet)	Fire Source	Distance (feet)	Average Response Time (seconds)
Sunlight, direct, modulated, reflected	—	6-inch propane	6	< 4
Vibration*	N/A	N/A	N/A	N/A
Radio frequency interference	1	6-inch propane	6	< 1
Arc welding	10	1 x 1 foot gasoline	10	0.2
6 kw heater, modulated	100	1 x 1 foot gasoline	100	5.0
6 kw heater, unmodulated	10	1 x 1 foot gasoline	100	10.7
250 w vapor lamp, modulated	3	1 x 1 foot gasoline	100	7.1
300 w incandescent lamp, modulated	3	1 x 1 foot gasoline	100	9.6
500 w unshielded quartz halogen lamp, modulated	8	1 x 1 foot gasoline	100	6.3
1500 w electric radiant heater, modulated	10	1 x 1 foot gasoline	90	6.4
Two 34 w fluorescent lamps, modulated	3	1 x 1 foot gasoline	100	4.6

\* Fire was verified with very high sensitivity only.

## FALSE ALARM IMMUNITY:

### Very High Sensitivity

False Alarm Source	Distance (feet)	Modulated Response	Un-modulated Response
Sunlight, direct, reflected	—	No alarm	No alarm
Vibration	N/A	No alarm	N/A
Radio frequency interference	1	No alarm (keyed)	No alarm (steady)
Arc welding	40	No alarm	No alarm
6 kw heater	3	No alarm	No alarm
250 w vapor lamp	3	No alarm	No alarm
300 w incandescent lamp	3	No alarm	No alarm
500 w unshielded quartz halogen lamp	8	No alarm	No alarm
1500 w electric radiant heater	3	No alarm	No alarm
Two 34 w fluorescent lamps	3	No alarm	No alarm

### Medium Sensitivity

False Alarm Source	Distance (feet)	Modulated Response	Un-modulated Response
Sunlight, direct, reflected	—	No alarm	No alarm
Vibration	N/A	No alarm	N/A
Radio frequency interference	1	No alarm (keyed)	No alarm (steady)
Arc welding	10	No alarm	No alarm
6 kw heater	3	No alarm	No alarm
250 w vapor lamp	3	No alarm	No alarm
300 w incandescent lamp	3	No alarm	No alarm
500 w unshielded quartz halogen lamp	8	No alarm	No alarm
1500 w electric radiant heater	3	No alarm	No alarm
Two 34 w fluorescent lamps	3	No alarm	No alarm

**FIELD OF VIEW:****Very High Sensitivity**

Fuel	Size	Distance (feet)	Horizontal (degrees)	Avg. Horiz. Response Time (seconds)	Vertical (degrees)	Avg. Vert. Response Time (seconds)
Gasoline	1 x 1 foot	150	+45 -45	11.9 9.5	+45 -30	8.5 6.0
Gasoline	1 x 1 foot	100	+45 -45	3.5 4.0	+45 -30	4.2 3.2
Diesel**	1 x 1 foot	100	+45 -45	2.2 4.4	+45 -30	2.1 2.8
Methanol	1 x 1 foot	110	+45 -45	8.5 9.2	+45 -30	9.5 4.3
Methane	30 inch plume	100	+45 -45	1.9 4.3	+45 -30	3.5 2.0
JP-5**	2 x 2 feet	180*	+45 -45	13.3 17.3	+45 -30	10.4 5.0
JP-5**	2 x 2 feet	90	+45 -45	2.9 4.1	+45 -30	1.4 2.5
Office Paper 0.5 lb.	18" x 16" x 10"	80	+45 -45	6.4 9.8	+45 -30	8.2 6.0
Corrugated Panel	18" x 36"	80	+45 -45	15.6 12.2	+45 -30	14.7 10.6

\* Outdoor test condition.

\*\* 10 second flame pre-burn from ignition.

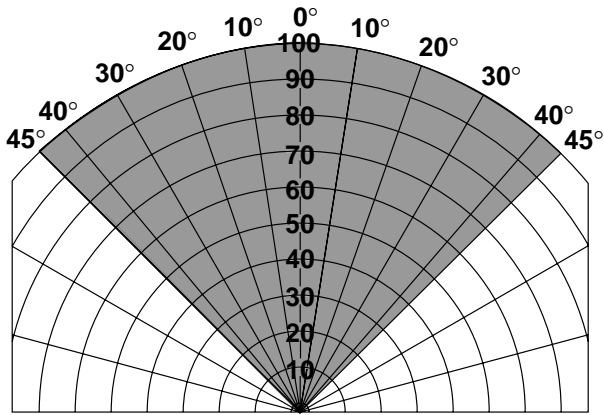
**Medium Sensitivity**

Fuel	Size	Distance (feet)	Horizontal (degrees)	Avg. Horiz. Response Time (seconds)	Vertical (degrees)	Avg. Vert. Response Time (seconds)
Gasoline	1 x 1 foot	75	+45 -45	9.5 9.5	+45 -30	6.4 5.4
Gasoline	1 x 1 foot	50	+45 -45	3.8 3.8	+45 -30	4.1 3.1
Diesel**	1 x 1 foot	60	+45 -45	4.5 6.8	+45 -30	5.5 2.1
Methanol	1 x 1 foot	45	+45 -45	9.0 9.7	+45 -30	9.8 6.6
Methane	30 inch plume	45	+45 -45	4.4 0.9	+45 -30	2.0 0.5
Methane	30 inch plume	40	+45 -45	1.7 0.4	+45 -30	3.4 1.4
JP-5**	2 x 2 feet	90	+45 -45	2.9 8.1	+45 -30	3.4 2.5

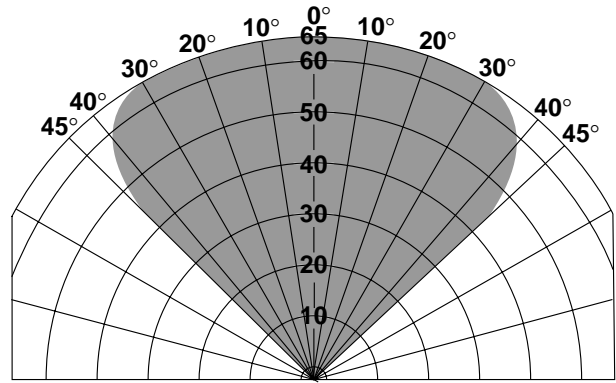
\* Outdoor test condition.

\*\* 10 second flame pre-burn from ignition.

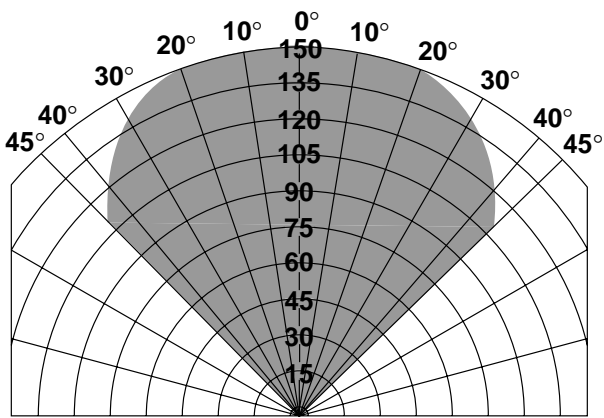
## HIGH RESOLUTION FIELD OF VIEW



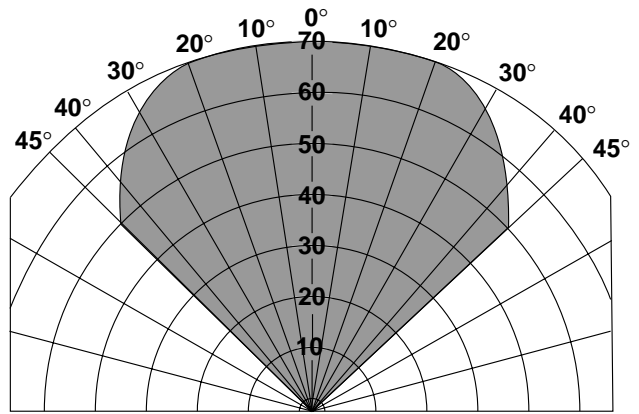
Field of View at Indicated Distance in Feet  
for Methane at Very High Sensitivity



Field of View at Indicated Distance in Feet  
for Methane at Medium Sensitivity



Field of View at Indicated Distance in Feet  
for Methanol at Very High Sensitivity



Field of View at Indicated Distance in Feet  
for Methanol at Medium Sensitivity

### NOTE

*Factory Mutual Research minimum requirements are response distance measurements at 0° (on axis) and the limits of the field of view. These high resolution field of view diagrams show the measured response distances at all the indicated angles in the horizontal plane.*