



## **Fire Sentry Model SS4-AS/-AS2**

**For Special Applications**

**(Optimised for Hydrogen, Silane, Methanol, Ethanol, and Methane)**

**Multi-Spectrum Digital Electro-Optical Fire Detector**

**STAND-ALONE RELAY MODE or 4-20 mA Output Option**

# ایمن کنترل سپهند

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**IMEN  
CONTROL  
SAHAND**



**UV and UV/IR Electro-Optical  
Digital Fire and Flame Detectors**

# Fire Sentry SS4 Detectors



## Fire Sentry SS4-A and SS4-AS Features:

- Multi-Spectrum™: senses ultraviolet, visible and Wide Band Infrared™
- Built-in test for optical “through the lens” testing
- False alarm immunity
- Detects hydrocarbon and non-hydrocarbon based fires
- Wide field-of-view and solar-blind
- Adjustable detector sensitivity
- Microprocessor based algorithms: FirePic™, Snapshot™ and Tri-Mode Plot™
- Wide temperature range of operation
- Compatible with standard approved fire alarm panels
- Explosion-proof housing
- Time programmable alarm verification

## Fire Sentry SS4-AUV Features:

- Senses solar-blind ultraviolet band
- Built-in test for optical “through the lens” testing
- Utilizes long-life, ruggedized UV sensors
- Detects hydrocarbon and non-hydrocarbon based fires
- Wide field-of-view and solar-blind
- Adjustable detector sensitivity
- Microcomputer based algorithms: FirePic™, Snapshot™ and UV Plot
- Wide temperature range of operation
- Compatible with standard approved fire alarm panels
- Explosion-proof housing
- Time programmable alarm verification

## Applications include:

- Petrochemical Facilities and Refineries
- Co-Generation Plants
- Aircraft Hangars
- Silane and Hydrogen Gas Storage
- Gas Turbines & Power Plants
- Gas Compressor Stations
- Warehouses

## The Fire Sentry SS4 Electro-Optical Digital Fire and Flame Detectors represent leading edge UV and UV/IR technology.

### FireSentry SS4-A

The Fire Sentry SS4-A represents the world’s pre-eminent UV/IR technology for Electro-Optical Flame Detectors with tens of thousands successfully operating in a multitude of installations worldwide. This multi-spectrum detector senses radiant energy in the ultraviolet (UV), visible and Wide Band Infrared™ (IR) spectrum. The radiant energy from all types of flaming fires will alert the detector to their presence.

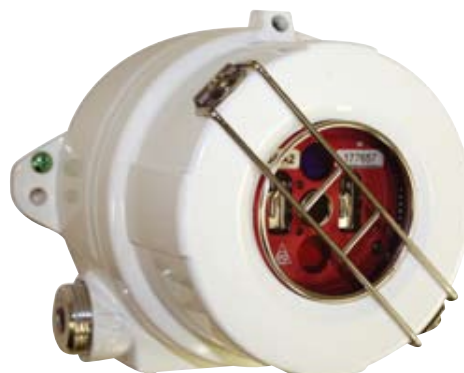
To eliminate common nuisance false alarms that occasionally occur with UV-only, IR-only, Dual IR or Dual Mode UV/IR detectors, the Fire Sentry SS4 detectors’ FireLogic signal processing requires that UV, visible and Wide Band IR radiant energy all be evaluated before declaring a fire. The smart detector utilizes real-time signal processing algorithms that are optimized to alarm on all types of fires, while virtually eliminating the possibility of false alarms.

### Fire Sentry SS4-AS

The Fire Sentry SS4-AS processes UV, IR and Visible (VIS) spectral ranges from ruggedized solar-blind UV, “Quantum-Effect” IR and VIS sensors correspondingly. It is optimized for detection of hydrogen, ethanol, methanol and methane (natural gas) fires and like the other detectors in its family, it responds to Type A, B and C flaming fires.

### Fire Sentry SS4-AUV

The Fire Sentry SS4-AUV represents the leading edge technology UV optical flame detectors. This flame detector senses radiant energy in the ultraviolet (UV) spectrum. The radiant emissions of flaming fires will alert the detector to their presence.



# Fire Sentry SS4 Detectors



The field of view for the Fire Sentry SS4 detectors is the widest in the industry with a 120° cone of vision. This means more hazard area can be covered by each detector. Greater sensitivity also increases the volume covered by each detector, up to four times more than some other detectors.

Using sophisticated microprocessor signal processing algorithms, false alarm rejection is maximized – with virtual immunity to false alarms from arc welding, corona discharge and other common non-fire sources.

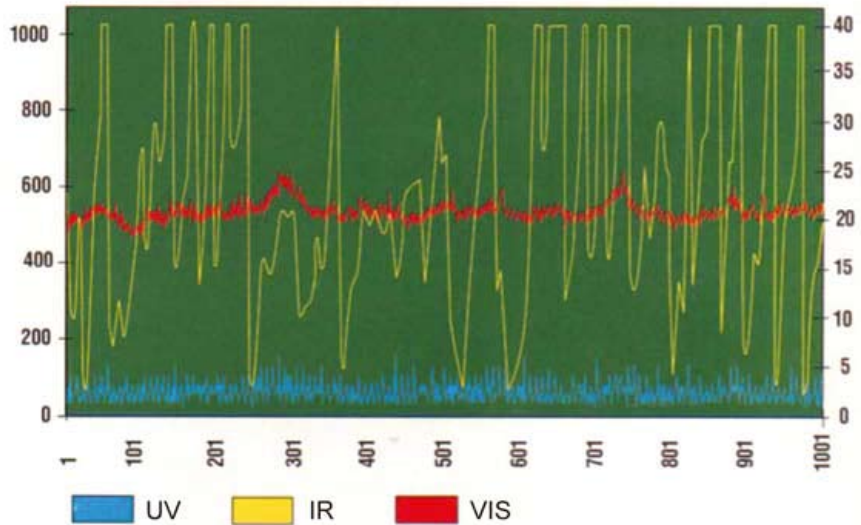
## Operation

The Fire Sentry SS4 detectors operate from standard 24 Volt DC power and interfaces to approved fire alarm panels or standard PLC's. When power is applied, a self-test is performed and the fault relay resets to show no faults. The front LED lights flash every ten seconds to indicate power is on.

The continuous spectral data stream of information from the sensor array is analyzed by the microprocessor. Upon alarm, the detector activates the alarm relay and stores all the pre-fire spectral data in non-volatile memory for retrieval and evaluation. This Fire Pic™ data can be used to postulate the cause of the fire.

As part of the FS2000™ System, the SS4 family of detectors communicate with CM1-A Controller via a four wire bi-directional RS-485 FireBus™.

## Tri-Mode Plot Shown on Computer Display



# Honeywell Analytics Lines of Business



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Fire Sentry Corporation is now part of Honeywell Analytics. As we begin to fully integrate our companies, you might notice some small changes. This integration is about bringing together two of the best in life safety. We are focused on putting our customers first and making the right decisions to guarantee Honeywell Analytics continues to remain the experts in fire and gas safety.

# Honeywell



## **Fire Sentry Model SS4-AS/-AS2**

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**STAND-ALONE RELAY MODE or 4-20 mA Output Option**



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## APPROVALS

The Model SS4-AS/-AS2 Multi-Spectrum Fire Detectors are manufactured in compliance with the requirements of the ISO-9001:2000 standard and are approved by Inmetro:

- BR-Ex d IIB + H2, T4 (-40°C ≤ Ta ≤ +80°C)
- BR-Ex d IIB + H2, T5 (-40°C ≤ Ta ≤ +40°C)

## SECTION 1: TECHNICAL DESCRIPTION

### 1.1 Features and Specifications

#### 1.1.1 General Description

The Model SS4-AS/-AS2 Multi-Spectrum Electro-Optical Fire/Flame Detectors are fast-reacting (within 5 seconds), digital, configurable, microprocessor-based, “smart” units. This Detector has sensitivity to Type A, B, and C flaming fires. They are optimized for detection of hydrogen, ethanol, methanol, and methane (natural gas) fires. Detectors of this design process Ultraviolet (UV), Wide Band Infrared (IR), and Visible (VIS) spectral ranges from ruggedized Solar-blind UV, “Quantum-Effect” IR, and Visible (VIS) sensors correspondingly. They are equipped with SRL-BIT (Built In Test) for optical “through the lens” of both the sensors and lens. These UV, IR, and VIS Fire Detectors have false alarm immunity, and alarm range between 15 and 60 feet for a one square foot heptane, gasoline, kerosene, or isopropyl alcohol pan flame with a 120-degree ( $\pm 60$  degrees from the axis) conical field of view. Additional optimization for hydrogen assures a less than 5 second response to a 10-inch hydrogen flame at 15 ft.. Their microprocessor-based algorithms (FirePic™, SnapShot™, and Tri-Mode Plot™) assure time programmable alarm verification, Fire Signature Analysis, and compatibility with standard FM Approved or UL Listed fire alarm panels.

The Detector has the flexibility to be re-configured in the field. Its installation is simple, and operation straightforward due to the built-in self-testing feature. Therefore, the maintenance consists mainly in keeping the Detector window lens clean, and performing periodic testing required by the manufacturer of the Fire Control and Suppression System.

#### 1.1.2 Detector Technical Specifications

##### 1.1.2.1 Mechanical Specifications

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

##### 1.1.2.2 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: (400 Ohms Max Load)	0 to 20 mA (Source or Sink, User Selectable) 0.0 mA (<0.6 mA) = Fault 2.0 mA ( $\pm 0.6$ mA) = Dirty Window Lens 4.0 mA ( $\pm 0.6$ mA) = Normal, Safe (no Fault, no Fire) 20.0 mA ( $\pm 0.6$ mA) = Verified Fire Alarm
Screw Terminal Wire Sizes:	12 AWG to 22 AWG (2.50 mm to 0.762 mm) Use stranded conductors ( <i>not</i> solid core)

### 1.1.2.3 Environmental Specifications

Operating Temperature	Standard:	-40° F to +185° F (-40° C to +85° C)
Operating Humidity Range:		5 to 98% RH non-condensing
Storage Temperature:		-67° F to +221° F (-55° C to +105° C)

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

Field of View:	120° Horizontal and Vertical (conical)
Sensitivity	One (1) sq. ft. heptane reference fire at 60 feet
Speed of Response:	2 to 5 seconds (typical)
High Speed Response:	Less than 0.5 seconds to "fireball" type fires (if selected)
Spectral Sensitivity	0.4 to 3.5 micron wavelengths, TriBand Dual IR Plus

### 1.1.2.5 Hazardous Area Classifications

#### North America, ATEX, IECEx:

Class I, Division 1, Groups A, B, C & D	Class I, Zone 1,
Class II, Division 1 Groups E, F & G	<b>AEx d IIC xx</b> , II 2 G Ex d IIC <b>xx</b>
Class III	II 2 D Ex tD A21 IP66 T135°C
T4: Ta = -40°C to +110°C <sup>3</sup>	<b>xx</b> = T4: Ta = -40°C to +110°C <sup>3</sup>
T5: Ta = -40°C to +75°C <sup>3</sup>	T5: Ta = -40°C to +75°C <sup>3</sup>
T6: Ta = -40°C to +60°C	T6: Ta = -40°C to +60°C

#### InMetro:

Ex d IIC <b>xx</b> Gb
<b>xx</b> = T4: Ta = -60°C to +110°C <sup>3</sup>
T5: Ta = -60°C to +90°C <sup>3</sup>
T6: Ta = -60°C to +75°C

### 1.1.2.6 Additional Certifications

FM verified and approved to meet FM 3260 Radiated Energy-Sensing Fire Detectors for Automatic Fire Alarming Signals.

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

<sup>2</sup> See Section 1.4 for Additional Performance Specifications

<sup>3</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)

### 1.1.2.7 Other Specifications:

#### LED Visual Indicators:

Powered Detector:	Dual LEDs blink every 10 seconds
Fault Declared:	One LED turns ON solid until the fault is cured
Re-calibrate when:	Both LEDs flash ON and OFF rapidly
Fire Declared:	Both LEDs ON solid (one LED blinks during first few seconds)

#### Relay Contact:

Rating:	0.5 Amp at 120 Volt AC or 1 A at 24 V DC resistive
Fire relay:	N.O. and N.C. contacts (Latching/Non-Latching, switch selected)
Verification relay:	N.O. and N.C. contacts (Adjustable time from 0 to 30 seconds)
Fault relay:	N.O. and N.C. contacts

### 1.1.3 Applications

Applications of the Model SS4-AS/-AS2 Detectors include storage warehouses of Ethanol, Methanol, and Methane (Natural Gas) and Hydrogen gas, among others.

### 1.1.4 Detector Locations

For unobstructed performance, considering Detector locations in application areas, avoid sources, other than fire, which may cause false alarms, such as operations utilizing welding or gas torch equipment, high power sources of EMI or RFI, or artificial lighting pointed directly at the Detector. Locations experiencing strong mechanical or acoustical vibrations should also be avoided. For optimum performance, locate the Detector(s) as close as possible to the potential fire source, preferably, along the axis of the vision cone. Install enough Detectors to completely eclipse the fire hazardous area. Assure accessibility for the Detector lens cleaning, as well as best possible protection and/or cleaning from fog, rain, ice, dust, hazardous atmospheres, and other adverse elements. If necessary, utilize the Steel Swivel Mount (Model SM2) or 316 Stainless Steel Swivel Mount (Model SM4) for greater flexibility in mounting locations (See Figures 4 and 5).

## 1.2 Stand-Alone Operation

For Stand-Alone operation, the Model SS4-AS/-AS2 Detector may be connected to a suitably approved transmitter or control system/panel. The Detector operated in the Stand-Alone mode, uses the Fire, Fault, and Verify (optional) relays or optional 4 to 20 mA current source (FSC Model MA420-4 Module, refer to Section 4.3) to interface with the Fire/Security Panels. For Stand-Alone operation, the Detector's Fault relay is automatically configured by the on-board microprocessor. The input current of the Detector is about 15 mA higher in the Stand-Alone mode compared to FS2000 System operation.

**NOTE:** The Fault relay is not available when the Detector is wired to the FS2000 System.

## 1.3 FS2000 System Operation

For FS2000 System operation, the Model SS4-AS/-AS2 Fire and Fault signals are sent digitally to the FS2000 System Controller using the four wire FS2000 FireBus. The FireBus provides 24 Volt DC power for the Detector and RS-485 digital communication (Refer to Fire Sentry document MN0003: "FS2000 FIRE EARLY WARNING SYSTEM - INSTALLATION and OPERATIONS GUIDE"). For special remote alarm applications, users may also connect directly to the Detector's Fire alarm relay.

**NOTE:** When the Model SS4-AS/-AS2 Detector is connected to the FS2000 System using FireBus communication, the Controller automatically disables the Detector's Fault relay.

## 1.4 Overview

### 1.4.1 Model SS4-AS/-AS2 Detector

**Version SS4-AS:** There are two (2) LEDs on the Model SS4-AS Detector that indicate the state of the Detector. During normal operation both LEDs will blink every 10 seconds.

If the Detector alarms to a fire, it energizes the Fire relay and turns on both LEDs in the following sequence. One LED is turned on immediately and the second LED will rapidly blink for several seconds indicating that the Detector's FirePic spectra is being permanently stored in the Detector's solid-state memory (FirePic is the several seconds of Detector spectral data which precedes an alarm event). Once the FirePic data is stored, the second LED will remain on. For this version, the fire alarm LEDs turn on and remain on until power to the unit is cycled (turned off and on again).

If the Detector has a Fault, it de-energizes the Fault relay and turns one (1) LED on (the LED will not light if the Fault is a "No Power Fault"). If the Fault condition, such as a "Low Voltage Fault", is eliminated the Detector will automatically return to Normal Operation.

**NOTE:** Faults caused by excessive input voltage or due to temperatures outside the operating temperature range require factory re-certification. Re-certification is required if a Fault is indicated by both LEDs rapidly blinking (with frequency about 2 Hz.).

**Version SS4-AS2:** The operation of this unit is identical to the SS4-AS, except the fire alarm LEDs turn off once the fire threat is eliminated, without power cycling of the device.

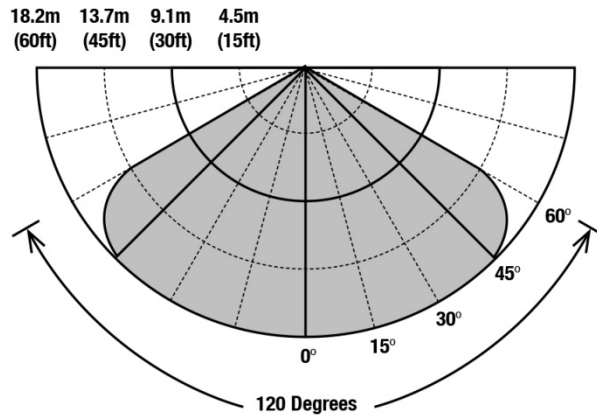
### 1.4.2 Detection Range and Field-of View

The SS4-AS detection range is field adjustable between 4.5m (15ft.) and 18.2m (60 ft.) in 4.5m (15 ft.) increments to an industry-standard 0.1 m<sup>2</sup> (one square foot) heptane, gasoline, kerosene, or isopropyl alcohol pan fire within 5 seconds.

The Detector is also optimized for the following specific type of fuels and will alarm to the resultant fire within five (5) seconds. Careful attention should be given to the Detector sensitivity setting for these types of fires.

- **Hydrogen:** 254mm (10") fire height at a distance of 4.5m (15 ft.) with the Detector sensitivity setting of 4.5m (15 ft.)
- **Ethanol:** 0.1 m<sup>2</sup> (one square foot) pan fire at a distance of 4.5m (15 ft.) with the Detector sensitivity setting of 4.5m (15 ft.)
- **Methane (Natural Gas):** 762mm (30") fire height using a 9.5mm (3/8") orifice at a distance of 4.5m (15 ft.) with the Detector sensitivity setting of 4.5m (15 ft.)
- **Methanol:**
  - 0.1 m<sup>2</sup> (one square foot) pan fire at a distance of 2.2m (7.5 ft.) with the Detector sensitivity setting of 4.5m (15 ft.)
  - 0.1 m<sup>2</sup> (one square foot) fire at a distance of 4.5m (15 ft.) with the Detector sensitivity setting of 9.1m (30 ft.)
  - 0.18 m<sup>2</sup> (two square foot) pan fire at a distance of 18.2m (60 ft.) with the Detector sensitivity setting of 18.2m (60 ft.)

The Detector incorporates a 120-degree conical Field of View. The fire emissions received by the Detector diminish at extreme range and edges of the field-of-view. It is recommended that the Detector be pointed at the fire threat area for the fastest response times to the smallest size fire. When multiple Detectors are used to cover large areas, the Field-of-Views should overlap to insure complete coverage of the fire threat area. The Field-of-View is not, however, limited to 120 degrees. Larger fires outside the 120 degree Field-of-View may cause the SS4-AS/-AS2 to alarm. Based on the Inversed Square Law for radiated energy, a larger size fire outside the Detection Range and field-of-view may cause the Detector to alarm. Refer to Figure 1.



**Figure 1: Field of View, Horizontal, and Vertical.  
Sensitivity to 1 Sq. Ft. Gasoline Pan Fire**

### 1.5 Configuration Settings

The SS4-AS/-AS2 Detector may be reconfigured in the field and thus optimized for special applications. The configuration of the Detector is set from a DIP switches located on the middle circuit board of the Detector Module. The DIP switch settings for each configuration are listed in Table 2.

These configurable options include:

1. **Fire Verify Relay** - The Verify Relay may be disabled or enabled with several Verify Time settings. It also may be set to act as another Fire Relay. The Verify Time may be set from 5 to 30 seconds in 5 seconds increments. **The Factory setting: Verify Relay Disabled.**

When the Verify Relay is enabled and Verify Time is set the Verify Relay will energize and the Fire Relay will de-energize if the fire conditions are still present at the end of the Verify Time period. In the opposite case, the Detector will wait for 5 seconds plus another Verify Time period to test for the fire conditions. This wait and verify cycle will repeat 10 times or until the presence of the fire is confirmed. This concludes the verification process. If the presence of the fire is not established the Fire Relay will remain energized unless Non-Latching mode is set. In case a subsequent fire is detected the entire verification process will be repeated. The state of the Fire and Verify Relay after the verification process will depend on the choice between Latching and Non-Latching modes.

**NOTE:** When the Verify Relay is enabled and Verify Time is set, the Fire Relay will de-energize when the Verify Relay is energized.

2. **Latching / Non-Latching** - The Fire Relay and Verify Relay may be set in a Latching or Non-Latching mode. **The Factory setting for the SS4-AS is Latching and the SS4-AS2 is Non-Latching.**  
If the **SS4-AS or SS4-AS2 Latching** mode is selected, the Fire or Verify Relay will energize and Red LEDs will remain illuminated until the Detector power is cycled (power is turned off then on).  
If the **SS4-AS Non-Latching** mode is selected, the Fire or Verify Relay will de-energize after 10 seconds and the Red LEDs will remain illuminated until power is cycled.  
If the **SS4-AS2 Non-Latching** mode is selected, the Fire or Verify Relay will de-energize and the Red LEDs will turn-off after 10 seconds.
3. **Test Period** - This setting pertains to the Through-the-Lens test period, which may be set to 6 or to 30 minutes. The 6-minute period may be required in applications where the lens is frequently obscured. **The Factory setting is 30 minutes.**

**NOTE:** Utilization of the 6-minute period may adversely affect the source tube service life.

#### 4. IR-Only Enable / Disable

The IR only setting allows the Detector to declare a Fire on events where UV is not present or is obscured.

In applications where UV absorbing fumes are commonly present in high concentrations (these fumes are usually toxic and should require masks or breathing equipment), the Detector will function. **The Factory setting for IR-Only is Disabled.**

**WARNING:** This setting should be used only in special indoor applications.

5. **Fire Detection Range Setting** - 15, 30, 45, or 60 ft.. **The Factory setting is 45 ft..** This setting should be changed only if the Detector is located too close to the fire threat area and in the presence of abnormally high UV.

**NOTE:** Refer to section 1.4.2. for Detector range setting details for industry standards and specific fuels.

## 1.6 Testing

### 1.6.1 Special Conditions for Testing

The SS4-AS/-AS2 Detector should be tested immediately after installation, after repair or maintenance involving wiring or model replacement, after periodic maintenance, or after lens contamination has been identified.

### 1.6.2 Automatic Testing

Automatic SLR-BIT (Built In Test) "through-the-lens" self-testing is performed, during Detector operation, for virtually all-internal electronic systems at the selected Test Period (Section 1.5, 3). One of the Red LEDs will remain illuminated (Fault) to indicate contamination of the window lens, missing the protective Self-test grill, or when removing the enclosure cover.

### 1.6.3 Manual Testing

For manual testing, the SS4-AS/-AS2 Detector may be exposed to an actual industry standard open flame or to a Test Lamp simulating a fire. It is mandatory to use the Fire Sentry handheld UV/IR Test Lamp Model No. FT-2045 or FT-2145 with SS4 Fire Detectors. The FT-2045 and FT-2145 Test Lamps are housed in an Explosion-Proof enclosure, powered by internal rechargeable batteries, and designed for indoor and outdoor use. For additional information on the Test Lamp, refer to FSC Specifications SP0242 for the FT-2045 or 1505-008A for the FT-2145.

**NOTE:** Other manufacturers UV/IR Test Lamps should not be utilized to test FSC Detectors; conversely, the Models FT-2045 and FT-2145 Test Lamp should not be utilized for testing other manufacturer's Detectors.

## SECTION 2: INSTALLATION

### 2.1 Installation Instructions

This section describes the installation of the Model SS4-AS/-AS2 Detector for the Stand-Alone relay mode. It is recommended that junction boxes be used to wire the Detectors. Determine the configuration settings for the device(s) and the number of connections to be used (Fire, Fire Verify, Fault, and Power) depending on the desired Detection Range and the Fire Control Panel type used (refer to the Fire Control Panel Manual for details).

#### 2.1.1 Installation Precautions

The following precautions should be observed during installation of Model SS4-AS/-AS2 Detectors.

1. Make sure that the external electrical power is turned **OFF** before connecting the Model SS4-AS/-AS2 Detector.
2. Printed circuit board components of the Detector are susceptible to damage from electrostatic discharge. **Do not handle the Detector's module (and its printed circuit boards)** without adequate grounding and observing all necessary measures to prevent the effect of electrostatic discharge (ESD).

#### 2.1.2 Conduit Installation

When planning the conduit, follow these recommendations.

1. If only one of the two 3/4 inch NPT conduit openings on the Model SS4-AS/-AS2 Detector enclosure is used, seal the unused opening with a threaded plug and approved sealing material.
2. In areas where moisture may accumulate, install an approved conduit trap or drain.
3. A seal should be installed 6 inches from the **enclosure wall** for all applications requiring a Class I, Div. 1 Explosion-Proof rating.

#### 2.1.3 Wiring Recommendations

To prevent intermittent connections, Fire Sentry Corporation recommends using junction boxes. Install a junction box near each Detector location. Wire each Detector to its junction box. Use screw-down terminal strips inside the junction box to make the connections from the Detector's terminals to an FM Approved or UL listed Fire Alarm Panel. Also use FM/UL Approved junction boxes and terminal strips.

**NOTE:** Avoid wire splices. However, if wire splices are necessary, all splices should be soldered. Utilization of good wiring practices will simplify installation, improve reliability, and facilitate maintenance.

#### 2.1.4 Power Supply Considerations

The Model SS4-AS/-AS2 Detector uses 24 Volts DC at a maximum current of 75 mA (with the 4-20 mA option the maximum supply current is 95 mA). Make sure the Panel's power supply can withstand the load current of the total number of Detectors connected to it. For example, if 10 (ten) Model SS4-AS/-AS2 Detectors are connected to a single Panel's power supply (multiplying 75 mA by 10), the power supply must be able to withstand at least 750 mA + 10% (0.75 A + 10%). This load current must also be taken in consideration for calculating the Panel's 24-hour power backup requirements.

### 2.2 Installation Procedure

#### 2.2.1 Configuring and Wiring Detectors

To configure and wire a Model SS4-AS/-AS2 Detector, or to replace the Detector module, the module must be removed from the enclosure. After the wiring; configuration settings and wiring connections have been completed, the module should soon be re-installed in the enclosure to avoid contamination from the environment.

**NOTE:** Avoid touching the Detector sensors at the front of the Detector module. If touched accidentally, they should be cleaned per instructions of Section 3.2.

**2.2.2 Removing Detector From Its Enclosure.**

- a. With electrical power off (verify that electrical power is off by making sure that the Detector's LEDs do not blink for at least 15 seconds), loosen the Allen-head screw at the base of the metal enclosure top lens cover.
- b. Remove the cover and set it aside along with the "O" ring avoiding contamination.
- c. Loosen the three Philips head captive screws located on the top circuit board.
- d. Carefully lift out the module, sliding it along the three metal standoffs.

**2.2.3 Configuring the Detector Module.**

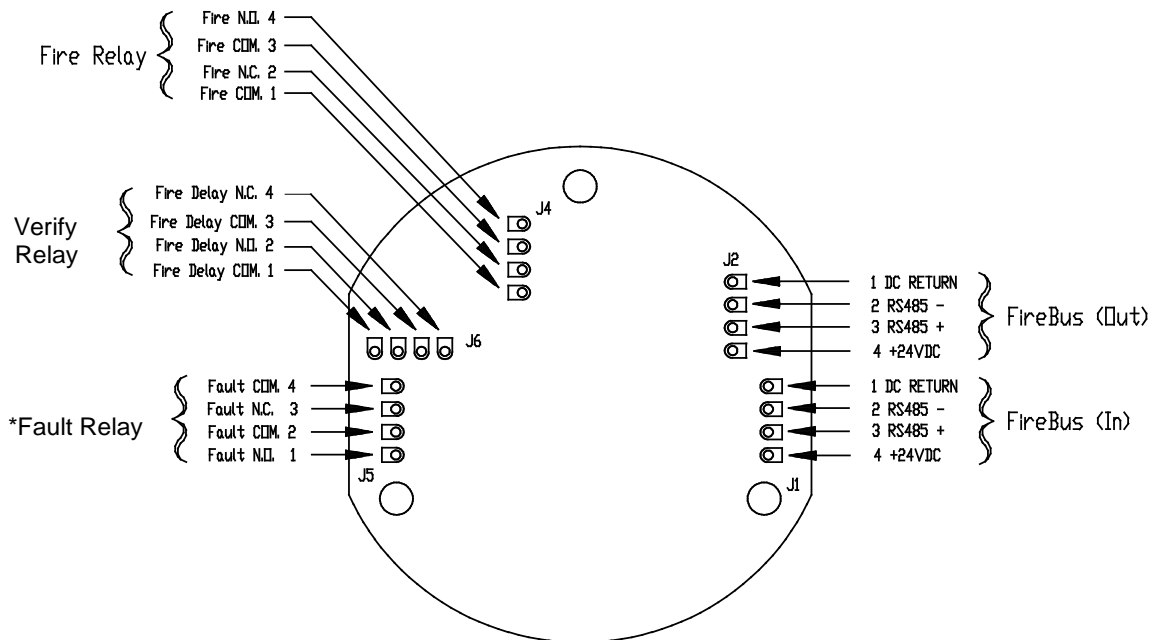
Set the DIP switches located on the center PC board of the Detector module to desired settings. Refer to Section 1.5 and Table 2 for DIP switch settings.

**2.2.4 Wiring the Detector Module.**

- a. Insert the cables into the metal enclosure base through one of the conduit openings. Refer to Figure 6.
- b. Connect the 24 Volt DC power supply wires to pins 1 (-) and 4 (+) of the J1 or J2 connector, observing the correct polarity. Refer to Figure 2. Firmly tighten down the two slotted screws with a small screwdriver taking care not to over-tighten the screws.

Pins 2 and 3 of the J1 and J2 connectors are the RS-485 interface used only for downloading the FirePic from the Detector's non-volatile memory, or for viewing the Tri-Mode Plot. It is recommended to wire pins 2 and 3 to a separate junction box and properly identify them for future use. A color-coded, multi-connector, shielded, UL-rated cable with 18 to 24-gauge wire is recommended for connecting to J1 or J2. The following color-coding is suggested as a guideline:

Pin 1	Pin 2	Pin 3	Pin 4
Black	Green or Blue	White or Yellow	Red
DC Return ( - )	RS-485( - )	RS-485( + )	+24 VDC Power ( + )



\* Fault relay is shown in the energized condition during normal operation (No Fault).

**Figure 2: Model SS4-AS/-AS2 Detector Wiring  
 (Bottom View of SS4-AS/-AS2 Detector Module)**

**2.2.5 Wiring the SS4-AS/-AS2 Detector for 4 or 20 mA Current Mode Operation (Optional)**

For applications requiring a 4-20 mA analog output, order the Detector with the Optional 4-20 mA Module Assembly, P/N MA420-4. The module must be Factory installed and certified along with the Detector.

The following analog output levels are available from the Detector equipped with the MA420-4 Module. The module is capable of driving a maximum load impedance of 283 Ohms:

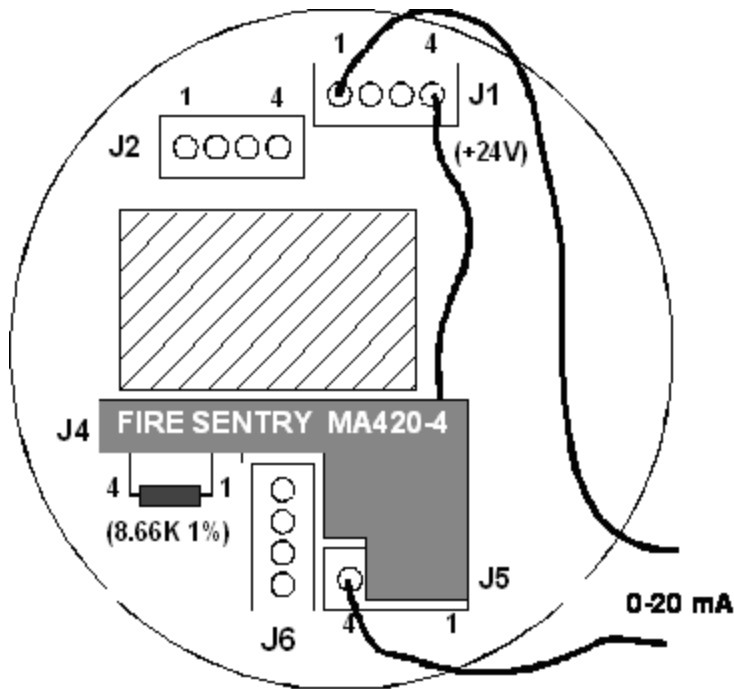
<b>NORMAL Operation</b>	<b>4.0 mA +/- 0.6 mA</b>
<b>ALARM</b>	<b>20.0 mA +/- 0.6 mA</b>
<b>FAULT</b>	<b>≤ 0.6 mA</b>

To use the analog output of an SS4-AS/-AS2, make the following connections:

<b>24 V DC</b>	<b>J2, pin-4</b>
<b>24 V DC RTN</b>	<b>J2, pin-1</b>
<b>4-20 mA output</b>	<b>J5, pin-4 (+)</b>
<b>4-20 mA RTN</b>	<b>J1, pin-1 (-)</b>

The fire Alarm and fault relays of the Detector equipped with the MA420-4 Module are not usable. However, the Detector's Verify Relay may still be used as a separate Fire Alarm output. Refer to Table 2: "Configuration DIP Switch Settings" to set DIP switches properly.

**NOTE:** J1 is a "loop through" connection to J2. The +24 V supply is connected to J2 pin 4. The red lead connection of the MA420-4 must stay in J1, pin-4. Also, the 8.66 K Ohm supervising resistor must remain connected at the Fire Alarm relay contacts J4 pin-4 to J4 pin-1, or a Fault condition will occur.



**Figure 3: SS4 Detector Module with MA420-4 Installed (Rear View)**

**2.2.6 Wiring the Detector Relays**

- a. Insert relay cables into the Detector enclosure base through one of the conduit openings. Refer to Figure 6.
- b. **Fire Alarm Relay** - Connect wires for Fire Alarm to the appropriate J4 terminals of the Detector. For **Normally Open** relay contacts, install wires into pins 3 and 4 and firmly tighten down the slotted screws with a small screwdriver. The Fire Alarm relay is de-energized during normal operation and will energize when detecting a fire.
- c. **Fault Relay** – Connect wires for Fault to the appropriate terminals of the J5 connector. For **Normally Closed** relay contacts, install wires into pins 3 and 4 and firmly tighten down the slotted screws with a small screwdriver. The fault relay is *energized* during normal operation and with no fault detected, as shown in Figure 2. The fault relay will *de-energize* when a fault is detected.

**2.2.7 Replacing the Detector Module in the Enclosure.**

- a. Carefully re-install the module over the three metal standoffs and screw it down with the three captive screws to the standoffs.
- b. If necessary, clean the Detector' sensors and windowed cover per instructions of Section 3.2.
- c. Securely screw down the metal enclosure top windowed cover and tighten the Allen-head "tamper-proof" screw.

## 2.3 Enclosure Installation (optional)

### 2.3.1 Installing the Detector on the Swivel Mount (SM2) or SS Extra Duty (SM4) Swivel Mount

- a. Select fasteners for the swivel mounting such that they will secure it to the type of material at the enclosure location.
- b. Mount the swivel-mount to the wall assuring correct orientation.
- c. Install the mounting bracket onto the Model SS4-AS/-AS2 Detector enclosure using the #1/4-20 or #6 mm screws and nuts provided. If oriented correctly, the outside contours of the mounting ears on the Detector enclosure and the ends of the bracket will match. The large diameter of the threaded insert should face the enclosure.
- d. Screw the enclosure/bracket assembly onto the ball or swivel stud. Turn the Detector until the stud bottoms against the enclosure. **Do not tighten.** While holding the enclosure, tighten the jam nut against the bracket.
- e. While holding the enclosure, loosen the socket head screw on the SM2 swivel-mount or swivel release bolt SM4. Position the enclosure in such a way that the conduit openings are located horizontally at the bottom. Point the enclosure in the desired direction and tighten the appropriate hardware.

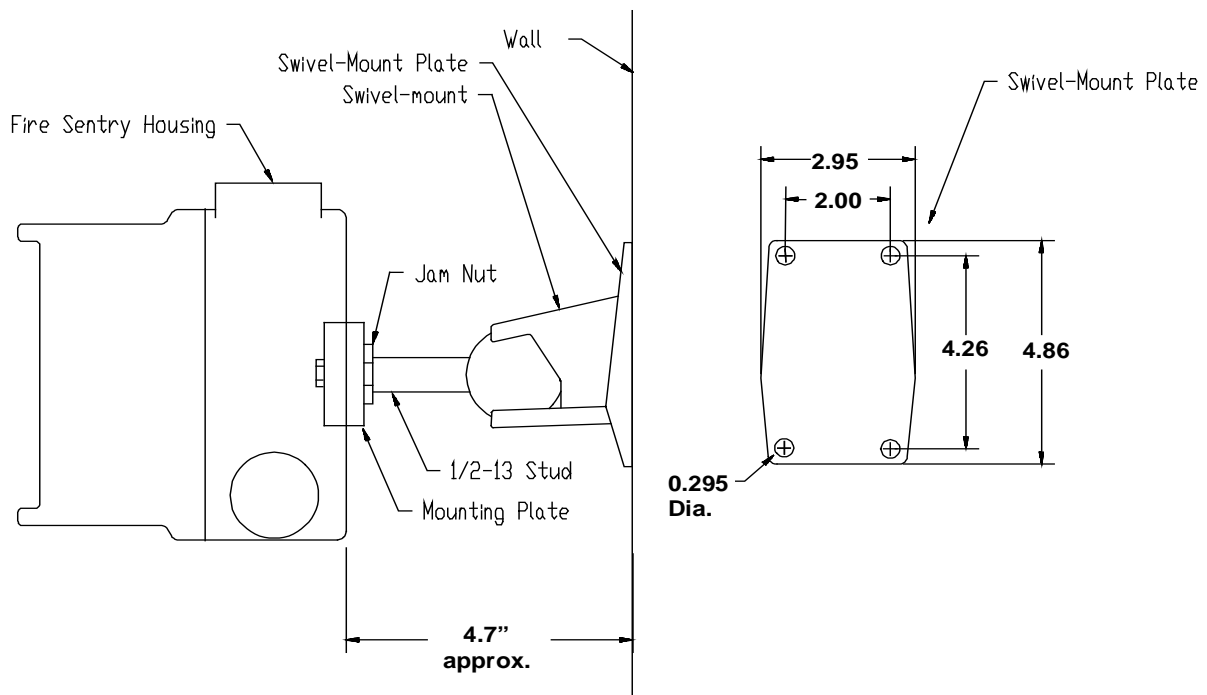
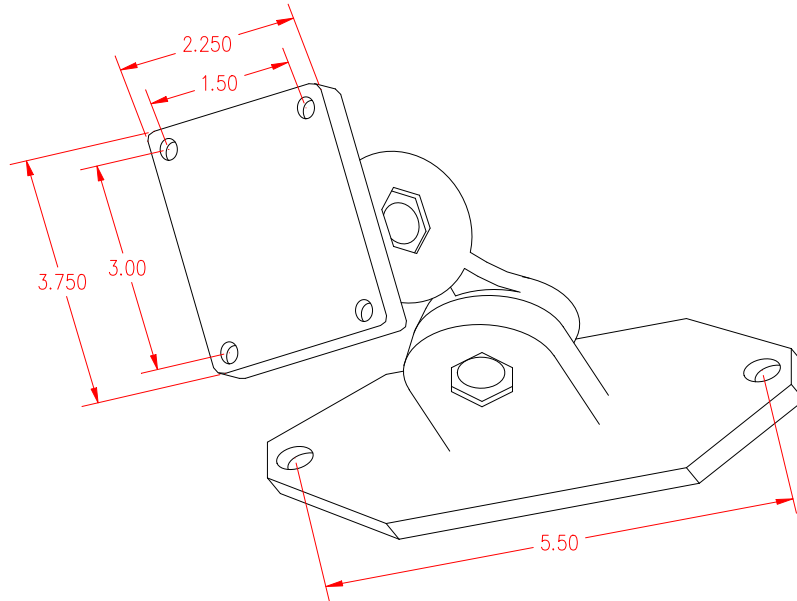
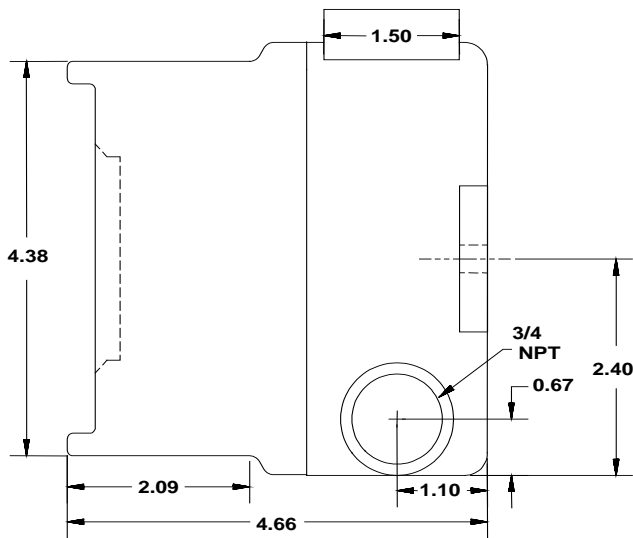


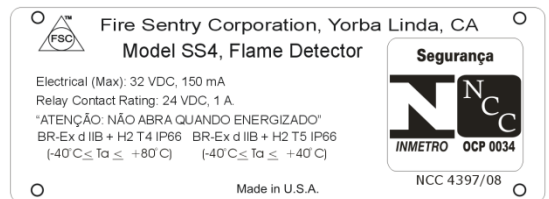
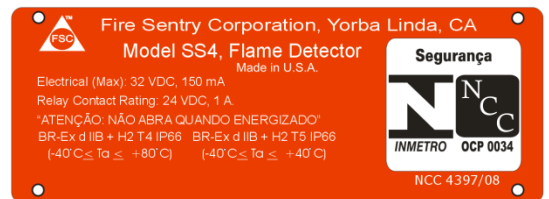
Figure 4: Model SM2 Swivel Mount



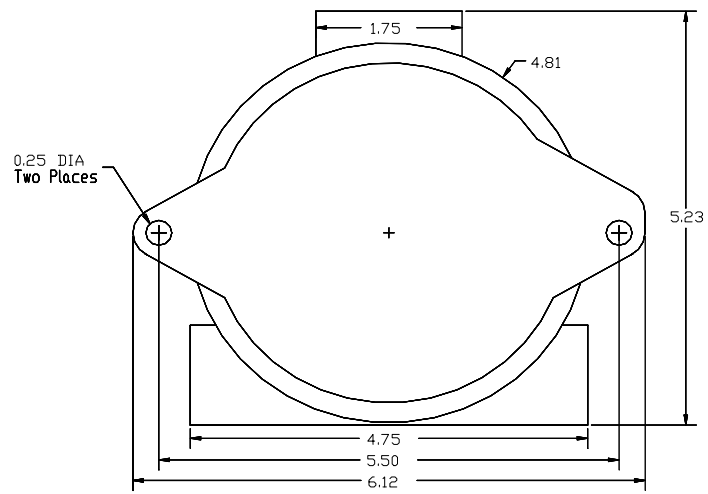
**Figure 5: Model SM4 Stainless Steel Swivel Mount**



**Figure 6: Model SS4-AS/-AS2 Detector Enclosure (Side View)**



**Figure 7: Model SS4-AS/-AS2 Label**



**Figure 8: Model SS4-AS/-AS2 Detector Enclosure - Rear View**

## SECTION 3: TROUBLESHOOTING AND MAINTENANCE

### 3.1 Model SS4-AS/-AS2 Detector Faults

The Model SS4-AS/-AS2 Detector issues a Fault (or Trouble) condition by de-energizing the Fault Relay (J5 connector). The following are Detector Faults:

- a. **Temperature Fault:** The Detector faults if the internal temperature during operation rises above 85°C or falls below -40°C causing both LEDs to blink rapidly. Corrective action for this type of fault requires factory re-certification.
- b. **Excessive Input Voltage Fault:** The Detector faults if the input voltage is too high (greater than 45 Volts) causing both LEDs blink rapidly. Corrective action for this type of fault requires factory re-certification.
- c. **Low Input Voltage Fault:** The Detector faults if the input voltage too low. The user should check the voltage between Pins 1 and 4 of the power connector J1 or J2. In this case one LED is on until the fault is corrected. If the voltage is below 15 Volts the user should check the wiring and the power supply.
- d. **No Power Fault:** The Detector faults if the input voltage is interrupted or turned off causing the absence of LED indication. The user should measure the voltage between Pins 1 and 4 of the power connector J1 or J2. If none or very low voltage is measured, the user should check the wiring and the power supply.
- e. **Detector Fault:** The Detector faults if its Optical Sensors fail the automatic built-in “through the lens” test. In this case one LED is on until the fault is corrected. The user should first clean both inside and outside of the lens thoroughly, then clean the exposed surface of the Detector sensors and the protective grill mounted on the outside of the housing cover. If the fault has not been eliminated after re-assembly and powering up for 10 to 15 minutes, factory service may be necessary.
- f. **Relay Fault:** The Detector faults if one of its Relay circuits fails. In this case one LED is on until the fault is corrected. The user should return the unit to the factory for service.
- g. **Self-Checking Fault:** The Detector faults if its internal microprocessor finds a failure during self-checking of the hardware and software. In this case one LED is on until the fault is corrected. This type of fault may be caused by a number of reasons. The user should verify proper grounding of the device and the absence of noise on the power cables. If fault persists the user should return the Detector to the factory for service.
- h. **Analog “0” current:** All the above faults will produce an output current loss ( $0 \pm 0.6\text{mA}$ ) with the 4-20 mA module option.

### 3.2 Cleaning Windowed Enclosures and Detectors

The optical window (lens) of the Model SS4-AS/-AS2 Detector should be cleaned periodically on a regular maintenance schedule. For clean area applications, perhaps monthly cleaning schedule will be sufficient. For extremely contaminated application environments, such as truck filling stations with presence of black carbonaceous smoke, daily cleaning schedule may be necessary.

Clean the window of the Detectors each time they are handled, the windows appear contaminated, fails Built-In-Test, or the Detector fails an end-to-end test with a handheld UV/IR Test Lamp FT2045 or FT-2145. If necessary, clean the Detector Module Sensors each time the Detector has been disassembled for wiring or replacement.

Use a blast of an air hose or an oil-free cloth to clean the enclosure window. Oil degrades the performance of UV Detectors. Occasionally, the use of a solvent, such as alcohol is acceptable. No disassembly of the Detector is required.

**DO NOT USE SILICONE-BASED OR COMMERCIAL WINDOW CLEANING PRODUCTS.  
THESE WILL DEGRADE THE MODEL SS4-AS/-AS2 DETECTOR PERFORMANCE.**

### 3.3 Personnel Training

Troubleshooting of the Model SS4-AS/-AS2 Detector should be performed only by qualified authorized personnel observing all standard safety practices. Although the Detector operates on safe 24 Volts DC, the FM Approved or UL listed Fire Alarm Panel's power supply may operate on life threatening 120 or 240 Volts AC.

**WARNING: Hazardous voltages may be present during testing procedures. Serious injury or death may result due to failure to observe safety precautions.**

**CAUTION: Model SS4 Detector modules and their components are susceptible to permanent damage due to electrostatic discharge (ESD). Do NOT handle a module without adequate grounding precautions.**

### 3.4 Detector Repair

Return the defective module to the factory for repair service.

**THERE ARE NO USER SERVICEABLE PARTS IN THE DETECTOR MODULE**

If the Model SS4-AS/-AS2 Module must be shipped back to the factory for repair, it **MUST** be packed in static protective material. If not available, the Module should be carefully wrapped with aluminum foil. An RMA (Return Material Authorization) is required for all returns to the factory. Contact Fire Sentry Customer Service at 714-694-2700 or your Distributor for an RMA number before shipping a unit back to the factory.

## DETECTOR PINOUT DATA

**TABLE 1: Stand-Alone Model SS4-AS/-AS2 Detector Connectors - Pinouts**

### **J1: DETECTOR INPUT POWER**

<b><u>PIN</u></b>	<b><u>DESCRIPTION</u></b>
<b>1</b>	DC Return (-)
<b>2</b>	RS-485 (-)*
<b>3</b>	RS-485 (+)*
<b>4</b>	Power (+24 Volts DC)

### **J2: DETECTOR POWER OUT**

<b><u>PIN</u></b>	<b><u>DESCRIPTION</u></b>
<b>1</b>	DC Return (-)
<b>2</b>	RS-485 (-)*
<b>3</b>	RS-485 (+)*
<b>4</b>	Power (+24 Volts DC)

\*RS-485 Connection to an optional interface unit for viewing FirePic and TriMode Plot.

### **J4: FIRE RELAY**

<b><u>PIN</u></b>	<b><u>DESCRIPTION</u></b>
<b>1</b>	Fire Relay Common
<b>2</b>	Fire Relay Normally Closed
<b>3</b>	Fire Relay Common
<b>4</b>	Fire Relay Normally Open

### **J5: FAULT RELAY (Energized)**

<b><u>PIN</u></b>	<b><u>DESCRIPTION</u></b>
<b>1</b>	Fault Relay Normally Open
<b>2</b>	Fault Relay Common
<b>3</b>	Fault Relay Normally Closed
<b>4</b>	Fault Relay Common

### **J6: FIRE VERIFY RELAY**

<b><u>PIN</u></b>	<b><u>DESCRIPTION</u></b>
<b>1</b>	Verify Relay Common
<b>2</b>	Verify Relay Normally Closed
<b>3</b>	Verify Relay Common
<b>4</b>	Verify Relay Normally Open

**TABLE 2: Configuration DIP Switch Settings**

**Verification Time**

DIP SWITCH 1	DIP SWITCH 2	DIP SWITCH 3	DESCRIPTION
<b>closed</b>	<b>closed</b>	<b>closed</b>	Verify is disabled and the Verify Relay is unused. <b>Factory setting</b>
closed	open	open	Verify is enabled and the Verify time is 5 seconds.
open	closed	open	Verify is enabled and the Verify time is 10 seconds.
closed	closed	open	Verify is enabled and the Verify time is 15 seconds.
open	open	closed	Verify is enabled and the Verify time is 20 seconds.
closed	open	closed	Verify is enabled and the Verify time is 25 seconds.
open	closed	closed	Verify is enabled and the Verify time is 30 seconds.
open	open	open	Verify is disabled and the Verify Relay operates as a second Fire Relay.

**Latching**

DIP SWITCH 4	DESCRIPTION
open	Non-Latching mode. If Verify is enabled then the Verify Relay will de-energize approximately 10 seconds after it energizes. If Verify is disabled then the Fire Relay(s) will de-energize approximately 10 seconds after it energizes. <b>The SS4-AS2 Factory setting is Non-Latching</b>
closed	Latching mode. If Verify is enabled then when the Verify Relay energizes it will remain energized until the Detector is reset. If Verify is disabled then when the Fire Relay energizes it will remain energized until the Detector is reset <b>The SS4-AS2 Factory setting is Latching</b>

**IR-Only Enable**

DIP SWITCH 5	DESCRIPTION
<b>open</b>	Fire Alarm declaration <b>UV and IR</b> energy. <b>Factory setting</b>
closed	A Fire Alarm may be declared <b>without UV</b> being detected.

**Test Cycle**

DIP SWITCH 6	DESCRIPTION
<b>open</b>	Testing of the Lens occurs every 30 minutes. <b>Factory setting</b>
closed	* Testing of the Lens occurs every 6 minutes

\* Utilization of the 6-minute period may adversely affect the source tube service life.

**Fire Range**

DIP SWITCH 7	DIP SWITCH 8	DESCRIPTION
open	open	Set to detect an industry standard 1 sq. ft. fire at 15 ft. on axis.
closed	open	Set to detect an industry standard 1 sq. ft. fire at 30 ft. on axis.
<b>open</b>	<b>closed</b>	Set to detect an industry standard 1 sq. ft. fire at 45 ft. on axis. <b>Factory setting</b>
closed	closed	Set to detect an industry standard 1 sq. ft. fire at 60 ft. on axis.

## SECTION 4: OPTIONAL ACCESSORIES

### 4.1 Air Shield for Applications in Contaminated Environment (Part No. DASA1-P)

For installation in areas with high levels of airborne contaminants the Detector Air Shield should be mounted to the Flame Detector housing. The Airline fitting accepts ¼" O.D. nylon tubing for an instrument grade air supply of 5 to 15 psi @ 6 cubic ft. per minute.

### 4.2 PC Software Kit (2029-INTERFACE-KIT)

PC DOS Software Kit installation facilitates access to FirePic™ and SnapShot™ and provides Detectors operation monitoring capability through the Detector's RS485 connections. The Kit includes an Interface Box, a PC software diskette, an RS485 and RS232 cables, and a 120 VAC/12 VDC charger. Optional 220 VAC/12 VDC charger is also available upon request.

### 4.3 4-20 mA Option (MA420-4)

The 4-20 mA module is by Factory Mutual (FM) recognized device to be used with all approved SS4 type Detectors. Fire Sentry is required by FM to install this device at the factory and certifies this option along with the Detector. Refer to Section 2.2.5 for system wiring details.

NOTE: Converting Field units of the SS4 Stand-alone relay type to the 4-20 mA version requires the unit be returned to the factory for installation and certification.

### 4.4 Detector Mounts (SM2 or SM4)

The heavy duty steel Swivel Mount (SM2) or extra duty Stainless Steel Swivel Mount (SM4) may be utilized for mounting the SS4 type Detectors. Refer to Section 2.3 for details.

### 4.5 Test Lamp (FT2045 or FT-2145)

This battery powered, portable, explosion-proof handheld test source for remote activation of the SS4 type Detectors simulates the radiant energy emitted by an actual fire in order to test the Detectors operation without the need for an open flame. The unit is rechargeable with a 120VAC / 12VDC charger. Optional 220 VAC/12 VDC charger is also available upon request.

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