

Installation Guide and Operating Manual

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

**Models SS2-A, SS2-AN, SS2-AH, and SS2-AM
Stand-Alone Mode**

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The detector must be installed only by qualified professional personnel in accordance with local codes.

The protection provided by the gas detector may be impaired if it is used in a manner not specified by Honeywell Analytics.

ACCTTL, ALERT-1, ALARM-2, ALERT-1: ALARM 2, ALERT-1: ALARM-2, ATAG, Clean Room Sentry, COP-i, Complete Optical Path Integrity, CM1, CM1-A, DartLogic, FireLogic, Fire Signature Analysis, FireBusI, FireBusII, FirePic, FirePicII, FirePicIII, FirePix, FirePicture, FSC, Fire Sentry Corporation, Fire Sentry Corp., FSX, All FSX Nomenclature Variations (such as: FS2, FS2X, FS3, FS3X, FS4, FS4X, FS5, FS5X, FS6, FS6X, FS7, FS7X, FS8, FS8X, FS9, FS9X, FS10X, FS10X, FS11, FS11X, FS12, FS12X, FS14, FS14X, FS15, FS15X, FS16, FS16X, FS17, FS17X, FS18, FS18X, FS19, FS19X, FS20, FS20X, FS24, FS24X, FS24XN, FS26, FS26X, FS26XN), FS7-2173-2RP, FS System 7, FS System 10, FS7-2173, FS7-2173-RP, FS2000, FS System 2000, High Speed Flame & Surveillance Detector, Multi-Spectrum QuadBand Triple IR, Multi-Spectrum TriBand, Multi-Spectrum Tri-Band, Near Band Infrared, Near Band IR, NearBand IR, QuadBand IR, Room Sentry, RS, RS2, SM2, SM3, SS, SS2, SS2X, SS2-A, SS3, SS3-A, SS3X, SS4, SS4-A, SS4X, SnapShot, SLR-BIT, SuperBus, SuperSentry, System 2000, Tri-Mode Plot, QuadBand Triple IR Plus, TriBand, Tri-Band, "FS & FSC triangle logo's", WBIR, Wide Band Infrared, WideBand IR, Wide Band IR

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Symbol Definitions

The following table lists those symbols used in this document to denote certain conditions.




Symbol	Definition
	ATTENTION: Identifies information that requires special consideration.
 CAUTION	Indicates a situation which, if not avoided, may result in equipment or work (data) on the system being damaged or lost, or may result in the inability to properly operate the process.
	CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. CAUTION: Symbol on the equipment refers the user to the product manual for additional information. The symbol appears next to required information in the manual.

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APPROVALS

The Model SS2 Optical Fire Detectors have been manufactured in compliance with the requirements of the ISO-9001 standard and have been approved by:

- **California State Fire Marshal (CSFM)**
- **Factory Mutual (FM)**
- **Canadian Standards (CSA)**
- **CENELEC approval by FM Approvals Ltd. Certification Service in compliance with the ATEX Directive.**



Read and understand this manual before installing or operating equipment.

Marking: Class I, Div. 1 & 2, Groups A, B,C, & D
Class II, Div. 1 & 2, Groups E, F, & G
Class III

Class I , Zone 1 AEx d IIC

Ex d IIC; Ex tb IIIC T135°C

SECTION 1: FAMILIARIZATION

1.1 Introduction

The Model SS2 Multi-Spectrum Electro-Optical Fire/Flame Detectors may be used in the FS2000 Fire Early Warning System or in the Stand-Alone mode. Detectors of this model are housed in Explosion-Proof Class I, Div. 1 enclosures. The only difference between an FS2000 System Model SS2 Detector and a Stand-Alone SS2 Detector is in the wiring. The wiring differences are described in Sections 1.2 and 1.3.

Model SS2-A Detectors have a latching relay. They are used for hydrocarbon and non-hydrocarbon fires

Model SS2-AN Detectors have a non-latching relay. They are otherwise identical to the SS2-A.

Model SS2-AH is the same as Model SS2-A except for the programming to assure High Speed millisecond response to non-UV emitting sodium azide fires (in addition to the normal fire response) for air bag industries. The Detector is housed in a Class I, Div. 1 Explosion-Proof enclosure. For more information, refer to corresponding specification sheets.

Model SS2-AM is the same as Model SS2-A except for the programming to assure Ultra High Speed millisecond response to normal non-sodium azide burning materials radiating UV and IR energy for munitions and air bag industries. The Detector is housed in a Class I, Div. 1 Explosion-Proof enclosure. For more information, refer to corresponding specification sheets.

There are operational advantages when the Detector is connected to an FS2000 Controller and FireBus. The Detector also has flexibility to be re-configured in the field. It is simple to install and operate due to built in self-testing. The maintenance consists in wiping the lens and performing periodic testing required by the manufacture of the Fire Control and Suppression Systems.

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1.2 Stand-Alone Operation

The Model SS2 Detectors may be connected to an approved Fire/Security Panel for Stand-Alone operation. The Detectors operate on 24 Volts DC. In this mode the Detectors utilize Fire and Fault relays to interface to FM/UL approved 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 operation as part of FS2000 System.

1.3 FS2000 System Operation

For FS2000 System operation, the Detector's Fire and Fault signals are sent digitally to the FS2000 System Controller using the four wire FS2000 FireBus. The FireBus provides the 24 Volts DC power for the Detector and RS-485 digital communication (Refer to Honeywell Analytics 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 SS2 Detector is connected to the FS2000 System using FireBus communication, the Controller **automatically** de-energizes the Detector's Fault relay.

1.4 Overview

1.4.1 Model SS2 Detector Status Indications

The Model SS2 Multi-Spectrum Optical Fire/Flame Detectors are microprocessor-based devices, which see ultraviolet (UV), visible (VIS), and infrared (IR) spectral regions. The Detector's logic processor is capable of quick response to fires while virtually eliminating false alarms. The Model SS2 Detector has a 120° field-of-view.

There are two (2) LEDs on the Model SS2 Detector for indication of the Detector status. During Normal Operation both LEDs will blink every 10 seconds.

If a Model SS2 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.

Faults caused by Excessive Input Voltage or temperatures outside the operating temperature range require factory re-certification. Both LEDs rapidly blinking (with frequency about 2 Hz) indicate faults requiring re-certification.

If a Model SS2 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 is being permanently stored in the Detector's solid-state memory. (FirePic is the several seconds of Detector data, which precede an alarm event.)

1.4.2 Detection Range

The detection range of the detector is 60 feet to an industrial standard of one square foot gasoline pan fire within 5 seconds.

1.4.3 Field-of-View

The Detector incorporates a minimum 120-degree conical Field of View. The fire emissions received by the Detector diminish at extreme edges of the field-of-view. For the fastest response times to the smallest size fire,

the Detector should be pointed to the fire threat area. When multiple detectors are used to cover large areas, the Fields-of-View should overlap. The Field-of-View is not limited to 120 degrees. Larger fires outside

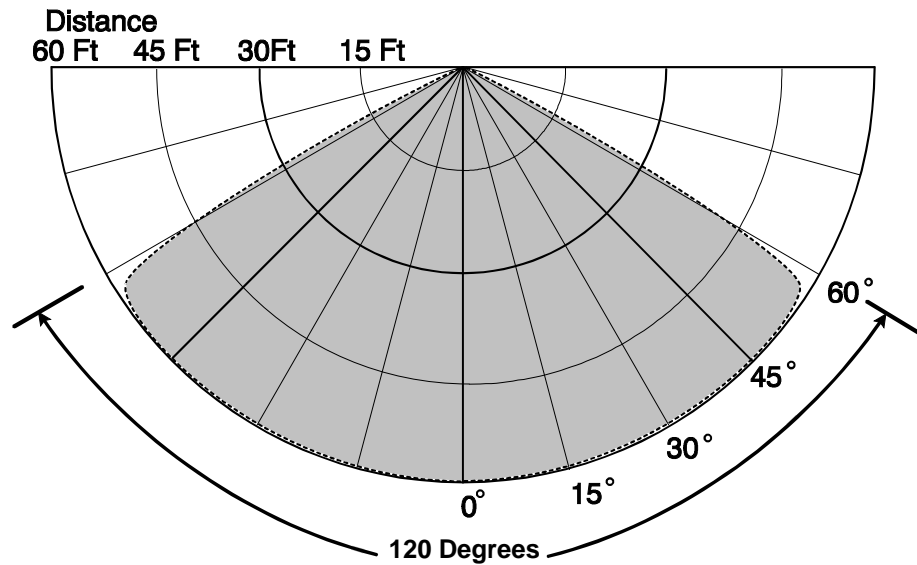


Figure 1. Field of View, Horizontal and Vertical.
Maximum Sensitivity to 1 Sq. Ft. Gasoline Pan Fire

1.5 Testing

1.5.1 Special Conditions for Testing

The SS2 Detector should be tested immediately after installation, after repair or maintenance involving wiring or module replacement, after periodic maintenance, or after lens contamination has been identified.

1.5.2 Automatic Testing

The Model SS2 Detectors contain an internal source for self-testing. For testing the Model SS2 Detectors end-to-end for both optical path and window cleanliness, use a Honeywell Analytics Model FT-2045 Test Lamp.

1.5.3 Manual Testing

For manual testing the Detector may be exposed to an actual industry standard open flame or to a Test Lamp simulating a fire. For Honeywell Analytics model SS2 Multi-Spectrum Fire Detectors, it is mandatory to use the handheld UV/IR Test Lamp, Model No FT-2045 or FT-2145.



NOTE: Other manufacturers UV/IR Test Lamps should not be utilized to test Honeywell Analytics Detectors, and Honeywell Analytics Model FT-2045 and FT-2145 Test Lamps should not be utilized for testing other manufacturer's 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 Honeywell Analytics Specification SP0242 for the FT-2045 or 1505-008A for the FT-2145.

SECTION 2: INSTALLATION

2.1 Installation Procedure

This section describes the installation of the Model SS2 Detectors for the Stand-Alone mode. Utilization of junction boxes is recommended for the Detectors wiring.

2.1.1 Installation Precautions

The following precautions should be observed during installation of Model SS2 Detectors.

1. Make sure that external electrical power is turned **OFF** before connecting to the Detector.
2. **Do not handle the Detector's module (with its printed circuit boards) without grounding.** Printed circuit board components are susceptible to damage from electrostatic discharge.

2.1.2 Conduit Installation

The following recommendations should be observed when planning conduits.

1. In case only one of the two 3/4 inch NPT conduit openings on the 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. For applications requiring a Class I, Div. 1 Explosion-Proof rating, install a seal within 6 inches of the enclosure.

2.1.3 Wiring Recommendations

Install a junction box near each Detector location. Wire each Detector to the junction box. Use screw-down terminal strips inside the junction box to make the connections to the Detector's terminals and an Approved Fire Alarm Panel. Use only approved junction boxes and terminal strips.

Avoid wire splices. However, if wire splices are necessary, Honeywell Analytics recommends soldering all splices. The use of good wiring practices will greatly improve the ease and reliability of installation, and facilitate servicing.

2.1.4 Power Supply Considerations

Model SS2 Detectors use 24 Volts DC at a maximum current of 75 milliamps. Make sure that the Panel's power supply can handle the current load of the total number of Detectors connected to it. For example, if 10 Detectors are used on one Panel's power supply, (multiply 75 mA 10 times) the Panel's power supply must be able to handle at least 750 mA (0.75 A). This current load must also be considered while calculating the Panel's 24-hour backup power requirements.

2.2 Enclosure Installation (Optional)

2.2.1 Swivel Mount (SM2):

- 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 SS2 Detector enclosure using the # $\frac{1}{4}$ -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. 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.

2.2.2 Install Conduit (If not already installed).

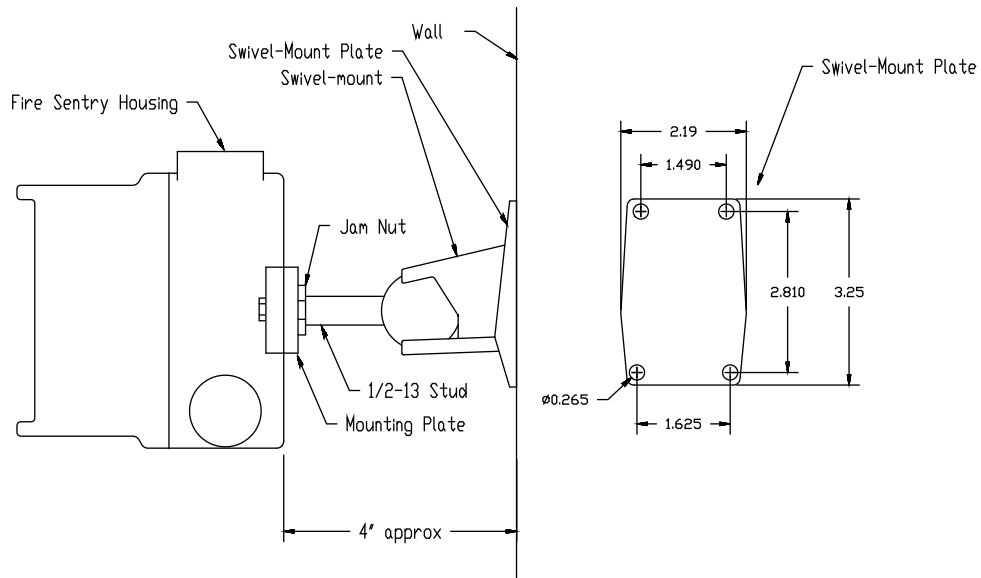


Figure 2. Model SS2 Detector with SM2 Swivel Mount

2.3 Wiring Detectors

To wire a Model SS2 Detector, remove its module from the enclosure. After wiring connections re-install the module in the enclosure.

Observe static protection safeguards while handling Model SS2 Detector modules. Wear a grounded wrist strap.



NOTE: The supply connection wiring shall be rated at least 10°C above the rated service temperature (95°C for T4 applications and 85°C for T5 applications). See Figures 6 and 7 on Page 11 of this Instruction Manual.



Caution: Do not touch the detector elements on the front of the Model SS2 Detector modules. If touched accidentally, clean them per instructed of Section 3.2.

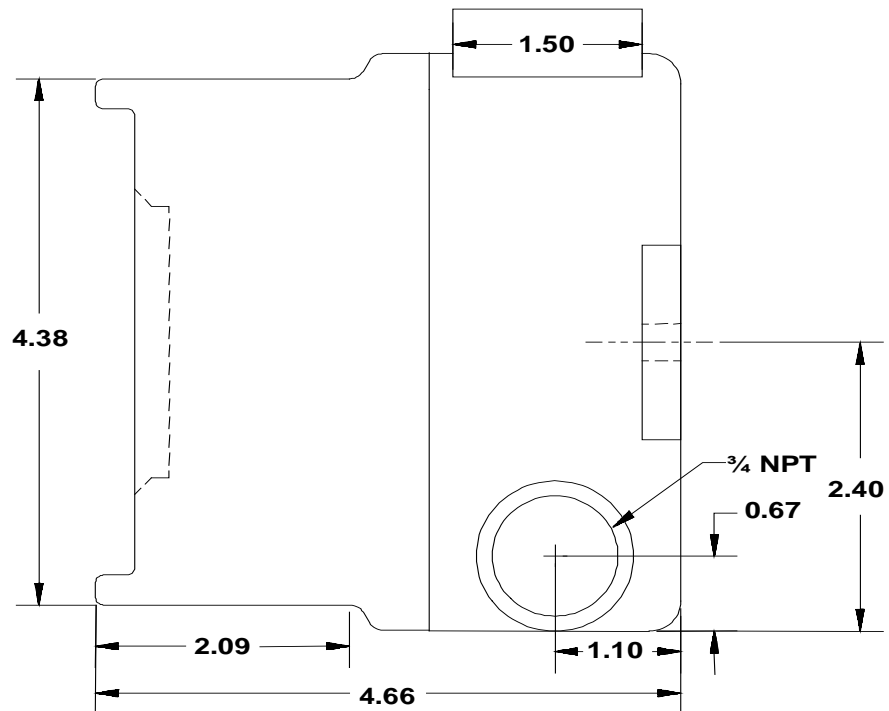


Figure 3: Model SS2 Detector Enclosure - Side View

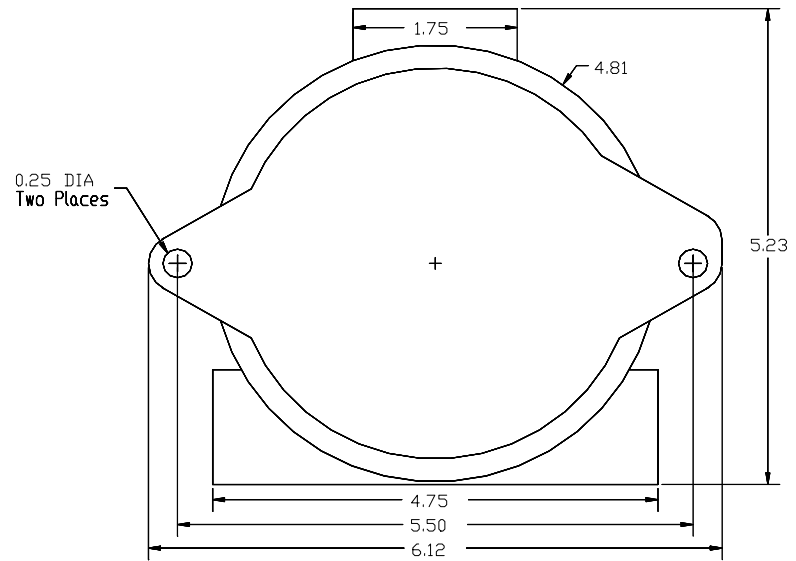


Figure 4. Model SS2 Detector Enclosure - Back View

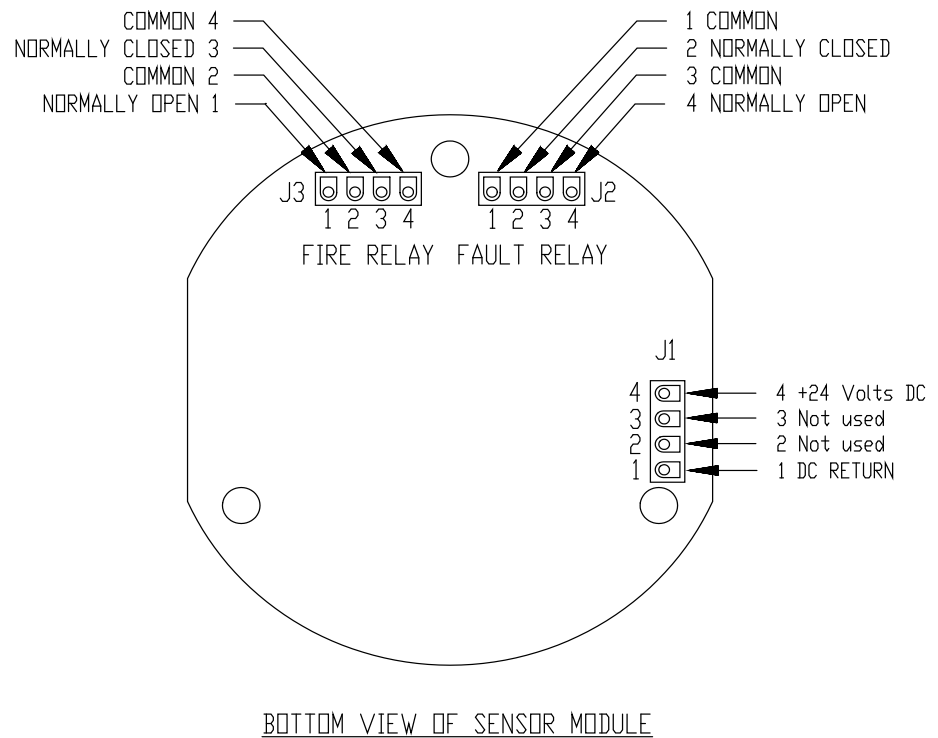


Figure 5. Models SS2-A, SS2-AN, SS2-AH, and SS2-AM.

1. REMOVE THE DETECTOR MODULE FROM ITS ENCLOSURE.

- a. With electrical power off, loosen the Allen-head screw at the base of the metal enclosure top windowed cover. (Make sure that electrical power is off by observing that the Detector's LED's do NOT blink for at least 15 seconds.)
- b. Unscrew the top windowed cover and set it aside with its "O" ring. Keep both clean.
- c. Loosen the modules' three captive screws; screws should not be removed from the circuit board.
- d. Carefully lift out the module, sliding it along the three metal standoffs.

2. WIRE THE DETECTOR MODULE.

- a. Insert the cables into the metal enclosure base through one of the conduit openings.
- b. Connect the 24-volt D.C. Power Supply wires to the J1 connector and firmly tighten down the two slotted screws with a small screwdriver. **DO NOT CONNECT ANY WIRES TO J1-Pin 2 or J1-Pin 3.** Do NOT over tighten to prevent stripping or breaking. (See Figure 4 above.)

Pin 1	Pin 2	Pin 3	Pin 4
Black	Green or Blue	White or Yellow	Red
Ground (-)	NOT USED	NOT USED	Power (+)

3. WIRE THE DETECTOR FIRE RELAY (All Models)

- a. Insert the Fire Alarm relay cables into the metal enclosure base through one of the conduit openings.
- b. Connect the wires to the four pin WECO terminal J3. Install the wires into J3 Pins 1 and 2 (for Normally Open relays) and firmly tighten down the slotted screws with a small screwdriver.

4. WIRE THE DETECTOR FAULT RELAY (SS2 -AM and -AH)

- a. Insert the Fault relay cables into the metal enclosure base through one of the conduit openings.
- b. Connect the wires to the four pin WECO terminal J2. Install the wires into J2 Pins 1 and 2 and firmly tighten down the slotted screws with a small screwdriver.

5. REPLACE THE DETECTOR MODULE INTO THE ENCLOSURE.

- a. Carefully install the module back over the three metal standoffs and screw it down with the three chrome-plated screws into the standoffs.
- b. If necessary, clean the detectors and windowed cover according to the instructions in Section 3.2.
- c. Screw down the metal enclosure top windowed cover until secure and tighten the allen-head "tamper-proof" screw.

SECTION 3 / MAINTENANCE AND TROUBLESHOOTING

3.1 Personnel

Troubleshooting, testing, and maintenance must be performed only by qualified authorized personnel observing standard safety practices. Although Model SS2 Detectors operate on safe 24 Volts DC, the FM/UL Approved Fire Alarm Panel's power supply may operate on a life-threatening 120 or 240 Volts AC.



WARNING: Hazardous voltages may be present during testing procedures. Serious injury or death may result if personnel fail to observe safety precautions.



CAUTION: Model SS2 Detector modules and their components are susceptible to permanent damage due to electrostatic discharge (ESD).

DO NOT handle a module without adequate grounding precautions.

If Model SS2 Module must be shipped back to the factory for repair, it **MUST** be packed in static protected material. If static protected material is not available, carefully wrap the Module with aluminum foil.

3.2 Cleaning Windowed Enclosures and Detectors

Optical windows on the Model SS2 Detector should be cleaned periodically according to a regular maintenance schedule. For clean area applications, perhaps monthly basis 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 Model SS2 Detectors each time they are handled, the windows appear contaminated, or the Detector fails an end-to-end test with a Handheld Tester.

Clean the Detector Module's Sensor each time Detectors have 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 Model SS2 Detector is required.

⚠ CAUTION **DO NOT** USE SILICONE-BASED OR COMMERCIAL WINDOW CLEANING PRODUCTS. THEY WILL DEGRADE THE MODEL SS2 DETECTOR PERFORMANCE.



WARNING: Potential electrostatic hazard. Do not rub with dry cloth.

3.3 SS2-A, -AN, -AH, and -AM Detectors' Faults

Model SS2 Detectors will indicate a Fault (or Trouble) condition by de-energizing its Fault Relay (J2 connector). The following are Detector Faults:

- a. **Temperature Fault:** The Detector will Fault if the internal temperature during operation is above 85°C or below -40°C. Requires factory re-certification to correct. (Both LED's blink rapidly.)
- b. **Relay Fault:** The Detector will Fault if one of its Relay circuit fails. (One LED is on until the fault is corrected.) Return to factory for service.
 - a. **Excessive Input Voltage Fault:** The Detector will Fault if the voltage supplied to it is too high. Requires factory re-certification to correct. (Both LED's blink rapidly.)
- c. **No Power Fault:** The Detector will Fault if the voltage supplied to it is interrupted or turned off. (No LED indication.)
- d. **Self-Checking Fault:** The Detector will fault if its internal microcomputer self-checking circuitry and software finds a failure.

3.4 SS2-A, -AN, -AH, and -AM Detector Modules Replacement



CAUTION: Model SS2-A, -AN, -AH, and -AM Detector modules and their components are susceptible to permanent damage due to electrostatic discharge (ESD). DO NOT handle without adequate grounding precautions.

1. With power off, loosen the Allen-head screw at the base of the metal enclosure top windowed cover. (Double-check and make sure that the Detector's LEDs do NOT blink for at least 10 seconds.)
2. Unscrew the top windowed cover and set aside with its "O" ring. Keep both clean.
3. Loosen and remove the three slot headed screws located on the top circuit board. (Some models use captive screws that should not be removed from the circuit board).
4. Carefully lift out the module, sliding it along the three metal standoffs.
5. Disconnect all of the wires from the female jacks located on the bottom of the module. Be sure to note the connection location of each wire.
6. Install another module. Reconnect the wires to the new module. Make sure the module is correctly aligned. Carefully re-install back over the three metal standoffs. Re-install the three chrome-plated screws. **Be careful not to touch the sensor elements.** If they are accidentally touched, clean as instructed in Section 3.2.
7. Screw down the metal enclosure top windowed cover until it is secure and tighten the Allen-head "tamper-proof" screw.

3.5 Detector Repair

Return the defective module to the factory for repair service.



There are NO user serviceable parts in a Detector module.

If a Model SS2 Module must be shipped back to the factory for repair, it **MUST** be packed in static protective material. If this material is not available, carefully wrap the Module with aluminum foil. An RMA (Return Material Authorization) is required for all returns to the factory. Contact the Honeywell Analytics Customer Service Department or your Distributor for an RMA number before shipping a unit back to the factory.

SECTION 4 / DETECTOR PINOUT DATA

TABLE 1: Stand-Alone Model SS2 Detector Connectors - Pinouts

J1: DETECTOR INPUT POWER

PIN

- 1 D.C. Return or Ground (-)
- 2 NOT USED (Do not connect anything to this Pin.)
- 3 NOT USED (Do not connect anything to this Pin.)
- 4 Power (+24 Volts D.C.)

J2: FAULT RELAY

(SS2-A, -AN, -AM, -AML, AH)

PIN

- 1 Fault Relay Common
- 2 Fault Relay Normally Closed
- 3 Fault Relay Common
- 4 Fault Relay Normally Open

J2: FIRE RELAY #2

(SS2-AMD, -AMD, -AHD)

PIN

- 1 Fire Relay #2 Common
- 2 Fire Relay #2 Normally Open
- 3 Fire Relay #2 Common
- 4 Fire Relay #2 Normally Closed

J3: FIRE RELAY

PIN

- 1 Fire Relay Common
- 2 Fire Relay Normally Open
- 3 Fire Relay Common
- 4 Fire Relay Normally Closed

SECTION 5 / DETECTOR LABEL DRAWINGS

LB-6093-
CAUTION: OPEN CIRCUIT BEFORE REMOVING COVER.
ATTENTION: OUVRIR LE CIRCUIT AVANT D'ENLEVER LE COUVERCLE.

Model

Assembled in USA
 Honeywell Analytics Inc.
 405 Barclay Blvd.
 Lincolnshire, IL 60069

Electrical (Max): 32VDC, mA
 Relay Contact Rating: 24VDC, 1A
 DO NOT OPEN WHEN A
 FLAMMABLE ATMOSPHERE IS
 PRESENT. SEAL CONDUIT
 WITHIN 450mm OF ENCLOSURE

Class I Div 1, Groups ABCD;
 Class II/III, Div 1, Groups EFG;
 Class I, Zone 1, AEx d IIC;
 T4: Ta = °C to °C
 T5: Ta = °C to °C
 T6: Ta = °C to °C
 Type 4X, IP66

Ex d IIC T6...T4 Gb
 Ex tb IIIC T135°C Db IP66
 IECEx FMG 14.0027X
 II 2 G Ex d IIC T6...T4 Gb
 II 2 D Ex tb IIIC T135°C Db IP66
 FM14ATEX0058X

Part Number	Model Number	Material	Back-ground Color	Text Color	mA	T4	T5	T6
LB-6093-049	SS2	0.020' Al 1100-H14	Black	White	75	-40°C to +85°C	-40°C to +75°C	-40°C to +60°C
LB-6093-050	SS2	0.020' 316 Stainless Steel	Polished	Black	75	-40°C to +85°C	-40°C to +75°C	-40°C to +60°C
LB-6093-051	SS2	0.020' Al 1100-H14	Black	White	75	-40°C to +85°C	-40°C to +75°C	-40°C to +60°C
LB-6093-052	SS2	0.020' 316 Stainless Steel	Polished	Black	75	-40°C to +85°C	-40°C to +75°C	-40°C to +60°C

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Limited Warranty

Honeywell Analytics warrants its Products against defects in material and workmanship under normal use and service for a period of two (2) 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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1998M0908

Rev. A

July, 2014

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