



MBCE-1001  
September 20, 2023



# MBCE-110/230FR Flame Sensor Module



**exida**  
FMED  
SIL2  
SEE NOTE 1 ON PAGE 4



## DESCRIPTION

The MBCE-110/230FR modules provide visual indication and electrical outputs that signal the user regarding flame presence in a combustion chamber. The module uses Fireeye flame rods to sense flame presence independently or as components in a burner management system. Many operational characteristics are provided including:

- CE approved
- Self-contained: 110 VAC, 50/60 Hz: MBCE-110FR-1, MBCE-110FR-3  
230 VAC, 50/60 Hz: MBCE-230FR-1, MBCE-230FR-3
- Flame Rod compatible
- Flame ON/OFF LED indicator
- 4-20mA permits direct reading of flame signal strength
- Uses CE approved 11-pin relay base
- Panel surface or DIN-rail mounting
- Self-check

The unit provides a cost effective, self-checking method of monitoring flames using the ionization principle.

Check with Fireeye for more details by contacting your local distributor or by checking the Fireeye home page at [www.fireeye.com](http://www.fireeye.com).

*NOTE: When the MBCE-110/230FR modules are used, additional means must be furnished to provide those functions usually provided by flame safeguard control systems to meet local regulations (i.e.: safe start checks, valve closure, starting and running interlocks, safety timings, etc.).*



**WARNING:** The Equipment described in this manual is capable of causing property damage, severe injury, or death. It is the responsibility of the owner or operator to ensure that the equipment described is installed, operated, and commissioned in compliance with the requirements of all national and local legislation, which may prevail. Installation, commissioning, or adjustment of this product **MUST** be carried out by suitably trained engineer or personnel qualified by training or experience.



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



## ORDERING INFORMATION

PART NUMBER	DESCRIPTION	BULLETIN
<b>Flame Sensor</b>		
MBCE-110FR-1	Single channel module, 110 VAC 50/60 Hz, use with flame rod, 1 sec. FFRT.	MBCE-1001
MBCE-110FR-3	Single channel module, 110 VAC 50/60 Hz, use with flame rod, 3 sec. FFRT.	MBCE-1001
MBCE-230FR-1	Single channel module, 230 VAC 50/60 Hz, use with flame rod, 1 sec. FFRT.	MBCE-1001
MBCE-230FR-3	Single channel module, 230 VAC 50/60 Hz, use with flame rod, 3 sec. FFRT.	MBCE-1001
<b>Flame Sensor (ATEX / IECEx Ex d IIC T6)</b>		
MBCE-110FR-1CEX	Single channel module, 110 VAC 50/60 Hz, use with flame rod, 1 sec. FFRT.	MBCE-1001
MBCE-110FR-3CEX	Single channel module, 110 VAC 50/60 Hz, use with flame rod, 3 sec. FFRT.	MBCE-1001
MBCE-230FR-1CEX	Single channel module, 230 VAC 50/60 Hz, use with flame rod, 1 sec. FFRT.	MBCE-1001
MBCE-230FR-3CEX	Single channel module, 230 VAC 50/60 Hz, use with flame rod, 3 sec. FFRT.	MBCE-1001
<b>Wiring Base</b>		
60-2886	Plug in wiring base, DIN rail or panel surface mount complete with retaining kit.	MBCE-1001
<b>Mounting Rails</b>		
60-2539-12	DIN style mounting rail, 12 inches, mounts up to 4 modules.	
60-2539-24	DIN style mounting rail, 24 inches, mounts up to 8 modules.	
60-2539-36	DIN style mounting rail, 36 inches, mounts up to 12 modules.	
<b>Flame Rods</b>		
69ND1-1000K4	Flame rod 1/2" NPT mount, 12" length.	SC-103
69ND1-1000K6	Flame rod 1/2" NPT mount, 18" length.	SC-103
69ND1-1000K8	Flame rod 1/2" NPT mount, 21" length.	SC-103

## PRODUCT SPECIFICATIONS

<b>Supply Voltage:</b>	<b>MBCE-110FR</b> - 110 VAC (+10%, -15%), 50/60 Hz (@ 0.1 Amp consumption) <b>MBCE-230FR</b> - 230 VAC (+10%, -15%), 50/60 Hz (@ 0.05 Amp consumption)
<b>Flame Relay Output:</b>	SPDT 2 Amp Resistive @ 110VAC, 1 Amp @ 30VDC SPDT 1 Amp Resistive @ 230VAC, 1 Amp @ 30VDC
<b>Flame Fail Response Time:</b>	1 or 3 seconds - depending on part number (-1, -3)
<b>Operating Temperature:</b>	- 40° F to 150° F (- 40° C to 65° C)
<b>Storage Temperature:</b>	- 40° F to 176° F (- 40° C to 80° C)
<b>Humidity:</b>	85% RH (max), non-condensing.
<b>Agency Approvals:</b>	(Note <sup>1</sup> ) <b>MBCE-110FR</b> CE / EN298 <b>MBCE-230FR</b> CE / EN298
<b>Shipping Weight:</b>	1 lb (.5 Kg)
<b>Flame Rod:</b>	S1 = Terminal 4 S2 = Terminal 8 (local panel ground)
<b>Power:</b>	Terminals 4 and 8, - 240 - 360 VAC <i>Note:</i> Measured with digital VOM Terminals 5 and 8 are internally connected.
<b>Sensitivity:</b>	Flame Rod - 3 µA @ 100 Meg ohms
<b>IP-Rating</b>	IP-20
<b>Test Jacks:</b>	Standby/No flame                      4mA Flame signal (Min)                      6mA Flame signal (Max)                      20mA





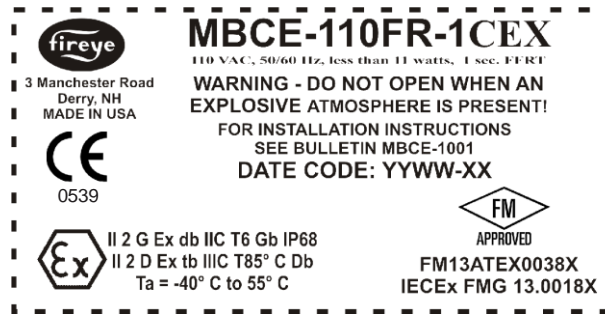
4. Shall use cable glands or conduit entry devices rated for the application to maintain the explosion protection and IP rating.
5. The MBCE flame sensors are not repairable. If repairs are required, consult the manufacturer.

Note: The MBCE-110FR & MBCE-230FR have been evaluated to EN 298:2012 by TUV, and meet the Gas Appliance Regulation (EU/2016/426)

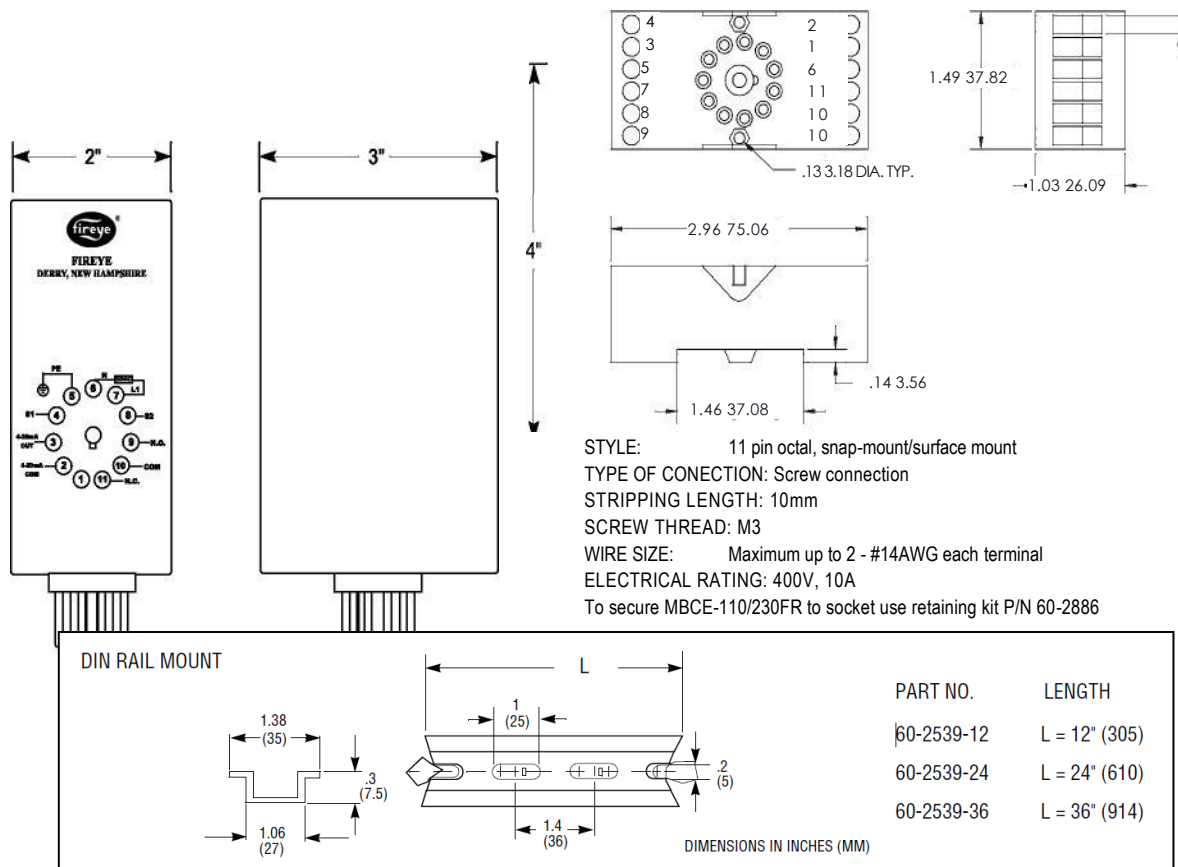
CE Certificate # CE-0085BT0365

Note 1: Based on Exida's FMEDA report no. FIR 09/10-26 R001 dated December 13, 2010, Fireeye certifies that the MBCE Flame Sensor Modules are suitable for installations up to and including SIL2

**Example of product label**



**FIGURE 2. DIMENSIONS OF DIN RAILS, WIRING BASES AND FLAME SWITCH MODULES SHOWN IN INCHES (MM)**





## SENSOR INSTALLATION



**WARNING: Incorrect flame rod installation may result in the generation of a false flame signal, causing unburned fuel to collect in the combustion chamber. The result can be explosions, injuries and property damage. Be certain that the flame rod detects only pilot and/or main flames.**

Route sensor wiring a sufficient distance from ignition and other high voltage or high current wiring to avoid electrical interference. Interference from ground currents, nearby conductors, radio-frequency emitters (wireless devices), and inverter drives can induce false flame signals. Shielded cables can help reduce interference with the shield connected to ground at the control end only. The wire type and its capacitance (picofarads or microfarads) to ground may cause low signal problems, so a grounded shield may decrease the signal due to the cable's internal capacitance. Multiple sensor leads run together without shielding may interfere or “cross talk”, so the shield or flexible armor must be grounded to prevent this situation. For flame rod sensor runs approximately 100 feet (30 meters) or greater, use Belden P/N 8254-RG62 coax cable. To achieve the maximum wiring distance, the shield should not be grounded (keep in mind that an underground shield provides less protection against electrical interference). Depending on field connections, sensor wiring can be up to 200 feet (61 meters).

### **Do not ground the shield to terminal GND.**

*Unshielded sensor wiring must not be run in common with other wires; it must be run in separate conduit. Multiple flame sensor wiring must not be run together in a common conduit or wireway. Use #14 to #18 AWG wire suitable for 90°C (194°F) and 600-volt insulation and run each pair of leads in its own shielded cable. Multiple shielded cables can be run in a common conduit.*

Flame rods are recommended to be used on gas burners. They accumulate soot on oil burners, causing nuisance shutdowns and unsafe operating conditions.

See the burner manufacturer's literature for flame rod mounting location.

## INDICATION LEDS

The CE Flameswitch contains two bi-color LEDs that are used to provide flame status and alarm condition per the following table.

LEDs can be viewed through the cutout located on the top side of the unit.

LED	COLOR	DEVICE STATUS
LED 1 (SYSTEM LED)	GREEN	SYSTEM OK
	BLINKING GREEN	SELF-CHECKING
	BLINKING RED/ORANGE	ALARM
	SOLID RED/ORANGE	SYSTEM FAULT
LED 2 (FLAME LED)	SOLID GREEN	GOOD FLAME
	BLINKING GREEN	WEAK FLAME
	BLINKING RED/ORANGE	FLAME RELAY FAULT
	SOLID RED/ORANGE	OTHER FLAME FAULTS
	OFF	FLAME OFF



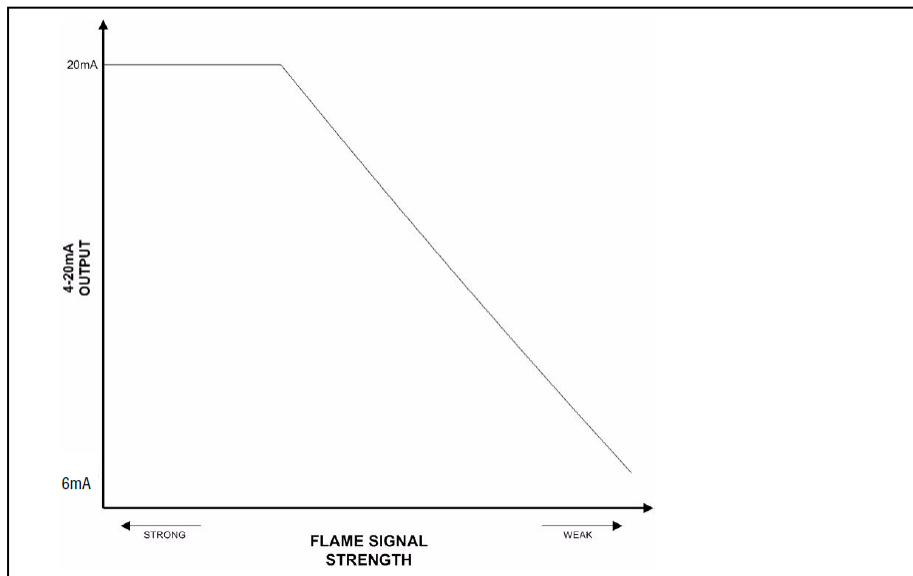
### WIRING BASE PINOUT INFORMATION

The following table shows the wiring information and the ratings. To guarantee proper operation, the unit **MUST NOT** be operated above its maximum rating.

TERMINAL NO.	TERMINAL NAME	DESCRIPTION	DIRECTION	RATING	
1	(11)	OPEN	UNUSED	N/A	
2	(A1)	4-20mA COM	4-20mA COMMON	LOCAL GROUND	
3	(14)	4-20mA OUT	4-20mA OUTPUT	28 VDC, 20mA max	
4	(12)	S1	FLAME ROD EXCITATION	OUTPUT	300 VAC, 1mA max
5	(22)	PE	PROTECTIVE EARTH	EARTH GROUND	
6	(21)	L2	NEUTRAL	INPUT	
7	(24)	L1	LINE VOLTAGE SUPPLY	INPUT	110/230 VAC (+10%,-15%) 50/60 Hz
8	(32)	S2	FLAME ROD RETURN	EARTH GROUND	
9	(34)	NO	FLAME RELAY NORMALLY OPEN (N.O.)	OUTPUT	110 VAC, 2A max/ 230 VAC, 1A max 30 VDC, 1A max
10	(A2)	COM	FLAME RELAY COMMON	INPUT	110 VAC, 2A max/ 230 VAC, 1A max 30 VDC, 1A max
11	(31)	NC	FLAME RELAY NORMALLY CLOSED (N.C.)	OUTPUT	110 VAC, 2A max/ 230 VAC, 1A max 30 VDC, 1A max

Any equipment connected to the 4-20 mA current loops shall be insulated from hazardous live parts by protective separation (e.g., double, or reinforced insulation according to DIN EN 61010, DIN EN 50178, DIN EN 60730-1 or DIN EN 60950).

### FLAME SIGNAL STRENGTH vs. 4-20mA OUTPUT

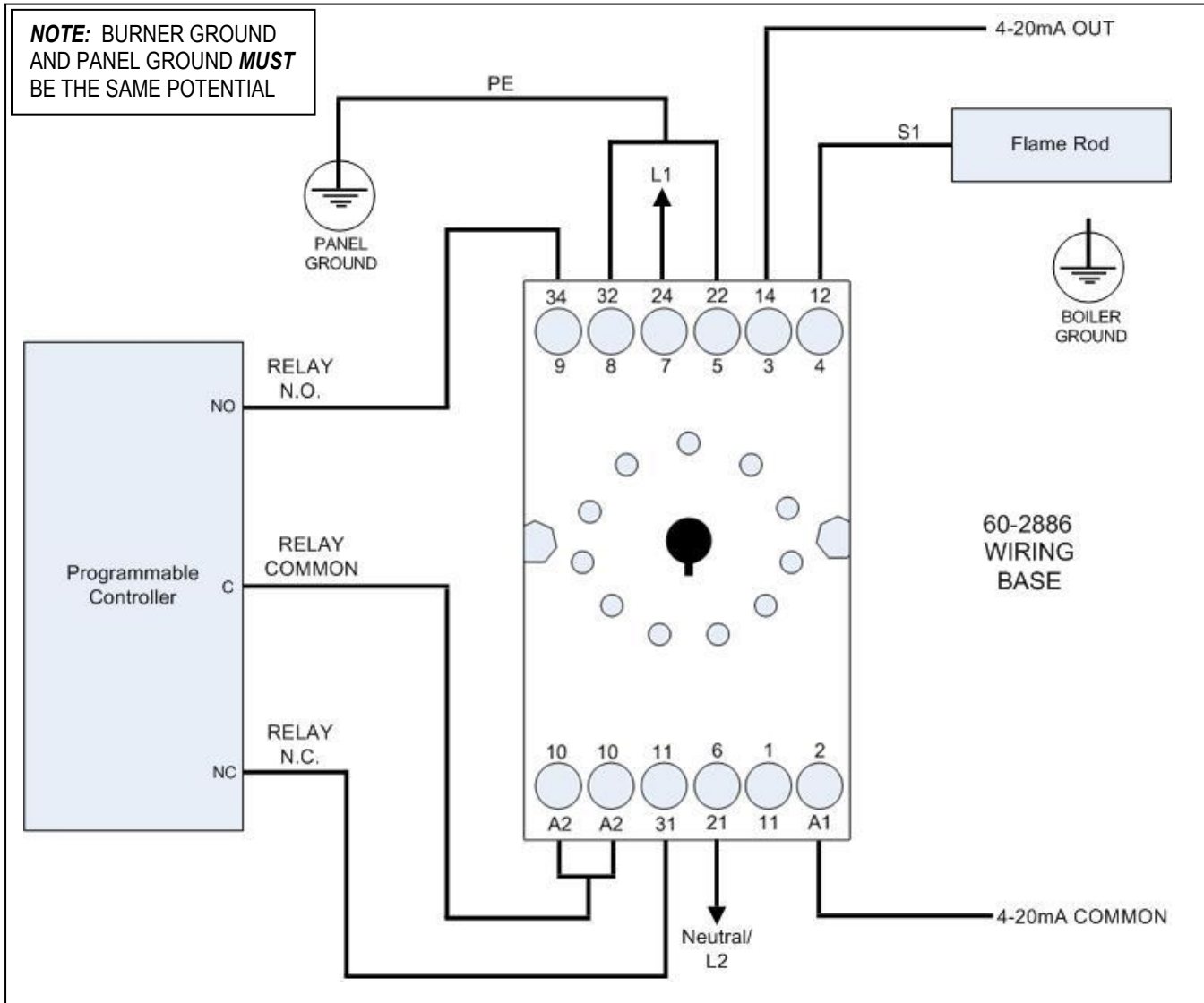




4-20mA measurements can be taken from the test jack connector located at the faceplate of the unit. Measurements can also be taken using the dedicated 4-20mA OUT & 4-20mA COM terminals located at the wiring base.

**NOTE:** The 4-20mA return path is labeled “GND” on the faceplate. This is simply a local return path for the 4-20mA current, and it **MUST NOT** be attached or referenced to earth ground or other forms of ground connection. Likewise, 4-20mA COM is the return path at the wiring base and **MUST NOT** be attached or referenced to earth ground or other forms of ground connection.

**FIGURE 3. TYPICAL APPLICATION -- MBCE-110/230FR**



**SPECIAL CONDITIONS OF USE**

1. The equipment shall be installed in compliance with the enclosure, mounting spacing and segregation requirements of the ultimate application.
2. Line voltage and extra-low voltage wiring to and from this device is intended to be wired in the field to become part of a Class 1 circuit only.



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## NOTICE

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## WARRANTIES, EXCLUSIVE REMEDIES, AND LIMITATION OF DAMAGES

Fireeye guarantees for one year from the date of installation or 18 months from the date of manufacture, whichever occurs first, to replace, or at its option, to repair any product or part thereof which Fireeye, in its sole discretion, deems to be defective in material or workmanship or which otherwise fails to conform to the description of the product on the face of its sales order. Fireeye's obligations pursuant to this warranty do not extend to any products or parts thereof which Fireeye determines to have been installed, operated, maintained, repaired, or altered improperly or otherwise than in conformity to Fireeye's applicable instructions, or which have been subject to misuse, accident, or neglect.

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