® fireye

MBUV-100R, MBUVS-100R
MBIR-100R, MBFR-100R
RACK MOUNT
FLAMEWORX™ MODULES

® **U** ⬦**FM**⬦
APPROVED ®**CSA**

Year 2000 Compliant in accordance with BSI document DISC PD2000-I:1998

DESCRIPTION

Fireye offers a complete line of dual channel, rack mount flame switch modules to provide accurate, reliable flame on/flame off indication. The user can select from four (4) different type of flame scanners (ultra-violet, infra-red, ultra-violet self check, and flame rectification) to meet a wide range of flame scanning applications. Each module provides two (2) independent flame switches. Each flame switch has its own SPDT flame relay (Refer to Jumpers JP4 and JP5).

A series of LED's on the FlameWorx module provide indication of system status (power on), flame relay status, and fault indication. Three (3) separate front panel test jacks are provided to measure the flame signal strength (4-20 mA) of each flame relay. Access to the 4-20 mA signal is also available via the wiring terminal (Refer to Jumpers JP4 and JP5). Flame Failure Response Time (FFRT) is selectable between 1, 2, 3, or 4 seconds (selected via dipswitch).

Fireye FlameWorx modules can be used in a number of flame detection applications. In addition, the modules also incorporate LonWorks* communications, which allow the use of Fireye programming modules (e.g. multi-burner module) to provide safe start check, purge timing, safety lockout, etc. expanding on the functionality of the flame switches. LonWorks communications use an RS485 twisted pair wire as the communications network.

Note: Note: When the FlameWorx modules are used without the Fireye programming modules, some additional means must be furnished to provide those functions required in flame safeguard control systems (e.g. safety interlocks, purge timing, etc.).

Note: FlameWorx modules are shipped from the factory with the FFRT set for 1 second.

Note: See Bulletin MBD-1001 for DIN Mount modules.

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* LonWorks® is a registered trademark of Echelon Corporation.

ORDERING INFORMATION

PART NUMBER	DESCRIPTION
MBUV-100R	Ultra-violet FlameWorx module, dual channel - 19" rack mount
MBIR-100R	Infra-red FlameWorx module, dual channel - 19" rack mount
MBUVS-100R	Ultra-violet self-check FlameWorx module, dual channel - 19" rack mount
MBFR-100R	Flame rectification FlameWorx module, dual channel - 19" rack mount
Note: Connectors for FlameWorx modules must be ordered separately.	
Power Supplies	
MBPS-100R	Power supply (120 VAC input power) for Flame Worxs modules and flame scanners - 19" rack mount. Will power up to 10 flame switch modules and 20 flame scanners. (UV, UV Self-check, flame rod or photo cells).
MBPS-200R	Power supply (220 VAC input power) for Flame Worxs modules and flame scanners - 19" rack mount. Will power up to 10 flame switch modules and 20 flame scanners. (UV, UV Self-check, flame rod or photo cells).
23-184	Replaceable fuse (I.6A) for MBPS-1000R.
Note: Connector for power supply module must be ordered separately.	
Connectors	
60-2536-1	Screw terminal, straight style (22-14 AWG, 2.5 mm^2) connector for all rack mount Flame Worxs modules.
60-2536-2	Screw terminal, straight style (22-14 AWG, 2.5 mm^2) connector for MBPS-100R
Mounting Racks	
60-2535-1	Half rack for use with MBxx-100R modules. Will mount up to 6 modules. Includes one 60-2536-1 connector.
60-2535-2	Full rack for use with MBxx-100R modules. Will mount up to 13 modules. Includes one 60-2536-1 connector. (The MBPS power supply can only power 10 flame switch modules.)
Flame Scanners	
UV1A3	Ultra-violet scanner for use with MBUV modules. 1/2" NPT mount. 3' flex conduit.
UV1A6	Ultra-violet scanner for use with MBUV modules. 1/2" NPT mount. 6' flex conduit.
UV2	Ultra-violet scanner for use with MBUV modules. 3/8" NPT mount. 3' flex conduit.
UV8A	Ultra-violet scanner for use with MBUV modules. 1/2" NPT mount. 90 head, 6' cable, no conduit.
45UV3-1050	Ultra-violet scanner for use with MBUV modules. 3/4" NPT mount, w/ 4-314-1 UV tube.
45UV5-1007	Self-checking ultra-violet scanner for use with MBUVS modules. 1″ BSP mount (220 VAC).
45UV5-1008	Self-checking ultra-violet scanner for use with MBUVS modules. 1" BSP mount (120 VAC).
45UV5-1009	Self-checking ultra-violet scanner for use with MBUVS modules. 1" NPT mount (120 VAC).
48PT2-1003	Infra-red scanner for use with MBIR modules. 1/2" NPT mount, straight head, 8' cable.
48PT2-1007	Infra-red scanner for use with MBIR modules. 1/2" NPT mount, straight head, 4' cable.
48PT2-9003	Infra-red scanner for use with MBIR modules. 1/2" NPT mount, 90° head, 8' cable.
48PT2-9007	Infra-red scanner for use with MBIR modules. 1/2" NPT mount, 90° head, 4' cable.
48PT2-9007W	Infra-red scanner for use with MBIR modules. 1/2" NPT mount, 90° head, 4' cable, water repellant.
45CM1-1000	Photocell (with filter) for use with MBFR modules. 1/2" NPT mount.
45CM1-1000Y	Photocell (without filter) for use with MBFR modules. 1/2" NPT mount.
69ND1-1000K4	Flame rod for use with MBFR modules. 1/2" NPT mount, 12" length.
69ND1-1000K6	Flame rod for use with MBFR modules. 1/2" NPT mount, 18" length.
69ND1-1000K8	Flame rod for use with MBFR modules. 1/2" NPT mount, 24" length.

PRODUCT SPECIFICATIONS

FLAMEWORX MODULES

Supply Voltage:	24 VAC +10 / -15%, 50 / 60 Hz @ 100 mA.
	24 VDC +10 / -15%, @ 100 mA.

Power Consumption: 2.4 VA

Flame Relay Contacts: (1 Form C SPDT)

        5 amps (resistive load) @ 250 VAC

        3 amps (resistive load) @ 24 VDC

        250 VA (maximum connected load) each
        40 mA (minimum connected load current).

Contact Material: Silver cadmium oxide

Flame Signal Output: 4-20 mA (current source). Max connected load: 750 ohms.

POWER SUPPLIES

Input Supply Voltage: **MBPS-100R:** 120 VAC +10 / -15%. 50/60 Hz.
                             MBPS-200R: 220 VAC +10 / -15%. 50/60 Hz.

Maximum current output: MBPS-100R, -200R:

        1.4A @ 24 VDC (Will power up to 10 Flame Worxs modules)

        25mA @ 600 VAC (Will power up to 20 flame scanners -
        UV and/or flame rod).

FLAMEWORX MODULES and POWER SUPPLIES

Operating Temperature:	-40° F to 140° F (-40° C to 60° C)
Storage Temperature:	-40° F to 176° F (-40° C to 80° C)
Humidity:	85% RH (max), non-condensing.
Agency Approvals:	Underwriters Laboratories (UL)
	Factory Mutual (FM)
	Canadian Standards Association (CSA)

Year 2000 Compliant in accordance with BSI document DISC PD2000-I:1998

FRONT FACEPLATE

The front faceplate of the FlameWorx modules provides LED indicator lights and flame signal test jack points for current status and failure mode analysis, and two communication push-buttons for LonWorks communications.

FIGURE 1.
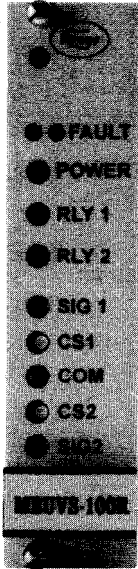
TEST JACK POINTS

SIG1, SIG2, and COM: These three (3) test jack points provide access via the front faceplate to measure flame signal strength for each flame relay. The output signal is a current source 4-20 mA signal. Maximum connected load not to exceed 750 ohms. SIG1 referenced to COM provides the flame signal for Channel #1, and SIG 2 referenced to COM provides the flame signal for Channel #2.

Minimum acceptable flame signal	6 mA.
Average flame signal	8-20 mA.

LED STATUS INDICATORS

POWER: The green LED will blink when power (24 VAC/VDC) is applied to the FlameWorx module (terminal 13 and 14 - Refer to Wiring Diagram).

Note: **RLY 1 and RLY 2:** These two (2) green LED's will light when the scanner detects flame for the appropriate flame switch.

LED FAULT INDICATORS

FAULT: These two (2) red LED's will light and/or blink in the manner described below to indicate the following fault conditions:

Fault Condition	Corrective Action
○ ✸ CPU failure.	Replace Flame Worxs module.
✸ ○ Communication failure.	Check communication wiring Check communication master. Press CS1 and CS2 communication push-buttons. Set dipswitch #6 to open position (for stand alone module).
○ ● Shutter check failure on Channel 1.	Check shutter operation on scanner. Check UV tube on scanner.
● ○ Shutter check failure on Channel 2.	Check shutter operation on scanner. Check UV tube on scanner.

○ LED is Off   ● LED is On.   ✸ LED is blinking.

COMMUNICATION PUSHBUTTONS:

CS1 and CS2: These two (2) push-buttons are associated with LonWorks communications. After all wiring connections between the FlameWorx module and designated master device (e.g. Fireye MB Module, host PC, etc.), press **each** push-button **one time** to establish the communication link between the FlameWorx module and the designated master. These push-buttons do not need to be pressed a second time unless the address of the master device or the master device itself is changed. A "Fault" indicator LED will light momentarily when each CS1 push-button is pressed. Also refer to dipswitches #1 through #5 (Communication Address) and dipswitch #6 (stand alone or network mode).

FIGURE 2.   DIMENSIONS — FLAME WORXS MODULES
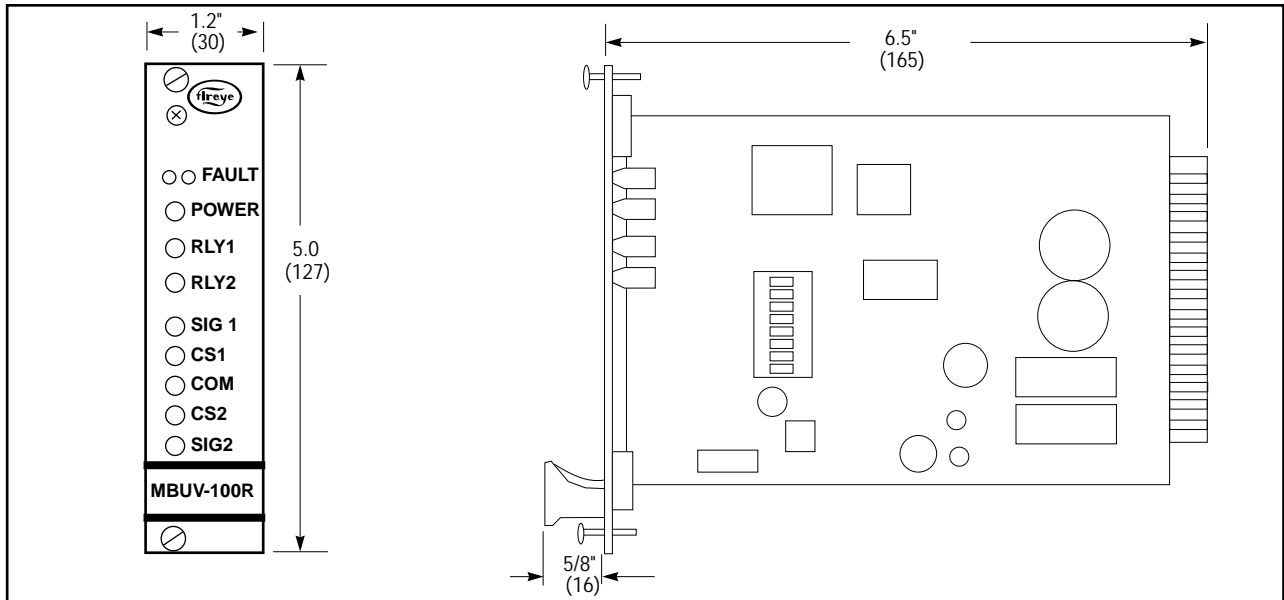
DIPSWITCHES (1-8)

Eight (8) dipswitches located on the printed circuit board (see Figure 1) are used to set the communication address of the Flame Worxs module (switches 1 through 5), stand alone operation or connection to a communication network (dipswitch #6) and the Flame Failure Response Time (FFRT) for the flame switches (switches 7 and 8). **All 8 switches are shipped in the Open position.**
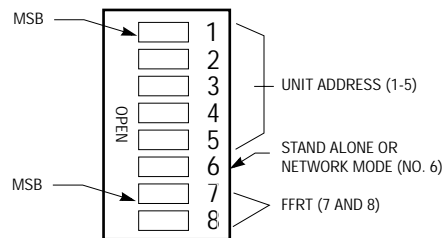
Dipswitches 1 through 5 — Communications address

Dipswitches 1 through 5 are used to configure the communication address (address 00 through 31) for each flame switch module when used on the LonWorks communication network (e.g., communicating with the Fireye MB module). Dipswitch #1 is the Most Significant Bit (MSB). Dipswitch #5 is the Least Significant Bit (LSB). Setting dipswitches 1 through 5 in the Open position will set address 00. Also refer to Communication Pushbuttons CS1 and CS2

DIPSWITCHES

#1	#2	#3	#4	#5	ADDRESS
Open	Open	Open	Open	Open	00
Open	Open	Open	Open	Closed	01
Open	Open	Open	Closed	Open	02
		:			
Closed	Closed	Closed	Closed	Closed	31

Dipswitch #6 — Stand Alone or Network Communications

Dipswitch #6 sets the FlameWorx module in either Stand Alone or Network mode. When set for the stand alone mode, the FlameWorx module **will not** attempt to communicate on a communications network. The settings for dipswitches #1 through 5 are inhibited when set for stand alone mode. When the Flame Worxs modules are used in a communication network (e.g. Fireye MB Module), dipswitch #6 **must be** set in the Network mode to enable communications. Also refer to Communication Push-buttons CS1 and CS2.

Dipswitch 6
Open   Stand alone mode.
Closed   Network mode.

> ⚠ **WARNING: If the FlameWorx modules are used in a stand-alone application (e.g. LonWorks communications ARE NOT being used), dipswitch 6 MUST BE SET IN THE OPEN POSITION or the FlameWorx will shut down on communication failure**

Dipswitches 7 & 8 - Selectable Flame Failure Response Time (FFRT)

Dipswitches 7 and 8 are used to select the FFRT time for both flame switches. Available selections are 1, 2, 3, or 4 seconds.

Switch 7	Switch 8	FFRT
Open	Open	1 sec
Open	Closed	2 sec
Closed	Open	3 sec
Closed	Closed	4 sec

> ⚠ **WARNING: Dipswitches 7 and 8 are shipped from the factory in the OPEN position. FFRT = 1 sec.**

FIGURE 3.   **LOCATION OF DIPSWITCHES AND JUMPERS**

DIPSWITCHES   JP4   JP5   JUMPERS
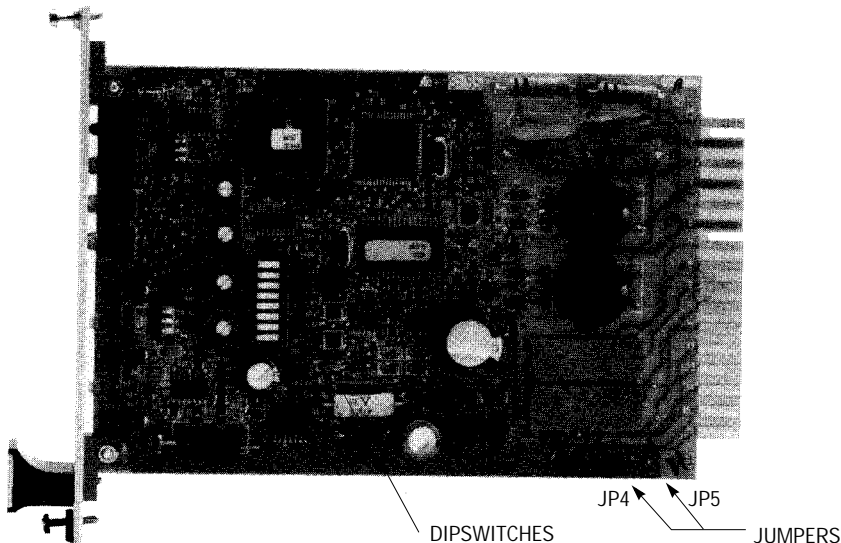
> ⚠ **WARNING: After eight (8) hours of continuous power being applied to the FlameWorx module, FFRT timings CANNOT BE CHANGED.**

JUMPERS JP4 AND JP5

Two jumpers on the FlameWorx module select the function associated with terminal 9 (Flame Channel #1) and terminal 10 (Flame Channel #2) of the FlameWorx module (refer to Wiring Diagrams). The two selections (for each terminal) are:

— Normally closed contact for the appropriate flame relay

— 4-20 mA output signal proportional to the flame signal strength for each flame switch

Normally closed contact: Each flame switch provided with the FlameWorx module has a SPDT flame relay. The normally open contact (NO) and associated common of each flame relay are provided on terminals 7 and 8 (for Channel #1) and terminals 12 and 11 (for Channel #2). With jumper JP4 placed over pins 2 and 3, the FlameWorx module will also provide a normally closed flame relay contact (terminal 9) for Channel #1. With jumper JP5 placed over pins 2 and 3, the FlameWorx module will provide a normally closed flame relay contact (terminal 10 for Channel #2. **The jumpers are shipped from the factory jumpering pins 2 and 3 (providing NC flame relay contact).** Refer to Wiring Diagram.

4-20 mA Output Signal: The FlameWorx module provides a 4-20mA output signal (proportional to flame signal strength) for each flame switch via test jack points located on the face plate of the module. **In addition to these analog outputs via the test jacks**, jumpers JP4 and JP5 will provide an additional 4-20 mA flame signal via terminals on the connector of the FlameWorx module (to allow an easier means of wiring to a remote meter). Use terminal 14 (Input power common) as the common return for either/both 4-20 mA output signals. With jumper JP4 placed over pins 1 and 2, the FlameWorx module will also provide a 4-20 mA output signal (terminal 9) for channel #1. With jumper JP5 placed over pins 1 and 2, the Flame Worxs module will provide a 4-20 mA output signal (terminal 10) for channel #2. **The jumpers are shipped from the factory jumpering pins 2 and 3 (providing NC flame relay contact).** Refer to Wiring Diagram.

SPECIFICATIONS OF MOUNTING RACKS

There are two mounting racks for the installation of the rack mount FlameWorx modules (MBUV-100R, MBIR-100R, MBFR-100R, and MBUVS-100R) and the power supply (MBPS-100R, -200R).

Full Rack (60-2535-2)

The full rack has an aperture opening of 84 HP (Horizontal Pitch) or 16.8 inches (426mm). 1 HP is approximately.2 inch. The rack mount FlameWorx modules have a width of 6 HP. The rack mount power supply (MBPS-100R, -200R) has a width of 10 HP. A full rack is set up by the factory to accommodate up to 13 rack mount FlameWorx modules, or 12 rack mount FlameWorx modules and 1 rack mount power supply.

Note: Note: The MBPS power supply can power up to 10 FlameWorx modules and scanners.

Half Rack (60-2535-1)

The half rack has an aperture opening of 42 HP (Horizontal Pitch) or 8.4 inches (213mm). 1 HP is approximately.2 inch. The rack mount FlameWorx modules have a width of 6 HP. The rack mount power supply (MBPS-100R, -200R) has a width of 10 HP. A half rack is set up by the factory to accommodate up to 6 rack mount Flame Worxs modules, or 5 rack mount Flame Worxs modules and 1 rack mount power supply.

Filler Plates

Filler plates are provided to cover any openings in the racks after the installation of the FlameWorx modules and power supply. Filler plates are offered in 2, 4, 6, 8, and 10 HP widths. 1 HP is approximately.2 inch. To determine the number and types of filler plates required, subtract the HP widths of each installed FlameWorx module and power supply from the aperture opening of the mounting rack.

Mounting Rack		FlameWorx Modules and Power Supply		Filler Plates	
Part #	Width	Part #	Width	Part #	Width
60-2535-2	84 HP	MBUV-100R	6 HP	60-2490-2	2 HP
60-2535-1	42 HP	MBIR-100R	6 HP	60-2490-4	4 HP
		MBFR-100R	6 HP	60-2490-6	6 HP
		MBUVS-100R	6 HP	60-2490-8	8 HP
		MBPS-100R	10 HP	60-2490-10	10 HP
		MBPS-200R	10 HP		

FIGURE 4. **FULL AND HALF-RACK DIMENSIONS**
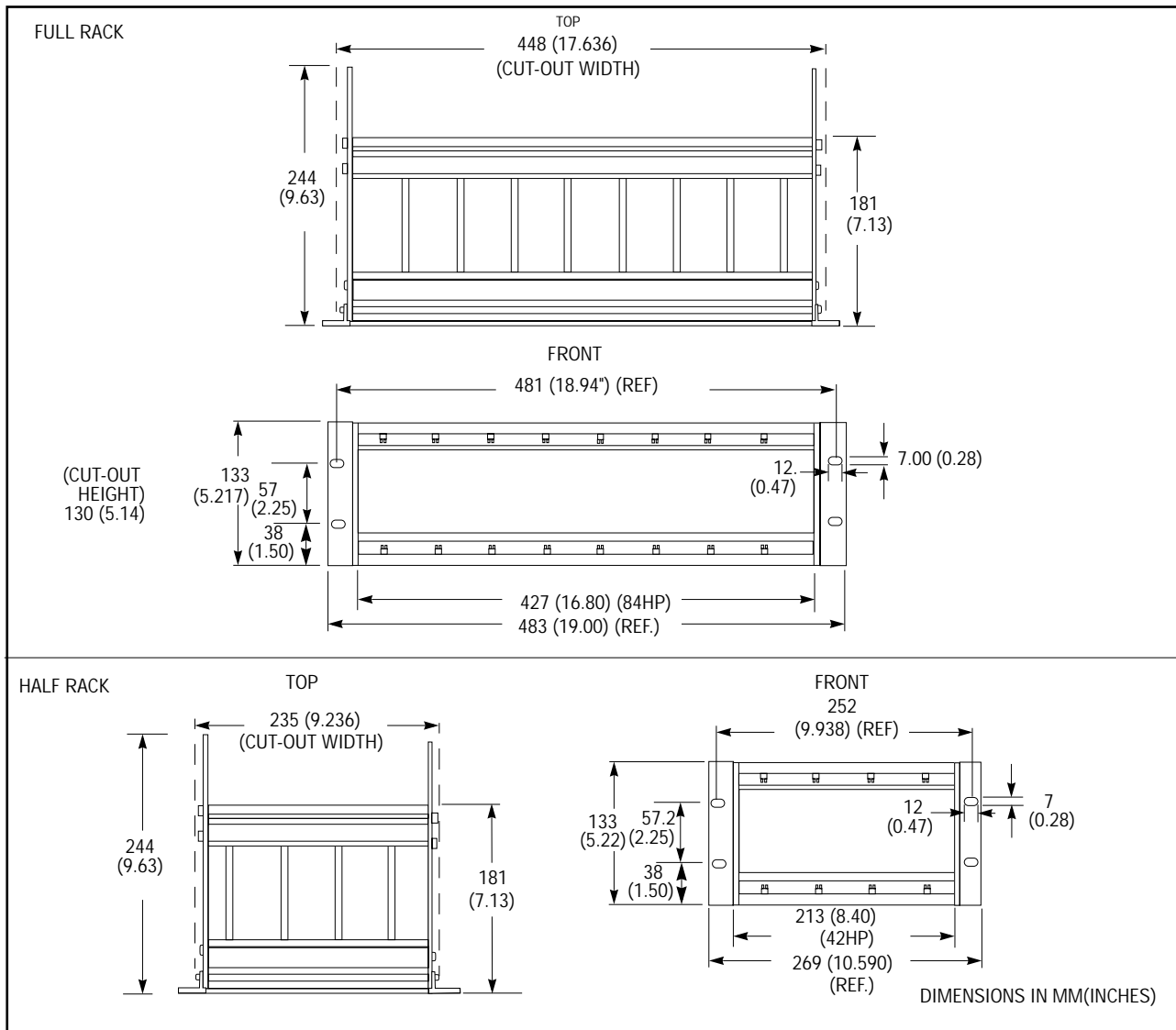
INSTALLATION OF RACK MOUNT FLAMEWORX MODULES AND POWER SUPPLY:

The Half Rack (60-2535-1) is shipped with seven (7) factory mounted rack guides with their center-lines (center groove of the rack guide) in positions 3, 7, 13, 19, 25, 31, and 37 with their extensions facing right (as viewed from the top and front). The half rack also includes one 60-2436-1 connector screwed into position 37. The full rack (60-2535-2) is shipped with fourteen (14) factory mounted rack guides with their centerlines (center groove of the rack guide) in positions 3, 7, 13, 19, 25, 31, 37, 43, 49, 55, 61, 67, 73, and 79 with their extensions facing right (as viewed from the top and front). The full rack also includes one 60-2536-1 connector screwed into position 79. Each position corresponds to 1 HP (approximately .2 inch).

Connectors

The FlameWorx modules use a 60-2536-1 connector. The MBPS-100R power supply uses a 60-2536-2 connector. Both connectors are similar in appearance. **The two connectors are keyed differently to prevent a FlameWorx module from being incorrectly plugged into a power supply connector.** The Full Rack (60-2535-2) and the Half Rack (60-2535-1) offered by Fireye each come with one screw terminal connector (60-2536-1) for use with the rack mount FlameWorx modules. The connectors are edge card style connectors consisting of 16 pins. The connectors will accept between 22-14 AWG (2.5 mm^2) wires.

To install rack mount FlameWorx modules

Since the Flame Worxs modules are 6 HP wide, the rack guides do not have to be moved. The connectors are installed at the same position as the centerlines of the rack guides. Screw the connectors (60-2536-1) as required into positions 7, 13, 19, 25, and 31 on the half rack, and positions 7, 13, 19, 25, 31, 37, 43, 49, 55, 61, 67, and 73 on the full rack. Then slide the FlameWorx module into the connector and secure with the top and bottom screws. The rack guide in position 3 is located for use with the 19MPS power supply.

Note: Note: The half rack includes one 60-2536-1 connector screwed into position 37, and the full rack includes one 60-2536-1 connector screwed into position 73.

Note: Note: If desired, filler plates are available to close any openings. Refer to the section on "Filler Plates."

To install the MBPS-100R power supply

The MBPS-100R, -200R power supply is 10 HP wide, and the rack guides are factory installed 6 HP apart. The MBPS-100R, -200R power supply uses a straight style connector (60-2536-2). **This connector is similar to the 60-2536-1 connector for the FlameWorx modules but is keyed differently to prevent a FlameWorx module from being incorrectly plugged into a power supply connector.** Mount the connector for the MBPS-100R, -200R power supply (60-2536-2) in the same position as the centerline of the rack guide. To install the power supply at the far left position of the mounting rack, screw the 60-2536-2 connector into position 3. Then slide the power supply into the connector and secure with the top and bottom screws.

Connections for MBPS-100R, -200R Power Supply

TERMINAL	FUNCTION
1, 7	Power for UV scanners (UV1A, 45UV5). Connect to terminals 1 and 2 of MBUV -100R and MBUVS-100R.
2, 4	Power for flame rods and photocells. Connect to terminals 1 and 2 of MBFR-100R.
9, 11	24 VDC Power for Flame Worxs modules. Connect to terminals 13 and 14 of Flame Worxs modules.
14, 15	Incoming line power (120 VAC for MBPS-100R, 220 VAC for MBPS-220R).
16	Earth Ground

Replaceable fuse (1.6A) for MBPS-100R power supply (Part Number 23-184).

WIRING DIAGRAM

The connector for the rack mount flame modules (60-2536-1) provides 16 terminals for wiring the FlameWorx modules.

FIGURE 5. Internal/External Wiring Connections

EXTERNAL CONNECTIONS

1 Power for flame rod and UV scanner(s) (from MBPS-100R, -200R power supply)
2 Power for flame rod and UV scanner (s) (from MBPS-100R, -200R power supply)
3 Scanner input (flame signal) - Flame Switch (Channel #1)
4 Scanner input (flame signal) - Flame Switch (Channel #1)
5 Scanner input (flame signal)- Flame Switch (Channel #2)
6 Scanner input (flame signal)- Flame Switch (Channel #2)
7 Flame relay normally open (NO) contact - Flame Switch (Channel #1)
8 Flame relay common - Flame Switch (Channel #1)
9 Flame relay normally closed (NC) contact or 4-20 mA output - Flame Switch (Channel #1)
10 Flame relay normally closed (NC) contact or 4-20 mA output - Flame Switch (Channel #2)
11 Flame relay common - Flame Switch (Channel #2)
12 Flame relay normally open (NO) contact - Flame Switch (Channel #2)
13 Input power (24 VAC / 24 VDC)
14 Input power common
15 LonWorks Communications (Data A)
16 LonWorks Communications (Data B)

USE TERMINAL 14 (INPUT POWER COMMON) AS THE COMMON RETURN FOR EITHER /BOTH 4-20 mA OUTPUT SIGNALS. JUMPER(S) JP4/JP5 ARE SET IN POSITION 1-2.

INTERNAL CONNECTIONS

Jumpers JP4 and JP5 are shipped from the factory in positions 2-3, providing the flame relay normally closed (NC) contact.
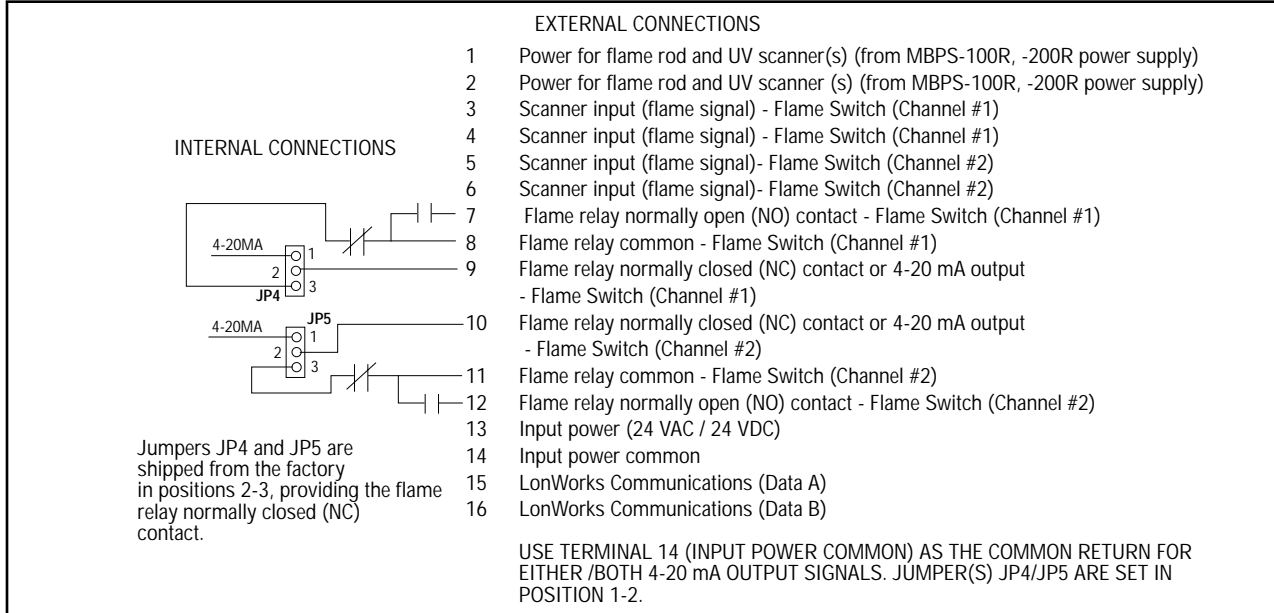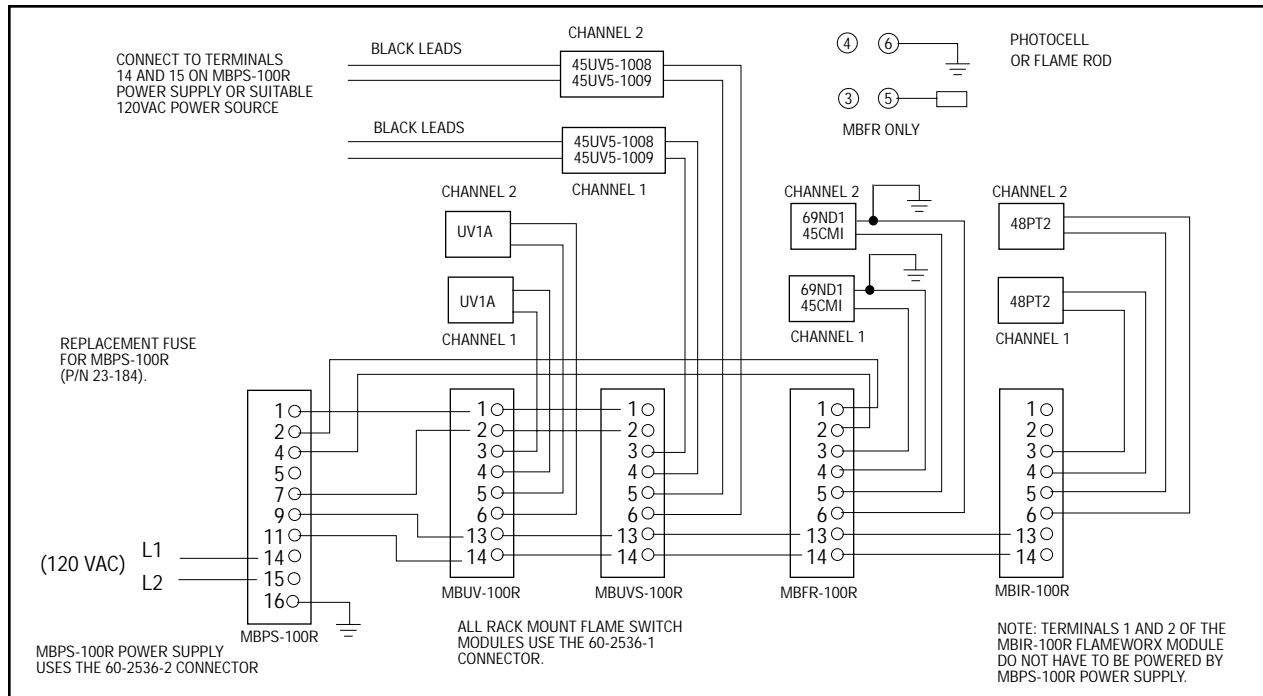
FIGURE 6. Scanner wiring diagram for MBPS-100R power supply and MBUV-100R, MBUVS-100R, MBFR-100R, and MBIR-100R FlameWorx modules and their associated scanners.

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FIGURE 7.   Scanner wiring diagram for MBPS-200R power supply and MBUV-100R, MBUVS-100R, MBFR-100R, and MBIR-100R FlameWorx modules and their associated scanners.

NOTICE

When Fireye products are combined with equipment manufactured by others and/or integrated into systems designed or manufactured by others, the Fireye warranty, as stated in its General Terms and Conditions of Sale, pertains only to the Fireye products and not to any other equipment or to the combined system or its overall performance.

WARRANTIES

FIREYE guarantees for one year from the date of manufacture of its products to replace, or, at its option, to repair any product or part thereof (except lamps, electronic tubes and photocells) which is found defective in material or workmanship or which otherwise fails to conform to the description of the product on the face of its sales order. **THE FOREGOING IS IN LIEU OF ALL OTHER WARRANTIES AND FIREYE MAKES NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED.** Except as specifically stated in these general terms and conditions of sale, remedies with respect to any product or part number manufactured or sold by Fireye shall be limited exclusively to the right to replacement or repair as above provided. In no event shall Fireye be liable for consequential or special damages of any nature which may arise in connection with such product or part.