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## FSX™ Fire and Flame Detectors

### Model FS24X™

FS24X QuadBand Triple IR™



## User Manual

Multi-Spectrum Infrared Electro-Optical Multi-Spectral Digital WideBand IR Sensor  
Radiant Energy Fire and Flame Detector

# Read and understand this manual before installing or operating equipment.

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## SECTION 1: INTRODUCTION

### 1.1 Product Overview

The Model FS24X™ Detectors sense the WideBand IR™ radiant energy of blackbody particulate and molecular emissions generated by **BOTH** hydrocarbon and non-hydrocarbon flames and fires. The WideBand IR spectral radiant energy wavelengths sensed by the Quad (4) sensors span from approximately 0.4 to 5.0 microns for the **FS24X**.

The Model FS24X Multi-Spectrum Fire and Flame Detectors are designed and Factory Mutual approved for use in Class I, Div. 1 and 2, Class II and Class III; Class I, Zone 1 AEx d and Ex d IIC Hazardous Locations and ATEX Certified Ex db IIC (T4-T6) and Ex tb IIIC (T4-T6) Flameproof (*Figure 1-1 & Figure 1-2*).

The FS24X Detectors are available in copper-free Aluminum or 316 Stainless Steel enclosure. The FS24X Detector electro-optical electronics module (puck) is enclosed in a field-replaceable black, hard anodized aluminum puck that provides superior ruggedness, handling, ease of installation, and protection against EMI/RFI.



Figure 1-1  
FS24X Detector (110° Field of View)  
Shown with 316 Stainless Steel Housing

#### FS24X Detector Field Connectors

The field connections feature two (2) connector choices for the installer:

1. A removable ten (10) pin screw terminal connector (J2) for hard-wired relay applications.
2. A removable six (6) pin screw terminal connector (J1) for analog output or RS-485 Digital Communication applications.

The removable connectors provide quicker installation and allows the Detector enclosure to be installed prior to the Detector Module (puck).



Figure 1-2  
FS24X-9 Detector (90° Field of View)  
Shown with Copper Free Aluminum Housing

#### User Field Selectable Configuration Switches

1. The eight (8) pin DIP switch (SW2) is used to select the Detector's Sensitivity and Relay Options.
2. The ten (10) pin DIP switch (SW1) is used for:
  - Selecting a unique digital address (128 choices).
  - Factory Use
3. The ten (10) position Rotary switch allows selection of the analog and digital communication protocol.



Figure 1-3  
FS24X and FS24X-9 Detector Puck, (rear view)

## 1.2 Detector Technical Specifications

### 1.2.1 Mechanical Specifications

|                      |  |
|----------------------|--|
| Enclosure Material:  | Copper Free Aluminum<br>316 Stainless Steel  |
| Physical Dimensions: | Assembly 4.35 in. (110.49 mm) Height X 4.81 in. (122.24 mm) Diameter                                 |
| Mounting Holes       | ¼ in. (6.35 mm) Diameter, 5.50 in. (139.70 mm) Center to Center                                      |
| Conduit Entries      | Two (2) ¾ in. NPT or Two (2) 25 mm   |
| Weight:              | Aluminum 3 lbs. 11 oz. (1.7 kg) approximately<br>Stainless Steel 7 lbs. 7 oz. (3.4 kg) approximately |
| Enclosure Rating:    | IP66 / NEMA 4X   |
| Vibration:           | Meets or exceeds Mil Spec 810C,<br>Method 514.2, Curve AW  |

### 1.2.2 Electrical Specifications

|   |   |
|---|---|
| Input Voltage Range:                          | 18 VDC to 32 VDC  |
| Normal Operation Current:                     | 60 mA (nominal)      205 mA (nominal with heater <sup>1</sup> )   |
| Maximum Fire Alarm Current:                   | 85 mA (maximum)      235 mA (maximum with heater <sup>1</sup> )   |
| Relay Contact Rating:                         | 1 Amp @ 24 VDC resistive  |
| Analog Current Output:<br>(400 Ohms Max Load) | 0 to 20 mA (Source or Sink, User Selectable)<br>0.0 mA (<0.6 mA) = Fault<br>2.0 mA (±0.6 mA) = Dirty Window Lens<br>4.0 mA (±0.6 mA) = Normal, Safe (no Fault, no Fire)<br>20.0 mA (±0.6 mA) = Alarm or Verified Fire Alarm |
| Screw Terminal Wire Sizes:                    | 12 AWG to 22 AWG (2.50 mm to 0.762 mm)<br><i>Use stranded conductors (<b>not</b> solid core)</i>  |

### 1.2.3 Environmental Specifications

|                                  |  |
|----------------------------------|--|
| Operating Temperature, Standard: | -40° F to +185° F (-40° C to +85° C) for FS24X-2 (110° FoV)  |
| Operating Temperature, Standard: | -76° F to +185° F (-60° C to +85° C) for FS24X-9 (90° FoV)   |
| Operating Humidity Range:        | 0 to 95% RH,<br>100% RH condensing for short periods of time |
| Storage Temperature:             | -67° F to +221° F (-55° C to +105° C)                        |

### 1.2.4 Performance Specifications<sup>2</sup>

|                       |   |
|-----------------------|---|
| Field of View:        | FS24X detectors have a cone of view of 90° horizontal and 80° vertical with the highest sensitivity on the central axis |
| Sensitivity:          | One (1) sq. ft. heptane reference fire at 200 feet  |
| Speed of Response:    | 2 to 5 seconds (typical)  |
| Spectral Sensitivity: | 0.4 microns to 5.0 microns  |

### 1.2.5 Hazardous Area Classifications

Class I, Division 1, Groups A, B, C & D; Class II, Division 1 Groups E, F & G; Class III; Class I, Zone 1 AEx d /Ex d IIC Hazardous Locations. ATEX IECEx Certification Class I, Zone 1, Ex db IIC (T4-T6) and Ex tb IIIC (T4-T6). See Section 4.7.3

#### All FS24X-9 Detectors

T4: Ta = -60°C to +110°C  
T5: Ta = -60°C to +75°C  
T6: Ta = -60°C to +60°C

#### All FS24X-2 Detectors

T4: Ta = -40°C to +110°C  
T5: Ta = -40°C to +75°C  
T6: Ta = -40°C to +60°C

<sup>1</sup> Heater circuit turns ON only when temperature drops below zero (0) degrees Fahrenheit (-17° C)

<sup>2</sup> The supply connection wiring shall be rated at least 10°C above the rated service temperature (120°C for T4 applications and 85°C for T5 applications)

### 1.2.6 Flame Performance Certification (See Sections 4.7.3 and 4.7.4 on page 28 and 29)

| Agency | Standard               | Certificate    | Notes   |
|--------|------------------------|----------------|---|
| LPCB   | EN 54-10:2002 +A1:2005 | 1175a/02       | Sensitivity settings: Very High, High<br>EN 54-10 Class 1 |
| CPR    | EN 54-10:2002 +A1:2005 | 0832-CPR-F0516 |   |
| FM/cFM | FM3260                 |                | Sensitivity: Very High                                    |

## 1.3 Features and Benefits

- **Selectable Sensitivity (four settings)**  
User can set an FSX Detector to four (4) different Detector sensitivity levels (see Section 3.2).
- **Selectable Relay Options**  
User configurable for a variety of dry contact relay interface options (see Section 3.2).
- **Selectable 4 – 20 mA Output**  
User can set for Source or Sink non-isolated output (see Section 3.2).
- **Selectable Communications**  
User can configure for analog or digital communication outputs such as Modbus (see Section 3.2).
- **Selectable Digital Communication Address**  
Users can select unique 7-bit code (128 addresses) (see Section 3.2).
- **Lower Power Consumption**  
Requires smaller external power supplies and fewer system backup batteries.
- **Dual Microprocessors**  
Reduces the number of discrete Detector components, provides larger programming and memory capacity, and provides redundant self-checking.
- **100% Solid-State Quantum IR Sensors**  
Superior performance, stability, reliability, durability, and ruggedness. Provides higher MTBF and much wider operating temperature range.
- **Higher Operating Temperature**  
185°F (85°C) for more applications.
- **Lower Operating Temperature**  
-40°F (-40°C) for more applications and -76°F (-60°C) available for lower temperature applications.
- **Built-In Automatic “Through-the-Lens” Self-Test**  
Monitors window lens obscuration and checks the operation of the Detector’s Sensor Array and Electro-Optical Electronics Module.
- **Anodized Field Removable Detector Aluminum Module (Puck)**  
Rugged, superior protection against EMI/RFI and handling plus easier field installation and replacement.
- **Three Separate Bright LED’s (Red, Yellow, Green)**  
Field status indicators with individual LED’s for Alarm, Fault and Normal conditions. Provides superior Detector status viewing in bright outdoor environments (see Section 3.6).
- **FSC Windows® based PC Interface**  
User can perform remote FSX Detector diagnostics, real-time status, Real-Time Graphing (RTG™), SnapShot™ data recording, and downloading FirePic’s™ with Honeywell Analytics’ exclusive FSIM-2 USB Interface Unit and easy to use Windows® based PC Software.
- **Designed to Detect both Hydrocarbon and Non-Hydrocarbon Fires with one FSX™ Detector**  
All fire and flame threats are sensed, not just hydrocarbon fires as with other Triple IR Flame Detectors.
- **Designed, Manufactured, Tested, and Patented by Honeywell Analytics**  
Over 30 years of proven fire / flame detection product excellence worldwide.
- **EN54-10 certified**

## 1.4 Applications

Partial List of Applications:

|                         |                            |  |
|-------------------------|----------------------------|--|
| Refineries              | Gas Processing Plants      | Offshore Drilling and Production Platforms     |
| Cogeneration Plants     | Gas Collection Facilities  | Petroleum Product Pipelines & Pumping Stations |
| Petrochemical Plants    | Gas Turbine Enclosures     | Commercial and Military Aircraft Hangars       |
| Airport Terminals       | LPG Storage/Distribution   | Rail and Truck Loading/Unloading Terminals     |
| Engine Test Cells       | General Warehouses         | Gasoline Loading Terminals                     |
| Power Plants            | Aerosol Filling Facilities | Product Storage Terminals                      |
| Marine Terminals        | Paint and Solvent Storage  | Crude & Product Tank Farms                     |
| Cold Storage Warehouses | Marine Engine Rooms        | Gas Compressor Buildings                       |



## SECTION 2: INSTALLATION

### 2.1 Mounting Instructions

Consider the following guidelines when selecting Detector location:

1. As with all flame and fire Detectors, avoid areas that contain radiant energy sources (such as radiant heaters, high intensity lamps, flare-stacks, etc.) in close proximity to the Detector's field of view.
2. The installation shall take into account that the FS24X orientation should be with the base horizontal (see Figure 2-1) as the view angle in this direction is 90°. The vertical angle is 90°.

Horizontal Field of View

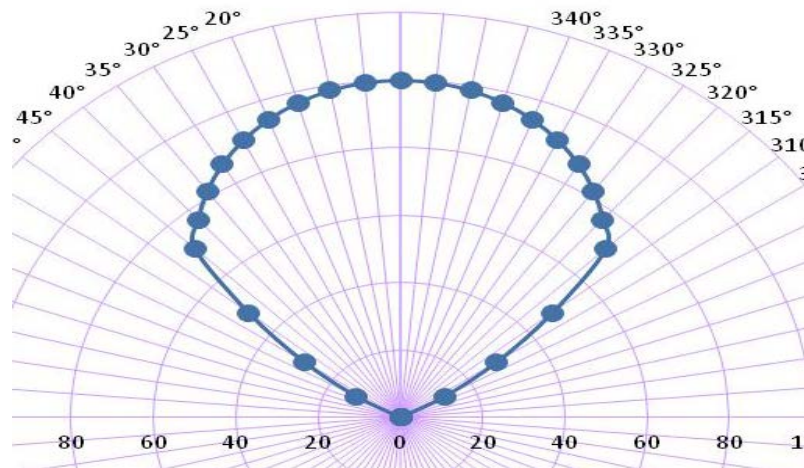


Figure 2-1

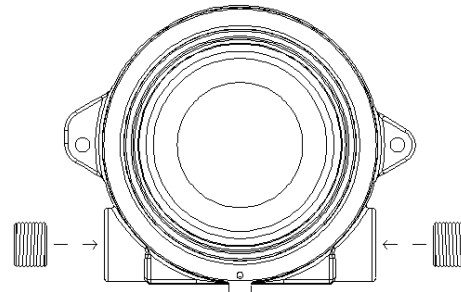
FS24X Graphical View

3. Detectors should not be mounted so that they look up or face the horizon (especially outdoors). Use a minimum thirty degrees (30°) downward angle with the SM4 swivel mount (see Figure 2-1).
4. Make sure the Detector has a clear, unobstructed view of the threat area. Physical obstructions between a fire and the Detector may cause the fire to be undetected.
5. The Model SM4 is a 316 Stainless Steel Swivel Mount designed for the Honeywell Analytics Detector housing. The adapter plate, with the two (2) screw holes (facing away), is attached to the base of the Detector (see Figure 2-1). The mounting plate, with the four (4) screw holes (facing towards), is used for mounting the SM4 to a solid surface. Each adjustment increment along an axis is calibrated to 10°. For single axis adjustments, the center section need not be installed.
6. Avoid mounting the Detectors in areas where temperatures exceeds the specified operating temperature range (see Sections 1.2.3 & 1.2.5).
7. Detector Conduit Entries
  - a) If only one conduit entry is used, correctly install and seal the conduit plug on the unused entry, ¼ in. NPT or 25mm (see Figure 2-3).
  - b) Install an approved conduit trap or drain, if required to meet hazardous area classifications per NFPA 70: National Electrical Code, latest revision.

## Mounting Instructions *(continued)*



Figure 2-2  
SM4 Swivel Mount



3/4 in. NPT or 25 mm Conduit Entries

Figure 2-3  
Detector (front view)

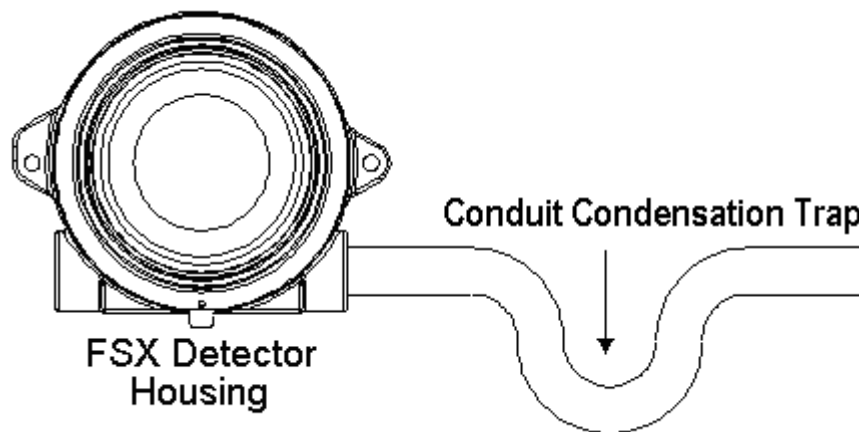


Figure 2-4

Note the following Precautions:

1. ***Do not touch*** the sensors' windows on the front of the Detector electro-optical electronics module (puck). If touched accidentally, they should be cleaned following the instructions listed below (see Figure 2-5).
2. When cleaning the Detector's sensor windows on the puck, it is best to use Alcohol or IPA sparingly and a cotton swab.
3. There are no serviceable parts inside the Detector puck. If the puck is opened up or tampered with, all warranties are voided.



FSX Detector Module "puck"  
Figure 2-5

**CAUTION:** Follow static protection procedures while handling the connectors and the wiring of the Module puck to the Detector. Use a wrist strap connected to earth ground.

## 2.2 Opening the Detector

It is necessary to remove the Detector Module puck from the enclosure to access the field connections.

**CAUTION: Disconnect power before unscrewing the Housing Lid.**

1. Loosen the set screw on the enclosure lid (see *Figure 2-6*).

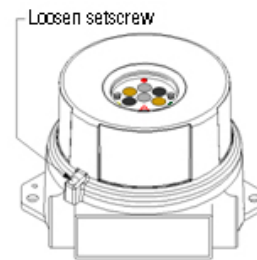


Figure 2-6

2. Turn counterclockwise (CCW) to unscrew the enclosure lid (see *Figure 2-7*).

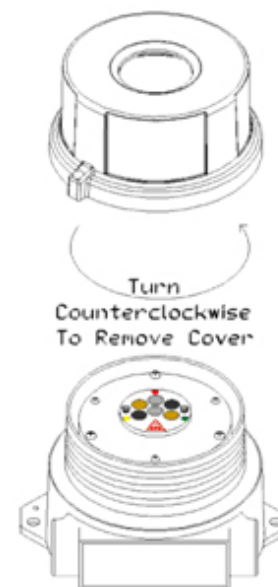


Figure 2-7

**Opening the Detector** *(continued)*

3. Loosen the three captive screws on the Detector Module puck (see *Figure 2-8*).

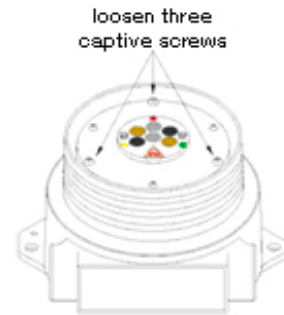


Figure 2-8

4. Slide the Detector Module puck out of the enclosure base (see *Figure 2-9*).

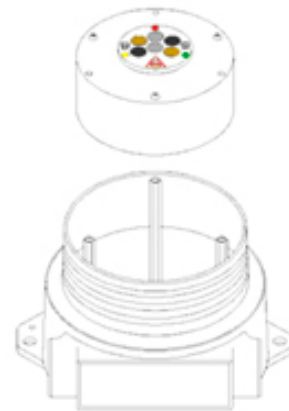


Figure 2-9

## 2.3 Detector Connections

The Detector Module puck has a six (6) pin and a ten (10) pin keyed removable connector with screw terminal female plugs that connect to the two (2) respective male connectors with analog, digital, and relay interfaces. See the *figure 2-10*.

- For **relay configurations**, use the ten (10) pin plug (J2) and its connector.
- For **digital and analog configurations**, use the six (6) pin plug (J1) and its connector.

**J2 Connector**

| Pin | Connection    |
|-----|---------------|
| 1   | Auxiliary NC  |
| 2   | Auxiliary NO  |
| 3   | Auxiliary COM |
| 4   | Alarm NC      |
| 5   | Alarm NO      |
| 6   | Alarm COM     |
| 7   | Fault NO      |
| 8   | Fault COM     |
| 9   | +24 VDC       |
| 10  | DC Return     |

*Contacts shown with no power applied*

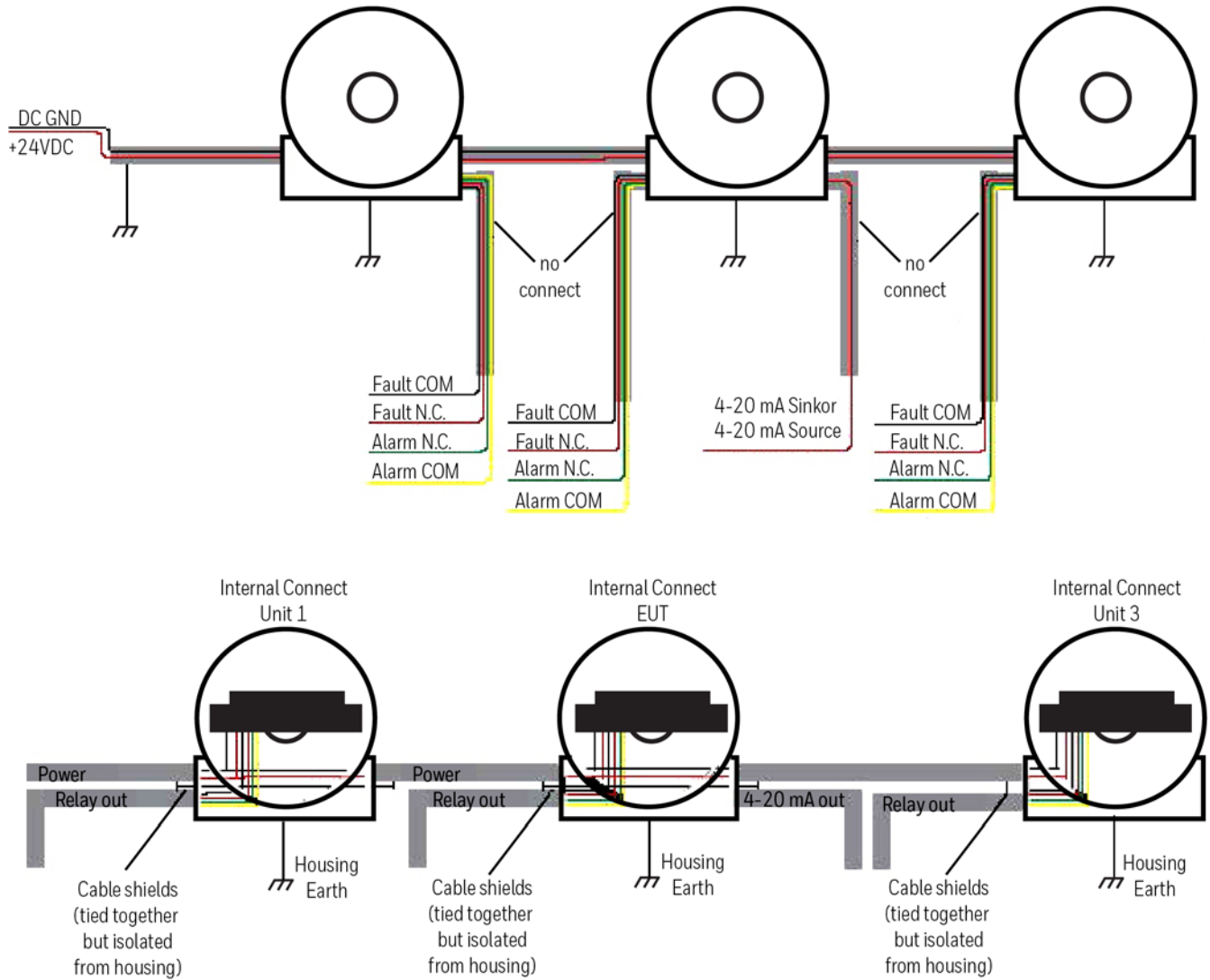


Figure 2-10  
Detector Puck, (rear view)

**J1 Connector**

| Pin | Connection    |
|-----|---------------|
| 1   | DC Return     |
| 2   | RS-485-A      |
| 3   | RS-485-B      |
| 4   | +24 VDC       |
| 5   | 4-20mA Source |
| 6   | 4-20mA Sink   |

**Note: Do not attempt to open the Detector Module puck as this voids all warranties.**

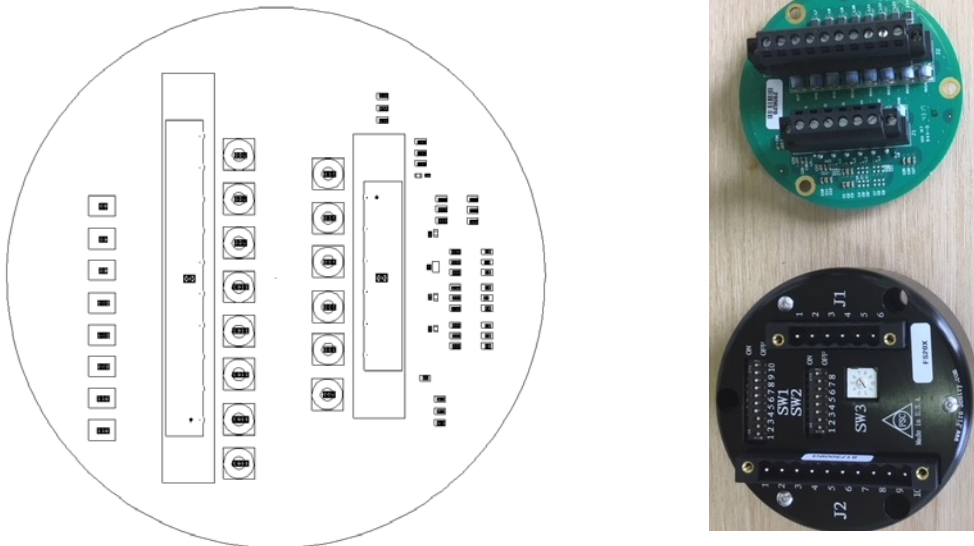


- 1) Cable shields are tied together and earth grounded at the supply only.
- 2) Housings are tied independently to earth via external cables.
- 3) Housings and cable shields are isolated from each other.

Figure 2-11. Recommended Wiring Configurations

## Detector Connections *(continued)*

Figure 2-12  
Terminals



**Note:** For EN54 units (FS24X-6 suffix), the outer circuit board must be removed to set the user configurations and then placed back onto the module after making the adjustments.

**ATTENTION: FSX Power-Up** – After the application of 24 VDC input power or resetting the Detector, wait a minimum of (thirty) 30 seconds to allow the Detector's sensors to normalize to the environment's spectral background conditions.

**FSX Testing** - As with any intelligent flame or fire Detector, please wait a minimum of thirty (30) seconds between tests (i.e., butane lighter, FSC test lamp, or test fires) to allow the Detector's sensors to fully normalize to the spectral background conditions.

**Changing the Detector Settings** – To activate changes to the settings using SW1, SW2 and SW3, reset the Detector by cycling (OFF, then ON) 24 VDC input power.

1. Verify that the external 24 VDC input power is turned **OFF** before connecting the Detector.
2. Avoid wire splices whenever possible. If wire splices are required, solder and properly insulate them. Good wiring practices simplify installation, improve reliability, and facilitate maintenance.
3. For applications requiring analog/digital communications, please refer to Section 3.2 of this Instruction Manual.

## 2.4 Installation Practices

For installations in a Hazardous Classified Area, consult the National Electric Code Handbook, Articles 500 through 517 for the proper installation practices. For locations outside of the United States, observe local and/or regional regulations.

Flame detectors must be connected to control panels meeting the requirements of either NFPA 71 or the local authority having jurisdiction.

**IMPORTANT:** The Detector's metal conduit plug by itself cannot make a weather-tight seal. Metal-to-metal does NOT provide protection against the ingress of moisture. It is necessary to obtain an approved material to apply to the threads in order to maintain the "weatherproof" integrity and satisfy local/regional regulations.

**Before completing the installation**, check that the Detector is configured correctly for the specific application. The FSX Detectors Factory Default Settings are:

|  |                                 |                  |
|--|---------------------------------|------------------|
| Alarm Relay Outputs are Non-Latching and Normally De-Energized | SW2-1 <b>OFF</b>                | SW2-7 <b>OFF</b> |
| Detector Range / Sensitivity is Medium (2)                     | SW2-2 <b>OFF</b>                | SW2-3 <b>ON</b>  |
| Auxiliary Relay Verify Time is set to 5 seconds                | SW2-4 <b>ON</b>                 | SW2-5 <b>OFF</b> |
| End of Line Resistor is Disabled                               | SW2-6 <b>OFF</b>                |                  |
| Fault Relay Output is Normally Energized                       | SW2-8 <b>ON</b>                 |                  |
| Communication is set to FireBusII™                             | SW3 is set to Position <b>4</b> |                  |
| Factory Use Only   | SW1-1 through SW1-3 <b>OFF</b>  |                  |
| Digital Communication Address is set to 127                    | SW1-4 through SW1-10 <b>ON</b>  |                  |

If the application for the Detector requires different settings, refer to Section 3.2 for detailed descriptions.

**Before applying 24 VDC power to the Detector, make sure:**

1. Wire connections are correct (Section 2.3). Each wire must be stripped properly to the correct length, loose wire strands must be removed and each wire must be securely and firmly screwed clockwise in the connector.
2. If using conduit, ensure a proper conduit seal, (appropriate for the area classification), has been installed and ***all measures to prevent moisture ingress have been taken.***
3. Consult the manufacturer for dimensional information on the flameproof joint specifications.
4. The FSX Detector is securely mounted and has an unobstructed view of the area of coverage (Section 2.1).
5. The Detector window is unobstructed and clean.
6. To ensure optimum performance, shield the detector face from intense bright light sources when first energized.

The Detector is now ready for Power-Up. **on Power-Up, the Fault Relay will change status if the Factory Default Setting is used (Section 3.2).**



## 2.5 Start-Up and Commissioning

During Start-Up and Commissioning, **DISABLE** all outputs from the Detector to any control panels or control devices. As with any flame and fire detector, after the Detector(s) is powered, perform an external Detector test “end to end”. Using an external hand-held test lamp ensures that the Detector has a clear unobstructed view of the threat area and the wiring is correct to the control panel or device.

**Note:** Honeywell Analytics FSX Detectors feature an automatic built-in “through the lens” test that verifies the cleanliness of its viewing window lens and test its internal electronics and software. As with any optical fire and flame detector, this does not constitute a fully functional “end to end” test as these types of internal self-tests only partially check and test the operational readiness of a detector.

In order to test the full functionality and operational readiness of any fire or flame detector “end to end”, without starting a real fire (which is not permitted in hazardous areas), it is necessary to test the detector(s) with an external test lamp.

Using a test lamp is the only non-hazardous and safe method to test any flame or fire detector’s sensors, internal electronics and its alarm activation software, viewing window lens cleanliness, terminal wiring integrity, actual relay activation, and the proper functionality of any other outputs that are used. Also, since most detectors are installed in a fire alarm system, this is the only method to test the complete fire alarm system, ensuring all the system wiring and cabling and system control panel are properly installed.

Additionally, using an external test lamp eliminates the following detector conditions:

1. The fire or flame detector(s)’ window lens being covered up (such as paint, paint over spray, paint masking material, hanging garments, etc.),
2. Improperly positioned and oriented for coverage of the threat area,
3. Partial or full blockage of the detector’s line of sight by one or more objects (i.e., recently installed air ducts or pipes, storage boxes, vehicles, etc.) such that the threat area is not fully protected. Since all optical fire and flame detectors are line-of-sight sensors, they must be properly positioned and oriented with an unobstructed view of the threat area so that they can detect flames/fires.

To test the full functionality of a FSX Detector, use the Model TL-1055 or TL-2055 Test Lamp in the manner prescribed in this Instruction Manual.

**WARNING:** Use test lamp model TL-1055 in *non-hazardous* locations only! For hazardous locations, use model TL-2055, as described below.

The TL-1055 and the TL-2055 are the only Test Lamps that will activate the FSX Detectors.. Additionally, do not use these Test Lamps to activate other Honeywell Analytics Detectors (nor any other conventional fire and flame detectors). Do not use other Honeywell Analytics Test Lamps or non-Honeywell Analytics Test Lamps to test the FSX Detectors.



Figure 2-13  
TL-1055 Hand Held Test Lamp (NEMA 1)

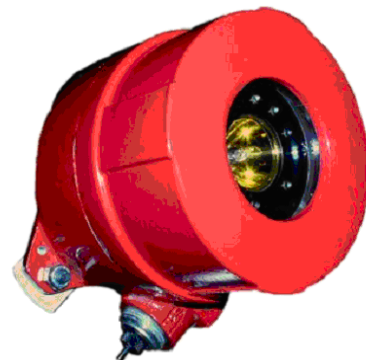


Figure 2-14  
TL-2055 Hand Held Test Lamp for Hazardous Areas

## Start-Up and Commissioning *(continued)*

Remember to disable the outputs, as a full functional test includes activating the ALARM outputs. A Honeywell Analytics Test Lamp must be used for this test (Section 4.4). Point the Test Lamp directly at the front of the Detector (on axis as much as possible, within a distance of about 1 to 25 feet). Activate the Test Lamp by pressing and holding its pushbutton. While watching the **red** ALARM LED on the face of the Detector, slowly move the Test Lamp's boresight to ensure the Detector receives its full intensity. **(NOTE: Practicing this technique may help to optimize testing of the FSX Detectors).** (Sections 3.6 and 4.4). The Detector's **red** ALARM LED will illuminate, usually within three (3) to ten (10) seconds. Also, the ALARM Relay outputs will activate and the 4-20 mA analog output will change to 20 mA ( $\pm 0.6$  mA).

If the Detector fails to respond within ten (10) seconds, do the following:

1. Wait ten (10) to twenty (20) seconds before performing another test.
2. **Check the Distance:** verify that the testing distance is between one (1) and twenty-five (25) feet from the FSX Detector(s).
3. **Check Aiming Accuracy:** verify that the proper testing technique (as described above) is followed.

## SECTION 3: OPERATION

### 3.1 Principle of Operation

Honeywell Analytics' multi-spectrum and multi-spectral infrared Fire and Flame Detectors are sophisticated, state of the art, electro-optical digital radiant energy transducers that sense the wideband radiant energy emitted by fire's combustion processes that include flames' molecular emissions and hot particulate blackbody emissions. Radiant Energy Fire Detectors respond much faster to flames and fires at a longer distance than other types of conventional photoelectric and ionization smoke and heat detectors because a fire's emitted radiant energy travels at the speed of light. Fast response is critical for detecting flaming fires in time to successfully activate suppression or activate other fire responses such as closing fire doors. Seconds can make the difference between suppressing a small fire with little or no damage or having a disastrous fire that overwhelms a suppression system thereby failing to stop the fire.

Infrared (IR) consists of spectral wavelengths longer than the color red. The IR range for fire detection, which is invisible to humans, is from about 700 nanometers to 5000 nanometers (0.7 to 5.0 microns). Honeywell Analytics' FS24X Fire Detectors utilize a NearBand IR™ portion of the spectrum from approximately 0.7 to 1.1 microns and two WideBand IR regions from approximately 1.1 to 3.0 microns and 3.0 to 5.0 microns. This allows the FS24X Detectors to sense over 85% of the total radiant "Blackbody Energy" emitted by a fire. Honeywell Analytics' Detectors sense and measure the radiant energy generated by a fire at the speed of light.

FSX Detectors also utilize an additional spectral region, the Visible Band, that spans from about 400 to 700 nanometers (0.4 to 0.7 microns.) The Visible Band is used to further discriminate against non-fire false alarm sources. The Model FS24X Detectors also sense the specific WideBand 4.3 IR™ "Triple IR". Sensing these hydrocarbon wavelengths does not inhibit the Detector's ability to see non-hydrocarbon fires. Built-in microprocessors use sophisticated Digital Signal Processing (DSP) to accurately distinguish radiant energy from a real fire and a false alarm source(s). Honeywell Analytics has developed and refined these complex proprietary and patented WideBand IR algorithms over the last 30 years. These patented algorithms perform real-time DSP, and precisely analyze the signals in high-resolution frequency and time domains. This decision making process involves thousands of real-time calculations every second. Honeywell Analytics FS24X Detectors use solid-state high speed quantum sensors (not heat sensors such as pyroelectric or thermopile) that all respond to the fire's radiant energy emissions. The quantum sensors convert the rate of photonic energy directly into analog electrical signals. These analog signals are then converted to high resolution digital bits for real-time microprocessor analysis. The Detector microprocessors incorporate random access memory (RAM), read-only memory (ROM), and non-volatile flash memory. When the microprocessors determine that a real fire has been detected, the pre-alarm digital sensor data (FirePic™) and the event information are recorded in flash memory. Depending on the configuration, other actions may include activating one or more status LEDs, relays, a current loop and sending digital data such as the RS-485 FireBusII, and Modbus. If the microprocessors determine, based on internal testing and "through-the-lens" testing, that the Detector is not operating correctly, it records the Fault data and activates the Fault outputs and the yellow status LED. The digital data in the Detector can be easily accessed with a PC for later analysis and record keeping using Honeywell Analytics' Windows® based PC software and FSIM-2 USB Interface Unit.

### 3.2 Configuring the Detector

**IMPORTANT:** Changing the Detector Settings – To activate changes to the settings using SW1, SW2 and SW3, reset the Detector by removing and re-applying 24 VDC input power.

The Digital Address for the RS485 Communication can be set using positions 4 through 10 on SW1. Switch positions 1, 2 & 3 for SW1 are for factory use only and should not be changed.



Figure 3-1 (SW1)  
Ten (10) Position DIP Switch

|     | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 127 | OFF | OFF | OFF | ON  | ON  | ON  | ON  | ON  | ON  | ON  |
| 126 | OFF | OFF | OFF | ON  | ON  | ON  | ON  | ON  | ON  | OFF |
| 125 | OFF | OFF | OFF | ON  | ON  | ON  | ON  | ON  | OFF | ON  |
| 124 | OFF | OFF | OFF | ON  | ON  | ON  | ON  | ON  | OFF | OFF |
| /   |     |     |     |     |     |     |     |     |     |     |
| 003 | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | ON  | ON  |
| 002 | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | ON  | OFF |
| 001 | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | ON  |
| 000 | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF |

Configuring the Detector (continued)

**CAUTION – WARNING**  
 When the switches SW1, SW2, or SW3 are changed, the Detector’s input power must be cycled OFF, then ON, in order for the change(s) to be accepted.

Eight (8) position DIP Switch (SW2) – Figure 3-2



Use the following tables to configure the Detector:

| Alarm Relay  | SW2-1 |
|--------------|-------|
| Latching     | ON    |
| Non-Latching | OFF   |

| Sensitivity Levels |     | SW2-2 | SW2-3 |
|--------------------|-----|-------|-------|
| Very High          | (4) | ON    | ON    |
| High               | (3) | ON    | OFF   |
| Medium             | (2) | OFF   | ON    |
| Low                | (1) | OFF   | OFF   |

| Auxiliary Relay    | SW2-4 | SW2-5 |
|--------------------|-------|-------|
| No Verify Time     | ON    | ON    |
| 5 Sec Verify Time  | ON    | OFF   |
| 10 Sec Verify Time | OFF   | ON    |
| 20 Sec Verify Time | OFF   | OFF   |

| EOL Resistor | SW2-6 |
|--------------|-------|
| Enabled      | ON    |
| Disabled     | OFF   |

| Alarm Relay  | SW2-7 |
|--------------|-------|
| Energized    | ON    |
| De-Energized | OFF   |

| Fault Relay   | SW2-8 |
|---------------|-------|
| Energized     | ON    |
| De-Energized* | OFF   |

During a fire, model FS24X-911-24-5 detectors will alarm in non-latching mode and will unlatch when the fire decreases. If the condition persists and begins to grow, the detectors will re-alarm.

Factory default settings are shown with a gray background.

\*If the Fault Relay to set to “De-Energized”, the Detector will not report any faults due to loss of input power to the Detector.

Analog and digital outputs are available in addition to relay outputs. Select from two (2) analog outputs or two (2) digital outputs using a ten (10) position Rotary Switch (SW3). FireBusII is the factory default setting. Use Table on the right and Figure 3-3 to configure SW3.



Figure 3-3  
 SW3 10-Position  
 Rotary Switch

| Position | Output Selection |
|----------|------------------|
| 0        | 4-20 mA Sink     |
| 1        | 4-20 mA Source   |
| 2        | RS-485 Modbus    |
| 3        | Factory Use Only |
| 4        | RS-485 FireBusII |
| 5        | Factory Use Only |
| 6        | Factory Use Only |
| 7        | Factory Use Only |
| 8        | Factory Use Only |
| 9        | Factory Use Only |

Note: The Medium and Low Sensitivity ranges are not approved as compliant with the requirements of EN 54-10:2002.

### 3.3 LED Status Indicators

The Model FS24X Detector uses three (3) separate, bright LED's to indicate the Detector's status.

- The **Green** LED blinks (flashes) once every ten (10) seconds to indicate a Normal, safe operational condition (i.e. no Faults and no Alarms). The Green LED is OFF when no external 24 VDC input power is applied to the Detector.
- The **Red** LED turns ON when a fire is Alarmed.
- The **Yellow** LED blinks (flashes) when the window lens is dirty. For all other Fault conditions, the Yellow LED will turn ON.

### 3.4 Normal Operation

In **Normal** operation, the bright **Green LED** blinks (flashes) every 10 seconds. See Figure 3-4 for the location of the **Green LED**. Normal Operation is defined as the Detector with 24 VDC applied and no **Alarm** or **Fault** conditions are present. If one of the 4-20 mA options are selected (Table 3-1), the current, sink or source, will be 4.0 mA ( $\pm 0.6$  mA). Only the current source mode has been certified to the EN54-10 standard.

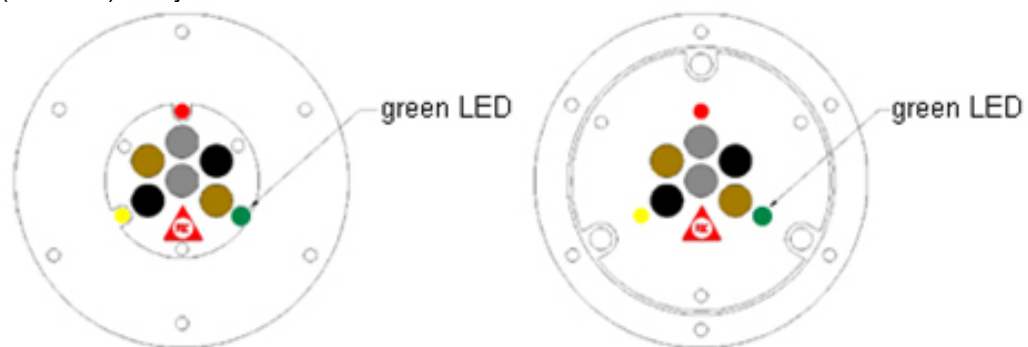


Figure 3-4  
Green LED Location

### 3.5 Alarm Condition

When an **Alarm** condition occurs, the **Red LED** will turn **ON**, (factory setting with the **Auxiliary** relay set to "0" seconds). See Figure 3-5 for the location of the **Red LED**.

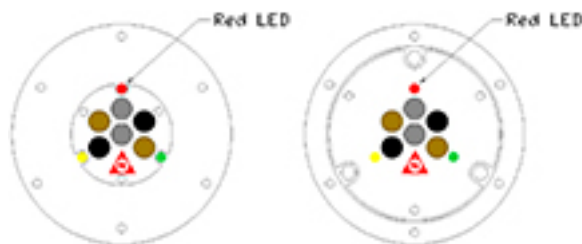


Figure 3-5  
Red LED Location

The Detector has the following outputs with an **Alarm** condition:

- Alarm Relay activation
- Auxiliary Relay activation<sup>1</sup>
- 4-20 mA (sink 20 mA) Output<sup>2</sup>
- 4-20 mA (source 20 mA) Output<sup>2</sup>
- RS-485 FireBusII Alarm Notification<sup>2</sup>
- RS-485 Modbus Alarm Notification<sup>2</sup>

<sup>1</sup> This output is a Verified Alarm Output

<sup>2</sup> Only one active **Alarm** output from this group

### 3.6 Fault Conditions

When a **Fault** (Trouble) condition occurs, the **Yellow LED** will illuminate. See Figure 3-6 for the location of the **Yellow LED**.

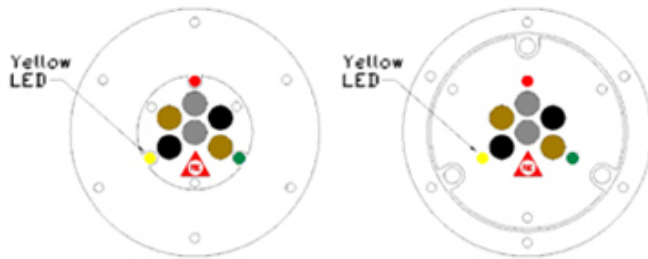


Figure 3-6  
Detector Module, Front View

The Detector has the following outputs with a **Fault** condition:

- Fault Relay activation
- 4-20 mA (sink) Output<sup>3</sup>  
2 mA (Dirty Window Fault)  
0 mA (All Other Faults)
- 4-20 mA (source) Output<sup>3</sup>  
2 mA (Dirty Window Fault)  
0 mA (All Other Faults)
- RS-485 FireBusII Fault Notification<sup>3</sup>
- RS-485 Modbus Fault Notification<sup>3</sup>

<sup>3</sup> Only One Active **Fault** output from this group

**Fault** (Trouble) conditions can be caused by:

- Under Voltage Input Power (< 18 VDC).
- Over Voltage Input Power (> 32 VDC).
- Over Temperature (> 85° C or 185° F for the Standard Version).
- Under Temperature (< -40° C or -40° F for the Standard Version).
- One or more Microprocessor Failures.
- One or more Relay Coil Failures.
- Communication Fault.
- Electronic Self-Test Failure.
- Dirty Window Lens (**Yellow** LED flashes, the **Yellow** LED is ON [solid] for all other Faults).

### 3.7 Maintenance

After the FS24X Detector is installed and commissioned, there is little maintenance required. However, a complete “end-to-end” test of the entire fire detection system should be performed periodically depending on the application. Additionally, semi-annual or quarterly testing should be performed, using the correct Honeywell Analytics Test Lamp, to ensure the integrity of the entire fire protection system.

In order to ensure the Detector is operating properly at all times, it may be necessary to establish a periodic cleaning schedule. Some industrial environments may necessitate more frequent cleaning of the Detector’s optical surfaces than others.

WARNING – Potential electrostatic charge, wipe enclosure only with a damp cloth

## SECTION 4: APPENDICES

### 4.1 Warranty Information

Honeywell Analytics warrants its Products against defects in material and workmanship under normal use and service for a period of three years from the date of shipment as described herein. Honeywell Analytics, at its option, will repair or replace, at no charge, such products found to be defective during the warranty period provided that they are returned in accordance with the terms of this warranty. Replaced parts or boards are warranted for the balance of the original applicable warranty period. All Replaced parts of Products shall become the property of Honeywell Analytics. This express limited warranty is extended by Honeywell Analytics to the original purchaser only and is not assignable or transferable to any other party. This is the complete warranty for the Products manufactured by Honeywell Analytics. Honeywell Analytics assumes no obligations or liability for additions or modifications to this warranty unless made in writing and signed by an officer of Honeywell Analytics. Honeywell Analytics does not warrant the installation, maintenance or service of its Products. Honeywell Analytics is not responsible in any way for ancillary equipment not furnished by Honeywell Analytics, which is attached to or used in connection with its Product(s), or for operation of the Product(s) with ancillary equipment and all such equipment if expressly excluded from this warranty. This warranty sets forth the full extent of Honeywell Analytics' responsibility regarding the Products' repair or replacement at Honeywell Analytics' options, is the exclusive remedy.

This Warranty is given in lieu of all other Express Warranties, Implied Warranties, including without limitation, Implied Warranties of Merchantability and fitness for a particular purpose, are limited to the duration of this Limited Warranty. In no other event shall Honeywell Analytics be liable for damages in excess of the purchased price of the product(s), for any loss of use, loss of time, inconvenience, commercial loss, lost profits or savings or other incidental, special or consequential damages arising out of or in connection with the use or inability to use such product, to the full extent such may be disclaimed by law.

#### **THIS WARRANTY DOES NOT COVER:**

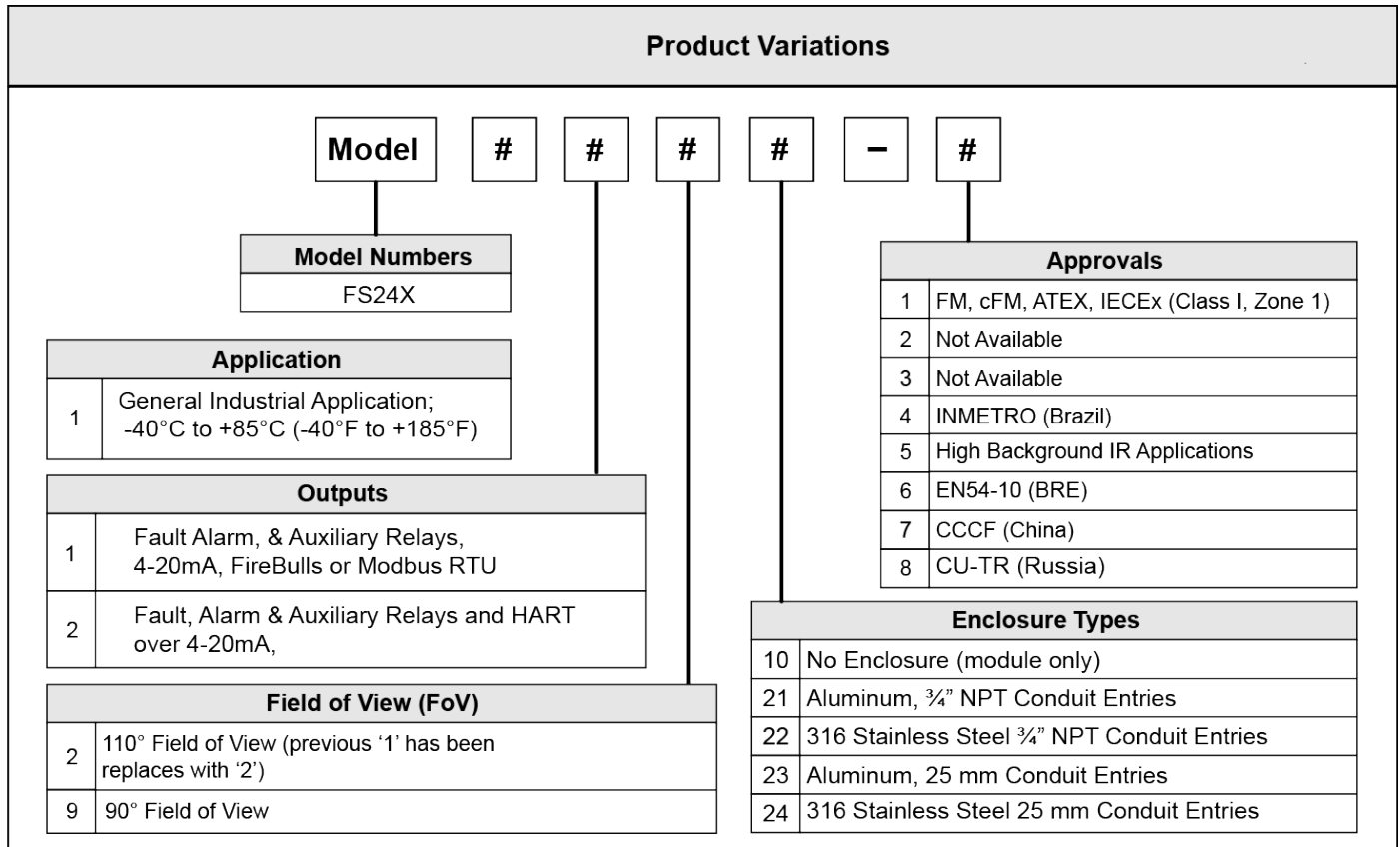
1. Defects or damage resulting from use of the Product(s) in other than its normal and customary manner.
2. Defects or damage from misuse, accident, or neglect.
3. Defects or damage from improper testing, operation, maintenance, installation, alteration, modification or adjustment.
4. Product(s) subject to unauthorized Product modifications, disassemblies or repairs (including, without limitation, the audition of the product of non-Honeywell Analytics supplied equipment) which adversely affect performance of the Product(s) to interfere with Honeywell Analytics' normal warranty inspection and testing of the Product(s) to verify any warranty claim.
5. Product(s) that have had the serial number removed or made illegible.
6. Freight cost to the repair facility.
7. A Product which due to illegal or unauthorized alteration of the software/firmware in the Product, does not function in accordance with Honeywell Analytics' specifications.
8. Scratches or other cosmetic damage to Product surfaces that do not affect the operation of the Product.
9. Normal and customary wear and tear.

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## 4.2 Product Variations

There are product variations above and beyond those that are field selectable by the end user(s). These variations are provided for the customer that has specialized needs.

### 4.2.1 Ordering Information



### 4.2.2 Ordering Examples

**FS24X-912-21-1:** QuadBand Triple IR Detector, 90° Field of View, General Applications (-40°C to +85°C) with Fault, Alarm, and Auxiliary Relays, HART over 4-20mA, Aluminum Enclosure with two ¾ inch NPT Conduit Entries, Approvals: FM, cFM, ATEX, IECEx.

**FS24X-211-24-4:** QuadBand Triple IR Detector, 110° Field of View, General Applications (-40°C to +85°C) with Fault, Alarm, and Auxiliary Relays, FireBusII or Modbus RTU, 316 Stainless Steel Enclosure with two M25 Conduit Entries, Approvals: Inmetro.



### 4.2.3 High Background IR Applications

Some environments contain higher levels of background infrared energy (IR). High background levels of IR are typically found within industrial applications that employ the use of one or more flare stacks. These types of installations are often challenging to the standard offering of Electro-Optical Flame Detectors. Specifically, these flare stacks are real fires of the type that the Flame Detectors have been installed to detect. Flares or flare stacks are sometimes referred to as 'friendly fires'. Many of these installation sites contain pipework(s), insulation, and/or large storage tanks/vessels that are highly reflective. Optical Flame Detectors will see the reflections from an active flare stack, as well as the direct line-of-sight to such. Recent adoption of emissions rules limiting continuous flaring practices have been put in place at many facilities worldwide. This reduction in flaring capacity is causing larger flares to be released during operations. The major symptom of this higher background IR can be frequent nuisance alarms or what some may interpret as false alarms. These types of alarms can be a source of annoyance or contention within a facility. Sophisticated processing and firmware algorithms are employed to trap and eliminate many false alarm sources, however, these optical devices will still have some level of vulnerability to non-fire sources as well as 'friendly fire' sources.

Honeywell Analytics makes some basic recommendations for mitigating nuisance or false alarms:

1. Lower the Sensitivity – A high sensitivity setting has a higher risk or a higher vulnerability to alarming to non-fire and friendly fire sources. Reducing the sensitivity of Flame Detectors reduces the risk and vulnerability of alarming to these. The Factory default sensitivity setting for FSX flame Detectors is 100 ft. to a 1 sq. ft. n-heptane pan fire and for SS4 Detectors it is 45 ft. to a 1 sq. ft. pan n-heptane fire. All other Honeywell Flame Detectors have fixed sensitivity settings that cannot be changed in the field. It is important to note that Flame Detectors do not have a distance limitation for detection of fires, if the detector has an unobstructed line of sight to the fire. The detection distance is a function of fire size and detector sensitivity. It also follows the Inverse Square Law<sup>1</sup>.
2. Carefully aim the Flame Detectors to avoid direct sight of flares and, where possible, reflected flares.
3. Utilize Field of View Restriction to just focus the Flame Detectors at the relevant area to be protected.
4. Vote Detectors - Typically, this is the recommendation for most outdoor installations where an Alarm from the Flame Detectors will initiate a suppression release. A spurious trip by single Detector should not activate a suppression release system. It is unlikely that two or more spurious conditions happen simultaneously, therefore, requiring two or more Detectors to alarm to a fire before initiating suppression is recommended. The best approach is to vote two detectors that cover the same threat area from different perspectives (opposing perspectives is optimal) i.e. 2 out of N, often referred to as 2ooN. It is highly unlikely that a single Detector covering the threat area that alarms to a source outside or beyond the threat area will initiate suppression if voting has been optimally employed.
5. Set a Fire Verification Time - All SS4 & FSX Detectors have a user selectable Verification time that can be set via a DIP setting on the back of the Detector Module. Setting a Verification time greater than zero seconds means that the secondary Alarm Relay (Auxiliary for FSX Detectors and Verify Fire for SS4 Detectors) will not activate unless the fire continues to burn during the entire Verification time. When that Verification Time expires and the fire is still burning, the 2nd stage Alarm will activate. If the time expires and the fire is not burning, the 2nd stage Alarm will not activate. Many non-fire sources are brief or have short time durations, and Verification is a setting that can be employed to that may dramatically reduce the occurrence of False and Nuisance Alarms. Moreover, ad-hoc flares are usually very large for a few seconds before decreasing in size.

#### Inverse Square Law<sup>1</sup>

In physics, an inverse-square law is a physical law stating that a specified physical quantity or intensity is inversely proportional to the square of the distance from the source of that physical quantity. EXAMPLE: A 1 ft. by 1 ft. fire (1<sup>2</sup> ft.) 100 feet from the Detector will have the same radiant intensity as a 2 ft. by 2ft. fire at (2<sup>2</sup> ft.) 200 feet, or a 3ft. by 3ft. (3<sup>2</sup> ft.) fire at 300 feet.

6. All three of these recommendations will help reduce or mitigate false and nuisance alarms from occurring, but they may not be enough by themselves. Honeywell has a detector that is a direct replacement for the existing detectors in this application, called the “-5” (dash five) version. See part numbers in section 4.2. The dash five firmware accounts for elevated background IR and performs better within these types of applications. The verification time mentioned above does not impact the 4-20mA signal on the existing detectors, however, the dash five version synchronizes the 20mA level to Fire Verification, meaning that if a verify time is set, the 4-20mA output remains at 4mA until the criteria for Fire Verification is met, at which point it will transition to 20mA. The Self-Test function on the dash five version is different and will require a grill kit for the FS24X Housing Lid. The grill kit is fitted onto the FS24X Housing cover at the Factory. All other aspects are unchanged between the standard and dash five versions.

The current version of the dash five FS24X is available with a 90° field of view and not a 110° field of view. Also, we would recommend 90° Field of View Flame Detectors in any high background IR or flare energy applications rather than the wider 110° Field of View units.

### 4.3 Digital Communication Options

The FS24X Detectors have a variety of RS-485 Digital Communication options that can be selected using its Rotary Switch SW3.

| SW3 Position | Outputs                  |
|--------------|--------------------------|
| 0            | 4-20mA Current Sinking   |
| 1            | 4-20mA Current Sourcing  |
| 2            | Modbus RTU               |
| 3            | Reserved for Factory Use |
| 4            | FireBus II               |
| 5 through 9  | Reserved for Factory Use |

### 4.4 Test Lamps

Some manufacturers claim that their detectors do not need remote testing with an external Test Lamp because it tests itself. Even though Honeywell Analytics Detectors also perform “through the lens” self-testing and tests themselves, Honeywell Analytics, in compliance with NFPA 72 codes, has developed portable test lamps for periodical “end-to-end” testing their Detectors remotely. Some of the most important functions of the remote test lamp are to ensure the Detector’s optical path is not blocked, the Detector is aimed properly at the fire threat area (that the Detector mounting bracket didn’t move or was accidentally bumped by someone), and the Detectors alarming circuitry and outputs (i.e. relays, 4-to-20 mA, etc.) function properly. Internal Detector testing and window lens cleanliness testing cannot insure the Detector is aimed properly, that its view of the fire scene has not been blocked by something such as a newly installed pipe or duct, storage box, parked vehicle, etc., and its alarm outputs are functioning properly.

For calibrated testing, in compliance with NFPA 72 Codes for flame detectors, as manufacturers of the FSX product line, our calibrated testing using our TL-2055 Test Lamp is as follows. If the FS24X set at Highest Sensitivity alarms to a fully charged TL-2055 Test Lamp at a distance between 1 and 25 feet, then the FS24X is in normal operating condition.

**WARNING: Use test lamp model TL-1055 in *non-hazardous* locations only! For hazardous locations, use model TL-2055, as described below.**

**TL-1055** is a general purpose NEMA 1 hand held rechargeable Test Lamp designed for testing the FS24X Detectors externally. The hand held Test Lamp (see Figure 4-1) comes with a Universal Charger (110 VAC and 220 VAC).



Figure 4-1  
TL-1055 Hand Held Test Lamp (NEMA 1)

**TL-2055** is a Class I, Div. 1 approved Explosion-Proof Test Lamp designed for testing the FS24X Detectors externally, in a hazardous location. The hand held Test Lamp (see Figure 4-2) comes with a Universal Charger (110 VAC and 220 VAC).



Figure 4-2  
TL-2055 Hand Held Test Lamp (Class I, Division 1)

## 4.5 Field of View Restrictor

There are some unique and specialized applications that may require a restricted field of view in order to prevent the Detector from alarming to a known (friendly) fire/flame source (such as a flare stack). The Model FVR-01 Field-of-View Restrictor is easily modified in the field with a simple hack saw to obtain custom Detector field-of-views for applications where specific narrow field-of-views are required. The Model FVR-01 Detector accessory has been developed specifically for these unique types of applications. Use of the restrictor has not been certified to the EN54-10 standard.

## 4.6 Additional Performance Specifications

### 4.6.1 Flame Response Sensitivity

The following table provides FS24X typical INDOOR response times and distance to various fuels:

| FS24X QuadBand (Very High [4] Sensitivity) |   |                      |                  |
|--|---|----------------------|------------------|
| Fuel                                       | Fire Size                               | Distance             | Typical Response |
| N-Heptane                                  | 6 in X 6 in (0.15m X 0.15m)             | 90 feet (27 meters)  | 5 seconds        |
| Acetylene                                  | 48 in X 3/8 in (1.2 meter) Plume        | 90 feet (27 meters)  | < 5 seconds      |
| Cardboard (single 1/8in wall)              | 7.5 x 7.5 x 7.5 in (191 x 191 x 191 mm) | 90 feet (27 meters)  | < 8 seconds      |
| Diesel                                     | 6 in X 6 in (0.15m X 0.15m)             | 90 feet (27 meters)  | 5 seconds        |
| Ethanol                                    | 12 in X 12 in (0.3m X 0.3m)             | 60 feet (18 meters)  | < 5 seconds      |
| IPA  | 6 in X 6 in (0.15m X 0.15m)             | 90 feet (27 meters)  | < 8 seconds      |
| JP-4                                       | 6 in X 6 in (0.15m X 0.15m)             | 90 feet (27 meters)  | < 5 seconds      |
| JP-8                                       | 6 in X 6 in (0.15m X 0.15m)             | 90 feet (27 meters)  | < 5 seconds      |
| Methane                                    | 48 in X 3/8 in (1.2 meter) Plume        | 90 feet (27 meters)  | < 5 seconds      |
| Methanol                                   | 12 in X 12 in (0.3m X 0.3m)             | 60 feet (18 meters)  | < 5 seconds      |
| Paper                                      | 24 Standard 8.5 x 11 sheets             | 90 feet (27 meters)  | < 8 seconds      |
| Silane                                     | 1 foot (0.3 meter) Plume                | 15 feet (4.5 meters) | < 5 seconds      |

The following table provides FS24X typical OUTDOOR response times and distance to various fuels:

| FS24X QuadBand (Very High [4] Sensitivity) |                                       |                         |                  |
|--|---------------------------------------|-------------------------|------------------|
| Fuel                                       | Fire Size                             | Distance                | Typical Response |
| N-Heptane                                  | 12 in X 12 in (0.3m X 0.3m)           | 200 feet (61 meters)    | 4.2 seconds      |
| N-Heptane                                  | 12 in X 12 in (0.3m X 0.3m)           | 264 feet (80 meters)    | < 15 seconds     |
| Diesel                                     | 12 in X 12 in (0.3m X 0.3m)           | 150 feet (45.75 meters) | < 5 seconds      |
| Ethanol                                    | 12 in X 12 in (0.3m X 0.3m)           | 75 feet (26 meters)     | < 5 seconds      |
| IPA  | 12 in X 12 in (0.3m X 0.3m)           | 175 feet (53 meters)    | < 5 seconds      |
| Methane                                    | 48 in X 3/8 in (1.2 meter) Plume      | 90 feet (27 meters)     | < 8 seconds      |
| Methanol                                   | 12 in X 12 in (0.3m X 0.3m)           | 60 feet (18 meters)     | < 5 seconds      |
| Paper (8½ x 11 sheets)                     | Shredded (loosely packed) 1 foot cube | 50 feet (15 meters)     | < 8 seconds      |
| Pine Needles                               | 12 in X 12 in (0.3m X 0.3m)           | 50 feet (15 meters)     | < 8 seconds      |
| Wood                                       | 12 in X 12 in (0.3m X 0.3m)           | 50 feet (15 meters)     | < 6 seconds      |

#### 4.6.2 False Alarm Immunity

The following table represents the minimum distance at which the detector did not false alarm or show any signs of instability during exposure to the sources listed. Additionally, the sensitivity to a one square foot n-Heptane reference pan fire in the presence of the false fire source is listed.

| <b>False Fire Source</b>  | <b>Minimum Distance with no Alarm</b> | <b>Sensitivity to a 1' x 1' n-Heptane reference pan fire in the presence of the false fire source</b> |
|---------------------------|---------------------------------------|---|
| Direct Sunlight           | No Alarm                              | 50 feet / 15.24 meters  |
| Modulated Sunlight        | No Alarm                              | 25 feet / 7.62 meters   |
| Modulated Arcwelding      | 3 feet 9 inches / 1.14 meters         | Source at 15 feet / 4.57 meters<br>Fire at 30 feet / 9.14 meters                                      |
| Continuous Arcwelding     | 3 feet 9 inches / 1.14 meters         | Source at 15 feet / 4.57 meters<br>Fire at 30 feet / 9.14 meters                                      |
| Resistive Electric Heater | 1 foot / 30.48 centimeters            | Source at 3 feet / 91.44 centimeters<br>Fire at 200 feet / 60.96 meters                               |
| Flourescent Lamp          | 1 foot / 30.48 centimeters            | Source at 3 feet / 91.44 centimeters<br>Fire at 200 feet / 60.96 meters                               |
| Halogen Lamp              | 1 foot / 30.48 centimeters            | Source at 7 feet / 2.13 meters<br>Fire at 200 feet / 60.96 meters                                     |
| Sodium Vapor Lamp         | 1 foot / 30.48 centimeters            | Source at 3 feet / 91.44 centimeters<br>Fire at 200 feet / 60.96 meters                               |
| Pelican Flashlight        | 1 foot / 30.48 centimeters            | Source at 3 feet / 91.44 centimeters<br>Fire at 200 feet / 60.96 meters                               |
| Incandescent Lamp         | 1 foot / 30.48 centimeters            | Source at 3 feet / 91.44 centimeters<br>Fire at 200 feet / 60.96 meters                               |

## 4.7 Drawings

### 4.7.1 Outline and Dimensions

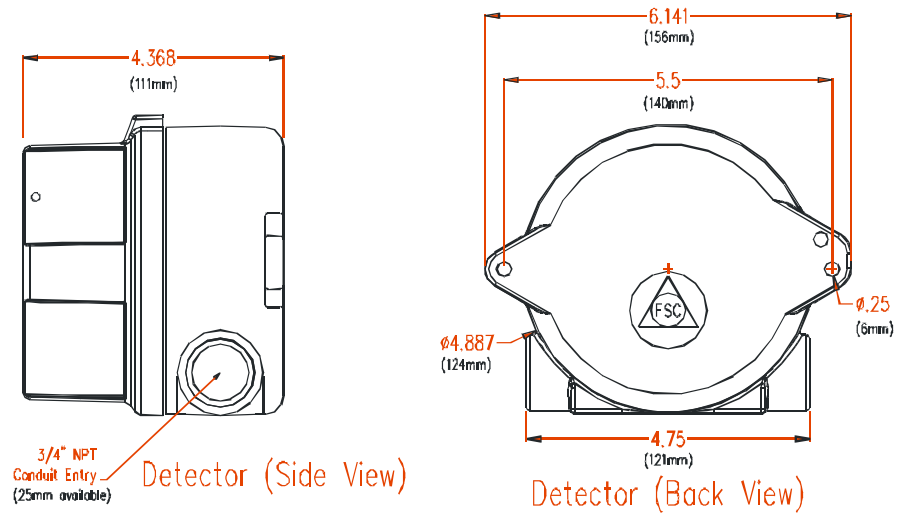


Figure 4-3  
Outline & Dimensional Drawing for FS24X

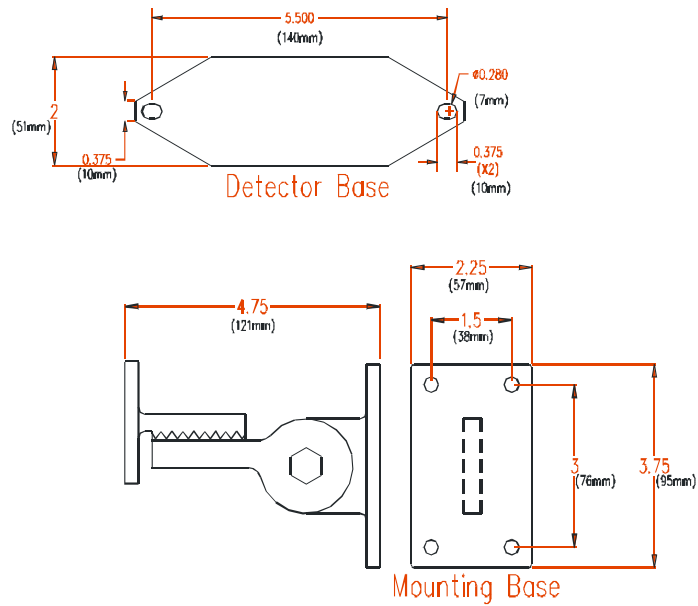


Figure 4-4  
Outline & Dimensional Drawing for SM4

**Drawings** (continued)

**4.7.2 Wiring and Terminal Connections**

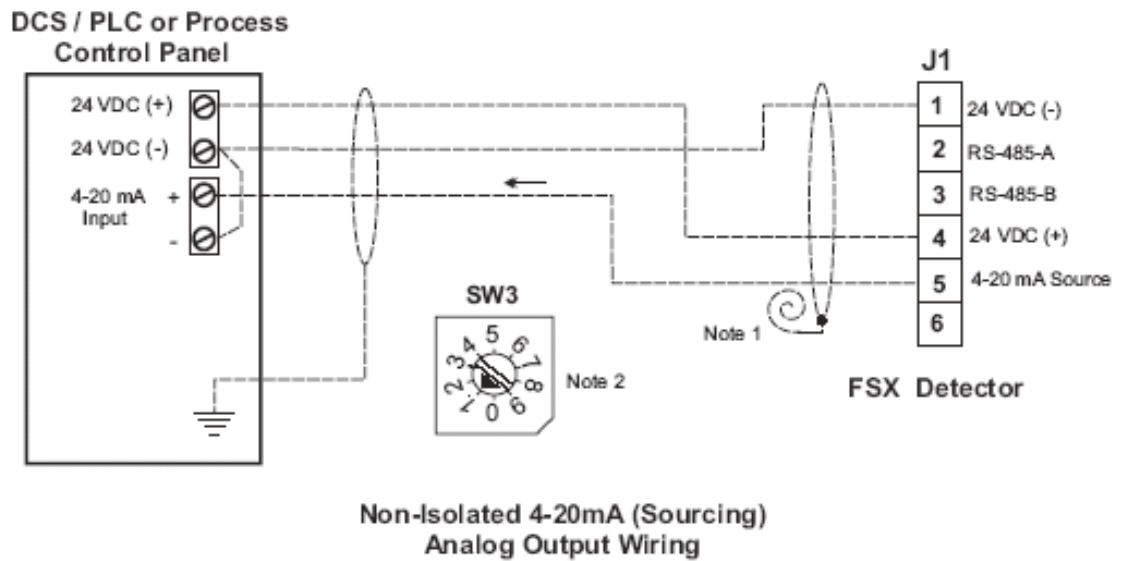


Figure 4-5  
Typical Wiring for 4-20mA (Sourcing) Analog Output

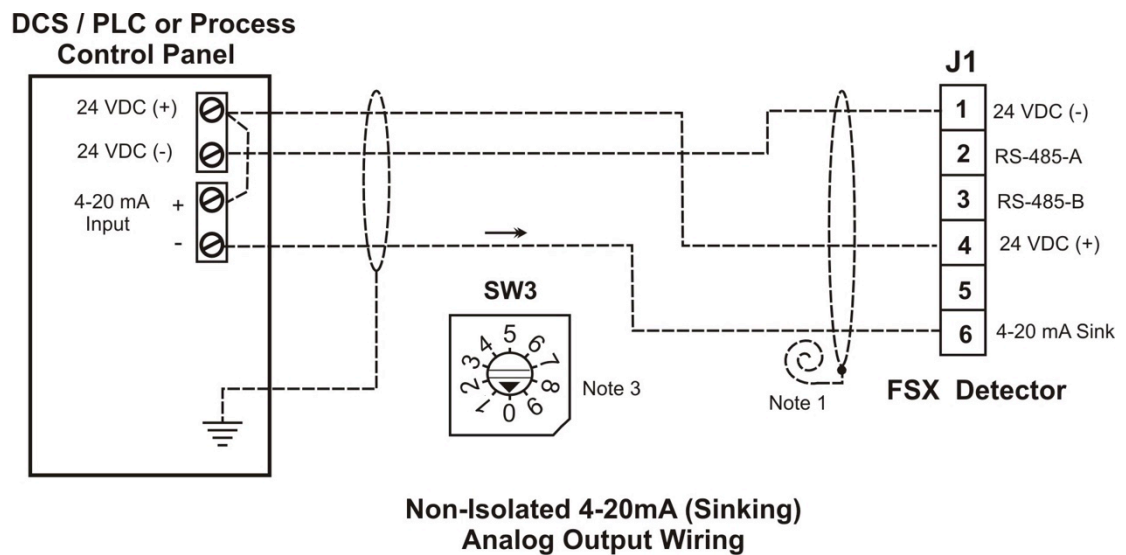


Figure 4-6  
Typical Wiring for 4-20mA (Sinking) Analog Output

**NOTES:**

1. Cable shield must be grounded at one end only, at the Control Panel. Coil and tape cable shield at the Detector end.
2. Set SW3 (rotary switch) to position one (1) for Source current wiring.
3. Set SW3 (rotary switch) to position zero (0) for Sink current wiring.

## Drawings (continued)

### Wiring and Terminal Connections (continued)

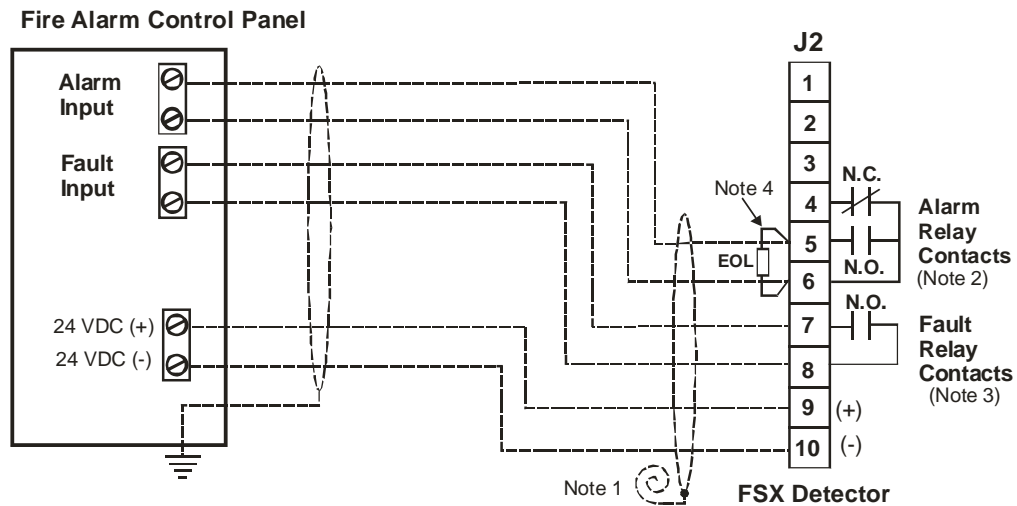


Figure 4-7

Typical Relay Output Wiring for Monitoring Separate Alarm and Fault Contacts

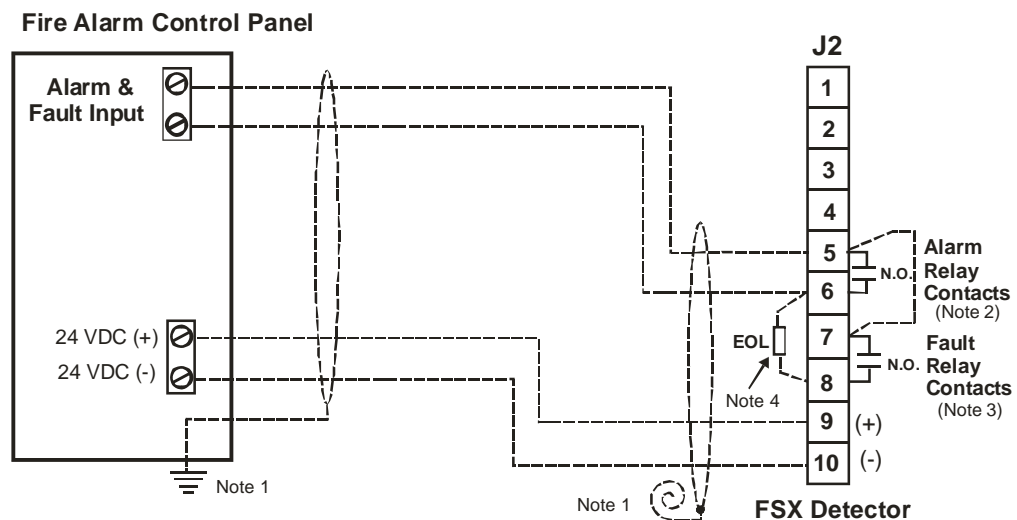


Figure 4-8

Typical Relay Output Wiring for Monitoring Alarm and Fault Contacts on a single two-wire input

#### NOTES:

1. Cable shield must be grounded to "Earth Ground" at the Control Panel end only. Coil and tape the cable shield at the Detector end.
2. Alarm relay contacts shown with no power applied. Alarm relay is normally De-Energized during normal operation and with no Alarm. This relay will Energize during Alarm conditions.
3. Fault relay contacts shown with no power applied. During normal operation and with no Fault, this relay will De-Energize and the N.O. (normally open) contacts will close.
4. EOL (End-Of-Line) device shall be installed as required and supplied by the Fire Alarm Panel.



## Drawings *(continued)*

### 4.7.3 Detector Markings

Class I, Division 1, Groups A, B, C & D; Class II, Division 1 Groups E, F & G; Class III; Class I, Zone 1 AEx d /Ex d IIC Hazardous Locations.

ATEX IECEX Certification Class I, Zone 1, Ex db IIC (T4-T6) and Ex tb IIIC (T4-T6).

| LABEL CONFIGURATIONS |           |  |                            |                      |                            |                  |            |         |                       |                      |                      |
|----------------------|-----------|--|----------------------------|----------------------|----------------------------|------------------|------------|---------|-----------------------|----------------------|----------------------|
| P/N                  | Model No. | Full Description   | Material                   | IR/UV Type           | LPCB Number<br>CPR Number  | Background color | Text Color | mA      | T4                    | T5:                  | T6:                  |
| FS24X-2              | FS24X-2   | FS24X-2  | FS24X-2                    | FS24X-2              | FS24X-2                    | FS24X-2          | FS24X-2    | FS24X-2 | FS24X-2               | FS24X-2              | FS24X-2              |
| LB-6095-003          | FS24X-9   | Label, FS24X-9, ss, with FM/Canada/US ATEX, IECEX approval | 0.020" 316 Stainless Steel | QuadBand Triple IRTM | 1175a/02<br>0832-CPR-F0516 | Matte            | Black      | 150     | -60°C<br>TO<br>+110°C | -60°C<br>TO<br>+75°C | -60°C<br>TO<br>+60°C |

ATEX Certification FM14ATEX0058X

IECEX Certification FMG 14.0027X

Ex db IIC T6....T4 Gb

Ex tb IIIC T135C Db IP66

II 2 G Ex db IIC T6...T4 Gb

II 2 Ex tb IIIC T135C IP66

## 1.8 WEEE Directive Disposal Chart

**EN**

**EU Directive 2012/19/EU: Waste Electrical and Electronic Equipment (WEEE)**

This symbol indicates that the product must not be disposed of as general industrial or domestic waste. This product should be disposed of through suitable WEEE disposal facilities. For more information about disposal of this product, contact your local authority, distributor or the manufacturer.

**ES**

**DIRECTIVA 2012/19/UE: Residuos de Aparatos Eléctricos y Electrónicos (RAEE)**

Este símbolo indica que el producto no puede ser desechado como residuo doméstico o industrial genérico. Este producto debe ser desechado en instalaciones de reciclado RAEE adecuadas. Para más información acerca del desecho de este producto, contacte con su autoridad local, el distribuidor o el fabricante.

**FR**

**DIRECTIVE 2012/19/UE: Relative aux déchets d'Équipements Électriques et Électroniques (DEEE)**

Ce symbole indique que le produit ne doit pas être éliminé en tant que déchet industriel ou ménager. Ce produit doit être envoyé vers des sites de valorisation ou élimination des D3E. Pour plus d'informations sur la mise au rebut de ce produit, contactez les autorités compétentes, votre distributeur ou le fabricant.

**NL**

**RICHTLIJN 2012/19/EU: Betreffende Afdankte Elektrische en Elektronische Apparatuur (AEEA)**

Dit symbool geeft aan dat het product niet als algemeen industrieel of huishoudelijk afval mag worden weggegooid. Het product dient te worden afgevoerd via geschikte afvalverwijderingsinstallaties voor AEEA.

Neem voor meer informatie over de afvoer van dit product contact op met uw lokale overheid, distributeur of de fabricant.

**IT**

**DIRETTIVA 2012/19/UE: Rifiuti di Apparecchiature Elettriche ed Elettroniche (RAEE)**

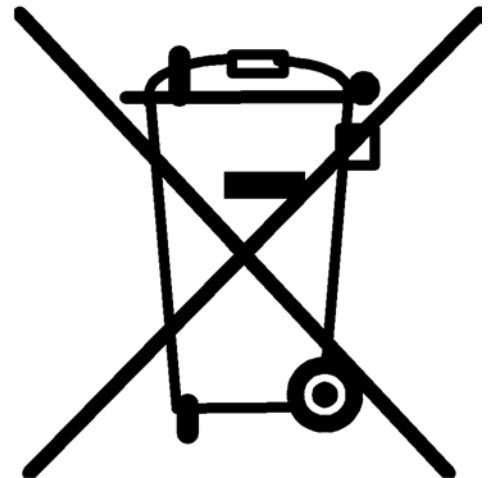
Questo simbolo indica che il prodotto non deve essere trattato come rifiuto industriale o domestico. Questo prodotto deve essere smaltito in idonei impianti di smaltimento specifici per RAEE. Per ulteriori informazioni sullo smaltimento di questo prodotto contattare l'ente locale preposto, il distributore o il produttore.

**DE**

**RICHTLINIE 2012/19/EU: über Elektro- und Elektronik-Altgeräte**

Dieses Symbol zeigt an, dass dieses Produkt nicht

als Hausmüll oder kommunaler Müll entsorgt werden darf. Es sollte zum Recycling zu einer geeignete WEEE Entsorgungsanlagen gegeben werden. Um weitere Informationen zum Recycling dieses Produkts zu erhalten wenden Sie sich an Ihre Kommunalbehörde, Ihren Lieferanten oder den Hersteller.



## 1.9 Restricted Materials Chart China RoHS

| 部件名称  | 有害物质      |           |           |                 |            |                 |
|-------|-----------|-----------|-----------|-----------------|------------|-----------------|
|       | 铅<br>(Pb) | 汞<br>(Hg) | 镉<br>(Cd) | 六价铬<br>(Cr(VI)) | 多溴联苯 (PBB) | 多溴二苯醚<br>(PBDE) |
| 感光探测器 | X         | 0         | 0         | 0               | 0          | 0               |

本表格中未列出的所有部件和配件包含的有害物质都没有超过 GB/T 26572 所要求的限制。

本表格依据 SJ/T 11364 的规定编制

○ : 表示该有害物质在该部件所有均质材料中的含量均在 GB/T26752 规定的限量要求以下。

× : 表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T26572 规定的限量要求。

2004Y2007C\_1 A05005 China RoHS Declaration 07 (Pb Det) 3 July 2017

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