INTRODUCTION TO FLAME SAFEGUARDS

PR-00-2-0100-004-A

The basics

What is a flame safeguard

A flame safeguard is a device that controls the safety aspects of establishing and maintaining a flame. The design of the flame safeguard is usually defined by codes that the manufacturers of industrial process equipment must adhere to.

The basics

Why use a flame safeguard

Safety is the top priority with any industrial process. As a result, the liability that an individual or company would assume if they were to create their own flame safety logic would be enormous.

By choosing to use a flame safeguard from an established manufacturer like Fireye, they don't have to worry about this aspect. They can rely on the years of experience and the maturity of the product and know that their industrial process will operate smoothly.

Regulations

Safety codes

The following codes must be considered in the design of a flame safeguard if it is going to be used in a particular application. Most jurisdictions will require compliance to these codes. There are also local codes in some places as well.

In some cases, code compliance can be achieved in other ways, but it is best to factor this into the flame safeguard selection process.

- **NFPA 54** – Standards for gas piping.
- **NFPA 85** – Standards for boilers with an input rating at or over 12.5MMBTU/hr.
- **NFPA 86** – Standards for ovens and furnaces.
- **ASME CSD-1** – Standards for boilers with an input rating below 12.5MMBTU/hr.

Regulations

Regulatory agencies

There are several regulatory agencies as well that provide listings that allow equipment to be installed. This indicates that the agency has tested and approved the safety of the device within the defined category.

- **UL** – Underwriter's Laboratories is a listing agency recognized primarily within North America.

- **CE** – The CE is the certification mark required within the European Economic Area (primarily countries within the European Union).

- **UKCA** – The UKCA is the certification mark required within the United Kingdom.

- **FM Approved** – FM Global is an insurance company specializing in loss prevention that offers testing and approval services.

Regulations

BurnerLogix Chassis/Flame Amp. Module	FM APPROVED	c UL US LISTED	c UL US	CE
YB110UV	X	X	X	
YB110UVSC	X	X	X	
YB110IR	X	X	X	X
YB110IR2	X	X	X	X
YB110FR	X	X	X	
YB110DC	X	X	X	
YB230UV	X			
YB230UVSC	X			
YB230IR	X			X
YB230IR2	X			X
YB230FR	X			
YB230DC	X			

Selection

Find out which agency approvals are required for the jurisdiction that the equipment will be going to, then find the documentation that shows which models comply.

The categories

Primary vs. Programming

There are two primary categories of flame safeguard: the primary control and the programming control.

The term primary control typically refers to a more basic control that doesn't have a modulation circuit – it typically controls an on/off burner. Most primary controls on the market now are microprocessor controlled but historically many of these devices used mechanical timers to achieve their sequencing.

The term programming control typically refers to a more advanced control that controls modulation or has other advance features. Programming controls are always microprocessor controlled.

The components

Main parts

The flame safeguard is composed of the main parts listed below. All of these are needed to have a functional unit.

- Wiring base
- Chassis
- Programmer
- Amplifier

The components

Wiring base

Most flame safeguard systems begin with the wiring base. This can also be referred to as a sub-base. The wiring base is where all the connections are made. This allows for the flame safeguard to be easily removed to be tested or replaced.

The components

Chassis

The flame safeguard chassis is what binds all the components together to form one functional unit. The other components such as the programmer or amplifier can either plug into the chassis or can be integral. When integral, the type of amplifier desired must be known prior to getting the chassis, and it can't be changed readily after the fact.

The components

Programmer

The programmer is what contains all the operating logic. The sequences and timings are all contained in the programmer. The model selected is based upon the application and while many of the settings are initially programmable, there are provisions with all programmers to burn-in these settings after a certain amount of run time (typically eight hours).

The components

Amplifier

The amplifier determines which type of flame scanner the flame safeguard can work with. The amplifier may be integral to the model of chassis chosen. In these cases, the chassis model determines the flame scanner to use. Other models have an amplifier card similar to a programmer card.

The typical types of flame scanning supported by amplifiers are flame rods, ultraviolet and infrared scanners.

The sequence

Non-recycling vs. recycling inputs

The flame safeguard has dedicated inputs and outputs for all the required components. There is a **non-recycling** or safety input that is monitored whenever there is an active cycle. If any device in this loop trips, the flame safeguard will lockout and require a manual reset. Items in this limit string are typically devices that should not normally be tripped such as the high temperature or pressure limit, gas pressure switches or the airflow switch.

There is also a **recycling** input that allows the flame safeguard to cycle on and off as needed to control the process. This loop is where inputs such as an operating limit or a control switch would be wired – limits that are normally turned on and off.

There may also be a **fuel valve end switch interlock** which proves that the fuel valve is not open via a mechanical switch. This may also be referred to as a proof-of-closure. This input must be closed whenever the flame safeguard is in standby and until the pilot fuel valve opens.

The sequence

Call for heat and initiating the start-up

If the recycling limit input has power, that means there is a **call for heat**. This initiates the start-up sequence. First, the blower motor is started, and a certain amount of time is allowed for the air pressure switch to prove airflow. This switch is in the **running interlock** circuit, which may also be where non-recycling limits are wired. If the airflow is proven, then the control will proceed to the next phase, which is a purge prior to ignition. This is commonly referred to as the **prepurge**.

The running interlock circuit may have a requirement that the state changes from closed to open whenever the flame safeguard is in standby. This is to detect an airflow switch that is stuck closed, which would potentially allow the burner to proceed to ignition without the blower motor running. Some flame safeguards even have an additional input to monitor the normally closed contact of the airflow switch.

The sequence

Purging

When determining whether to purge with an open or closed damper and for how long, consider that the goal is to have a specific amount of complete air changes within the confined space. If an open damper is used, the airflow will be much greater, resulting in a shorter required purge time.

If a closed damper is used for the purge, the purge timing will begin when the airflow switch is proven. After the purge timing is complete, the flame safeguard will proceed to the ignition phase.

If an open damper is used for the purge, the flame safeguard will command the modulating motor to drive to the open position. The flame safeguard may require that this open position is proven by receiving a signal from the **purge interlock**. The purge timing will begin upon driving to open if it is not proven, or when the open proven signal is received. In both instances, once the purge timing is complete, the modulating motor will be commanded to drive to the low-fire position. Once a signal is received from the **low fire start interlock**, the flame safeguard will proceed to the ignition phase.

The sequence

Ignition and pilot

There are several different ways that ignition can be wired depending upon the burner.

If there is a separate pilot valve, the ignition output will energize for a fixed amount of time while the pilot valve is also open. The pilot will then have a fixed amount of time to be proven before the sequence to establish the main flame begins. This period is known as the **pilot trial for ignition (PTFI) or pilot flame establishing period (PFEP)** and will typically last for around 5-10 seconds (selectable and depending upon code). If the pilot flame is not proven, the flame safeguard will lockout with a "pilot flame failure" error.

If the burner has a direct spark, the ignition output will energize at the same time as the main fuel valve. There is no PTFI when this is the case.

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The sequence

Pilot types

There are two terms used often to describe the type of pilot that the flame safeguard supports.

One type is **interrupted ignition.** This means that the ignition is timed so that it is only energized to light and establish the pilot (until the end of the PTFI period).

The other type is **intermittent ignition**. This means that the ignition is on all the time from when the ignition sequence begins until the main valve de-energizes to begin the shutdown sequence.

The sequence

Main

The main flame can either be established directly from a spark or it can be initiated from a pilot flame.

If initiated from a pilot flame, if there is a sufficient flame signal from the pilot at the end of the PTFI period, the main valve will open. The main flame will then have a fixed amount of time to be proven (selectable and depending upon code) before the sequence to run in automatic mode begins. This period is known as the **main trial for ignition (MTFI) or main flame establishing period (MFEP)** and will typically last for around 10-15 seconds.

If the burner has a direct spark, the ignition output will energize at the same time as the main fuel valve. The main flame will have to prove in the amount of time described above.

If the main flame is not proven, the flame safeguard will lockout with a "main flame failure" error.

The sequence

Automatic operation

Once the main flame has been proven, the flame safeguard transitions from the MTFI phase to the auto phase. At this point, the modulating motor is released to follow the commands received from the load control. The load control can be a part of the flame safeguard or it can be an externally mounted control. The load control is responsible for maintaining the setpoint and may or may not also include a call for heat output.

When the call for heat goes away, the flame safeguard will prepare for shutdown.

The sequence

Shutdown sequence

When there is no longer a call for heat, the flame safeguard may modulate down to the low-fire position before turning off the main valves. This is known as **assured low-fire cutoff (ALFCO).**

Once the main valves are de-energized, the blower will continue to run for a period of time known as the **postpurge**. Once the postpurge is over, the control will go into the standby phase and wait until the call for heat returns.

If the signal is lost to the recycling limit input, a normal shutdown will occur and the control will return to standby. If the signal is lost to the non-recycling input or the flame signal is lost, the control will shutdown immediately in a lockout condition.
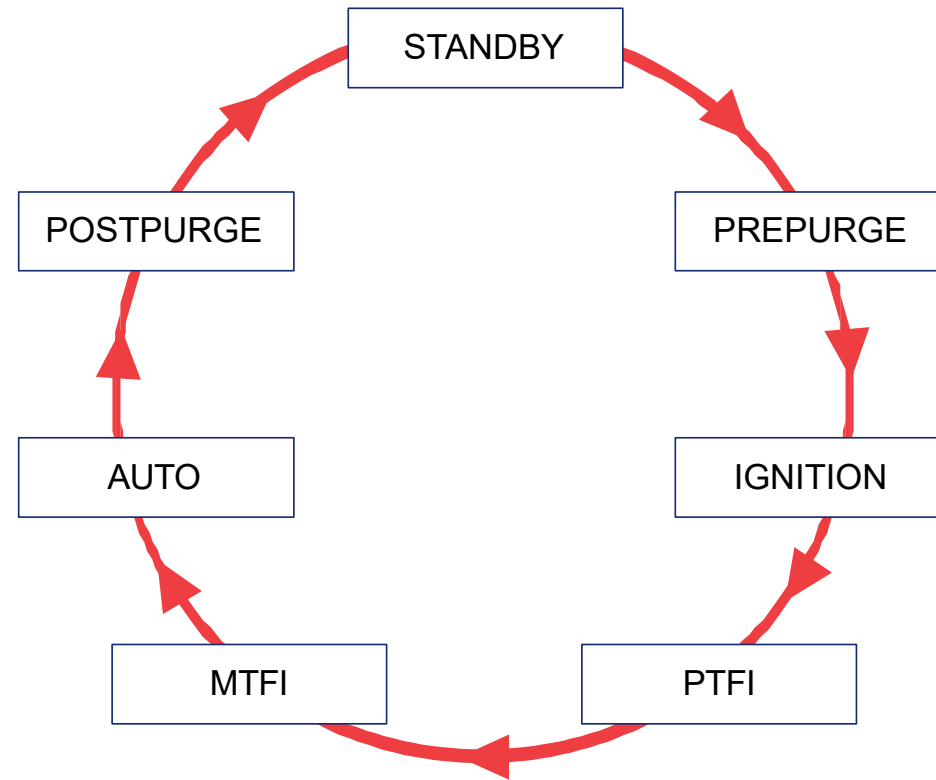
The sequence

Lockouts

There are many reasons that a flame safeguard can lockout. If an input that is critical to the safety of the operation is not proven in time, a lockout will occur. Some examples:

- Running interlock

- Non-recycling interlock

- Purge interlock

- Low fire start interlock

A lockout will also occur if the flame is not proven during the PTFI or MTFI – this is a flame failure. A lockout will also occur if a flame is detected when there should not be one – this is a false flame. A false flame may either be an extraneous flame signal (actual flame) or may be an induced flame signal due to interference or a faulty scanner.
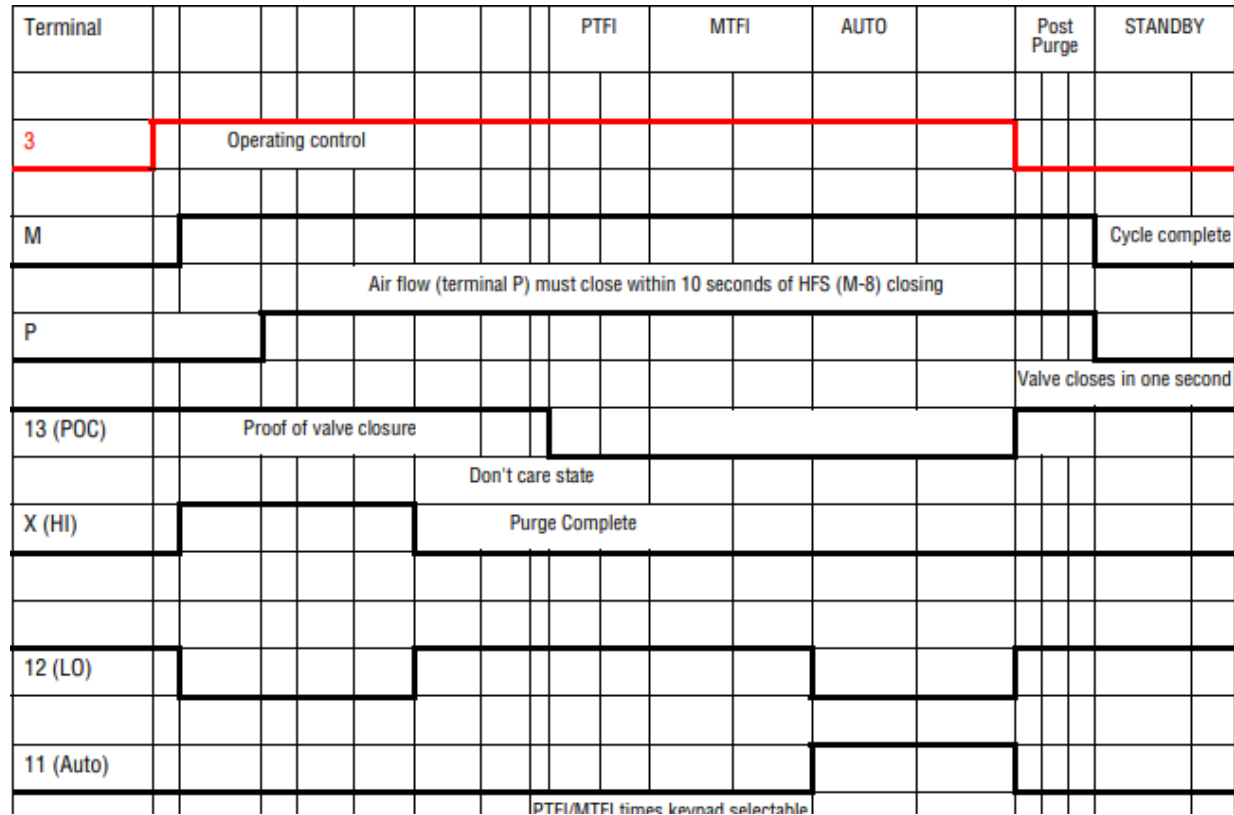
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The sequence

Summary

The sequence

Sequence charts

The manual for the flame safeguard should contain a sequence chart to show the desired status of inputs and commanded status of outputs for each phase. This chart can help to determine if the particular flame safeguard or programmer will work for your application.
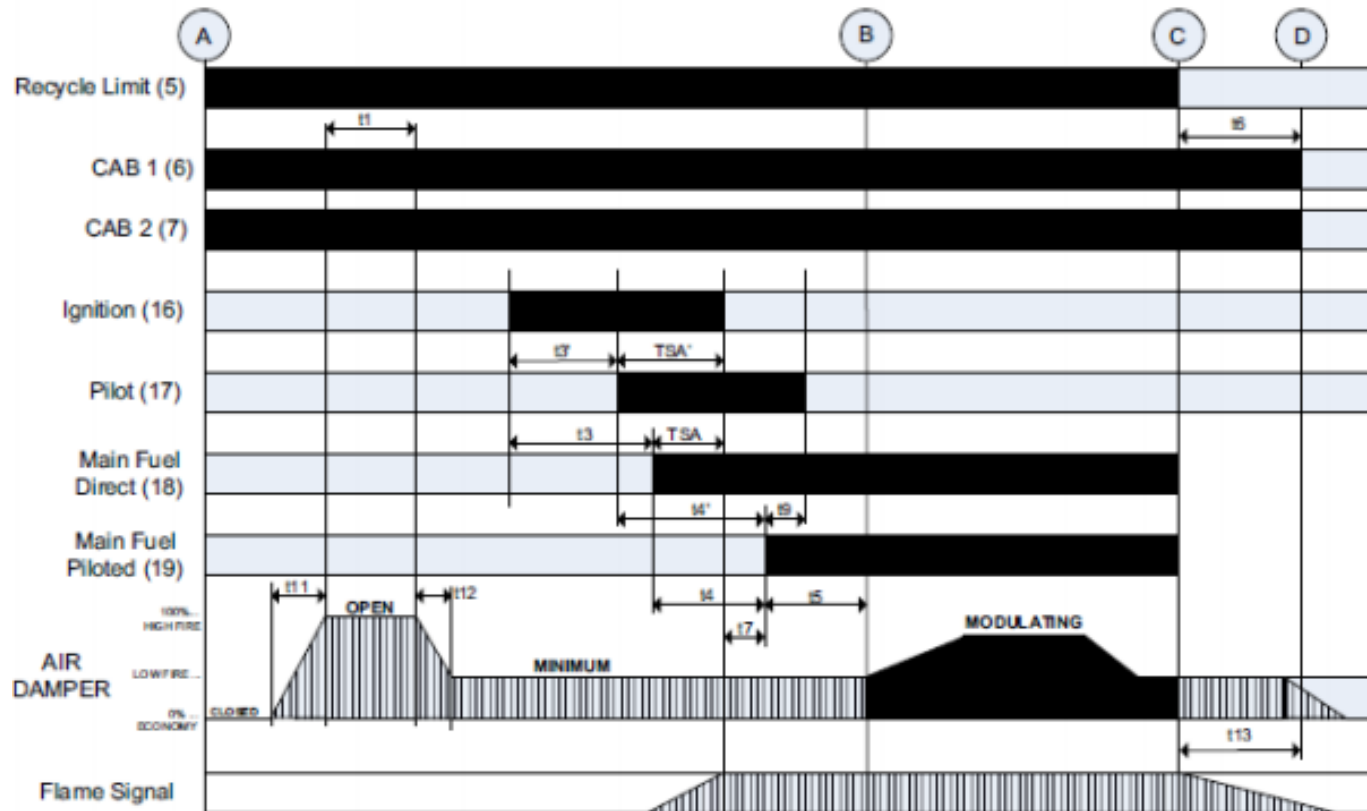
The sequence

Sequence chart example

The sequence

Sequence chart example

Connection details

Wiring

The manual for the flame safeguard will have all the information to describe each terminal on the wiring base. Example wiring diagrams are also provided in most cases.

Table 11: PRE-WIRED WIRING BASE, P/N 60-2810-1 (shown for 120 VAC)

Terminal No.	Wire Color	Type	Description	Rating
L1 (Hot)	Black		Line voltage supply	120/230 VAC (+10%,-15%), 50/60 Hz
L2 (Neutral)	White		Line voltage common	
EARTH	Green	Ground		
S1	Red/Wht		Scanner Input	300 VAC, 3 mA (UV models only)
S2	Blu/Wht		Scanner Input	300 VAC, 3 mA (UV models only)
A	Red	Output	Alarm	120/230 VAC, 1 A pilot duty
M	Brown	Output	Combustion Blower	120/230 VAC, 9.8 FLA, 58.8 LRA
3	Yellow	Input	Operating Control	120/230 VAC, 1 mA
13	Orange	Input	Fuel Valve End Switch, Pre-Ignition Interlock	120/230 VAC, 1 mA
P	Gray	Input	Running Interlock	120/230 VAC, 1 mA
D	Wht/Brn	Input	Low Fire Start Switch	120/230 VAC, 1 mA
8	Wht/Gry	Input	Open Damper Proving Switch	120/230 VAC, 1 mA
W	Wht/Orn	Output	Delayed Main Valve	See Load Ratings (Page 7)
5	LT Blue	Output	Ignition / Pilot Valve	See Load Ratings (Page 7)
6	Tan	Output	Pilot Valve	See Load Ratings (Page 7)
7	Violet	Output	Main Fuel Valve	See Load Ratings (Page 7)
16	DK Blue	Input	Pilot Valve Hold	120/230 VAC, 1 mA
21	Pink	Input	Start Input	120/230 VAC, 1 mA
10	Wht/Red	Output	Modulator Common	120/230 VAC 75 VA
12	Wht/Yel	Output	Modulator Low Fire	120/230 VAC 75 VA
X	Wht/Blue	Output	Modulator High Fire	120/230 VAC 75 VA
11	Wht/Grn	Output	Modulator Auto	120/230 VAC 75 VA
22	Wht/Vio	Input	Remote Reset	120/230 VAC, 1 mA
23	Brn/Wht	Input	Spare 2	120/230 VAC, 1 mA

Connection details

Suggested wiring example
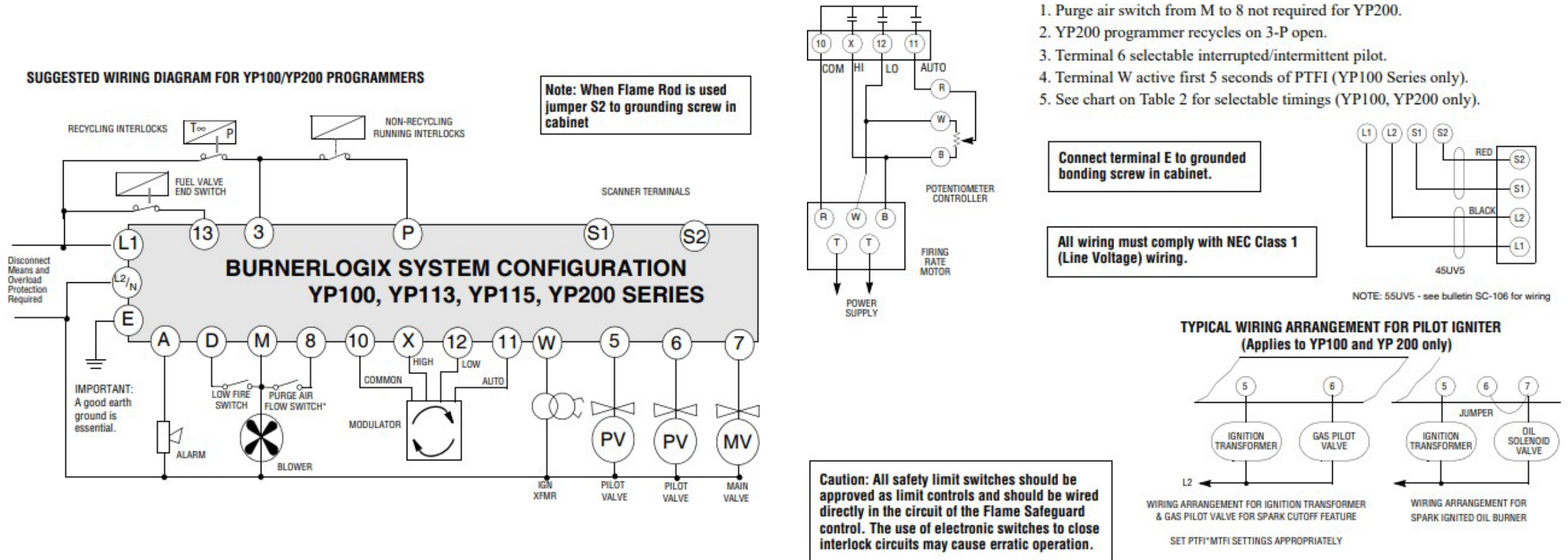
Interface

LEDs

If a display is not present, the flame safeguard may have LEDs to help indicate the current status.

Symbol	Name	Description
	FAN	Lights when the blower motor is energized (terminal M) and flashes when the RUN/CHECK switch is in the "CHECK" position during Purge, PTFI, MTFI and AUTO.
	OPEN DAMPER	Blinks when the modulator motor is being driven to the high fire position. (circuit 10-X made). Once the high purge switch closes (M-8), this LED stays lit. This LED provides the status of the high fire purge interlock circuit (M-8). This LED lights anytime the M-8 circuit closes during Prepurge, PTFI, MTFI, Post Purge.
	CLOSE DAMPER	Blinks when the modulator motor is being driven to the low fire position (circuit 10-12 made). Once the low fire switch closes (M-D), this LED stays lit. This LED provides the status of the low fire start interlock circuit (M-D). This LED lights anytime the M-D circuit closes during Pre-purge, PTFI, MTFI, post purge.
	AUTO	Lights when the control releases to automatic modulating control (circuit 10-11 made).
	IGNITION	Blinks during Pilot Trial For Ignition (PTFI). Stays lit during Main Trial For Ignition (MTFI).
	FLAME	Lights whenever flame is detected by the flame scanner.
	ALARM	Alarm LED blinks during lockout. The remaining LED's indicate the lockout condition. See "Safety Lockout Codes."

Interface
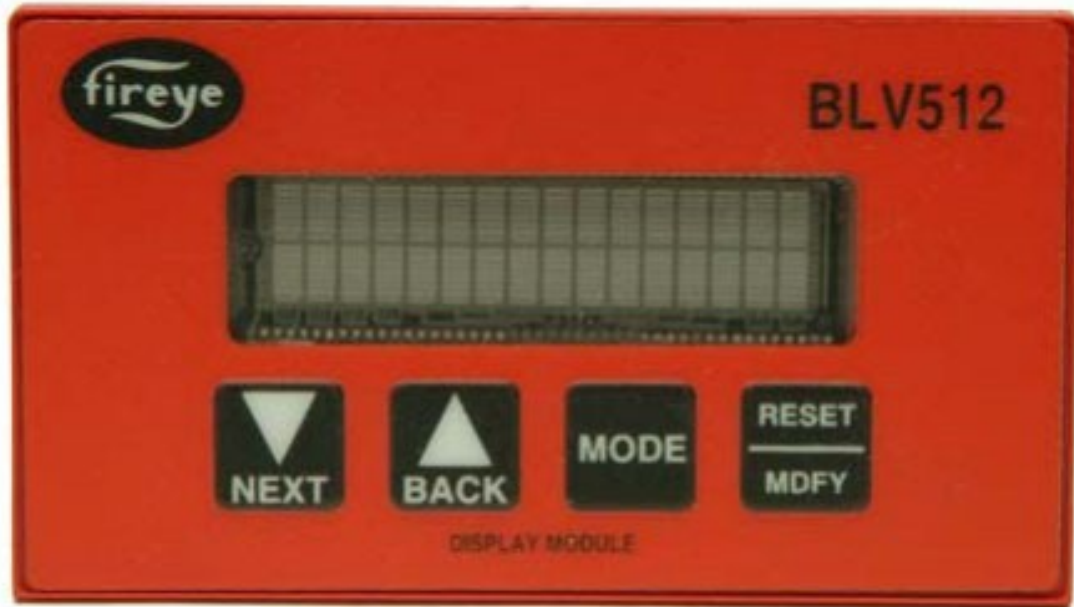
Keypad displays

The flame safeguard may have a keypad display to provide more detail as to the current phase than the LEDs alone can. The display can also show the exact flame signal and lockout codes. The keypad display is also necessary to program parameters into the flame safeguard.

The keypad display can either be used as a service tool or can be left permanently installed.

Interface

Modbus

The flame safeguard may have a Modbus interface which allows an external device such as a PLC or building automation system to communicate and get data as needed. Remote commands such as enable/disable may also be able to be sent.

The Modbus connections are typically serial using RS-485 and the addressing and communication setup is done using the keypad displays.
Using RS-485 allows multiple flame safeguards to connect to one device.

HOLDING REGISTER	MESSAGE ADDRESS	WORD REQUESTED	WORD RESPONSE	VALUE
40001	00	1	STATUS	83 (053H) = RUN; 202 (0CAH) = LOCKOUT
40002	01	1	MSGN	Current message being displayed (see Table 25)
40003	02	1	GSTAT	Defines Timer Type
40004	03	1	TIMER	Time in seconds
40005	04	1	FLAME	Flame Signal
40006	05	1	LOGSTAT	Current logic module, PURGE, PTFI, AUTO (see Table 24)
40007	06	1	INPUTS	Input limits state
40008	07	1	OUTPUTS	Output relays state
40009	08	2	SYSMINS	System on minutes
40011	10	2	BNRMINS	Burner on minutes
40013	12	2	CYCLES	Completed Burner Cycles
40015	14	1	LOCKOUT COUNT	Stored Lockout Count
40016	15	6	LOCKOUT HISTORY Most Recent Lockout Data	Beginning of Last 10 Lockouts Returns complete lockout description of stored lockout history. Includes lockout message (1), lockout module (1), @ burner hours (2), and @ burner cycles (2)s
40022	21	6	2nd Most Recent Lockout Data	
40028	27	6	3rd Most Recent Lockout Data	
40034	33	6	4th Most Recent Lockout Data	
40040	39	6	5th Most Recent Lockout Data	
40046	45	6	6th Most Recent Lockout Data	
40052	51	6	7th Most Recent Lockout Data	
40058	57	6	8th Most Recent Lockout Data	
40064	63	6	9th Most Recent Lockout Data	
40070	69	6	10th Most Recent Lockout Data	

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Accessories

Expanded annunciation

An expanded annunciation system allows inputs that are wired in series to a single terminal on the flame safeguard to be individually monitored and annunciated on the keypad display. Multiple input strings can be identified, and a provision for labeling the inputs is usually provided. This can dramatically reduce troubleshooting time since the exact cause for a lockout or loss of call for heat can be easily identified.

Accessories

Pre-wired base

A pre-wired base may be available. This will allow the installer to use pre-labeled leads of sufficient length to make the required connections, cutting down on the installation time.
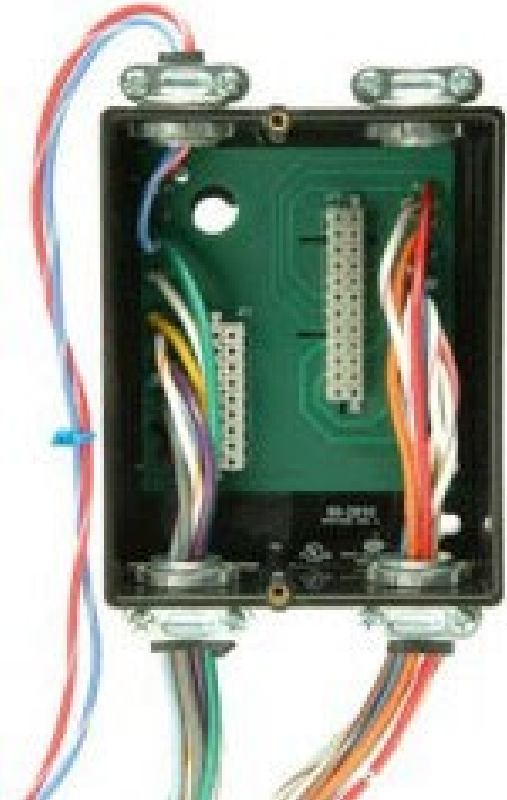
Parallel positioning

Pre-wired adapters

A pre-wired adapter may be available to retrofit a flame safeguard onto the wiring base of another model. This may help with retrofits of obsolete products. The adapter is designed to maintain the safety listing using the new flame safeguard.

Flame Monitor

E110 flame safeguard

The E110 flame safeguard is a modular unit with many different options for programmers, amplifiers and scanners. There are also additional options available for expanded annunciation and for a display. There are outputs to connect to standard modulating motors with feedback via switches.

The Flame Monitor has a very large installed base. Most technicians are familiar with this model as it has proven to be one of the most reliable and versatile flame safeguards available.

Flame Monitor

E110 base

The E110 base consists of the EB700 chassis which can accept the required amplifier and programmer.

Use the E120 base for 230V applications.

E110 Flame-Monitor (One required)
E110 consists of:
EB700 Chassis
EC600 Dust Cover
Mounting Screw (48-1836)
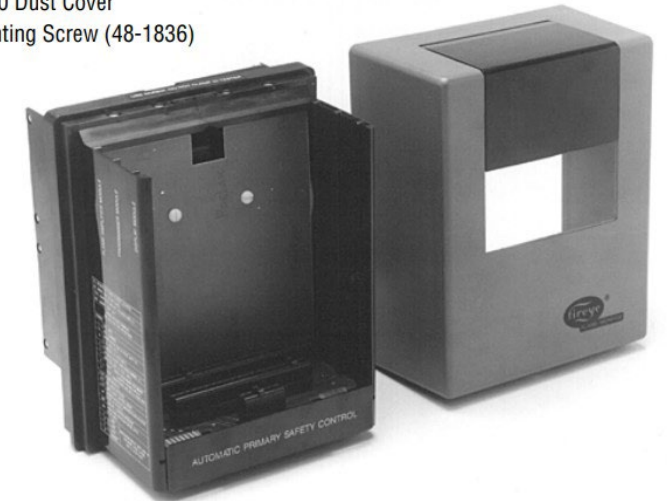
Flame Monitor

Wiring base

Choose the wiring base to fit the application (surface or cabinet mount). The surface mount version has ½" conduit knockouts available.

Wiring Base (One Required)

60-1386-2
Surface Mount
(shown)

60-1466-2
Cabinet Mount

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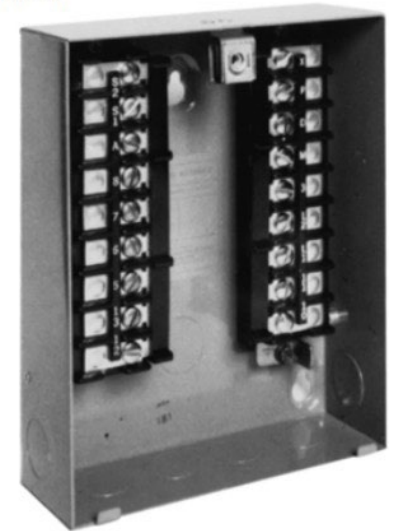
Flame Monitor

Amplifier Module (One Required)

E1R1
E1R2
E1R3
EUV1
EUVS4
ERT1

Amplifier

Choose the amplifier best suited to the application.
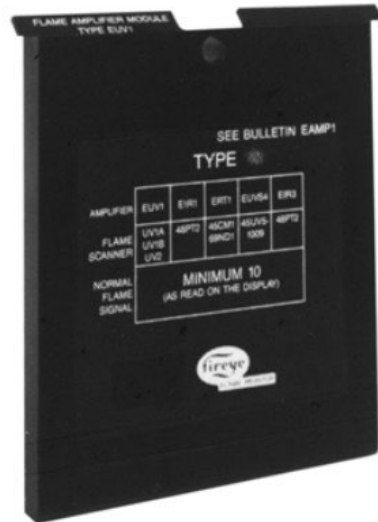
E1R1, E1R2, E1R3 – autocheck infrared amplifiers with different profiles, use E1R1 for general purpose. All use 48PT2 IR scanners.

ERT1 – rectification amplifier. Uses 69ND1 flame rod.

EUV1 – standard ultraviolet amplifier. Uses UV1A or UV90 UV scanners.

EUVS4 – self-checking ultraviolet amplifier. Uses 45UV5 UV scanner.

Flame Monitor

Scanner selection

FIREYE P/N	DESCRIPTION	USE WITH SCANNER	BULLETIN
48PT2-1003 48PT2-9003 48PT2-1007 48PT2-9007 4-263-1	Infrared 1/2" straight mount 96" TC-ER Infrared 1/2" 90° angle mount 96" TC-ER Infrared 1/2" straight mount 48" TC-ER Infrared 1/2" 90° angle mount 48" TC-ER Replacement photo detector	E1R1, E1R2, or E1R3	SC-103
UV1A3 UV1A6 UV8A UV2 UV2A6 45UV3-1050 UV90-3 UV90-6 UV90-9	UV 1/2" straight 36" TC-ER cable UV 1/2" straight 72" TC-ER cable UV 1/2" 90° head 72" unshielded leads UV 3/8" straight 36" TC-ER cable UV 3/8" straight 72" TC-ER cable UV 3/4" cast aluminum housing 8' cable UV 90° lateral view with 36" flex conduit UV 90° lateral view with 72" flex conduit UV 90° lateral view with 108" flex conduit	EUV1	SC-102
69ND1-1000K4 69ND1-1000K6 69ND1-1000K8	Flame rod 12", $1/2$" N.P.T. mount Flame rod 18", $1/2$" N.P.T. mount Flame rod 24", $1/2$" N.P.T. mount	ERT1	SC-103
45UV5-1007 45UV5-1008 45UV5-1009 4-314-1	Self-check UV 1" British thread mounts, 230V Self-check UV 1" British thread mounts, 120V Self-check UV 1" N.P.T. threads, 120V Replacement UV tube	EUVS4	SC-101

Flame Monitor

EP/EPD programmers

The EPD programmer is no longer offered but many are still installed. For replacements, choose the EP programmer for the operational sequence required (the numbers at the end will match).

Programmer Module (One Required)

EP Programmer	EPD Programmer
EP160	EPD160
EP161	EPD161
EP165	EPD167
EP166	EPD170
EP170	EPD260
EP260	EPD261
EP265	EPD270
EP270	EPD380
EP380	EPD381
EP381	EPD382
EP382	EPD390
EP387	
EP390	

Flame Monitor

FIREYE PART NUMBER	Pre-purge programming (Seconds)	Proven High Fire Purge Interlock (D/8 Ckt)	Proven Low Fire Start Interlock (M/D Ckt)	Intermittent Ignition/ Pilot	Interrupted Ignition/ Pilot	Early Spark Termination	Pilot Trial-for-Ignition Term 5	Pilot Trial-for-Ignition Term 6	Main Trial-for-Ignition Term 5	Main Trial-for-Ignition Term 6	Running Interlock (3/P CKT)	Firing Rate Motor Circuit
EPD/EP[2] PROGRAMMERS												
EPD160 EP160 EPD167[8]	30[1] Supervised	Yes	Yes	No	Yes	No	10	10	10	15	Non Recycle	Yes
EPD161 EP161	30[1] Supervised	Yes	Yes	No	Yes	No	10	10	10	30	Non Recycle	Yes
EP165[7]	30[1] Supervised	Yes	Yes	No	Yes	No	10	10	—	10[6]	Non Recycle	Yes
EP166[7]	30[1] Supervised	Yes	Yes	No	Yes	No	10	10	—	15[6]	Non Recycle	Yes
EPD170 EP170	30[1] Supervised	Yes	Yes	No	Yes	Yes	5	10	—	10	Non Recycle	Yes
EPD260 EP260	30[1]	No	Yes	No	Yes	No	10	10	10	15	Recycle	Yes
EPD261	30[1]	No	Yes	No	Yes	No	10	10	10	30	Recycle	Yes
EPD270 EP270	30[1]	No	Yes	No	Yes	Yes	5	10	—	10	Recycle	Yes
EPD380 EP380 EP387[8]	30	No	Yes	Yes[3]	Yes	Yes[4]	10	10	10	Intermittent[3]	Recycle[5]	None
EPD381 EP381	15	No	Yes	Yes[3]	Yes	Yes[4]	10	10	10	Intermittent[3]	Recycle[5]	None
EPD382 EP382	0	No	Yes	Yes[3]	Yes	Yes[4]	10	10	10	Intermittent[3]	Recycle[5]	None
EPD390 EP390	90	No	Yes	Yes[3]	Yes	Yes[4]	10	10	10	Intermittent[3]	Recycle[5]	None

All programmers have a maximum 4 second Flame Failure Response Time (FFRT) with the exception of the EP165 and EP166 (2 sec. FFRT).
All EPD Programmers and EP Programmers have selectable 3-P Proven Open to Start feature via dipswitch.

[1] These programmers add a 30 second waiting period to the prepurge while the firing rate motor is driven to the low fire position.
[2] Purge timings can be extended via dipswitches of EP style programmers.
[3] Selectable intermittent or interrupted (15 sec. MTFI) operation of terminal 6 via dipswitch (EP models only).
[4] These programmers can use terminal "X" for spark termination. This requires jumpering terminals 5 and 10 on the wiring base. PTFI timing is 5 seconds on terminal "X."
[5] Selectable Recycle or Non-Recycle Operation via dipswitch.
[6] During MTFI terminal 6 is energized for 5 seconds (pilot stabilization) before energizing terminal 7 for 10 seconds for EP165 and 15 seconds for EP166 only.
[7] EP165 will lockout on power interruption.
[8] The EPD167 and EP387 wait indefinitely for the low fire start switch (M-D) to close.

Programmer settings

The different programmer settings are specified in a chart to help ensure that the correct model is chosen. Some models have options which can be changed via DIP switch or have other choices that can be optioned with jumpers or alternative wiring arrangements.

Flame Monitor

Remote display

A display may be connected. Since the EPD programmer has an embedded display, the remote version is an option for that model. When using an EP programmer to replace an EPD, the ED510 display can be added to replace full functionality. Note that if a display is not used, an external reset button must be connected to reset lockouts.

ED510 Display Module
Required with EP Programmers
Optional with EPD Programmers
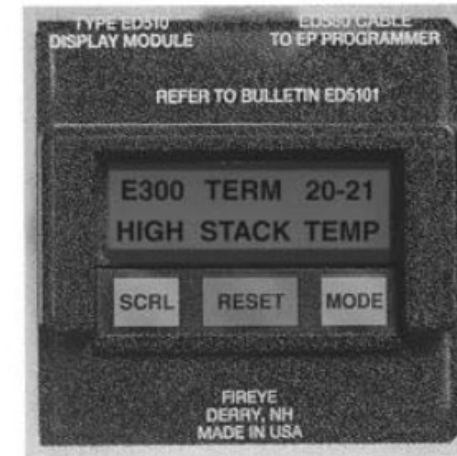
EP programmers must have an Eng. code of 28 or later (e.g. 9414-28). EPD Programmers must have an Eng. code of 02 or later.

Flame Monitor

E300 expanded annunciation

The E300 can annunciate up to 16 additional interlocks. Custom messages can be entered using the E300 software. A wiring base and ribbon cable are required to connect to the EB700 chassis. The messages are displayed on the connected display.

Flame Monitor
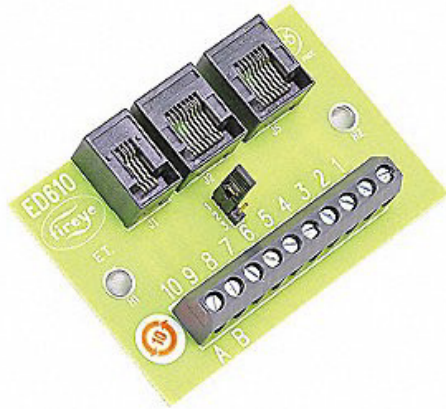
Modbus

Modbus RTU is available from the EP/EPD programmer using connection board ED610 with an ED512 cable. The connection is RS-485 (fixed at 4800 baud) with an address that is selectable using the display. Connecting multiple units together in a serial chain (daisy-chain) is allowed with Modbus RTU using RS-485. The units don't have to be the same model but they all have to use the same baud rate.

All of the current operating information from the base and expanded annunciator as well as complete lockout history is available via Modbus.

MicroM

MicroM

The MicroM flame safeguard control has many different options for chassis, programmer and amplifiers. There is also an option for a plug-in board for additional options.

The MicroM is an excellent choice for applications where space is an issue or when a flame safeguard that is customized to the specific needs of the application is desired.

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Wiring base

The MicroM has two wiring base options. One is closed with ½" knockouts, and the other is open for use in a panel.

MicroM

Chassis options

MicroM Chassis Types (For use with MEP1XX, MEP2XX, and MEP5XX, includes dust cover)	
MEC120	120 VAC input with standard plug-in board.
MEC120R	120 VAC input with remote reset capability.
MEC120D	120 VAC input with alpha-numeric display interface to ED510.
MEC120RD	120 VAC input with alpha-numeric display interface to ED510 and remote reset capability.
MEC120C	120 VAC input with interface to E500 Communication Interface and Modbus capability.
MEC120RC	120 VAC input with remote reset capability, alpha-numeric display interface to ED510, interface to E500 Communication Interface and Modbus capability.
MEC230	230 VAC input with standard plug-in board.
MEC230RC	230 VAC input with remote reset capability, alpha-numeric display interface to ED510, and Modbus capability.

MicroM Chassis Types (For use with MEP3XX, MEP4XX, and MEP6XX, includes dust cover)	
MEC320	120 VAC input with standard plug-in board.
MEC320R	120 VAC input with remote reset capability.
MEC320D	120 VAC input with alpha-numeric display interface to ED510.
MEC320RD	120 VAC input with alpha-numeric display interface to ED510 and remote reset capability.
MEC320C	120 VAC input with interface to E500 Communication Interface and Modbus capability.
MEC320RC	120 VAC input with remote reset capability, alpha-numeric display interface to ED510, interface to E500 Communication Interface and Modbus capability.
MEC320TS	120 VAC input with display interface to ED510, Modbus interface and auxiliary relay output with dry contact for controller interface (MED8).
MEC480	230 VAC input with standard plug-in board.
MEC480RC	230 VAC input with remote reset capability, alpha-numeric display interface to ED510, and Modbus capability.

MicroM

Programmer options – MEC120 and MEC230 chassis

| MicroM Programmer Models (For use with MEC120 and MEC 230 Chassis)	
MEP100	Relight operation, 10 sec. PTFI.
MEP101	Relight operation, allow flame signal until 60 seconds after interlock closed.
MEP102	Non-recycle on flame fail, 5 second PTFI.
MEP103	Fixed 10 second SISP*, 10 second MTFI, re-try once on igniter failure, fixed 30 second post purge.
MEP104	Non-recycle on flame fail, 10 second PTFI.
MEP105	Non-recycle on flame fail, lockout on air-flow open with flame present, 10 second PTFI.
MEP106	Same as MEP100. 12 second pre-purge, added reset from lockout via line voltage.
MEP107	Same as MEP100. Force 5 minute purge delay after main flame fail.
MEP108	Same as MEP100 with 0 second purge, 15 second PTFI, non-recycle on flame fail. Not FM approved.
MEP109	Immediate ignition and pilot, 10 second fixed PTFI, 10 second MTFI, intermittent pilot, non-recycle on flame fail.
MEP100P	Relight operation, 10 sec PTFI, fixed 15 second post purge.
MEP130	Same as MEP100, 30 second PTFI. Not FM approved.
MEP230	Selectable purge timing (7, 30, 60, 90 sec.) 10 sec PTFI timing, recycle/non-recycle, post purge, prove air open at start.
MEP230H	Same as MEP230 with 8 second pilot stabilization.
MEP235	Same as MEP230 with lockout on air flow open 10 seconds after the start of a cycle, selectable recycle/nonrecycle lockout on air flow open after flame is proven and dedicated lockout after loss of flame.
MEP236	Same as MEP230 with additional 6 second igniter on time with main fuel. To be used with intermittent pilot only.
MEP237	Same as MEP230 with fixed PTFI timing and check/run switch. Used with MEDC2 amplifier to provide operation with 85 Series (Phoenix) and 95 Series (InSight) scanners.
MEP238	Same as MEP230. Ignition de-energized 3 seconds after pilot flame detected. Provides 8 second pilot stabilization period.
MEP290	Same as MEP230 except selectable post purge is 0 or 90 seconds.
MEP560	Same as MEP230H, 10 second main trial for ignition, run-check switch.
MEP561	Same as MEP560 without 8 second pilot stabilization. Selectable purge time of 7s, 10s, 15s, 30s.
MEP562	Same as MEP560, lockout on loss of air flow, non-recycle operation only.
MEP564	Same as MEP560. Selectable purge time of 7s, 30s, 60s, 240s.
MEP536	Same as MEP230, 10 second main trial for ignition, run-check switch, will not lockout on air flow open during purge.
MEP537	Same as MEP536 except provides one recycle on main flame failure.

*Spark Igniter Sensing Period

MicroM

Programmer options – MEC320 and MEC480 chassis

| MicroM Programmer Models (For use with MEC320 and MEC 480 Chassis)	
MEP300	Relight operation, 10 sec. fixed PTFI, 5 sec.pilot proving period, 5 second MTFI. lockout on flame fail during PTFI, pilot proving and MTFI. Recycle on air flow open. No post purge. Reset on line voltage.
MEP304	Non-recycle on flame fail, 5 sec. purge, 10 sec.fixed PTFI, 5 sec. pilot proving, 10 sec.MTFI, interrupted pilot, early spark termination.
MEP335	Non-recycle on flame fail, 30 second purge, 35 second hot surface ignition on terminal 4, 3 second PTFI on terminal 3, 5 second pilot proving period, intermittent pilot, 15 second post purge. Manual reset only.
MEP397	Recycle on main flame fail, 15 sec. purge, 7 second fixed PTFI, 5 sec. pilot proving 5 sec. MTFI, early spark termination and interrupted pilot. Recycle on air flow failure. No post purge, run/check switch. Reset on line voltage.
MEP437	Recycle once on main flame failure, selectable 5 or 10 sec. fixed PTFI, selectable interrupted or intermittent pilot, 5 sec. MTFI, selectable purge time to 240 seconds, main valve proof of closure, 15 sec. post purge. Reset on line voltage.
MEP696	Provides 30 sec. pre-purge, lockout on airflow after 10 sec., 10 sec. PTFI, 5 sec. pilot proving, early spark termination, 5 sec. MTFI, interrupted pilot, selectable recycle/non-recycle on flame fail, 60 sec. post purge, selectable baud rate for communications, output for external controller operation.
MEP697	Provides dip-switch selectable pre-purge, selectable air flow proving at startup, selectable post purge, selectable 5/10 sec. PTFI, 5 sec. pilot proving early spark termination, 5 sec. MTFI, interrupted pilot, selectable recycle/non recycle on flame fail, output for external controller operation.

MicroM

Programmer

The programmers have LEDs to indicate the operating status of the control. The LEDs are also used to indicate the lockout code. DIP switches are provided for any options relevant to the particular programmer.
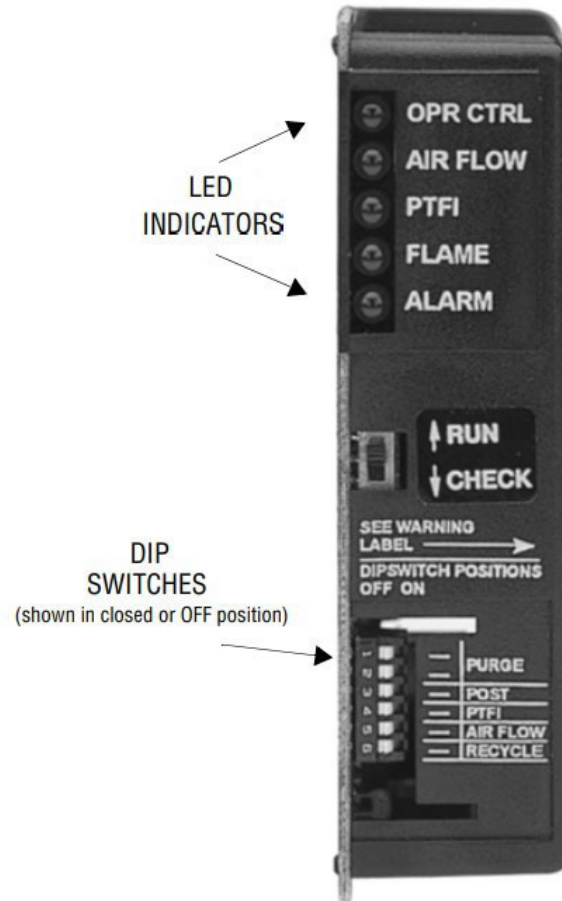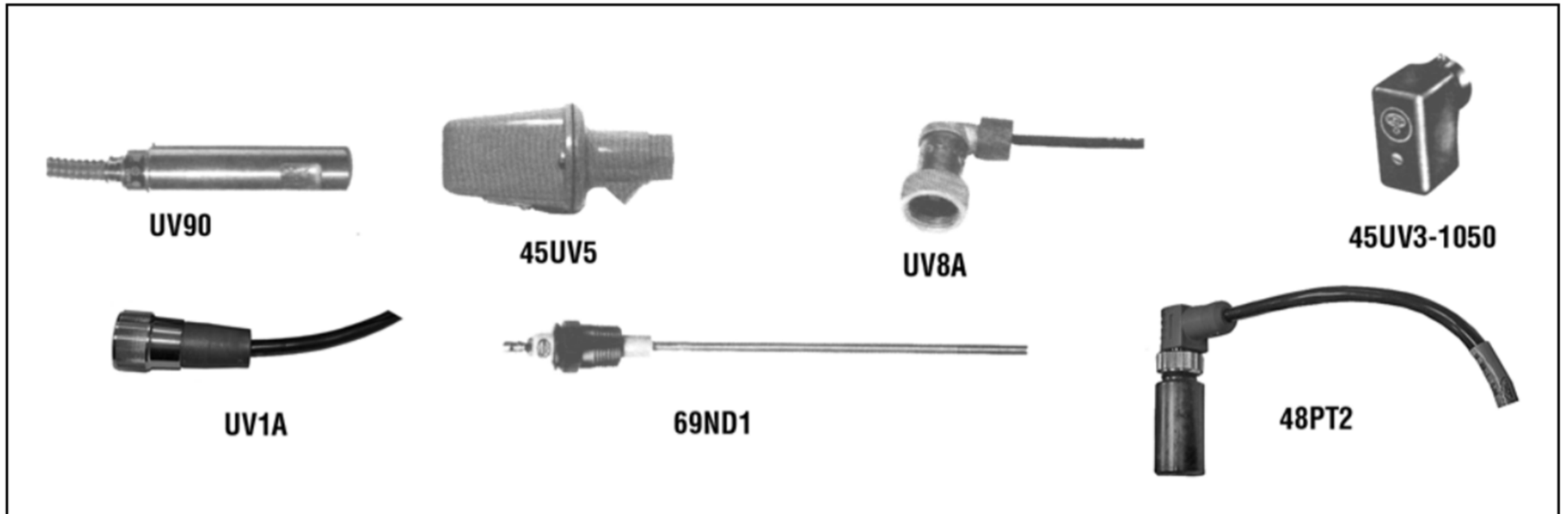
MicroM

Amplifier options

| MicroM Amplifier Models:	
MEUV1	UV amplifier, 0.8 second FFRT, uses UV1A, UV2, UV8A, UV90 and 45UV3-1050 scanners.
MEUV4	UV amplifier, 3 second FFRT, uses UV1A, UV2, UV8A, UV90 and 45UV3-1050 scanners.
MEUVS1	UV Self-Check amplifier, 0.8 second FFRT, uses 45UV5-1009 scanner.
MEUVS4	UV Self-Check amplifier, 3 second FFRT, uses 45UV5-1009 scanner.
MERT1	Flame Rod amplifier, 0.8 second FFRT, uses 69ND1.
MERT4	Flame Rod amplifier, 3 second FFRT, uses 69ND1.
MEIR1	Infrared amplifier, 0.8 second FFRT, uses 48PT2 scanner.
MEIR4	Infrared amplifier, 3 second FFRT, uses 48PT2 scanner.
MECD1	Cadmium sulfide amplifier, 0.8 second FFRT, uses CS1A5 scanner.
MECD4	Cadmium sulfide amplifier, 3 second FFRT, uses CS1A5 scanner.
MEDC2	Contact input amplifier for use with MEP237 to provide operation with 85 Series (Phoenix) and 95 Series (InSight) scanners
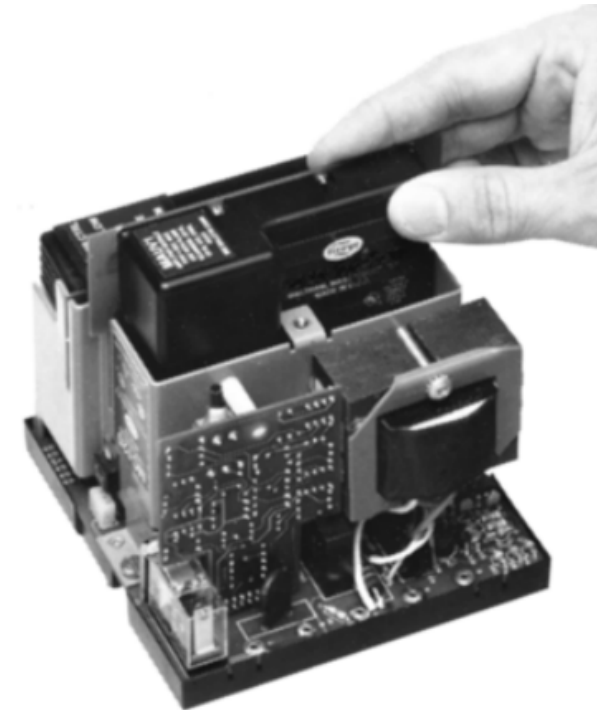
MicroM

Scanner selection

UV90
45UV5
UV8A
45UV3-1050
UV1A
69ND1
48PT2

MicroM

Amplifier test jacks

The amplifier card has test jacks that allow a multi-meter to be used to test the flame signal.
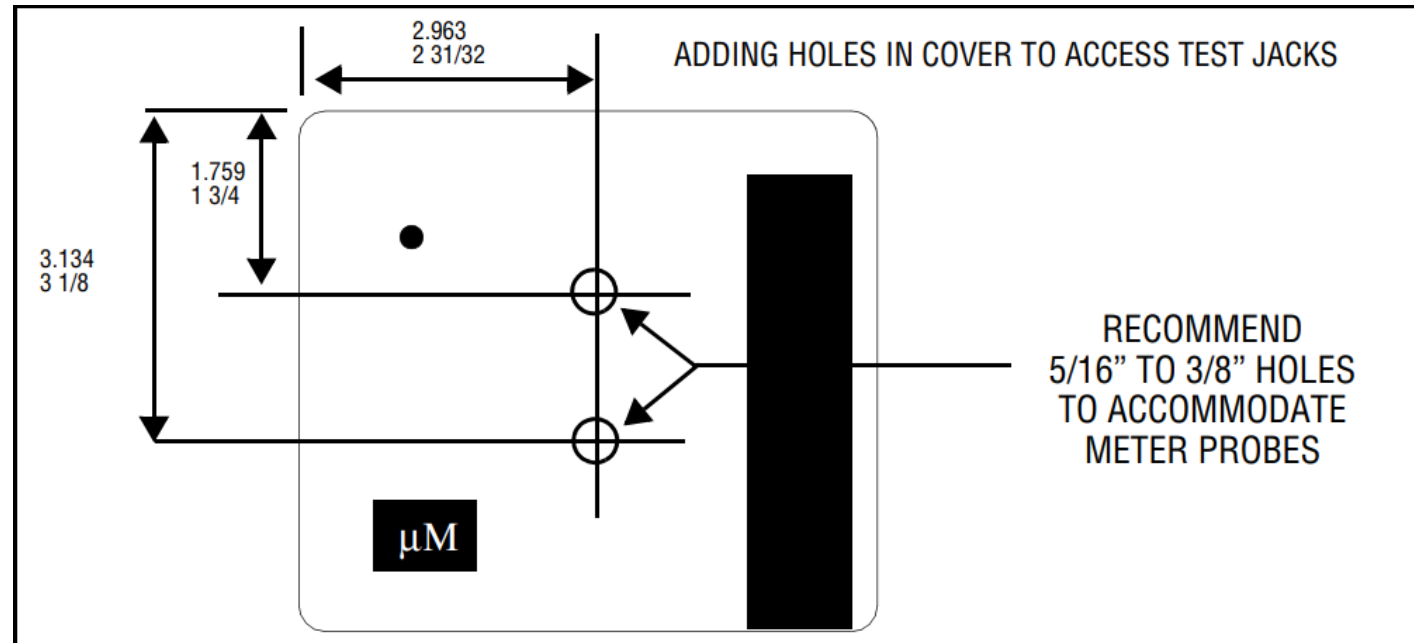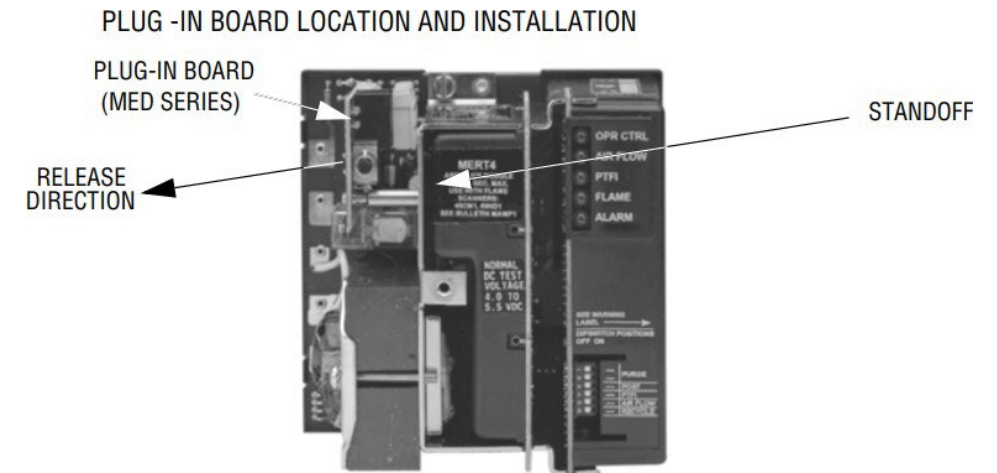
MicroM

Plug-in options

If the chassis is not ordered with the correct option, the plug-in option card can be added later.
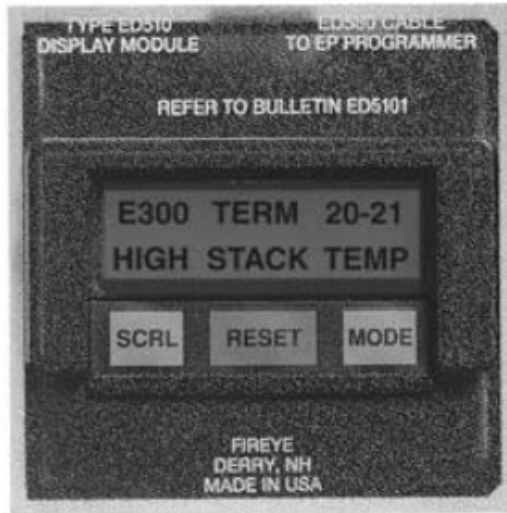
Optional Plug-In Board Modules:	
MED1	Standard local reset switch.
MED2	Same as MED1 with display output.
MED3	Same as MED1 with remote reset.
MED4	Same as MED1 with display output and remote reset.
MED5	Same as MED1 with display output and RS485 communications.
MED6	Same as MED1 with display output, remote reset and RS485 communications.
MED7	Same as MED1 with RS485 communications.
MED8	Same as MED1 with display output, RS485 Modbus interface and auxiliary relay output with normally closed dry contact for controller interface.
MED9	Same as MED1 with display output, RS485 Modbus interface and auxiliary relay output with normally open dry contact for controller interface.

PLUG-IN BOARD LOCATION AND INSTALLATION

MicroM

ED510 Display Module

Required with EP Programmers
Optional with EPD Programmers

TYPE ED510 DISPLAY MODULE
ED580 CABLE TO EP PROGRAMMER
REFER TO BULLETIN ED5101

E300 TERM 20-21
HIGH STACK TEMP

SCRL   RESET   MODE

FIREYE
DERRY, NH
MADE IN USA

EP programmers must have an Eng. code of 28 or later (e.g. 9414-28). EPD Programmers must have an Eng. code of 02 or later.

Remote display

The ED510 display (same used with the Flame Monitor) is an option and can be connected when using a plug-in option module that supports a remote display.

MicroM

Modbus

Modbus RTU is available from the plug-in option board using terminal blocks. The connection is RS-485 (fixed at 4800 baud) with an address that is selectable using the display. Connecting multiple units together in a serial chain (daisy-

chain) is allowed with Modbus RTU using RS-485. The units don't have to be the same model but they all have to use the same baud rate.

All of the current operating information as well as complete lockout history is available via Modbus.
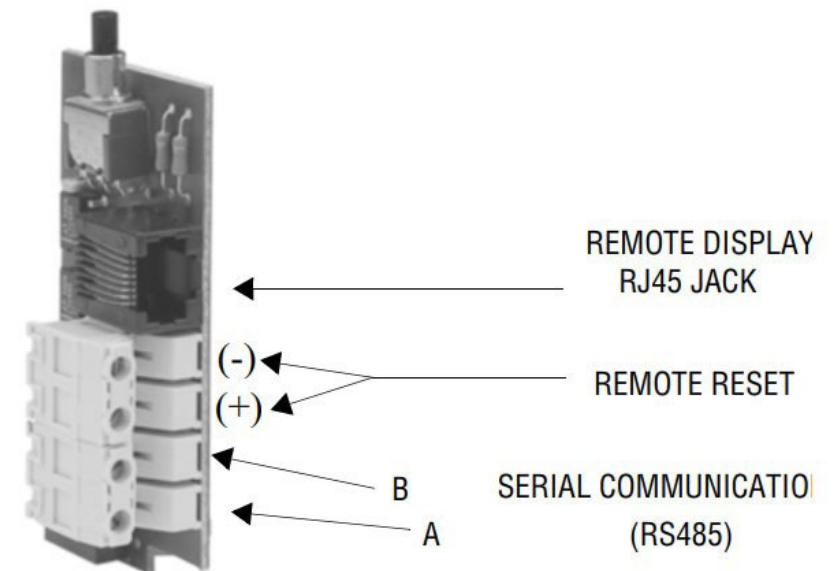
BurnerLogiX

YB110

The YB110 flame safeguard has several base units with different amplifier options. Programmer modules are used to control the sequencing and display options and expanded annunciation are also available. There are outputs to connect to standard modulating motors with feedback via switches.

The YB110 is a modern flame safeguard unit that is designed to fit most applications with one of the programmers available. The YB110 is also optimized for use with parallel positioning systems such as the PPC4000 and PPC6000 from Fireye.

Use the YB230 for 230V applications.

BurnerLogiX

ZB110

The ZB110 differs from the YB110 in that the outputs to the modulating motor are 4-20mA, although the feedback from the motor is still from end switches. The ZB110 also has an internal load controller (PID) and connects to a temperature or pressure sensor for firing rate control.

The ZB110 has most of the same options as the YB110 except for flame rod and direct coupled amplifier versions. Some of the programmer features (revert to pilot and low fire hold) are also included in the base unit directly.

Programmer modules are used to control the sequencing and display options and expanded annunciation are also available.

Use the ZB230 for 230V applications.

BurnerLogiX

Wiring base

There are multiple wiring base options. There is a closed base with ½" knockouts, an open base and a pre-wired base with color-coded wires 48" long.

BurnerLogiX

Base models

BurnerLogix Chassis/Flame Amplifier Module	
YB110UV	120 VAC input with UV non self-check amplifier
YB110UVSC	120 VAC input with UV self-check amplifier
YB110IR	120 VAC input with IR auto-check amplifier
YB110IR2	120 VAC input with IR auto-check amplifier (special application only -consult factory)
YB110FR	120 VAC input with flame rectification amplifier
YB110DC	120 VAC input with direct coupled amplifier
YB230UV	230 VAC input with UV non self-check amplifier
YB230UVSC	230 VAC input with UV self-check amplifier
YB230IR	230 VAC input with IR auto-check amplifier
YB230IR2	230 VAC input with IR auto check (special application only-consult factory)
YB230FR	230VAC input with flame rectification amplifier
YB230DC	230VAC input with direct coupled amplifier

BurnerLogiX

Programmers

Programmers fit into a slot on the side of the YB110 chassis.

BurnerLogix Programmer Modules	
YP100	Keypad selectable parameters, non-recycle operation, modulation, open damper proving, 4 second FFRT
YP102	Keypad selectable parameters, non-recycle operation, modulation, open damper proving, 2 second FFRT
YP113	Keypad selectable parameters, non-recycle operation, modulation, open damper proving, 1 second FFRT
YP115	Keypad selectable parameters, non-recycle operation, modulation, open damper proving, 1 second FFRT
YP118	Keypad selectable parameters, non-recycle operation, modulation, open damper proving, indefinite pilot hold, revert to pilot from auto, 1 second FFRT
YP138	Keypad selectable parameters, non-recycle operation, modulation, open damper proving, voltage on terminal 16 is indefinite pilot hold during lightoff, applied voltage on term 16 is revert to pilot from auto, 4 second FFRT
YP183	Same as YP138, except, removal of voltage on terminal 16 will suspend pilot hold during lightoff sequence. Terminal W used for purge complete.
YP200	Keypad selectable parameters, recycle operation, modulation, 4 second FFRT
YP202	Keypad selectable parameters, recycle operation, modulation, 2 second FFRT
YP300	Keypad selectable parameters, recycle operation, low fire start, early spark termination, 4 second FFRT
YP302	Keypad selectable parameters, recycle operation, low fire start, early spark termination, 2 second FFRT

Note: All programmers: when used with the YB110DC or YB230DC, the FFRT is **0.2** seconds

BurnerLogiX

Programmer settings

The different programmer settings are specified in a chart to help ensure that the correct model is chosen. Some models have options which can be used with alternative wiring arrangements.

FIREYE PART NUMBER	Pre-purge Programming (Seconds)	Proven High Fire Interlock (M-8)	Proven Low Fire Interlock (M-D)	Terminal 6, Interrupted or Intermittent	Early Spark Termination
		SETTINGS SHOWN ARE FACTORY DEFAULT			
YP100	30	YES	YES	INTRP	NO
YP102	30	YES	YES	INTRP	NO
YP138	30	YES	YES	INTRP	NO
YP118	30	YES	YES	INTRP	NO
YP183	30	YES	YES	INTRP	NO
YP112	30	YES	YES	INTRP	NO
YP113	30	YES	YES	INTRP	NO
YP115	30	YES	YES	INTRP	NO
YP200	30	NO	YES	INTRP	NO
YP202	30	NO	YES	INTRP	NO
YP300	30	NO	YES	INTMT	YES
YP302	30	NO	YES	INTMT	YES

FIREYE PART NUMBER	PTFI (5/6)	PTFI (W/6)	PILOT PROVING 6 Only	MTFI (5/6)	MTFI (W/6)	Running Interlock (3-P)	[1]Flame Fail Time (Seconds)	Firing Rate Motor
			SETTINGS SHOWN ARE FACTORY DEFAULT					
YP100	10/10		-	10/15		Non-recycle	4	YES
YP102	10/10		-	10/15		Non-recycle	2	YES
YP138[3]	10/10		-	10/15		Non-recycle	4	YES
YP118[3]	10/10		-	10/15		Non-recycle	1	YES
YP183[3]	10/10		-	10/15		Non-recycle	4	YES
YP112[2]	-	5/5	10	-	0/5	Non-recycle	2	YES
YP113[2]	-	5/5	10	-	0/5	Non-recycle	1	YES
YP115[2]	-	5/5	10	-	0/5	Non-recycle	1	YES
YP200	10/10		-	10/15		Recycle	4	YES
YP202	10/10		-	10/15		Recycle	2	YES
YP300	10/10		-	10/intmt		Recycle	4	NO
YP302	10/10		-	10/intmt		Recycle	2	NO

[1]FFRT with YB110DC or YB230DC is 0.2 seconds.

[2]Terminal W is igniter, terminal 6 is pilot valve. (**Terminal 5 is not intended for use**) Note additional 10 second proving time during PTFI.

[3] Revert to pilot models.

fireye

BurnerLogiX

Parameters

Certain parameters can be changed before they are "burned-in" at eight run hours. The changes are made using a connected display.
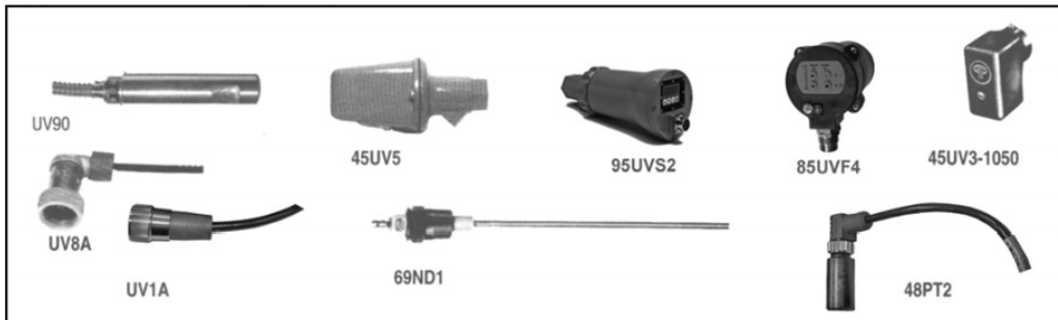
Parameter	Factory Default	Range	Description
Purge time	00:30s	0:00s – 60:00m, 1 second increments. 0:00s-60:00m, YP113 0:00s-60:00m, YP115 (0:00s - 60:00m in YP3XX)	Applies to open damper purge time in YP1XX and YP2XX programmers and to low fire start time in YP3XX programmers. Note: 0 sec purge requires a display with Engr code 9 or higher and chassis Engr code of 11 or higher
Count method	DOWN	UP, DOWN	Time counts UP to final value or DOWN to zero from starting value. This setting will apply to all timer values.
Prove 3-P open at start	NO	YES, NO	Prevents jumped terminals. Requires the 3-P circuit to be open at the start of a cycle.
PTFI*MTFI timing	10/10*10/15 YP113 = 5/5*3/5	See Table 2	Applies to terminals 5 and 6 operation during PTFI and MTFI.
Terminal 6 interrupted or intermittent	INTRP	INTRP, INTMT	Provide interrupted or intermittent operation on terminal 6.
Prove M-8 open	NO	YES, NO	If YES, M-8 must be open at start of open damper purge period. (YP1XX Series only).
Prove M-D open	NO	YES, NO	If YES, M-D must be open at end of open damper purge period. Does not apply to YP3XX Series.
Post purge	0:15	0:00s - 4:00m*, 1 second increments.	Selects Post Purge time. * code 8 or above display required
M-D WAIT 10m	YES	YES, NO	Select YES for lockout on M-D open for 10 minutes. Select NO for indefinite wait for M-D to close. This wait time applies prior to pilot trial for ignition.
PROVE M-D TFI	NO	YES, NO	Select YES to force lockout on M-D opening during PTFI and MTFI
Baud rate	9600	4800, 9600, 19200, 38400*	Sets communication baud rate, * code 8 or above display required
Unit address	00	00-31	Multi-drop requires unique addressing. Lowest address allowed for modbus is 01
Lock Settings	NO	YES, NO	Parameters can be stored to memory before automatic 8 hour store.

Note: Shaded parameters not affected by 8 hour burn-in or LOCK SETTINGS.

BurnerLogiX

Scanner selection

In addition to the standard scanners shown in the chart, Phoenix and InSight series integrated scanners can also be used with the YB110 flame safeguards if needed for the application.

FIREYE P/N	DESCRIPTION	USE WITH CHASSIS	BULLETIN
48PT2-1003	Infrared 1/2" straight mount 96"(2438mm) TC-ER cable	YB110IR	SC-103
48PT2-9003	Infrared 1/2" 90° angle mount 96" (2438mm) TC-ER cable	YB230IR	
48PT2-1007	Infrared 1/2" straight mount 48" (1219mm) TC-ER cable	YB110IR2	
48PT2-9007	Infrared 1/2" 90° angle mount 48" (1219mm) TC-ER cable	YB230IR2	
4-263-1	Replacement photo detector		
UV1A3	UV 1/2" straight 36" (915mm) TC-ER cable	YB110UV	SC-102
UV1A6	UV 1/2" straight 72" (1830mm) TC-ER cable	YB230UV	
UV8A	UV 1/2" 90° head 72" (1830mm) no armor flex		
UV2	UV 3/8" straight 36"(915mm) TC-ER cable		
UV2A6	UV 3/8" straight 72" (1830mm) TC-ER cable		
45UV3-1050	UV 3/4" cast aluminum housing 96" (2438mm) unshielded leads		
UV90-3	UV 90° lateral view with 36" (915mm) flex conduit		
UV90-6	UV 90° lateral view with 72" (1830mm) flex conduit		
UV90-9	UV 90° lateral view with 108" (2745mm) flex conduit		
45UV5-1007	Self-check UV 1" BSP threads, 102-264VAC	YB110UVSC	SC-101
45UV5-1009	Self-check UV 1" NPT threads, 102-264VAC	YB230UVSC	
4-314-1	Replacement UV tube		
69ND1-1000K4	Flame rod, 12", 1/2" mount	YB110FR	SC-103
69ND1-1000K6	Flame rod, 18", 1/2" mount	YB230FR	
69ND1-1000K8	Flame rod, 24", 1/2" mount		
45UV5-1005	Self-check UV 1" NPT threads, 61-5745-3 required	YB110UVSC	133-645
45UV5-1105	Self-check UV 1" BSP threads, 61-5745-3 required	YB230UVSC	
55UV5-1007	Self-check UV 1" BSP, 102-264VAC, Suitable for hazardous locations.	YB110UVSC	SC-106
55UV5-1009	Self-check UV 1" NPT, 102-264VAC, Suitable for hazardous locations.	YB230UVSC	

BurnerLogiX

Displays

Two displays are available. The BLL510 is an LCD (liquid crystal) display and the BLV512 is a VFD (vacuum fluorescent) display. Either display can be mounted directly to the YB110 base chassis or can be remote mounted using an ED580 cable.
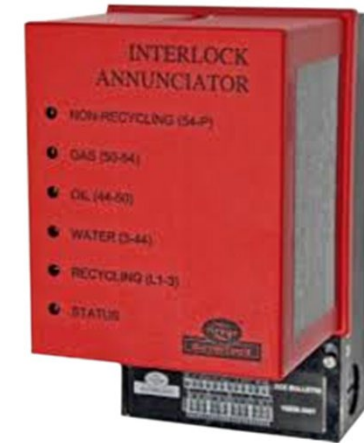
BurnerLogiX

YZ300 expanded annunciation

The YZ300 can annunciate up to 4 recycling and 16 non-recycling interlocks. Custom messages can be entered using the YZ300P software. A wiring base and ED580 cable are required to connect to the YB110 chassis. The messages are displayed on the BLL510 or BLV512 display connected to the YB110.

Use the YZ320 for 230V applications.

BurnerLogiX
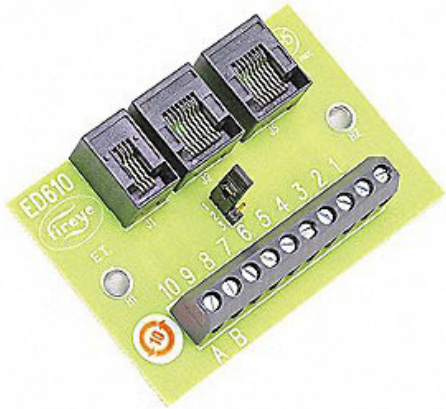
Modbus

Modbus RTU is available from the base unit using connection board ED610 with an ED512 cable. The connection is RS-485 with an address and baud rate that are selectable using the display. Connecting multiple units together in a serial chain (daisy-chain) is allowed with Modbus RTU using RS-485 – two jacks are provided to make this easier. The units don't have to be the same model but they all have to use the same baud rate.

All of the current operating information from the base and expanded annunciator as well as complete lockout history is available via Modbus.

SB Series

SB Series

The SB Series flame safeguard has several base units with integrated amplifier options. A display option is available. There is also an option to connect to standard modulating motors with feedback via switches.

The SB Series is well-suited to the industrial market with many configurations available to fit any application. This makes the wiring less complicated since the control has exactly the features needed. The SB Series is also a direct replacement for the Eclipse Veri-Flame flame safeguard and can mount on the same wiring base.

SB Series

Wiring base

There are two wiring base options, one for mounting in an enclosure and the other for external mounting with ½" knockouts. The SB Series can also mount on an existing Eclipse Veri-Flame wiring base.

SB Series

Model selection

All Eclipse Veri-Flame part numbers have a corresponding Fireye part number. Descriptions for every option combination are also provided to identify the appropriate part number.

Eclipse Part Number	Fireye Part Number	Description
VF560222AA	SB560222AA	120VAC,5/10TFI,UV,PURGE
VF560222AB	SB560222AB	120VAC,5/10TFI,UV,PURGE
VF560222XA	SB560222XA	120VAC,5/10TFI,UV,PURGE
VF560222XB	SB560222XB	120VAC,5/10TFI,UV,PURGE
VF560223AA	SB560223AA	120VAC,5/10TFI,FR,PURGE
VF560223AB	SB560223AB	120VAC,5/10TFI,FR,PURGE

SB Series

Scanner selection

UV SCANNER
(MODEL UV7A4)

69ND1

90° UV SCANNER
(MODEL UV7R4)

SELF-CHECK UV SCANNER
(MODEL UV7SC)
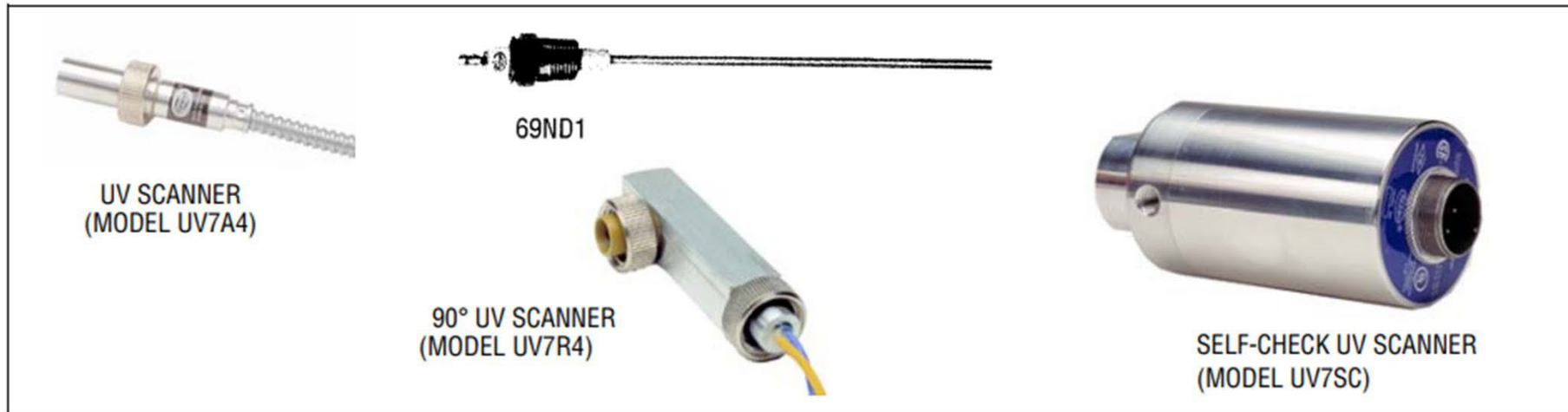
SB Series

Remote display

Remote display SB510 is available. Use 59-511-3 cable to connect.
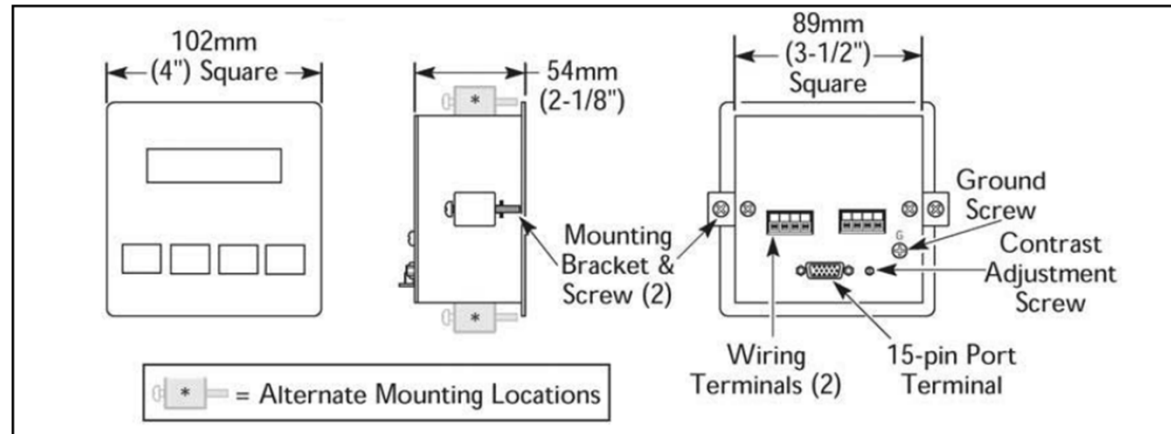
BurnerPRO

BurnerPRO

The BurnerPRO flame safeguard has the base, programmer and amplifier all in one unit. There are three models to choose from: basic, Modbus and Modbus with valve proving.

The BurnerPRO is well suited to any application where space is tight and ease of use is a must. The small size makes the BurnerPRO ideal for multi-burner applications and the Modbus interface makes it easy for the supervisory PLC to manage. The BurnerPRO is also a direct replacement for the Siemens LFL flame safeguard and can mount on the same wiring base.

BurnerPRO

Wiring base

The BurnerPRO mounts on wiring base 60-2981-1. The BurnerPRO can also mount on an existing Siemens LFL wiring base.

BurnerPRO

Models

All BurnerPRO models have integrated UV and flame rod amplifiers, and either or both can be used at any time. Modbus models also have user adjustable timing when using the *Config Wizard for BurnerPRO* software or BP410TS touchscreen. Six preset timing models are also available for ease of replacement without the need to program.

Times are in seconds		BURNERPRO SERIES TIMINGS					
TIMING	DESCRIPTION	S1	S2	S3	S4	S5	S6
t1	Purge time	35.5	31	37	60	37	30
t3'	Pre-ignition time (piloted)	4	6	2.5	2.5	2.5	1
TSA'	Ignition safety time (PTFI)	2	3	5	5	5	10
t6	Post-purge time	12	18	15	15	15	15
t9	Interval between Main Fuel Piloted and removal of Pilot (MTFI)	2	3	5	5	5	10
FFRT	Flame Failure Response Time (FFRT)	1.0				4	4

BurnerPRO

Scanner selection

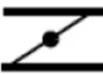An existing flame rod can also be used when mounting to an existing Siemens LFL wiring base.

UV90L

UV1AL

69ND1

BurnerPRO

Smart LEDs

The seven "Smart LEDs" display operating information as well as annunciate the lockout codes

LED Lights

FAN
OPEN DAMPER
CLOSE DAMPER
AUTO
IGNITION
FLAME
ALARM

BurnerPRO LED ERROR / LOCKOUT CODES

	OPERATION LED ● = ON	FAN	OPEN DAMPER	CLOSED DAMPER	AUTO	IGNITION	FLAME	STATUS
	ICON							
1	MODBUS RESET	●						RED
2	LOCAL RESET		●					RED
3	CAB FAULT	●	●					RED
4	SUPERVISORY MCU INPUT DIAG FAULT			●				RED
5	FLAME ROD FLAME LOSS MTFI	●		●				RED
6	FLAME ROD CIRCUIT FAIL		●	●				RED
7	SPI COMMUNICATION FAULT	●	●	●				RED
8	REMOTE RESET				●			RED
9	FLAME ROD DECISION MISMATCH	●			●			RED
10	MAIN PROGRAM SEQ FAULT		●		●			RED

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Honeywell 7800 adapter
Prewired adapter to fit popular 7800 bases. BurnerPRO can mount on top of adapter or in another panel location.

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Config Wizard for BurnerPRO
Software that allows changing timing and other configuration.

THANK YOU