FIRE SENTRY CORP.™

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FSC Model No.

FS System 10™

Multi-Spectral Digital Electro-Optical

Fire Detector

with

Card Controller OPTION 2GE

for

GEMA

Powder Paint Spray Booths

Installation Guide and Operating Manual

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Read and understand this manual before installing or operating equipment.

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SECTION 1: INTRODUCTION

1.1 Application

The FS System 10 Fire Detector with Card Controller, **Option 2GE** rapidly detects both fireball and flickering fires detects for **GEMA POWDER PAINT SPRAY BOOTHS**. The **0.30**-second response time exceeds the revised National Fire Protection Association (NFPA) 33 Standard for Paint Spray Booths. Each Detector includes a separate Card Controller for use when integrating into an end-user's cabinet. The plug-in Card Controller must be mounted on a Backplane Mounting Assembly. The Detector is connected to the Card Controller with a two pair (four) conductor, 22-gauge cable that provides low DC voltage power and digital RS-485 communication. The Detector can be located up to 1000 feet from the Card Controller with 18-gauge cable (up to 500 feet with 22-gauge cable).

1.2 Responses

If the fire is a spray gun "fireball" type fire, an **ALERT** condition is declared in **0.3 seconds** (300 milliseconds) and will energize the K2 Signal Relay, which will close the K2 Relay contacts. If a non spray gun fire erupts, a **FIRE EARLY WARNING** condition is declared in **0.5 seconds** and will energize the K2 Signal Relay which will close the K2 Relay contacts. The K2 Signal Relay is open during Normal Operation and is used to initiate a Process Shutdown sequence (such as shutting off the paint flow to the sprays guns, turning off the electrostatics and/or stopping the conveyor) if either an **ALERT** or **FIRE EARLY WARNING** condition occurs. If the fire continues, a **FIRE ALARM** is declared in **5.0 seconds**, which will energize and close the K4 Relay contacts.

1.3 Input Power Requirements

The total electrical input power requirements during normal operation for the Fire Detector including its Card Controller is 0.065 amps (65 milliamps) at 24 volt DC (+10/-15%) at 1.7 watts nominal. The maximum power required with all four relays energized and all four LED's turned on (fully alarmed) is less than 100 milliamps.

1.4 FirePic

FirePic™ stores the pre-fire Detector sensor spectral data of last six fire events in the Card Controller's non-volatile digital memory. FirePic provides the numerical spectral evidence to postulate the cause of a fire. The Card Controller records the time and date for each FirePic. The FirePic data includes a graphical display of the relative spectral intensities versus time preceding and during the fire. (Note: An PC computer is required to access FirePic.)

1.5 No Silicone Used

NO silicone based sealants or silicone greases are used in the Fire Detector or Card Controller.

1.6 FS System 10 Fire Detector

The multi-spectral digital Fire Detector, spanning the Wide Band IR™, Near Band IR, and visible spectrums, has intelligent, smart computer processing to tell the difference between a real fire and false alarm radiant energy sources. The Detector simultaneously examines these three spectral radiant energy bands and all three bands are real-time signal processed by sophisticated dual microcomputer "brains." The Detector must be used with a FS System 10 Card Controller or a Wall-Mounted Controller.

The Detector's Card Controller, **Option 2GE**, is factory set using **Software Configuration 4** for ALERT, FIRE EARLY WARNING (F.E.W.), and FIRE ALARM detection range to **30 feet** for a one square foot gasoline reference fire. The ALERT response time is factory set to **0.3 seconds** (300 milliseconds), the F.E.W. response time is factory set to **0.5 seconds** (500 milliseconds), and the FIRE ALARM response time is factory set to **5 seconds**. Relays K2 and K4 are factory set for non-latching.

1.61 Physical Description

The Detector's electro-optics (electronics and sensors) are mounted inside a sealed module which is housed in a water-tight and explosion-proof enclosure; Class I Div. 1, Groups B, C, D; Class II, Div. 1 & 2, Groups E, F, G and Class III; NEMA 3 & 4; tamper-resistant with integral dual 0.75 inch NPT conduit openings; copper-free aluminum (less than 0.4%) with a red powder-coated epoxy finish with reflective assembly. The Detector's housing "O" ring material is Dupont Viton that is not affected by paint solvents. The FS System 10 Detector is 4.65 inches long and 4.75 inches in diameter. The two mounting holes are 5.50 inches apart. The Detector weighs approximately 3.5 pounds (see Figures 4 and 5).

1.62 Field of View

The Detector's field-of-view is a full ninety (90) degrees (horizontal and vertical).

1.63 Environment Range

The operating and storage temperature range of the Detector is -40 ^{o}F to +185 ^{o}F (-40 ^{o}C to +85 ^{o}C). The Detector humidity range is 10% to 90%.

1.64 Location

For proper booth installation, each Detector should located within **30 feet** of the spray guns and have a clear view of the spray gun area at all times.

1.65 Self-Test

The Card Controller activates "Automatic Computer Controlled Through The Lens (ACCTTL)™ Test" for checking the Detector's window lens for contamination and for checking the FS System 10 "end-to-end". If the Detector's lens needs cleaning, the Card Controller's Yellow Fault LED blinks.

1.66 Communication

Detector 'talks" to the Card Controller via a differentially driven RS-485 digital communication link that eliminates spurious crosstalk and random noise problems.

1.67 Warranty

The Detector warranty is ten years from defects in material and workmanship as well as premature internal parts failure.

1.7 Card Controller

The FS System 10 Detector is directly connected (home run) to its Card Controller using four wire, 18 to 22 gauge, twisted pair shielded cable. The Fire Detector communicates to the Controller using a two-wire serial digital differentially driven RS-485 communication link, with the other two wires providing low voltage DC power and ground.

The Card Controller features real-world time and date stamped "Event History" files of its Fire Detector, that are stored in non-volatile solid-state memory. The Card Controller is mounted in an enclosed aluminum housing which contains 2 captive screws for quick mounting to the Backplane Mounting Assemblies (Part Nos. CCBPMA1-1, CCBPMA1-2, and CCBPMA1-4).

The Card Controller contains four 24 volt, 1 amp signal output relays (K1, K2, K3, and K4). Major Fault Relay K1 has both Normally Open (N.O.) and Normally Closed (N.C.) contacts and is energized during Normal Operation. Minor Fault Relay K3 and FIRE ALARM Relay K4 are de-energized with open contacts during Normal Operation. Process Control Relay K2 is de-energized with open contacts during Normal Operation.

The Card Controller performs the following functions:

- Provides safe, low voltage (9 volts) DC electrical power for the Fire Detector.
- De-energizes Major Fault Relay K1 if the wiring fails or trouble occurs with either the Card Controller, or the Detector.
- Energizes Process Control Relay K2 if ALERT or FIRE EARLY WARNING.
- Energizes Minor Fault Relay K3 if the Detector's lens needs cleaning.
- Turns on the Card Controller's LED's to indicate Normal Operation, FIRE EARLY WARNING, ALERT, FIRE ALARM, or Fault conditions.
- Using optional PC Software Kit (Part No. FS10COM-1), communicates externally to an IBM-compatible PC desktop or laptop computer through the built-in RS-232 communication channel.

1.71 Physical Description

The Card Controller consists of a plug-in Printed Circuit Board (PCB) with four status LED's that provide visual display of **NORMAL OPERATION**, **ALERT** (spray gun fire), **FIRE EARLY WARNING** (non-spray gun flickering fire), **FIRE ALARM**, and **Fault** conditions. The PCB is housed in a 6.69 long x 4.50 high x 1.00 inch thick rectangular aluminum enclosure and features a DB-9 type RS-232 interface port for accessing FirePic™. The Card Controllers must be mounted to a FS System 10 Backplane Mounting Assembly.

1.72 Environment Range

The operating temperature range of the Card Controller is +32 ^{o}F to +122 ^{o}F (0 ^{o}C to +50 ^{o}C). The storage temperature range is -4 ^{o}F to +158 ^{o}F (-20 ^{o}C to +70 ^{o}C). The humidity range is 10% to 90%

1.73 Fire Signal Relays

1.731 ALERT and FIRE EARLY WARNING Relay K2

During Normal Operation, **Relay K2** is de-energized with open contacts. During an ALERT or FIRE EARLY WARNING condition, Relay K2 is energized which close the contacts. The relay is rated for one amp at 24 volts DC.

1.732 FIRE ALARM Relay K4

During Normal Operation, **Relay K4** is de-energized with open contacts. During a FIRE ALARM condition, Relay K4 is energized which closes the contacts. The relay is rated one amp at 24 volts DC.

1.74 Fault Relays

1.741 Major Fault Relay K1

During Normal Operation, **Relay K1** is energized with both open and closed contacts available. When a Fault condition occurs, Relay K1 is de-energized. A Fault is when Detector Communication is Lost, Input Power is Lost, Detector has Failed Self-Test, Controller has Failed, etc. (Note: Fault is delayed 15 seconds during startup.) The relay is rated one amp at 24 volts DC.

1.742 Minor Fault Relay K3

During Normal Operation, **Relay K3** is de-energized with open contacts. During Minor Fault condition (dirty Detector lens), Relay K3 is energized which will open the contacts. The relay is rated one amp at 24 volts DC. Relay K3 is reset when the lens is cleaned. The Minor Fault Relay is used for Powder Coating Paint Spray Booths using the recommended Part No. DASA1-P Air Shield.

1.75 Non-Latching Mode for Relays K2 and K4

The Card Controller Relays K2 and K4 are non-latching. Both relays automatically reset after 5.0 seconds..

1.76 Warranty

The Card Controller has a two-year warranty against defects in material and workmanship. For further information, see the Card Controller warranty policy.

1.8 Backplane Mounting Assemblies

The Card Controller Backplane Mounting Assemblies are required for Card Controller installations. The Part No. CCBPMA1-4 Backplane Mounting Assembly accommodates up to four Card Controllers. The Part No. CCBPMA1-1 Backplane Mounting Assembly accommodates one Card Controller and Part No. CCBPMA1-2 accommodates up to two Card Controllers. For example, if 12 Fire Detectors are required for a particular installation, three Part No. CCBPMA1-4 Backplane Mounting Assemblies will be required.

Each Card Controller, which is mounted to an aluminum bracket that is secured to the Backplane Mounting Assembly with two captive screws, can also be easily “unplugged” and replaced by turning its captive screws.

All field terminations and relay outputs are wired from the Backplane Mounting Assemblies. There is no direct wiring from the Fire Detector to the Card Controller and the Card Controller cannot be used without a Backplane Mounting Assembly.

Note: The Backplane Mounting Assemblies require 24 Volt DC.
***Under NO circumstances* should 120 Volts AC or 240 Volt AC**
be applied to the input power or any other connection terminals.

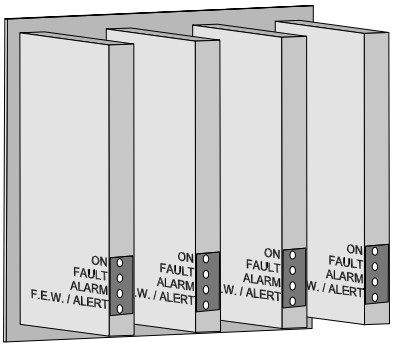
The four Card Backplane Mounting Assembly (Part No. CCBPMA1-4) includes one 9.00-inch high x 9.50 inch wide rectangular, 0.093-inch thick printed circuit board (PCB). The clearance behind the Backplane Mounting Assembly must be a minimum of 0.25 inches. The depth dimension from the bottom side of a Backplane Mounting Assembly PCB to the top of a Card Controller is less than 5 inches. (See Figure 1: Backplane Mounting Assembly for Four Cards). This Backplane Mounting Assembly PCB contains four Card Controller connectors and three removable 20 pin screw-down terminals (J5, J6, and J7) for interfacing up to four FS System 10 Detectors.

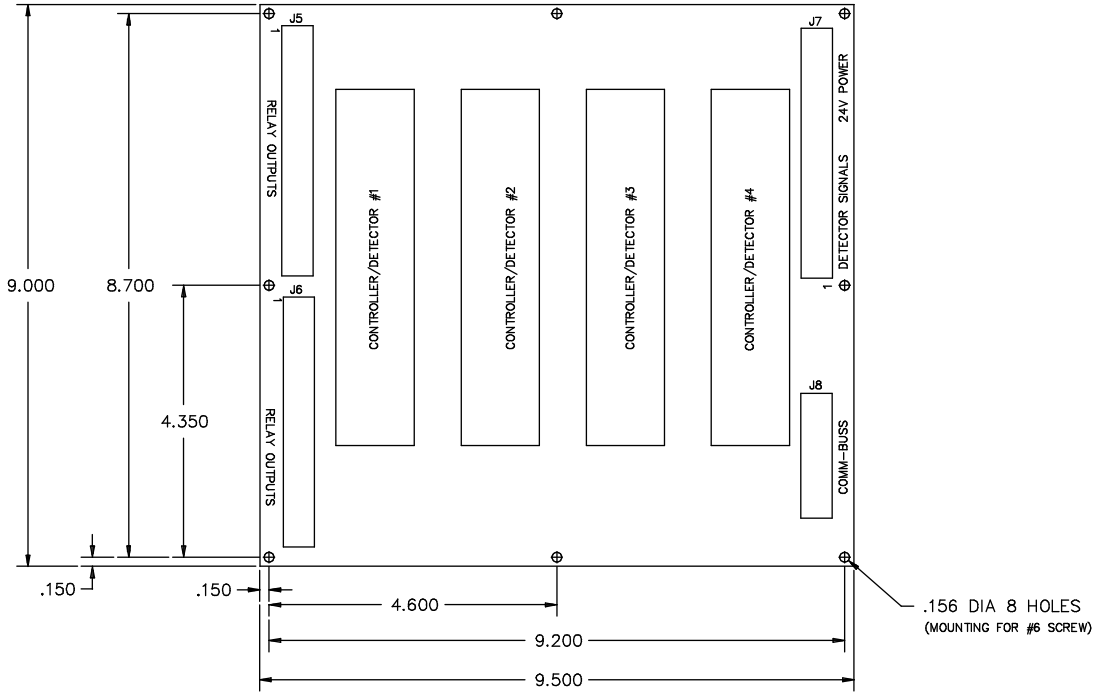
The two Card Backplane Mounting Assembly (Part No. CCBPMA1-2) includes one 9.00-inch high x 4.90-inch wide rectangular, 0.093-inch thick printed circuit board (PCB). The clearance behind the Backplane Mounting Assembly must be a minimum of 0.25 inches. The depth dimension from the bottom side of a Backplane Mounting Assembly PCB to the top of a Card Controller is less than 5 inches. (See Figure 2: Backplane Mounting Assembly for Two Cards). The Part No. CCBPMA1-2 Backplane Mounting Assembly PCB contains two Card connectors and two removable 20 pin screw-down terminals (J3 and J4).

The one Card Backplane Mounting Assembly (Part No. CCBPMA1-1) includes one 9.00-inch high x 3.00-inch wide rectangular, 0.093-inch thick printed circuit board (PCB). The clearance behind the Backplane Mounting Assembly must be a minimum of 0.25 inches. The depth dimension from the bottom side of a Backplane Mounting Assembly PCB to the top of a Card Controller is less than 5 inches. (See Figure 3: Backplane Mounting Assembly for One Card). The Part No. CCBPMA1-1 Backplane Mounting Assembly PCB contains one Card connector and one removable 20 pin screw-down terminal (J2) for interfacing one FS System 10 Fire Detector.

Fire Sentry recommends that the Backplane Mounting Assemblies be installed with a clear view of the LEDs and their function labels as may be required by the Authority Having Jurisdiction. A viewing angle of about 20 degrees from the left should be available as shown in Figure 1.

Figure 1: Backplane Mounting Assembly for Four Cards



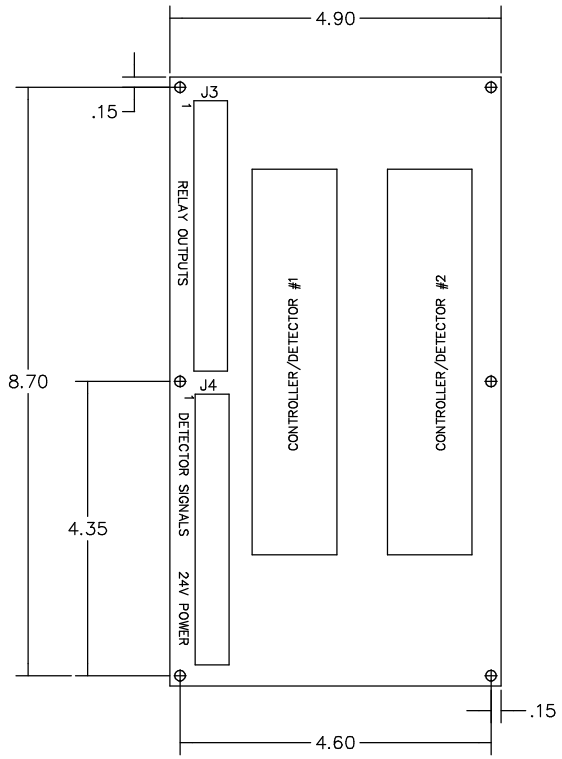


Connectors J5 & J6: Provide the 4 signal relay outputs for connecting up to 4 Fire Detectors for a total of 16 relay outputs. (See Table 5: Four Card Backplane Mounting Assembly - Part No. CCBPMA1-4.)

Connector J7: Provides screw-down terminals for connecting up to 4 Fire Detectors each with their 4 wire cabling, and for inputting and looping through 24 volt DC electrical power for the Card Controllers. (See Table 5: Four Card Backplane Mounting Assembly - Part No. CCBPMA1-4.)

Connector J8: Not used.

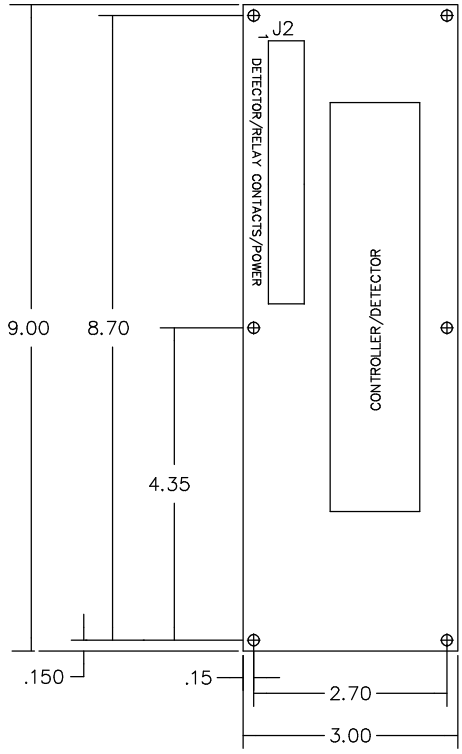
Figure 2: Backplane Mounting Assembly for Two Cards



Connectors J3: Provide Fire Detection and Fault relay outputs for connecting up to 2 Detectors. (See Table 6: Two Card Backplane Mounting Assembly - Part No. CCBPMA1-2.)

Connector J4: Provides screw-down terminals for connecting up to 2 Fire Detectors with their 4 wire cabling, and for inputting and looping through 24 volt DC electrical power for the Card Controller. (See Table 6: Two Card Backplane Mounting Assembly - Part No.CCBPMA1-2.)

Figure 3: Backplane Mounting Assembly for One Card



Connector J2: Provide the 4-signal relay outputs for one Card Controller for its one Fire Detector. Provides screw-down terminals for connecting one Detector with its 4 wire cabling, and for inputting and looping through 24 VDC power for the Card Controller (See Table 7: One Card Backplane Mounting Assembly - Part No. CCBPMA1-1.)

1.9 Cable

The following Table 1 specifies the type of cable to connect the Detector to the Controller.

Table 1: Cable Size

Fire Sentry Corporation recommends the use of four wire twisted pairs, shielded cable for connection of the Fire Detector to the Card Controller.

USING 22 GAUGE CABLE, MAXIMUM CABLE LENGTH FROM THE CARD CONTROLLER TO THE DETECTOR: 500 FEET

USING 20 GAUGE CABLE, MAXIMUM CABLE LENGTH FROM THE CARD CONTROLLER TO THE DETECTOR: 750 FEET

USING 18 GAUGE CABLE, MAXIMUM CABLE LENGTH FROM THE CARD CONTROLLER TO THE DETECTOR: 1000 FEET

SECTION 2: INSTALLATION

2.1 Wiring Requirements

2.1.1 Power

DANGER

Apply ONLY 24 Volt DC to the Backplane Mounting Assemblies' External Electrical Input Power Connections.

2.1.2 Card Controller Installation and Wiring

The characteristics of the interconnecting cable for connecting the Card Controller to its Fire Detector must conform to the specifications for RS-485 or RS-232. The RS-485 and RS-232 communications cabling specifications stipulate that the cable shall have a characteristic impedance in the general range of a minimum of 70 ohms to frequencies greater than 100 kHz. The wire resistance shall not 10 ohms per conductor for the full length of wires used. Mutual pair capacitance between the two communications wires shall not exceed 40 picofarads per foot. Stray capacitance between any other pair of wires shall not exceed 40 picofarads per foot.

It is important to remember the cable shields must only be terminated at the Backplane Mounting Assembly's Detector Ground or Chassis Ground connection - NOT at the Detector housing.

2.2 Fire Detector Housing Installation

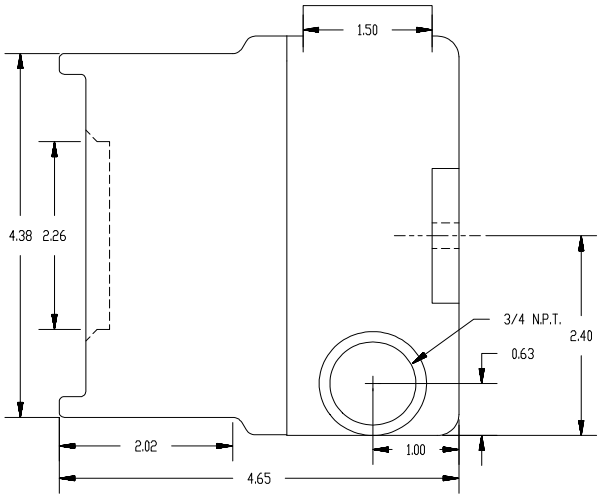


Figure 4: Fire Detector Housing - Side View

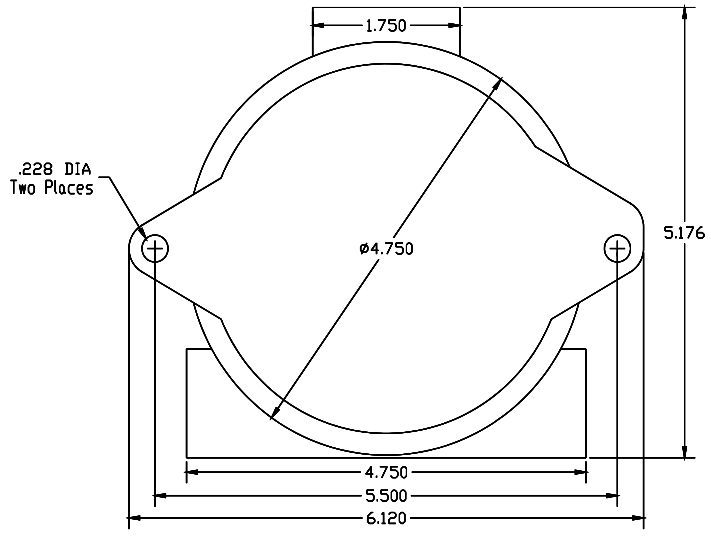


Figure 5: Fire Detector Housing - Rear View

2.3 Wiring Fire Detectors

Figure 6: Fire Detector Terminal Strip

Black	Green or Blue	White or Yellow	Red
TERMINAL #1	TERMINAL #2	TERMINAL #3	TERMINAL #4
GROUND RETURN	DATA "A"	DATA "B"	VOLTAGE
(NOT CHASSIS GRD.)	(COMM A)	(COMM B)	(+V)

2.4 Mounting Locations

2.4.1 Mounting Fire Detectors

The Fire Detectors have a 90-degree horizontal and vertical Field-of-View (viewing angle). It is recommended the Fire Detectors be positioned with the primary fire threat location aimed in the center of the Detector's Field-of-View. Since Fire Detectors must "see" the fire in order to detect it, mount the Detectors in locations such as room corners and ceilings to avoid line-of-sight blockage.

2.4.2 Mounting Card Controllers

The Card Controllers are designed to be mounted on Card Controller Backplane Mounting Assemblies (Part No. CCBPMA1-1, -2, or -4).

SECTION 3: CARD CONTROLLER OPERATION

3.1 FS System 10 Operation with the Card Controller

The Card Controller does NOT have an ON/OFF switch - the System turns ON when the external 24-volt DC Power is turned on.

3.2 Initial Start Up

APPLY EXTERNAL 24 volt DC ELECTRICAL POWER. At this time, turn the external power ON and check that the Card Controller is operating correctly. When the System is first powered up, the Detector's Green LED will illuminate briefly and then blink every 10 seconds.

3.3 System Operating Modes

3.3.1 Normal Operation

In Normal Operation, the Card Controller is ready to detect fires, report Faults, should any occur, and will have the Green LED **ON** and the Yellow, Orange and Red LED's **OFF**.

3.3.2 Fault

- turn ON the Yellow Fault LED,
- blink the Yellow LED if the "through the lens" test fails, usually indicating a dirty window lens and/or lens guard ring,
- record the event in the Fault Event History file, and
- de-energize the Fault relay.

The Fault condition is self-resetting; i.e. if the action causing the Fault is remedied, then the Card Controller will stop reporting a Fault.

Faults generally occur for the following reasons:

- failure in the wiring such as a severed cable, loose terminations, or
- the Controller's internal self-checking reported a hardware failure in the Fire Detector, or
- power loss at the Card Controller, or
- a problem has been encountered, such as a contaminated Detector window-viewing lens.

3.3.3 Automatic Detector Test

The Card Controller performs ACCTTL™ (Automatic Computer Controlled "Through the Lens") tests every 10 minutes (factory set) to check the operation of its Fire Detector. The Controller will blink the Yellow Fault LED if the Fire Detector detects an inadequate signal reflected back through the viewing window. This may indicate a Detector dirty window lens, which needs to be cleaned, or a missing or dirty reflector lens guard (i.e., the Detector's front cover not installed.) While these tests are occurring, the system is still functional and able to alarm to a fire.

3.3.4 Manual Detector Test

Test the system "end-to-end" by activating each Detector separately. (Note: It is recommended that a Portable Test Lamp, the Fire Sentry Model FS-846, be used to activate the Detectors individually). **NOTE: Disable responses to relay outputs to avoid activating external alarms and/or suppression systems during testing.**

3.4 Advanced System Diagnostics

The Controller's RS-232 port allows direct connection to a desktop or laptop PC computer, which requires the optional PC Software Kit, Part No. S10COM-1, which includes instructions.

SECTION 4: MAINTENANCE AND REPLACEMENT

4.1 Personnel

The following will aid in troubleshooting the FS System 10.

WARNING: Serious injury or death may result if personnel fail to observe safety precautions.

4.2 Card Controller Faults

For diagnostic purposes, possible Faults reported by the Card Controller are shown in the following table. If a Fault is detected, the Card Controller turns on the Yellow Fault LED. If the Fault is the result of a failed "through the lens" Detector test, the Yellow Fault LED will blink on and off. This usually means the window lens and/or grill need to be cleaned. The recommended actions for each respective Fault condition are listed below. Should remedial action fail to clear a Fault condition, call Fire Sentry or one of their Distributors for further advice.

Table 2: Detector and Card Controller Faults

EVENT HISTORY FILE	ACTION
Fault CONDITION (1)	Card Controller Fault, such as a broken relay coil. If this condition persists, return the entire Card Controller to Fire Sentry for service. Yellow Fault LED turns ON. See Section 4.6.
Fault CONDITION (2)	Communications Fault with Detector and Card Controller**.** Check wiring for broken or crimped cables or loose terminations. Yellow Fault LED turns ON. See Section 4.4
Fault CONDITION (3)	Fire Detector "through the lens" test failure. Clean the lens and grill. It is important to clean underneath the grill. Yellow Fault LED blinks ON and OFF. See Section 4.3

4.3 Cleaning Detectors Housing Windows

Clean the Detectors' windows and grills immediately after installation, after handling, on a regular, periodic schedule, and whenever a Controller Fault occurs for which that is the recommended action. Use a blast of an air hose or a clean cloth to clean the Detectors' windows. To keep the Detectors' window lens and grills clean, use Fire Sentry's Protective Covers, Part No. DPC-12.

4.4 Detector Faults

Under NORMAL operation, the Detector's green LED will blink every 10 seconds. Under a Fault condition, the Controller will turn on continuously the Yellow Fault LED.

A Detector problem causes a Fault. If this Fault persists, return the black Detector Module located within the red housing to Fire Sentry for service. There are no user-serviceable parts in a Module.

4.5 Detector Replacement

To replace an improperly operating Fire Detector Module, do the following:

1. Loosen the hex nut that secures the top windowed red cover to the Detector housing base.
2. Next, turn the Detector top cover counter-clockwise until the top cover is removed.
3. Using a screwdriver, turn the three captive screws securing the Fire Detector Module to the housing base counter-clockwise until the black Detector Module is free.
4. Gently lift the Fire Detector Module out of the housing base.
5. Using a small screwdriver, turn the two screws securing the four-wire cable plug counter-clockwise until the cable plug can be removed.
6. Handle the Fire Detector Module with care and do not touch the sensor windows.
7. Carefully wrap the Module in static protection material (if none available, use aluminum foil) and ship to Fire Sentry.
8. To install a Detector Module, just reverse the removal steps listed above.

4.6 Fire Detector and Card Controller Replacement

If a Fire Detector Module or Card Controller must be shipped back to Fire Sentry for repair or service, it **MUST** be packed in static protected material. If this material is not available, carefully wrap the Detector Module or Card Controller in aluminum foil. An RMA (Return Material Authorization) is required for all returns to Fire Sentry. Contact Customer Service for an RMA number before shipping a unit back to the factory.

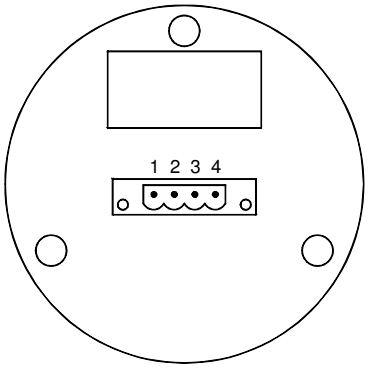
THERE ARE NO USER SERVICEABLE PARTS IN A DETECTOR's MODULE OR INSIDE A CARD CONTROLLER. ANY EVIDENCE OF TAMPERING, PRYING OPENING DETECTOR MODULE, REMOVING CARD CONTROLLER ENCLOSURE COVER, OR ATTEMPTED REPAIRS OF ANY KIND BY NON-FACTORY PERSONNEL WILL VOID ALL WARRANTIES.

SECTION 5: PINOUT DATA

Table 3: Fire Detector Connector Pin-outs

J1 Connector: FIRE DETECTOR Module

PIN		WIRE COLOR
1	Ground Return (Not Chassis Ground)	BLACK
2	Data "A" (RS-485 COMM A)	GREEN
3	Data "B" (RS-485 COMM B)	WHITE
4	DC (+) Voltage	RED



NOTE: DO NOT CONNECT SHIELD AT FIRE DETECTOR

(Note: *COMM* ***as it is used in this document is an abbreviation for Communications***).

Table 4: Four Card Backplane Mounting Assembly (Part #CCBPMA1-4)

J5: Backplane Relay Connector (Fire Detectors #1 and #2)

1	K1 - N.C.	Major Fault Relay	DETECTOR #1
2	K1 - COMMON		
3	K1 - N.O.		
4	K2 - A	**PROCESS CONTROL** **Signal Relay** (Normally Open)	
5	K2 - B		
6	K3 - A	**Minor Fault** Relay (Normally Open)	
7	K3 - B		
8	K4 - A	FIRE ALARM Relay (Normally Open)	
9	K4 - B		
10	Not Used		
11	K1 - N.C.	Major Fault Relay	DETECTOR #2
12	K1 - COMMON		
13	K1 - N.O.		
14	K2 - A	**PROCESS CONTROL** **Signal Relay** (Normally Open)	
15	K2 - B		
16	K3 - A	**Minor Fault** Relay (Normally Open)	
17	K3 - B		
18	K4 - A	FIRE ALARM Relay (Normally Open)	
19	K4 - B		
20	Not Used		

J6: Backplane Relay Connector (Fire Detectors #3 and #4)

1	K1 - N.C.	Major Fault Relay	DETECTOR #3
2	K1 - COMMON		
3	K1 - N.O.		
4	K2 - A	**PROCESS CONTROL** **Signal Relay** (Normally Open)	
5	K2 - B		
6	K3 - A	**Minor Fault** Relay (Normally Open)	
7	K3 - B		
8	K4 - A	FIRE ALARM Relay (Normally Open)	
9	K4 - B		
10	Not Used		
11	K1 - N.C.	Major Fault Relay	DETECTOR #4
12	K1 - COMMON		
13	K1 - N.O.		
14	K2 - A	**PROCESS CONTROL** **Signal Relay** (Normally Open)	
15	K2 - B		
16	K3 - A	**Minor Fault** Relay (Normally Open)	
17	K3 - B		
18	K4 - A	FIRE ALARM Relay (Normally Open)	
19	K4 - B		
20	Not Used		

NOTE: All Card Controller relays are shown as they are during **Normal Operation**, that is, there are no Fire Alarm Conditions or Faults. During **Normal Operation:** The PROCESS CONTROL **K2 Relay** is de-energized with **N.O.** (**N**ormally **O**pen) contacts and the Minor Fault **K3 Relay** is de-energized with **N.O.** (**N**ormally **O**pen) contacts. The FIRE ALARM **K4 Relay** is de-energized with **N.O.** contacts. The Major Fault **K1 Relay** is energized with both **N.O.** and **N.C.** contacts available.

J7: Connector on Backplane Mounting Assembly (Part No. CCBPMA1-4)

1	DETECTOR Voltage Return / Shield Termination	DETECTOR #1
2	DATA A	
3	DATA B	
4	DETECTOR +Voltage In	
5	DETECTOR Voltage Return / Shield Termination	DETECTOR #2
6	DATA A	
7	DATA B	
8	DETECTOR +Voltage In	
9	DETECTOR Voltage Return / Shield Termination	DETECTOR #3
10	DATA A	
11	DATA B	
12	DETECTOR +Voltage In	
13	DETECTOR Voltage Return / Shield Termination	DETECTOR #4
14	DATA A	
15	DATA B	
16	DETECTOR +Voltage In	
17	+24 VOLT DC IN supply into Backplane	
18	+24 VOLT DC IN loop through	
19	24 VOLT RETURN supply into Backplane	
20	24 VOLT RETURN loop through	

Table 5: Two Card Backplane Mounting Assembly (Part #CCBPMA1-2)

J3: Backplane Relay Connectors (Fire Detectors #1 and #2)

1	K1 - N.C.	Major Fault Relay	DETECTOR #1
2	K1 - COMMON		
3	K1 - N.O.		
4	K2 - A	**PROCESS CONTROL** **Signal Relay** (Normally Open)	
5	K2 - B		
6	K3 - A	**Minor Fault** Relay (Normally Open)	
7	K3 - B		
8	K4 - A	FIRE ALARM Relay (Normally Open)	
9	K4 - B		
10	Not Used		
11	K1 - N.C.	Major Fault Relay	DETECTOR #2
12	K1 - COMMON		
13	K1 - N.O.		
14	K2 - A	**PROCESS CONTROL** **Signal Relay** (Normally Open)	
15	K2 - B		
16	K3 - A	**Minor Fault** Relay (Normally Open)	
17	K3 - B		
18	K4 - A	FIRE ALARM Relay (Normally Open)	
19	K4 - B		
20	Not Used		

NOTE: All Card Controller relays are shown as they are during **Normal Operation**, that is, there are no Fire Alarm Conditions or Faults. During **Normal Operation:** The PROCESS CONTROL **K2 Relay** is de-energized with **N.O.** (**N**ormally **O**pen) contacts and the Minor Fault **K3 Relay** is de-energized with **N.O.** (**N**ormally **O**pen) contacts. The FIRE ALARM **K4 Relay** is de-energized with **N.O.** contacts. The Major Fault **K1 Relay** is energized with both **N.O.** and **N.C.** contacts available.

J4: Backplane Mounting Assembly (Part No. CCBPMA1-2) Connector

1	DETECTOR Voltage Return / Shield Termination	DETECTOR #1
2	DATA A	
3	DATA B	
4	DETECTOR +Voltage In	
5	DETECTOR Voltage Return / Shield Termination	DETECTOR #2
6	DATA A	
7	DATA B	
8	DETECTOR +Voltage In	
9	PIN NOT USED	
10	PIN NOT USED	
11	PIN NOT USED	
12	PIN NOT USED	
13	PIN NOT USED	
14	PIN NOT USED	
15	PIN NOT USED	
16	PIN NOT USED	
17	+24 VOLT DC IN supply into Backplane	
18	+24 VOLT DC IN loop through	
19	24 VOLT RETURN supply into Backplane	
20	24 VOLT RETURN loop through	

Table 6: One Detector Backplane Mounting Assembly (Part #CCBPMA1-1)

J2: Backplane Mounting Assembly Connector

1	DETECTOR Voltage Return / Shield Termination	
2	DATA A	
3	DATA B	
4	DETECTOR +Voltage In	
5	Not Used	
6	K1 - N.C.	Major Fault Relay
7	K1 - COMMON	
8	K1 - N.O.	
9	K2 - A	**PROCESS CONTROL** Signal Relay (Normally Open)
10	K2 - B	
11	K3 - A	**Minor Fault** Relay (Normally Open)
12	K3 - B	
13	K4 - A	FIRE ALARM Relay (Normally Open)
14	K4 - B	
15	Not Used	
16	Not Used	
17	+24 VOLT DC IN	supply into Backplane
18	+24 VOLT DC IN	loop through
19	24 VOLT RETURN	supply into Backplane
20	24 VOLT RETURN	loop through

NOTE: All Card Controller relays are shown as they are during **Normal Operation**, that is, there are no Fire Alarm Conditions or Faults. During **Normal Operation:** The PROCESS CONTROL **K2 Relay** is de-energized with **N.O.** (**N**ormally **O**pen) contacts and the Minor Fault **K3 Relay** is de-energized with **N.O.** (**N**ormally **O**pen) contacts. The FIRE ALARM **K4 Relay** is de-energized with **N.O.** contacts. The Major Fault **K1 Relay** is energized with both **N.O.** and **N.C.** contacts available.

SECTION 6: ACCESSORIES for Powder Spray Booths

6.1 Detector Heavy Duty Swivel Mount (Part No. FSSM-2)

6.2 Backplane Mounting Assemblies

These Backplane Mounting Assemblies (BMA's) are required for mounting Card Controllers. Three separate BMA's are available for mounting one, two, or four Card Controllers. (Note: The FS System 10 Card Controllers and BMA's are NOT required if the FS System 10 Wall-Mounted Controller is used.) Each BMA is a rectangular printed circuit board with removable external wiring connector(s). Each "plug-in" Card Controller is secured to a BMA with two captive screws. Each BMA must be offset 0.25 inches from the mounting surface.

- **Part No. CCBPMA1-1:** 9.00 x 3.00 inch BMA mounts one Card Controller.
- **Part No. CCBPMA1-2:** 9.00 x 4.90 inch BMA mounts up to two Card Controllers.
- **Part No. CCBPMA1-4:** 9.00 x 9.50 inch BMA mounts up to four Card Controllers.

6.3 Test Lamp (Part No. FS-846)

This portable, hand-held test lamp is battery-powered for remote activation of the FS System 10 Fire Detectors. This allows the entire Fire Protection System to be tested during startup or routine maintenance. This test lamp simulates the radiant energy emitted by an actual fire in order to test the Detectors without the need for an open flame. The Test Lamp is powered by four "D" sized replaceable flashlight batteries.

6.4 Air Shield for Dirty Applications (Part No. DASA1-P)

The Detector air shield mounts to the FS System 10 Fire Detector housing for installation in areas with high levels of airborne contaminants. Air line fitting accepts 1/4'' O.D. nylon tubing for instrument grade air supply of 5 to 15 psi at 6 cubic ft. per minute.

6.5 PC Software Kit (Part No. FS10COM-1)

The PC Software Kit allows access to FirePic™ as well as monitoring of the operation of the Detectors through the RS-232 serial port located on the FS System 10 Card Controller using a Desktop or portable Laptop IBM compatible PC computer. This Kit includes a Personal Computer (PC) Software Diskette, a plug-in interface cable to connect the RS-232 port on the FS System 10 Card Controller to the PC computer's RS-232 serial port and instructions.

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