



MP-5601  
JUNE 6, 2006



# FIREYE MODULAR MicroM

**FLAME SAFEGUARD CONTROLS  
MEC320TS, MEP696, MEUV4**



**WARNING: Selection of this control for a particular application should be made by a competent professional, licensed by a state or other government. Inappropriate application of this product could result in an unsafe condition hazardous to life and property.**

## DESCRIPTION

The Fireeye MicroM Series Flame Safeguard Control is a compact, microprocessor based, modular burner management system designed to provide automatic ignition and continuous flame monitoring for commercial sizes of heating and process equipment firing any type of fuel. The advantages of the MicroM are zero dependence on discrete components previously used for timing functions.

A complete MicroM system consists of the relay module, MEC320TS, programmer module, MEP696, amplifier module, MEUV4, subbase, 61-3060 or 61-5042 and UV scanner, UV1A3 or UV1A6. An optional alphanumeric display (ED510) is available that provides complete English language description of the current operating status as well as diagnostic history.

To maximize safety the MEP696 provides early spark termination followed by a pilot proving period. This prevents the unwanted detection of spark generated by a maladjusted pilot and spark assembly. The air flow switch connected between terminals 7 and 6 must be closed within 10 seconds after the start of a cycle.

Functions provided on the MEC320TS chassis and MEP696 programmer:

1. Fixed 30 second pre-purge period
2. Ignition terminal 4 shuts off 10 seconds into the Pilot Trial for Ignition
3. 5 second Pilot Proving period
4. Pilot terminal 3 shuts off 5 seconds into the Main Trial for Ignition
5. Post Purge has selectable 0 or 60 seconds duration
6. Release to modulate contacts 1 second after AUTO
7. Lockout occurs if air flow, terminal 6, is not proven 10 seconds into purge
8. Modbus communications allowing for hookup to plc system
9. Dip-switch selectable communication baud rate, 4800, 9600 or 19200 baud
10. Dip-switch selectable pilot trial for ignition timing, 5 or 10 seconds
11. Smart LEDs that provide on board diagnostic lockout information
12. Amplifier test jacks provide uniform 0-10 vdc for flame signal strength

## SPECIFICATIONS

**Supply:** 120 VAC (min. 102, max. 132) 50/60 Hz.  
**Power Consumption:** 12 VA (Operating)  
**Shipping Weight (Approx):** 3 lbs (1.4 kg)  
**Operating Temperature:** -40°F (-40°C) to 140°F (60°C)

Table 1:

### AMBIENT TEMPERATURE LIMITS

	MAXIMUM		MINIMUM	
	Control	140°F	60°C	- 40°F
Scanner UV1A, UV2, UV8A, 45UV3, UV90	200°F	93°C	- 40°F	- 40°C

## APPROVALS

**Underwriters Laboratories Inc.**

Listed Guide MCCZ - File MP1537

Listed Guide MCCZ7, Canada - File MP1537

**Underwriters Laboratories Inc.**

Recognized Components Guide MCCZ2

Recognized Components Guide, Canada MCZZ8 - File MP1537

**Factory Mutual System (FM) Approved**



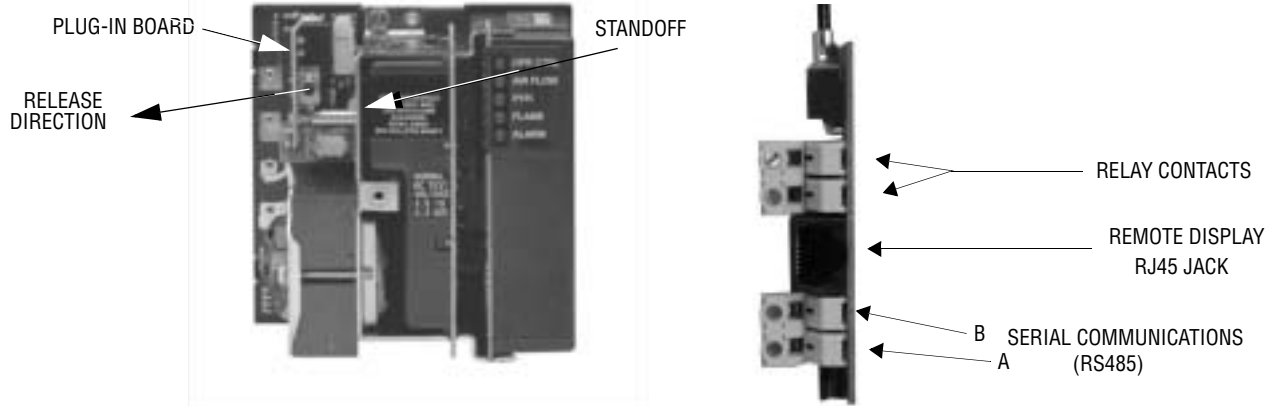
**In order for the MicroM to gather and retain statistical and historic data such as burner hours, burner cycles, system hours and average flame signal, it is necessary that Terminal 1 be powered at all times. Removing power from Terminal 1 at the end of the firing cycle causes all data gathered during the previous 16 hours or last 9 cycles to be lost. For conversions or upgrades from older TFM or M-Series II controls that use MART1 amplifiers, it is necessary that Terminal 1 be directly powered with 120 VAC.**

## PLUG-IN DAUGHTER BOARD

### Description

A plug-in board is pre-installed in the MEC320TS chassis to provide local reset, remote alphanumeric display, serial communications and normally closed relay contacts.

**FIGURE 1.** PLUG-IN BOARD LOCATION AND INSTALLATION



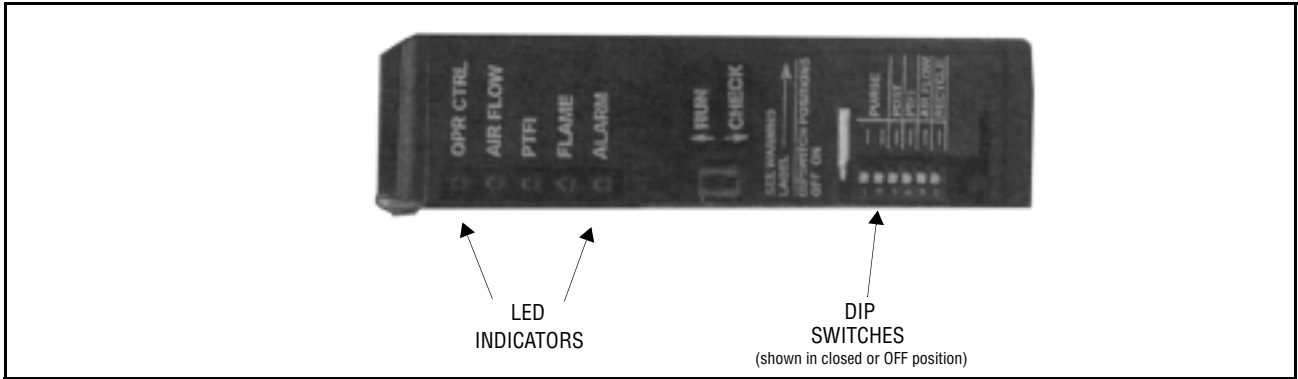
### MEP696 Programmer Dip Switch Configuration

SWITCH						FUNCTION	
6	5	4	3	2	1		
				C	C	4800	BAUD RATE SELECTION
				C	O	9600	
				O	C	19200	
				O	O	19200	
			C			DISABLED	POST
			O			60 SECONDS	PURGE
		C				5	PTFI TIME
		O				10	
		C				DISABLE	PROVE AIR FLOW OPEN AT START
		O				ENABLE	
					RECYCLE		
					NON-RECYCLE		

*Note: C refers to switch closed position, closed position is when the switch is toward the printed circuit board. O refers to switch open position or when the switch is moved away from the printed circuit board. Indicating arrow on top of programmer cover points toward closed position.*

Except for baud rate selection, once the switches are set, they become permanently stored after 8 hours of continuous operation or they can be manually set through the use of the optional ED510 display. Refer to the section using the optional ED510 display for detailed information.

The ED510 display operates at 4800 baud only. To use the ED510 display, power must be removed and dip switches 1 & 2 must be set in the **CLOSED** position.



**Dipswitch Definitions**

**Baud Rate:** On every application of power, the communication baud rate is determined by switches 1 & 2. The available selections are 4800, 9600 and 19200 baud. *Note the ED510 requires the baud rate to be set at 4800, switches 1 & 2 closed.*

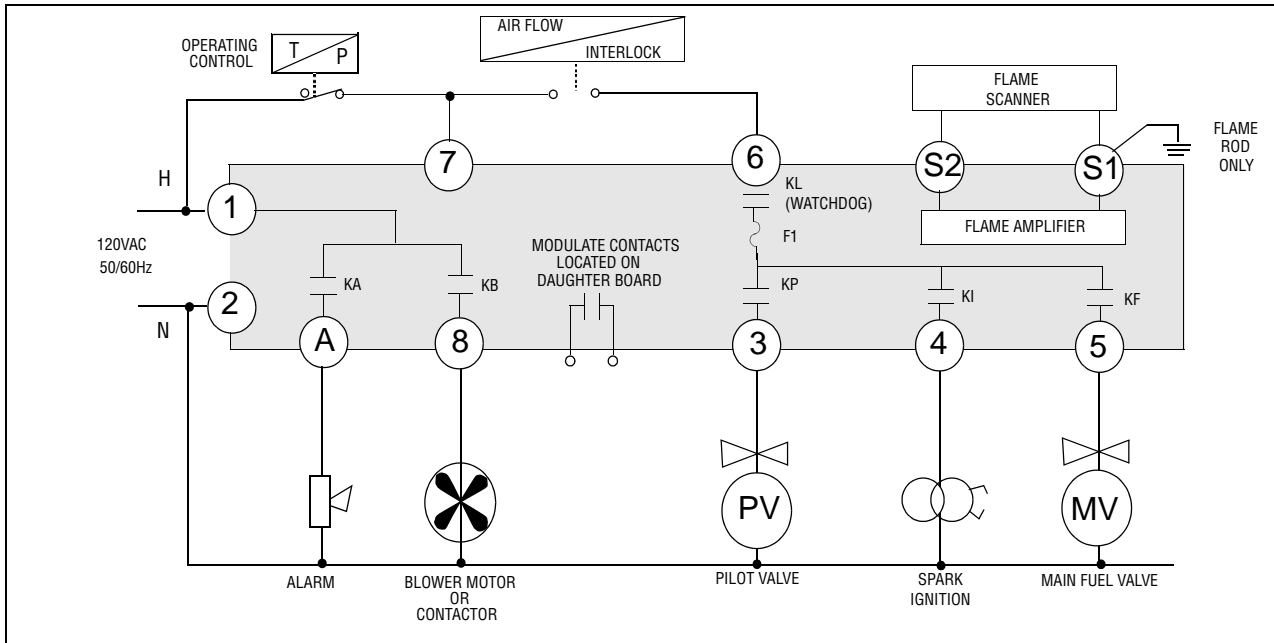
**Post Purge:** If enabled, Terminal #8 (blower motor or contactor) will remain energized for 60 seconds after terminal #7 or Terminal #6 is detected as open.

**PTFI Time:** The length of time that Terminal #3 and Terminal #4 will be energized after the pre-purge period to detect pilot flame.

**Prove Air Flow Open:** After power is detected on Terminal #7 (limit control) and before energizing Terminal #8 (blower motor or contactor) no power must be detected on Terminal #6 (running interlock switch). If power is detected on Terminal #6, the MicroM will hold for 60 seconds after which safety lockout will occur. On recycle operation, if this is enabled, Terminal #8 will be de-energized to allow Terminal #6 to open.

**Recycle:** Applies to air flow interlock opening during the Run condition. If the air flow interlock (Terminal #6) opens, the control will de-energize Terminals #3, #4 and #5, and if Recycle is selected a new prepurge period will begin. Lockout and alarm will occur immediately after air flow interlock opening if Non-Recycle is selected.

**FIGURE 2. WIRING ARRANGEMENT FOR PILOT IGNITED BURNERS USING MEP696 PROGRAMMER**



Lockout occurs on all occurrences of flame failure.

## SEQUENCE TIMING

**Table 2: MEP696 Timing Sequence**

FUNCTION	TERMINAL	STANDBY	PURGE 30 SEC.	PTFI 10 SEC.	PROVING 5 SEC	MTFI.	AUTO 1 SEC	POST PURGE 60 SEC	CYCLE COMPLETE
OPERATING CONTROL	7		10 SEC						
BLOWER	8								
AIR FLOW INTERLOCK	6		← AIRFLOW MUST CLOSE 10 SECONDS AFTER CYCLE START						
IGNITION	4				← EARLY SPARK CUT-OFF				
PILOT	3				PILOT PROVING	← INTERRUPTED PILOT			
MAIN VALVE	5								
MODULATE									
FLAME SIGNAL								← STATE CHANGE 1 SECOND AFTER AUTO	

## LED INDICATOR LIGHTS

The MEP696 Programmer Module has 5 LED lights to indicate the operating status of the control and also to display the coded sequence under locked out conditions. The function of the lights under a normal operating condition is:

### Operating Control:

This LED is energized whenever the burner control switch and all other various limit switches are closed and power is applied to Terminal #7.

### Interlock or Air Flow:

This LED is illuminated whenever power is detected on Terminal #6, indicating the air flow switch or other running interlock is closed. If the operating control is closed and the running interlock switch remains open, this LED will flash at a 1 second rate. The air flow switch must be closed within 10 seconds after the operating control is closed.

### PTFI:

This LED is illuminated only during the pilot trial for ignition period and the stabilization period when so equipped.

### Flame:

This LED is on whenever a flame signal is detected, and the control is not in a locked out state.

### Alarm:

This LED flashes when an alarm condition is detected and is also used as an address indicator. During an alarm condition, the Alarm LED is made to flash at approximately a 1 second rate. The remaining four LEDs are illuminated as a coded sequence identifying the reason for the lockout. For instance, for a LOCKOUT - FLAME FAIL- PTFI, the INTERLOCK, PTFI and FLAME LED's will all be lit steady, with the Alarm LED flashing. This remains true if power is removed and then restored in a locked out condition. While in the Idle or



Off state, the LEDs are made to flash sequentially to show the operational status of the control every minute. The LEDs can be tested by pressing and releasing the Reset push button, while in the Idle or Off state.

## LOCKOUT CODES

MSGN		DESCRIPTION	OP CTRL	AIRFLOW INTLCK	TFI	FLAME	ALARM
DEC	HEX						
6	6	Lockout Line Frequency Noise Detected	●	○	○	●	*
7	7	Lockout Flame Fail - TFI	○	●	●	●	*
15	0F	Lockout Fault Unknown	●	●	●	●	*
16	10	Lockout Amplifier High Count Fail	○	○	○	○	*
19	13	Lockout Flame Fail - MTFI	○	○	●	●	*
20	14	Lockout False Flame - STANDBY	○	●	○	○	*
21	15	Lockout Intrlck Open	●	●	●	○	*
22	16	Lockout Intrlck Closed	○	●	●	○	*
24	18	Lockout Chassis Opto	●	●	○	●	*
37	25	Lockout Flame Fail - AUTO	○	●	○	●	*
39	27	Lockout Fuel Valve State Change	○	○	○	●	*
54	36	Lockout Check Chassis	○	○	○	●	*
55	37	Lockout Check Programmer	○	○	●	○	*
56	38	Lockout Check Amplifier	●	○	○	○	*
58	3A	Lockout Amplifier Auto Check Fail	●	○	●	○	*
59	3B	Lockout Check BLOWN FUSE	●	○	●	●	*
76	4C	Lockout Check Scanner	●	●	○	○	*
N/A	N/A	System Error	*	*	*	*	●

○ = NOT LIGHTED

● = LIGHTED

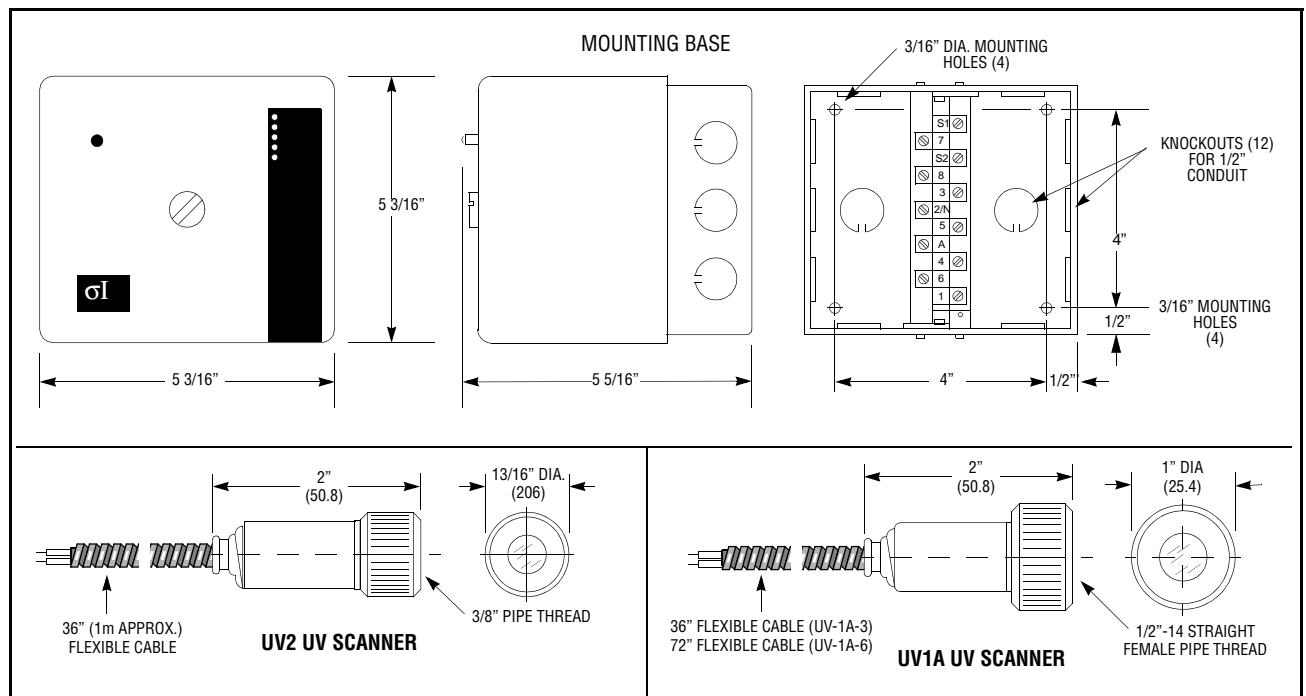
\* = FLASHING

All LED's Flashing indicates defective programmer.

All MicroM chassis are shipped with a convenient peel off label that can be applied to any surface (inside cover) for future reference.

## DIAGNOSTIC MESSAGES - TROUBLESHOOTING GUIDE

	POSSIBLE CAUSE	SOLUTION
Check Programmer	Voltage on Terminal 5 at improper time.	Inspect wiring to main fuel valve
	Welded watchdog relay	Replace chassis
	Internal diagnostic failure	Replace programmer
Check Chassis	Voltage on Terminal 3 or 4 at improper time.	Inspect wiring to pilot valve and igniter.
	Welded watchdog relay	Replace chassis
Chassis Opto	Opto-Coupler(s) short circuited	Replace chassis
Amplifier High Count Fail	Amplifier signal level high	Replace Amplifier module
Amplifier Auto Check Fail	Flame signal too high	Use orifice in sight pipe
	Internal Amplifier diagnostic fault	Replace Amplifier module
Check Scanner	Defective shutter	Inspect scanner wiring, replace scanner
	UV tube false firing	Replace UV tube or scanner
Check Blown Fuse	No power detected on terminal 3	Inspect defective pilot valve or igniter
	Defective fuse	Replace fuse
Line Frequency Noise Detected	Spikes detected on AC mains	Check for SCR motors or DC drives
		Inspect ground system
Fuel Value State Change	Terminal 5 (main fuel) detected on during TFI	Check external wiring or replace chassis
Check Amplifier	Amplifier not passing diagnostic tests	Replace Amplifier module
System Error	Noise transient	Check high energy ignition noise location. Be sure it is not arcing to chassis or wrapped with scanner wiring.



**CAUTION:** Published load ratings assume that no control be required to handle inrush current more often than once in 15 seconds. The use of control switches, solenoids, relays, etc. which chatter will lead to premature failure. It is important to run through a test operation (with fuel shut off) following the tripping of a circuit breaker, a blown fuse, or any instance of chattering of any external current consuming devices.



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## 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.

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## WARRANTIES

FIREYE guarantees for *one year from the date of installation or 18 months from 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 Fireeye shall be limited exclusively to the right to replacement or repair as above provided. In no event shall Fireeye be liable for consequential or special damages of any nature that may arise in connection with such product or part.



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