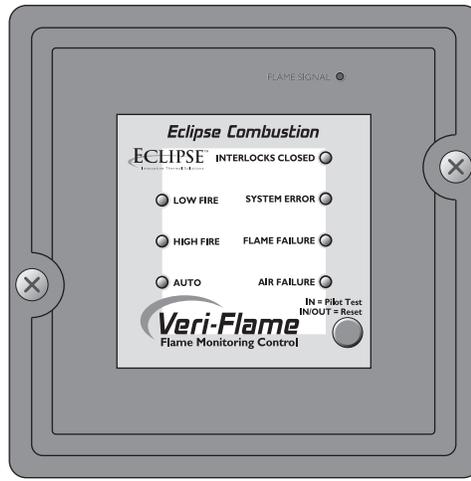
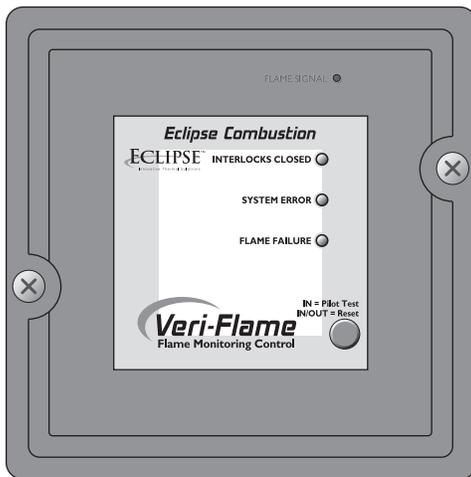


Eclipse Veri-Flame Single Burner Monitoring System

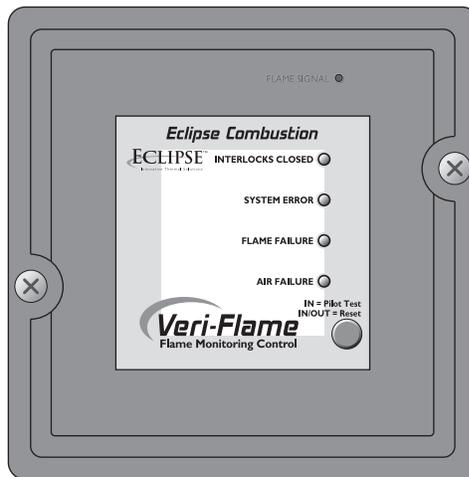
Model 5600



Modulation Model



No Purge Model



Purge Model

Copyright

Copyright 2008 by Eclipse, inc. All rights reserved worldwide. This publication is protected by federal regulation and shall not be copied, distributed, transmitted, transcribed or translated into any human or computer language, in any form or by any means, to any third parties, without the express written consent of Eclipse, inc.

Disclaimer Notice

In accordance with the manufacturer's policy of continual product improvement, the product presented in this brochure is subject to change without notice or obligation.

The material in this manual is believed adequate for the intended use of the product. If the product is used for purposes other than those specified herein, confirmation of validity and suitability must be obtained. Eclipse warrants that the product itself does not infringe upon any United States patents. No further warranty is expressed or implied.

Liability & Warranty

We have made every effort to make this manual as accurate and complete as possible. Should you find errors or omissions, please bring them to our attention so that we may correct them. In this way we hope to improve our product documentation for the benefit of our customers. Please send your corrections and comments to our Technical Documentation Specialist.

It must be understood that Eclipse's liability for its product, whether due to breach of warranty, negligence, strict liability, or otherwise is limited to the furnishing of replacement parts and Eclipse will not be liable for any other injury, loss, damage or expenses, whether direct or consequential, including but not limited to loss of use,

income, or damage to material arising in connection with the sale, installation, use of, inability to use, or the repair or replacement of Eclipse's products.

Any operation expressly prohibited in this manual, any adjustment, or assembly procedures not recommended or authorized in these instructions shall void the warranty.

Document Conventions

There are several special symbols in this document. You must know their meaning and importance.

The explanation of these symbols follows below. Please read it thoroughly.

How To Get Help

If you need help, contact your local Eclipse representative. You can also contact Eclipse at:

1665 Elmwood Rd.
Rockford, Illinois 61103 U.S.A.
Phone: 815-877-3031
Fax: 815-877-3336
<http://www.eclipsenet.com>

Please have the information on the product label available when contacting the factory so we may better serve you.

 ECLIPSE <small>Innovative Thermal Solutions</small>	www.eclipsenet.com
Product Name	
Item #	
S/N	
DD MMM YYYY	



This is the safety alert symbol. It is used to alert you to potential personal injunt hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



Indicates a hazardous situation which, if not avoided, will result in death or serious injury.



Indicates a hazardous situation which, if not avoided, could result in death or serious injury.



Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

Is used to address practices not related to personal injury.

NOTE

Indicates an important part of text. Read thoroughly.



Table of Contents

- Introduction5**
 - Product Description5
 - Audience5
 - Veri-Flame Documents.....4
- Safety5**
 - Safety Warnings5
 - Capabilities5
 - Operator Training5
 - Replacement Parts5
- DIP Switch Selection6**
 - Introduction.....6
 - Handling & Storage6
 - Approvals of Components6
 - DIP Switch Location7
 - DIP Switch Access7
 - No Purge DIP Switch Settings.....7
 - Modulation and Purge DIP Switch Settings.....7
- Function Summary9**
 - Introduction.....9
 - Standard Features.....9
 - Optional Features11
- System Installation12**
 - Introduction.....12
 - Interlocks and Limit Switch Input.....12
 - Combustion Air Switch Input12
 - Ignition Wiring.....12
 - Low Fire Input.....12
 - Main Valve Closed Switch.....12
 - High Purge Input13
 - Remote Reset13
 - Remote Display and Power Supply13
- Sensor Installation.....18**
 - Introduction.....18
 - Sensor Wiring18
 - Flame Rods18
 - Scanners19
 - Scanner Sighting Considerations19

Test Procedures	20
Introduction.....	20
Flame Signal Strength.....	20
Minimum Pilot Test.....	20
Pilot Flame Failure Test	20
Main Flame Failure Test (For Interrupted Pilot Systems).....	20
Spark Sighting Test.....	20
Limits and Interlocks Test.....	21
Maintenance and Troubleshooting	22
Introduction.....	22
Monthly Checklist	22
Yearly Checklist.....	22
Troubleshooting.....	23
LED Status	24
Remote Display Messages	27
Introduction.....	27
Veri-Flame Operating Sequence.....	27
Remote Display Diagnostic Messages.....	31
Appendix	i

Introduction

1

Product Description

The Eclipse Veri-Flame Single Burner Monitoring System controls the start-up sequence and monitors the flame of single gas, oil, or combination gas/oil burners. There are three different models of the Veri-Flame line: no purge, purge and modulation models. Each model features field selectable trial for ignition (TFI). Each model is also available for use with three types of flame sensor: ultraviolet (UV), self-check UV and flame rod

Required components are the Veri-Flame, matching wiring base and a flame sensor. Optional components include a remote display and cable, tester, and various scanner accessories.

The Veri-Flame No Purge and Purge models are available in three different series - 5602, 5603 and 5605. The 5602 Series is UL listed for the USA and Canada and FM approved; the 5605 Series is UL listed and FM approved. The 5603 Series is for 240 VAC applications and is FM approved.

The Veri-Flame Modulation model is available in two different series: 5602 and 5603. Both series are capable of modulation (high purging and low fire start). The 5602 Series is UL recognized for the USA and Canada and FM approved. The 5603 Series is for 240 VAC and is FM approved.

Audience

This manual has been written for people who are already familiar with all aspects of a nozzle-mix burner and its add-on components, also referred to as “the burner system”.

These aspects are:

- Design / Selection
- Use
- Maintenance

The audience is expected to have previous experience with this type of equipment.



Figure 1.1 Veri-Flame Single Burner Monitoring System (Purge Unit Shown)

Veri-Flame Documents

Installation Guide 818

- This document

Datasheet 818

- Required to complete design and selection

Spare Parts List Series 818

- Recommended replacement part information

Related Documents

- EFE 825 (Combustion Engineering Guide)
- Eclipse Bulletins and Info Guides: 684, 710, 732, 756, 760, 902, 930

Safety

Important notices which help provide safe burner operation will be found in this section. To avoid personal injury and damage to the property or facility, the following warnings must be observed. All involved personnel should read this entire manual carefully before attempting to start or operate this system. If any part of the information in this manual is not understood, contact Eclipse before continuing.

Safety Warnings

DANGER

- **The burners, described herein, are designed to mix fuel with air and burn the resulting mixture. All fuel burning devices are capable of producing fires and explosions if improperly applied, installed, adjusted, controlled or maintained.**
- **Do not bypass any safety feature; fire or explosion could result.**
- **Never try to light a burner if it shows signs of damage or malfunction.**

WARNING

- **The burner and duct sections are likely to have HOT surfaces. Always wear the appropriate protective equipment when approaching the burner.**
- **Eclipse products are designed to minimize the use of materials that contain crystalline silica. Examples of these chemicals are: respirable crystalline silica from bricks, cement or other masonry products and respirable refractory ceramic fibers from insulating blankets, boards, or gaskets. Despite these efforts, dust created by sanding, sawing, grinding, cutting and other construction activities could release crystalline silica. Crystalline silica is known to cause cancer, and health risks from the exposure to these chemicals vary depending on the frequency and length of exposure to these chemicals. To reduce the risk, limit exposure to these chemicals, work in a well-ventilated area and wear approved personal protective safety equipment for these chemicals.**

NOTICE

- **This manual provides information regarding the use of these burners for their specific design purpose. Do not deviate from any instructions or application limits described herein without written approval from Eclipse.**

Capabilities

Only qualified personnel, with sufficient mechanical aptitude and experience with combustion equipment, should adjust, maintain or troubleshoot any mechanical or electrical part of this system. Contact Eclipse for any needed commissioning assistance.

Operator Training

The best safety precaution is an alert and trained operator. Train new operators thoroughly and have them demonstrate an adequate understanding of the equipment and its operation. A regular retraining schedule should be administered to ensure operators maintain a high degree of proficiency. Contact Eclipse for any needed site-specific training.

Replacement Parts

Order replacement parts from Eclipse only. All Eclipse approved valves or switches should carry UL, FM, CSA, CGA and/or CE approval where applicable.

DIP Switch Selection

3

Introduction

This section describes the location, selection and description of the Veri-Flame DIP switches, which allow for sequence and timing functions as well as system configuration.

Handling & Storage

Handling

- Make sure that the area is clean.
- Protect the components from the weather, damage, dirt and moisture.
- Protect the components from excessive temperatures and humidity.
- Take care not to drop or damage components.

Storage

- Make sure that the components are clean and free of damage.
- Store the components in a cool, clean, dry room.
- After you have made sure that everything is present and in good condition, keep the components in the original package as long as possible.

Approval of Components

Limit Controls & Safety Equipment

All limit controls and safety equipment must comply with all applicable local codes and/or standards and must be listed for combustion safety by an independent testing agency. Typical application examples include:

- American: NFPA 86 with listing marks from UL, FM, CSA
- European: EN 746-2 with CE mark from TuV, Gastec, Advantica

Electrical Wiring

All the electrical wiring must comply with all applicable local codes and/or standards such as:

- NFPA Standard 70
- IEC60364
- CSA C22
- BS7671

Gas Piping

All the gas piping must comply with all applicable local codes and/or standards such as:

- NFPA Standard 54
- ANSI Z223
- EN 746-2

Where to Get the Standards:

The NFPA Standards are available from:

National Fire Protection Agency
Batterymarch Park
Quincy, MA 02269
www.nfpa.org

The ANSI Standards are available from:

American National Standard Institute
1430 Broadway
New York, NY 10018
www.ansi.org

The UL Standards are available from:

333 Pfingsten Road
Northbrook, IL 60062
www.ul.com

The FM Standards are available from:

1151 Boston-Providence Turnpike
PO Box 9102
Norwood, MA 02062
www.fmglobal.com/approvals

Information on the EN standards and where to get them is available from:

Comité Européen de Normalisation
Stassartstraat 36
B-1050 Brussels
Phone: +32-25196811
Fax: +32-25196819
www.cen.eu

Comité Européen de Normalisation Electronique
Stassartstraat 36
B-1050 Brussels
Phone: +32-25196871
Fax: +32-25196919
www.cenelec.org



CAUTION

- To avoid electric shock, shut off the power supply when installing or removing any control device. Flame monitoring systems must be installed by a qualified, licensed technician.

DIP Switch Location

All of the DIP switches are located in the back of each Veri-Flame unit (see Figure 3.1 on page 11, or the photograph on page 7).

DIP Switch Access

To gain access to the DIP switches, the Veri-Flame must be separated from the back box (for visual reference, please refer to “Dimensions” on page 9). This separation will expose the DIP switches on the back of the Veri-Flame unit.

No Purge DIP Switch Settings

No Purge models of the Veri-Flame only use three of the eight DIP switches, as shown in the labels in Figure 3.2 on page 11. They are as follows:

SW1: Recycling mode selection (On = Recycling; Off = Non-recycling)

SW2: Pilot selection (On = Intermittent, where pilot remains on during burner cycle; Off = Interrupted, where pilot valve closes after main burner is established).

SW3: Trial-for-ignition (TFI) range selection (For 5602/5603 units: On = 10 seconds; Off = 5 seconds. For 5605 units: On = 10 seconds; Off = 15 seconds).

Modulation and Purge DIP Switch Settings

Modulation and purge models of the Veri-Flame use all of the eight DIP switches, as illustrated in Figure 3.2 on page 11. They are as follows:

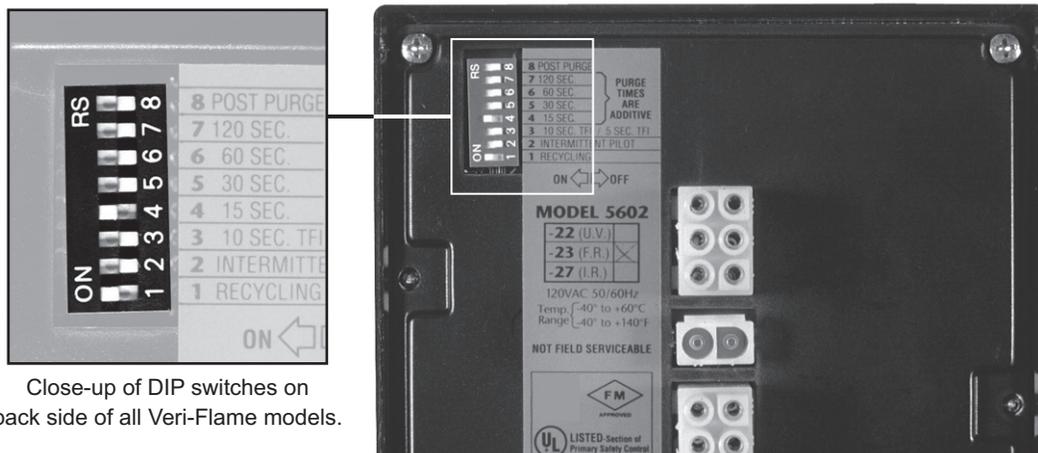
SW1: Recycling mode selection (On = Recycling; Off = Non-recycling)

SW2: Pilot selection (On = Intermittent, where pilot remains on during burner cycle; Off = Interrupted, where pilot valve closes after main burner is established).

SW3: Trial-for-ignition (TFI) range selection (For 5602/5603 units: On = 10 seconds; Off = 5 seconds. For 5605 units: On = 10 seconds; Off = 15 seconds).

SW4 through 7: Purge time selection. Total purge time is the sum of each switch selected. If all are set off, the trial for ignition starts when the air switch input comes on.

SW8: Post purge selection. (On = 15 second post purge).



Close-up of DIP switches on back side of all Veri-Flame models.

Figure 3.1. DIP Switch Location

No Purge Models

8	} NOT USED
7	
6	
5	
4	
3	10 SEC. TFI / 5 SEC. TFI
2	INTERMITTENT PILOT
1	RECYCLING

ON OFF

MODEL 5602

-32 (U.V.)
-33 (F.R.)
-37 (I.R.)

120VAC 50/60Hz
Temp. $\sqrt{-40^{\circ} \text{ to } +60^{\circ}\text{C}}$
Range $\sqrt{-40^{\circ} \text{ to } +140^{\circ}\text{F}}$

NOT FIELD SERVICEABLE

APPROVED

LISTED-Section of Primary Safety Control US

MADE IN

8	} NOT USED
7	
6	
5	
4	
3	10 SEC. TFI / 5 SEC. TFI
2	INTERMITTENT PILOT
1	RECYCLING

ON OFF

MODEL 5603

-32 (U.V.)
-33 (F.R.)
-37 (I.R.)

205-265VAC 50/60Hz
Temp. $\sqrt{-40^{\circ} \text{ to } +60^{\circ}\text{C}}$
Range $\sqrt{-40^{\circ} \text{ to } +140^{\circ}\text{F}}$

NOT FIELD SERVICEABLE

APPROVED

MADE IN

8	} NOT USED
7	
6	
5	
4	
3	10 SEC. TFI / 15 SEC. TFI
2	INTERMITTENT PILOT
1	RECYCLING

ON OFF

MODEL 5605

-32 (U.V.)
-33 (F.R.)
-37 (I.R.)

120VAC 50/60Hz
Temp. $\sqrt{-40^{\circ} \text{ to } +60^{\circ}\text{C}}$
Range $\sqrt{-40^{\circ} \text{ to } +140^{\circ}\text{F}}$

NOT FIELD SERVICEABLE

APPROVED

LISTED-Section of Primary Safety Control

MADE IN

Purge Models

8	POST PURGE	} PURGE TIMES ARE ADDITIVE
7	120 SEC.	
6	60 SEC.	
5	30 SEC.	
4	15 SEC.	
3	10 SEC. TFI / 5 SEC. TFI	
2	INTERMITTENT PILOT	
1	RECYCLING	

ON OFF

MODEL 5602

-22 (U.V.)
-23 (F.R.)
-27 (I.R.)

120VAC 50/60Hz
Temp. $\sqrt{-40^{\circ} \text{ to } +60^{\circ}\text{C}}$
Range $\sqrt{-40^{\circ} \text{ to } +140^{\circ}\text{F}}$

NOT FIELD SERVICEABLE

APPROVED

LISTED-Section of Primary Safety Control US

MADE IN

8	POST PURGE	} PURGE TIMES ARE ADDITIVE
7	120 SEC.	
6	60 SEC.	
5	30 SEC.	
4	15 SEC.	
3	10 SEC. TFI / 5 SEC. TFI	
2	INTERMITTENT PILOT	
1	RECYCLING	

ON OFF

MODEL 5603

-22 (U.V.)
-23 (F.R.)
-27 (I.R.)

205-265VAC 50/60Hz
Temp. $\sqrt{-40^{\circ} \text{ to } +60^{\circ}\text{C}}$
Range $\sqrt{-40^{\circ} \text{ to } +140^{\circ}\text{F}}$

NOT FIELD SERVICEABLE

APPROVED

MADE IN

8	POST PURGE	} PURGE TIMES ARE ADDITIVE
7	120 SEC.	
6	60 SEC.	
5	30 SEC.	
4	15 SEC.	
3	10 SEC. TFI / 15 SEC. TFI	
2	INTERMITTENT PILOT	
1	RECYCLING	

ON OFF

MODEL 5605

-22 (U.V.)
-23 (F.R.)
-27 (I.R.)

120VAC 50/60Hz
Temp. $\sqrt{-40^{\circ} \text{ to } +60^{\circ}\text{C}}$
Range $\sqrt{-40^{\circ} \text{ to } +140^{\circ}\text{F}}$

NOT FIELD SERVICEABLE

APPROVED

LISTED-Section of Primary Safety Control

MADE IN

Modulation Models

8	POST PURGE	} PURGE TIMES ARE ADDITIVE
7	120 SEC.	
6	60 SEC.	
5	30 SEC.	
4	15 SEC.	
3	10 SEC. TFI / 5 SEC. TFI	
2	INTERMITTENT PILOT	
1	RECYCLING	

ON OFF

MODEL 5602

-42 (U.V.)
-43 (F.R.)
-47 (I.R.)

120VAC 50/60Hz
Temp. $\sqrt{-40^{\circ} \text{ to } +60^{\circ}\text{C}}$
Range $\sqrt{-40^{\circ} \text{ to } +140^{\circ}\text{F}}$

NOT FIELD SERVICEABLE

APPROVED

US

MADE IN

8	POST PURGE	} PURGE TIMES ARE ADDITIVE
7	120 SEC.	
6	60 SEC.	
5	30 SEC.	
4	15 SEC.	
3	10 SEC. TFI / 5 SEC. TFI	
2	INTERMITTENT PILOT	
1	RECYCLING	

ON OFF

MODEL 5603

-42 (U.V.)
-43 (F.R.)
-47 (I.R.)

205-265VAC 50/60Hz
Temp. $\sqrt{-40^{\circ} \text{ to } +60^{\circ}\text{C}}$
Range $\sqrt{-40^{\circ} \text{ to } +140^{\circ}\text{F}}$

NOT FIELD SERVICEABLE

APPROVED

MADE IN

Figure 3.2. DIP Switch Labels with Selections

Function Summary

4

Introduction

This section describes the features of the Veri-Flame. It is divided into three categories: standard features, optional features and the LED indicator lights on the front cover. Refer to Figure 5.5 for sequence diagrams.

Standard Features

The following function features are standard on the Veri-Flame models as noted:

Interlocks and Limit Switch Input (Terminal 7)

This input is considered the normal operation control or run input to the Veri-Flame system. Interlocks are generally pressure or temperature switches which, when activated, start the burner. Limit switches are generally pressure, temperature and other switches which, when activated, stop the burner. The interlocks and limit switches are wired in series. A break in this circuit will shut the burner down, but will not produce an alarm.

Combustion Air Switch Input (Terminal 6)

For purge and modulation models: This input is for monitoring the combustion air switch separately from other interlocks and limits. The Veri-Flame checks the air flow switch input is open before start-up, closed during operation, and open again at burner shutdown, thus preventing operation with an air switch that is defective, maladjusted or jumped. This input has about a 2 second delay to filter out and ignore a momentary interruption.

The input will be proven open before start-up and after shutdown.

If the input is improperly powered before the fan output is energized, the system error light will blink. The input must de-energize within 30 seconds or the Veri-Flame will lockout.

After the fan output has energized, the air switch input must be made within 10 seconds. If not proven, then the system will lockout, the alarm output and the air failure light will come on. However, if the unit has the optional air switch input hold feature, the sequence is held indefinitely without causing a lockout. When the air switch input is made, then the sequence continues.

If the air switch opens during the main firing cycle, the system will either lockout or recycle, depending on the DIP switch recycle selection.

Main Fuel Valve Closed Switch (Terminal V)

For purge and no-purge models: The Veri-Flame can be interlocked with the main valve closed switch. This feature checks the switch position before start-up and after shutdown to insure proper valve operation when the jumper on the base is cut.

Low Fire Start

For modulation models: When wired, the system checks for the low fire start position prior to light-off.

Main Fuel Valve Closed / High Fire Purge Check (Terminal D)

For modulation models: This feature is enabled when the jumper on the base is cut. The system checks that the high fire position switch and the main valve closed switch are both made at the end of the high fire purge.

Recycle Mode



**Test Mode
(Button In)**

**Run Mode
(Button Out)**

For all models: When selected, the Veri-Flame will restart the sequence after flame or air failure. The recycle mode allows the system to re-initiate the start-up sequence automatically *provided the main burner has been operating for at least 35 seconds*. If the pilot flame fails to light during recycling, the system will lock out and announce a pilot flame fail. If the recycle is successful and the main burner is operational for at least 35 seconds, the system is ready for another recycle. At no time will the system recycle in the event of pilot flame fail.

Pilot Test Mode

For all models: This mode is entered by depressing the TEST/RESET button on the front cover. In the pilot test mode, the Veri-Flame will hold the sequence once the pilot flame is established (i.e., the main valve is not energized). When in the pilot test mode, the green "Interlocks Closed" *light blinks*.

To exit the pilot test mode, push the TEST/RESET button three times (the green "Interlocks Closed" light *stops blinking but remains lit*) and the Veri-Flame will restart the sequence.

Interrupted or Intermittent Pilot

For all models: Pilot mode is selected using the DIP switch SW2. An interrupted pilot shuts off 10 seconds after the main valve opens. An intermittent pilot continues during the entire main flame firing cycle.

Post Purge

For purge and modulation models: Post purge is enabled by DIP switch SW8. A post purge maintains the combustion air fan output for 15 seconds after the interlocks and limit switch input have opened.

Spark, Pilot, Flame and Main Flame Separation

For all models: During the trial for ignition period (TFI), the pilot valve and ignition coil remains energized. If a flame signal is present at the end of the TFI, the pilot output remains on and the ignition coil is de-energized. After a five second delay to prove the pilot flame, the main gas valve is energized.

System Errors and Lockout Conditions

A system error (illuminated by the red "System Error" LED on the front cover) prevents gas ignition. The unit will continue its sequence after the error is cleared. A lockout condition energizes the alarm output and de-energizes the gas valve and ignition outputs. The unit must be reset to clear the alarm and start the sequence. To reset, the button must be pressed twice so that the button is in the out position.

The following system errors result in immediate lockout conditions:

1. Wiring error which puts external voltage on the output terminals (for all models).
2. Welded internal contacts or other malfunctions in the Veri-Flame (for all models).
3. Main fuel valve (for all models)—open after cycle shut down or before start-up. The system error light blinks twice and then remains on. The fan output terminal 8 will energize.
4. Low fire fail (for modulating model)—low fire switch open prior to trial for ignition.

5. High fire fail (for modulating model)—high fire switch is not closed at the end of high fire purge.
6. Air failure (for purge and modulation models) – loss of combustion air anytime during the operational cycle. The Air Failure LED will be on for this condition. (See "Recycle Mode" on page 13.)
7. Pilot flame fail (for all models) loss of flame during the trial for pilot ignition period. The Flame Failure LED will be on for this condition.
8. Main flame fail (for all models) loss of flame during the main burner trial for ignition or run period (recycling not selected). The Flame Failure LED will be on for this condition.

The following result in lockout conditions after 30 seconds, the system error light blinks about 14 times and then remains on:

9. If a flame is detected out of sequence, which may be caused by:
 - a. A faulty scanner (for all models)
 - b. Electrical interference on the sensor wiring (for all models)
 - c. A flame exists in the burner or in the line of sight of a scanner, due to a gas leak, product fire or other conditions (for all models)
10. Air flow switch closed before start-up (for purge and modulation models).

High to Low Fire Purge Modulation Capability with High to Low Fire Position Switch Interlocks

For modulation models: The modulation feature incorporates a high fire purge time and a low fire purge time into the purge sequence. This feature allows the Veri-Flame to sequence internal dry contacts which can be used by the customer requiring a high fire purge of the combustion chamber before ignition.

The high fire and low fire purge times are selectable by means of DIP switches (see Section 3, "DIP Switch Settings" on page 10):

SW4	15 seconds	SW6	60 seconds
SW5	30 seconds	SW7	120 seconds

The selected times are additive and apply to both the high fire and low fire purge times (that is, high and low fire times are always identical).

The modulation terminals will sequence as follows:

Sequence Step	Internal Contact Connections	
Power Off	Terminal 10 (Common)	Terminal 12 (Low Fire)
Power On, Limits Open	Terminal 10 (Common)	Terminal 12 (Low Fire)
Purge to High Fire	Terminal 10 (Common)	Terminal 13 (High Fire)
Purge to Low Fire	Terminal 10 (Common)	Terminal 12 (Low Fire)
Automatic Modulation	Terminal 10 (Common)	Terminal 11 (Auto)
Alarm & Lockout	Terminal 10 (Common)	Terminal 12 (Low Fire)

The purge to high fire sequence does not start until the air switch input is on. The Automatic step occurs when the burners are operating and allows the burner firing rate to be controlled by an automatic temperature controller.

Optional Features

The following features are available on select models, or when optional equipment is purchased.

Air Switch Input Hold

For purge models: Holds the sequence indefinitely until air switch input is confirmed without affecting the air failure function and causing a lockout.

Remote Display and Power Supply

The model 5602DBP operates on 120 VAC and has a keypad for reset function. The display is door panel mounted and features a liquid crystal display in a 1/4 DIN housing. The unit connects to the Veri-Flame by a cable to the flame signal test jack, and receives a serial communication on each sequence state change. The display incorporates the following functions:

1. Provides status messages for the Veri-Flame sequence (see section 9).
2. Indicates lockout conditions when they occur, as well as the amount of time into the sequence when the lockout occurred (see section 9).
3. Provides continuous monitoring of the burner's flame signal strength and run time during main burner operation.

Status Lights and Pushbutton

All of the status lights and the TEST/RESET push-button are located on the front cover of the Veri-Flame. This section describes their respective functions.

• Interlocks Closed

For all models: This green LED illuminates when the operation limits are made. These limits are wired in series to terminal 7. This input becomes energized to begin the burner sequence. When in the test mode, this LED blinks (see "Pilot Test Mode" on page 13).

• Air Failure

For purge and modulation models: This red LED illuminates whenever combustion air is lost during the operational cycle of the Veri-Flame.

• System Error

For all models: This red LED illuminates when a system error is detected (see "System Errors & Lockout Conditions" on pages 13).

• Flame Failure

For all models: This red LED illuminates when a pilot or main flame fails.

• Low Fire

For modulation models: This yellow LED illuminates during the low fire period of the purge cycle.

• High Fire

For modulation models: This red LED illuminates during the high fire period of the purge cycle.

• Auto

For modulation models: This green LED illuminates during the automatic period which occurs 20 seconds after the main valve is energized.

• Test/Reset

For all models: This push-button is used to activate the pilot test mode or to reset the Veri-Flame unit.

• Flame Signal

For all models: This red LED is located behind the signal test port and illuminates when a flame signal is present.

System Installation

5

Introduction

This section describes the necessary procedures to integrate a Veri-Flame into a burner system. Figures 5.1 and 5.2 illustrate the various terminal strips mentioned.

NOTE: Shut off the power supply before the Veri-Flame is removed or replaced from the base.

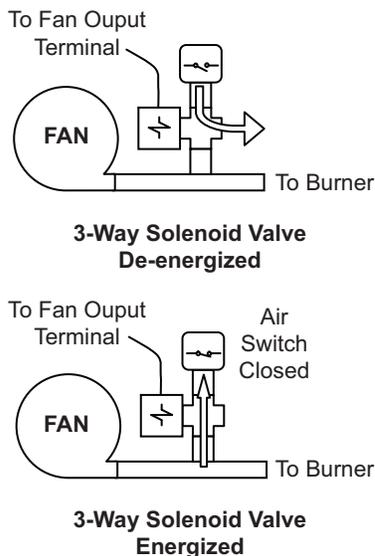
CAUTION

- **Installation and maintenance must conform with the National Electrical Code and all other national and local codes and authorities having jurisdiction. Flame monitoring systems must be installed by a qualified licensed technician.**

Interlocks and Limit Switch Input

Wire external interlock, control, and limit switches in series to this input. Guard against induced voltage levels to wiring connected to this input. In some extreme wiring runs, reduction of induced voltages may require a load (relay or light) connected to terminal 7 to avoid system error lockouts. This input is the power source for the valve and ignition output terminals. Be sure all switches wired to this input can handle the current required by the total of all loads connected to terminals 3, 4, and 5.

Combustion Air Switch Input



For purge and modulation models: Wire any switches and contacts in series to this terminal for proving air flow function and relating to the air failure light. Power must not be immediately present at terminal 6 when power is first applied to terminals 1 or 7.

If this terminal is not used, place a jumper between the combustion blower output (terminal 8) and the air switch input (terminal 6).

If the combustion air blower is controlled outside of the Veri-Flame system, then a three way solenoid valve must be connected between the air switch port and the blower sensing port. The valve de-energized state should vent the switch to ambient pressure. The energized state then connects the air switch to the blower sensing port. Power the valve from the blower output terminal 8. If accepted by local codes, the air switch could be wired between the combustion blower output and the air switch input. Connecting the air switch in this manner will satisfy the open contact (air short) check on the switch.

Ignition Wiring

Route ignition wiring a sufficient distance from all sensors and other low voltage wiring to avoid electrical interference, which may cause erratic operation of the Veri-Flame system. Keep the high voltage wire run from the ignition transformer as short as possible. The best condition is to mount the ignition transformer close to the burner and keep a low impedance path from the burner ground to the case of the transformer. Make sure the high voltage lead and ground return paths do not create a loop antenna around the Veri-Flame and sensor wiring.

Low Fire Input

For modulation models: It is possible to wire the system for checking low fire start position prior to pilot ignition. To use this feature, the low fire start switch must be connected between terminal 3 and the pilot valve (see Figure 5.2). On direct spark burners, a by-pass contact must be wired around the low fire switch, see relay and contact CR in Figure 5.3.

Main Valve Closed Switch

The system can be wired to check for the main valve closed switch on the main gas valve prior to start-up and after the end of the burner cycle.

For purge and no purge models: The main valve closed switch must be connected to Terminal V and the jumper in the base must be cut (see Figure 5.4).

For modulation models: The main valve closed switch must be wired in series between the air flow switch and the high purge damper switch (see Figure 5.1). To use this feature, the jumper in the base must be cut.

High Purge Input

For modulation models: The system can be wired to check for high purge position during the high fire purge portion of the sequence. To use this feature, the red jumper in the base must be cut and the high purge position switch must be connected from terminal 6 to D. If this feature is not used, the jumper in the base remains intact or a jumper must be installed between terminals 1 and D. Please note that the yellow jumper on the base has no effect whether cut or intact.

Remote Reset

This feature permits remote mounting of a switch to reset the Veri-Flame. To use this feature, a normally closed remote reset switch must be wired so power is interrupted to terminal 1. When it is depressed or actuated, the connection to terminal 1 is momentarily interrupted and resets the Veri-Flame.

Remote Display and Power Supply

Wire the display according to Figure 5.3. Mount through a 1/4 DIN cutout using the two supplied brackets in either the top and bottom or the side slots. Locate the display and wiring to minimize electrical interference. Applying and disconnecting the display power supply should coincide with power to terminal 1 of the Veri-Flame. Use

the appropriate cable (Eclipse part number 20318) to connect to the test jack and to the S2 terminal of the Veri-Flame wiring base. Do not attempt to parallel the test jack signal to other devices when using a remote display. The LCD display contrast can be adjusted on the back with a small blade screwdriver.

NOTE: Power for terminal 7 of the Veri-Flame must not flow through the R1-R2 contact of the remote display when load currents exceed 5 amps.

Notes for Figures 5.1, 5.2 and 5.3 below:

1. Ground, shielding and conduit must not be connected to terminal S2.
2. Control circuit wires must meet 90°C (194°F) specification minimum and must be number 16 AWG or larger and in accordance with all applicable codes.
3. Flame sensor wires must be individually run in their own separate conduit; flame sensor wires CANNOT be run together in a common conduit or wireway (See Section 6).
4. Flame signal should read between 4 and 10 VDC with a digital volt meter. Drop off is approximately 4.0 VDC. Positive test jack point is on the cover marked "Flame Signal" with negative point being the S2 or ground.
5. Purge time, TFI, intermittent/interrupted pilot, and recycle/non-recycle selections are made with a DIP switch located on the rear plate of the control unit.
6. Neutral must be grounded.

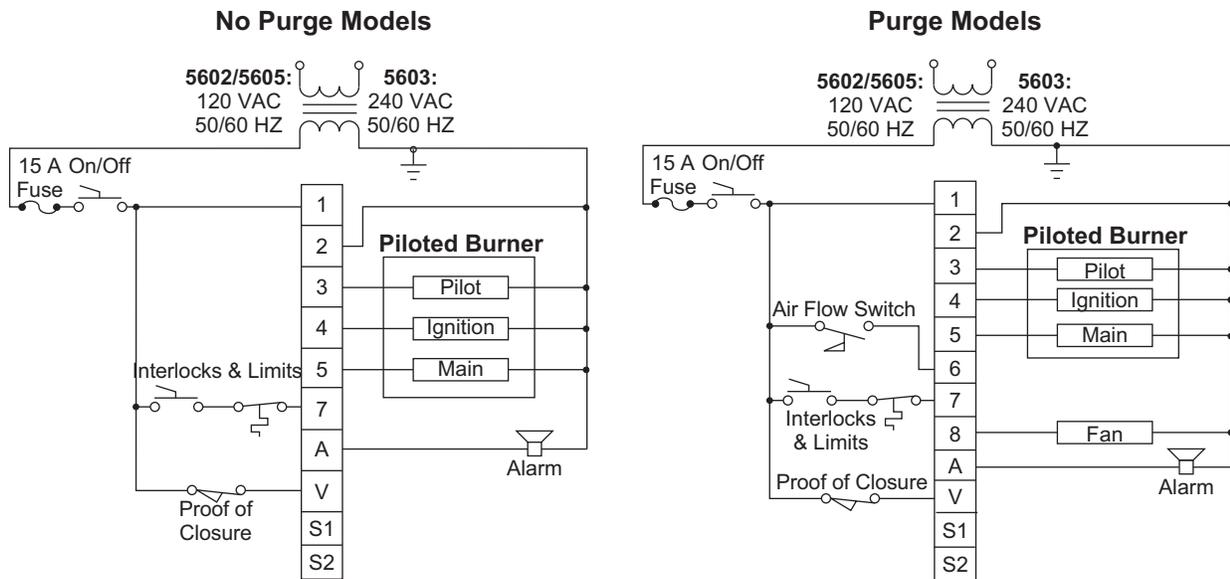


Figure 5.1. No Purge and Purge Wiring Diagram

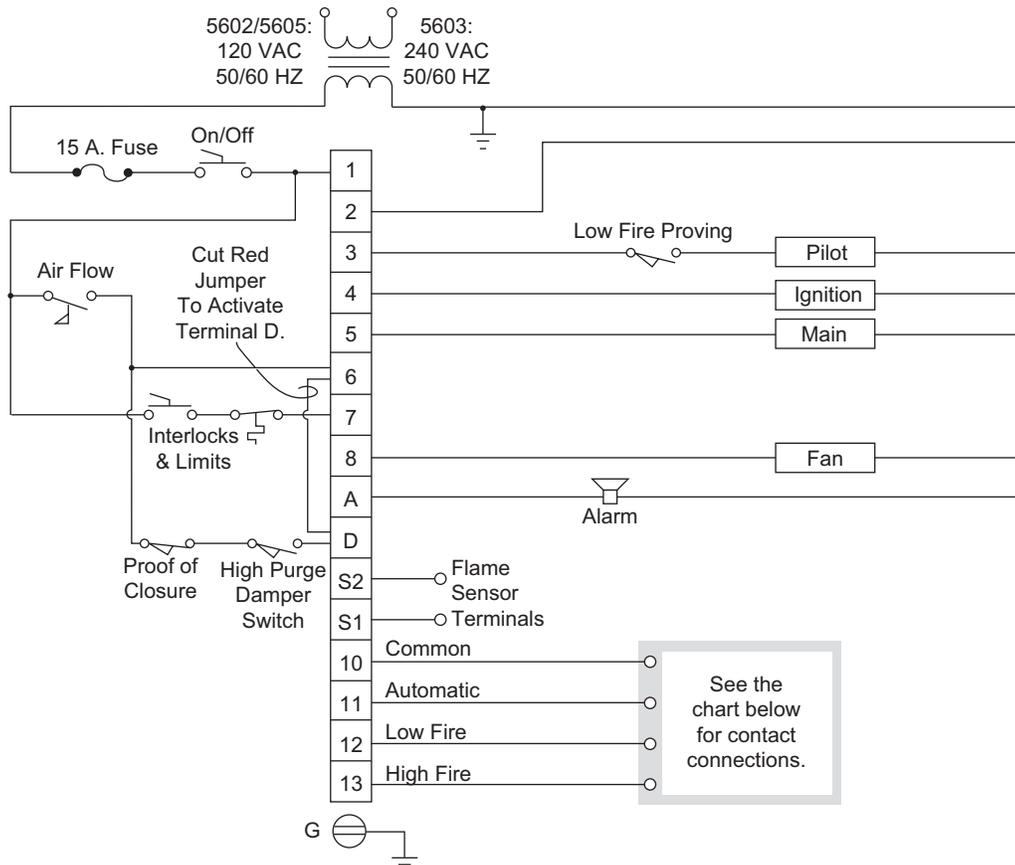
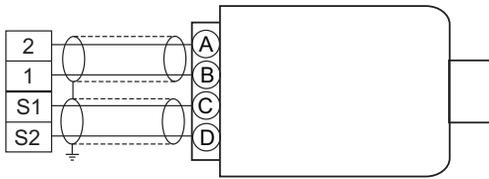
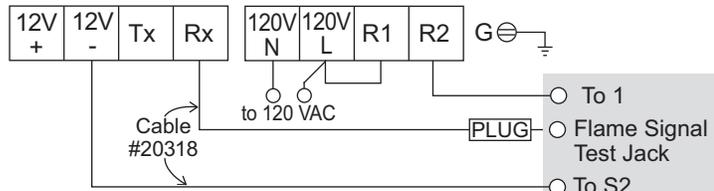


Figure 5.2. Modulation Wiring Diagram

**Self Check UV 5602-91
(Requires 5602-91-7 cable)**

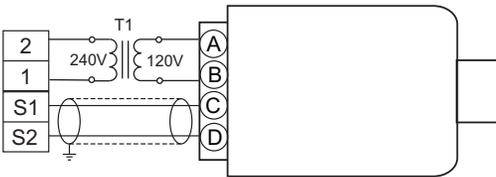


**Model 5602 DBP
120 VAC Remote Display**



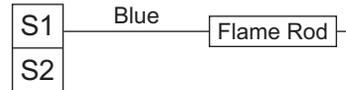
NOTE:
Power for terminal 7 must not flow through the R1-R2 contact when load currents exceed 5 amps.

**Self-Check UV 5602-91
(Requires 5602-91-7 cable)
for 240 VAC Veri-Flame**

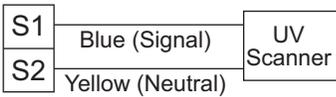


^{T1} Third party transformer required. Must be at least 25 VA.

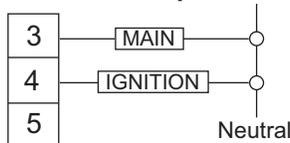
Flame Rod



UV

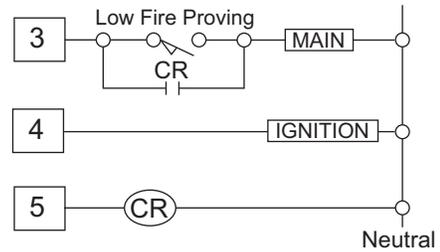


**No Purge & Purge
Direct Spark**



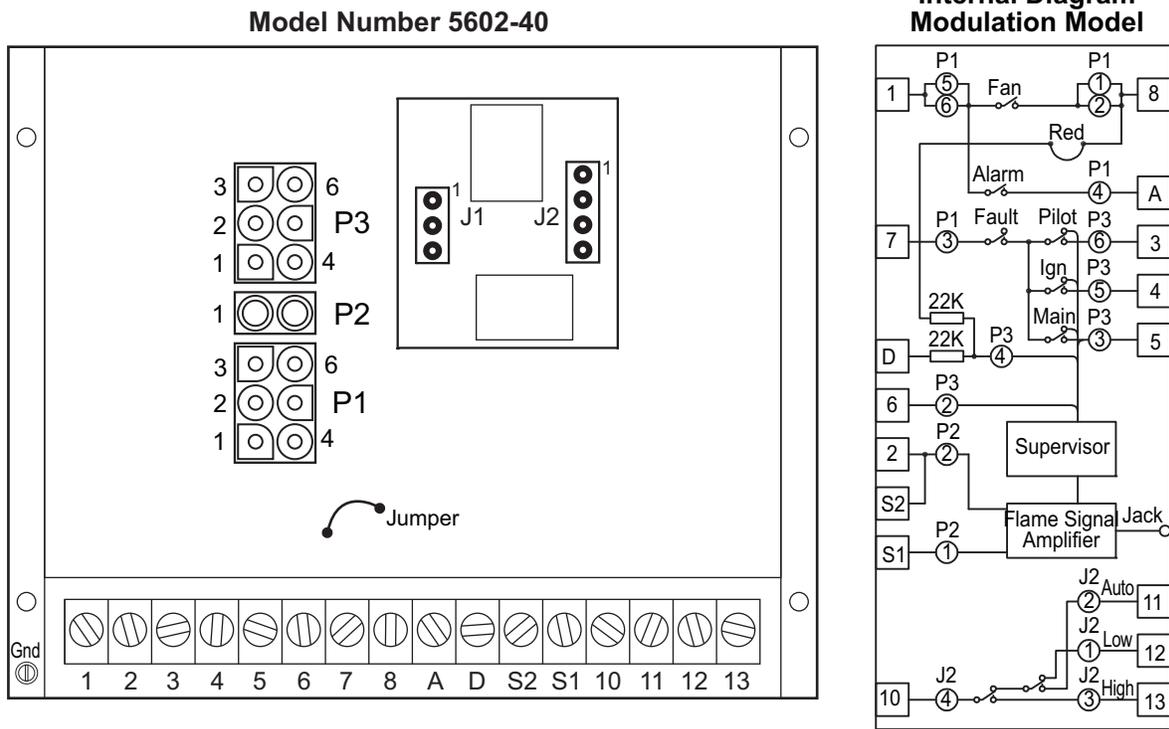
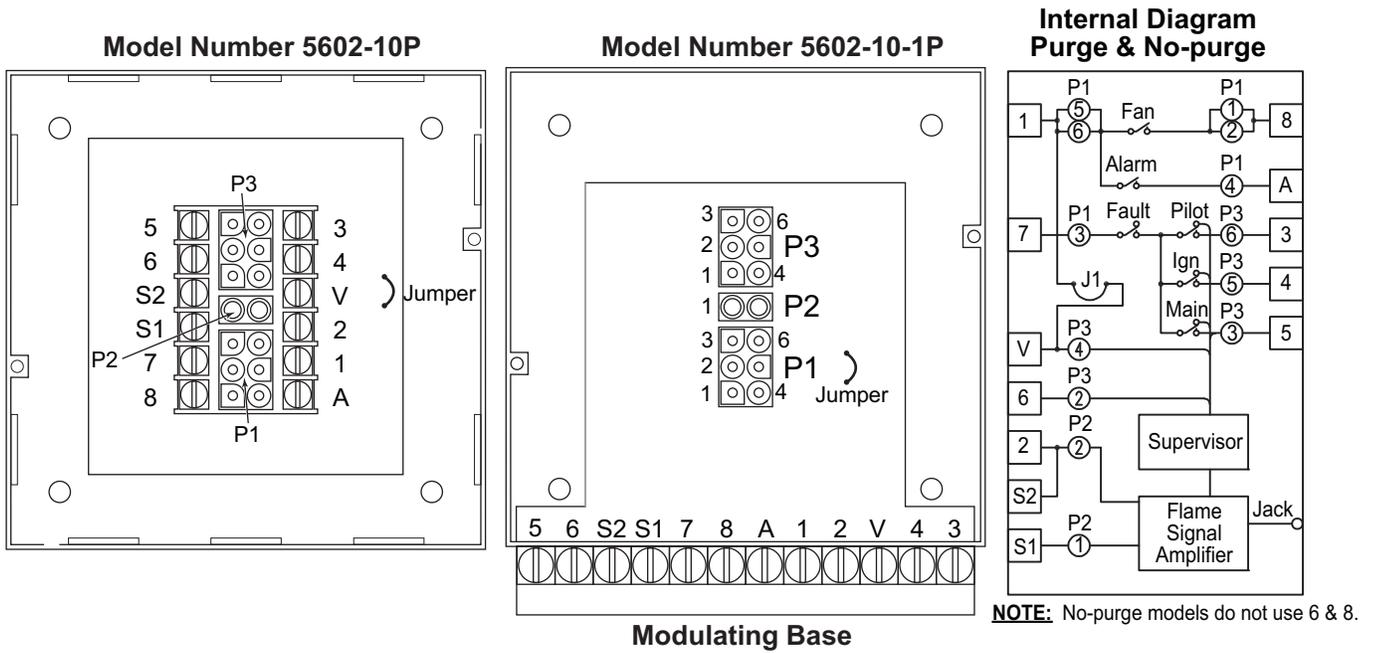
NOTE:
Intermittent pilot must be selected, DIP-SW2 = ON

**Modulation
Direct Spark with
Low Fire Start**



NOTE:
Intermittent pilot must be selected, DIP-SW2 = ON
CR is a control relay used to bypass the low fire switch after the burner is lit.

Figure 5.3. Typical Connections for All Models



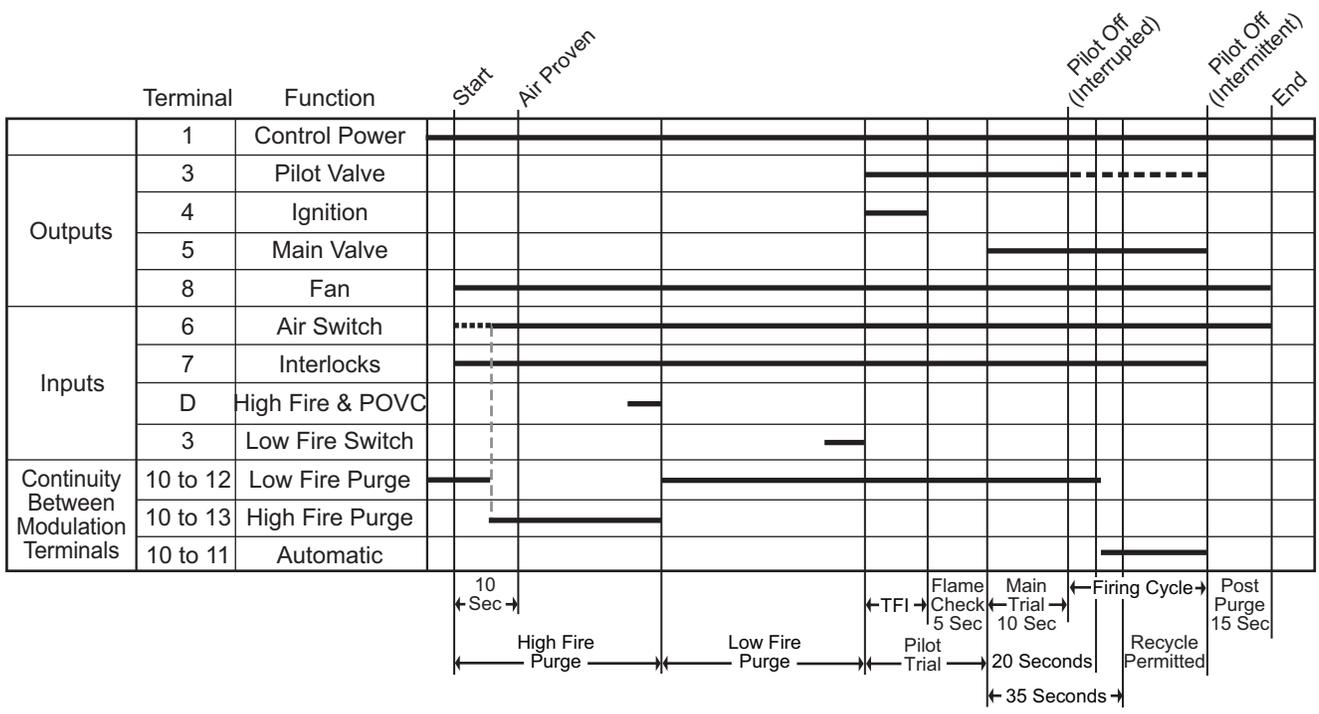
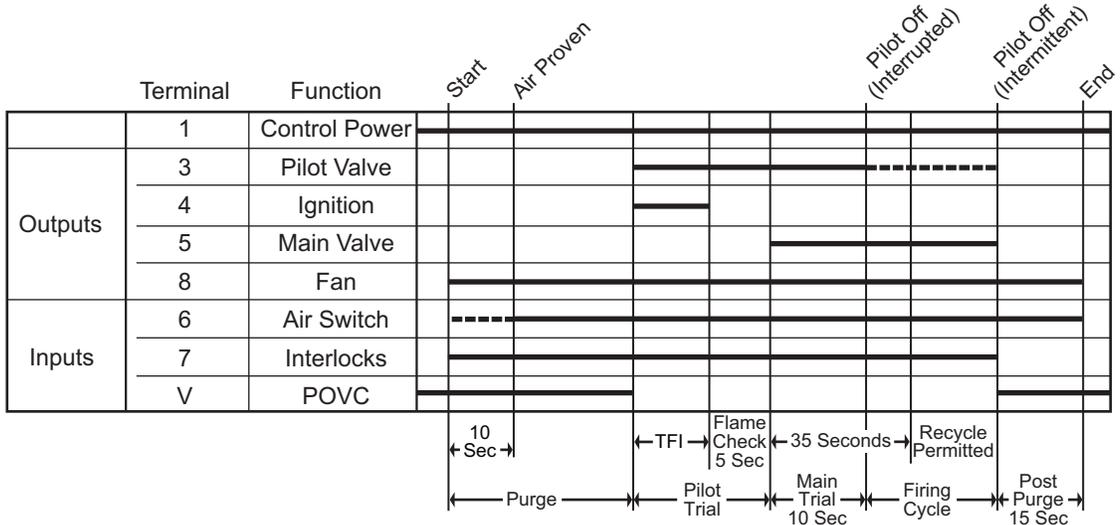
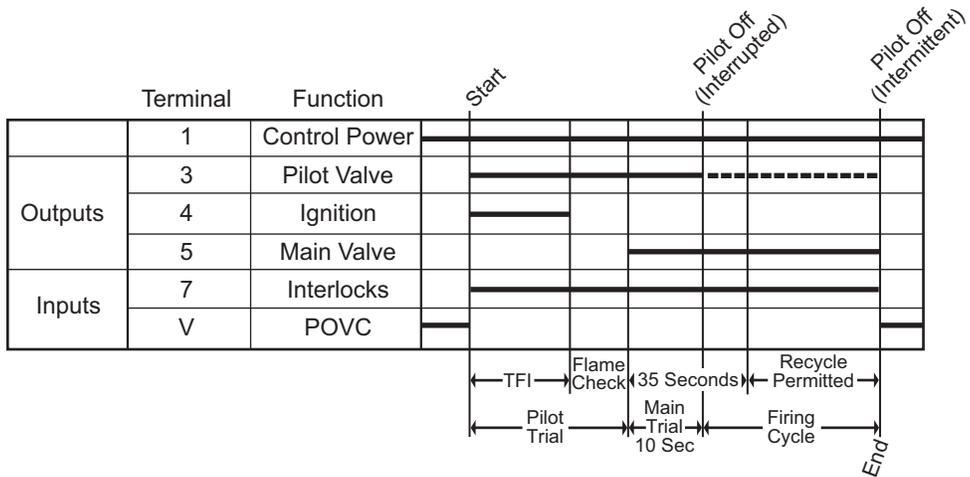


Figure 5.5. Sequence Diagrams

Sensor Installation

6

Introduction

This section describes the proper wiring, installation and sighting considerations for all sensors that can be used with a Veri-Flame.



WARNING

- **Incorrect sensor installation may cause the sensor to generate a false flame signal, possibly resulting in the collection of unburned fuel in the combustion chamber. This unburned fuel creates the potential for explosions which can result in injuries, death and property damage. Be certain that the flame sensor detects acceptable pilot and main flames only.**

Sensor Wiring

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 UV tube-type 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 running approximately 30 meters (100 feet) or greater, use Eclipse part number 21741 coax cable. To achieve the maximum wiring distance, the shield should not be grounded (keep in mind that an ungrounded shield provides less protection against electrical interference).

NOTE: Unshielded sensor wiring must not be run in common with other wires; it must be run in separate conduit. Multiple unshielded flame sensor wiring must not be run together for long lengths in a common conduit or wireway. Use number 14 to number 18 AWG wire suitable for 90°C (194°F) and 600 volt insulation, or a better grade if required by the application. Multiple shielded flame sensor cables can be run in a common conduit.

Flame Rods

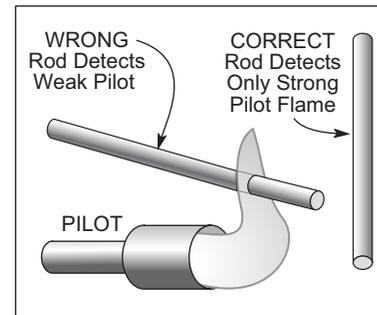


Figure 6.1. Flamerod Position

Flame rods should be used only on gas burners. They accumulate soot from oil burners, causing nuisance shutdowns and unsafe operating conditions.

See the burner manufacturer's literature for flamerod mounting location. When installing flame rods, please consider the following:

1. Keep the flamerod as short as possible and at least 13 mm (1/2 inch) away from any refractory.
2. Position the rod into the side of both the pilot and main flames, preferably at a descending angle to minimize drooping of the flamerod against burner parts, see Figure 6.1. Flamerod position must adequately detect the pilot flame at all burner draft conditions. Extend the rod 13 mm (1/2 inch) into non-luminous flames, such as blue flames from burning an air/gas mixture. For partially luminous flames, such as atmospheric air/gas mixtures, place the rod at the edge of the flame.
3. Provide a burner/flame grounding area that is at least four times greater than the flamerod area contacting the flame. The flamerod/burner ground ratio and position of the rod in the flame may need adjustment to yield maximum flame signal strength.
4. Ignition interference from the spark plug may increase or decrease the flame signal strength. Reversing the ignition transformer primary leads may reduce this effect. Changing the spark gap or adding grounding area between the flamerod and spark plug may eliminate the interference.



WARNING

- Use only Eclipse scanner models as listed in the Illustrated Parts List at the end of this document.

Scanners

When installing scanners, please consider the following:

1. Position the scanner within 457 mm (18 inches) of the flame. Consult factory for longer distances.
2. Bushing threads are 1/2" FNPT for all scanner models except 5602-91 which has 1" FNPT bushing threads.
3. The ambient temperature limits of each scanner varies; check the literature for the specific scanner model. For higher temperatures, use Eclipse heat block seal 23 HBS for 1/2" NPT. scanners and if necessary, add cooling purge air.
4. An optional magnifying lens may also be used to increase the flame signal strength in difficult sighting situations.

Scanner Sighting Considerations

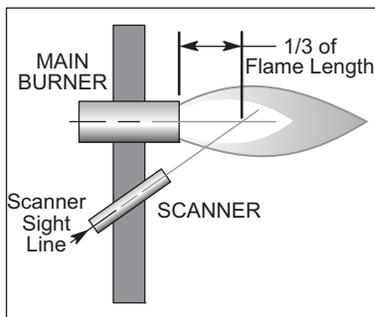


Figure 6.2.

Aim scanners at the third of the flame closest to the burner nozzle, see Figure 6.2 (oil flames typically have less UV radiation in the outer flame). The scanner should view the intersection of the pilot and main flames. When sighting scanners, please consider the following:

1. If possible, sight the scanner away from the ignition spark. Sighting the spark or its reflections from burner internals may lead to a misdiagnosis of shutdowns during burner ignition. If necessary, use a scanner orifice to reduce spark pickup.
2. Do not allow the scanner to detect a pilot flame that is too small to ignite the main burner.
3. Perform a minimum pilot test when installing or adjusting any pilot or main burner system; see "Minimum Pilot Test".

Test Procedures

7

Introduction

This section describes the test procedures that must be performed after installation to insure that the Veri-Flame is operating properly; these procedures are mandatory.

Flame Signal Strength

Insert the positive probe of a 0-15 VDC, digital volt meter into the test point on the front cover of the Veri-Flame; connect the negative probe to S2 or ground. A good flame signal strength will read between 6 and 11 VDC; anything below 4 VDC is inadequate. Also, the red LED inside the test point illuminates when a flame signal is indicated.

Minimum Pilot Test

Run the following test procedures to ensure that the sensor will not detect a pilot flame too small to reliably light the main flame:

1. Manually shut off the fuel supply to the burner, but not to the pilot.
2. Start the system normally.
3. To enter the pilot test mode, depress the test/reset button located in the lower right corner on the front cover.
4. The control will hold the operating sequence at the pilot flame step. Measure signal strength as described above.
5. Reduce pilot fuel until the flame relay drops out. Increase pilot fuel until the flame signal is greater than 4 VDC, and flame relay just manages to pull in. This is the minimum pilot. If you don't think this flame will be able to safely light the main burner, realign the sensor so that it requires a larger pilot flame and repeat steps 2 through 5.
6. Push the test/reset button located in the lower right corner on the front cover to exit the test mode (reset) and begin the normal start-up sequence again.
7. When the sequence reaches the main flame trial for ignition, smoothly restore the fuel supply to the burner. If the main burner does not light within five seconds, immediately shut off the burner supply to shut down the system. Realign the sensor so that it requires a larger pilot flame. Repeat steps 1 through 6 until the main burner lights off smoothly and reliably.

Pilot Flame Failure Test

1. Manually shut off the fuel supply to the pilot and the main burner.
2. Place system in pilot test mode (please refer to page 13).
3. Start the system normally. The controller should lock out*; if it doesn't, then the controller is detecting a false flame signal (see Section 6). Find the problem and correct it before resuming normal operation.

Main Flame Failure Test (For Interrupted Pilot Systems)

1. Manually shut off the fuel supply to the main burner but not to the pilot.
2. Start the system normally. This should ignite the pilot and lock out* after pilot interruption. If the system does not lock out, the controller is detecting a false flame signal (see Section 6). Find the problem and correct it before resuming normal operation.

Spark Sighting Test

1. Manually shut off the fuel supply to the pilot and the main burner.
2. Start the system normally.
3. Measure the flame signal as described in "Flame Signal Strength" in this section.
4. If a flame signal greater than 4 VDC is measured for more than three seconds during the trial for ignition, then the sensor is picking up a signal from the spark plug; see "Sensor Wiring". It is not necessary to correct a spark sighting condition for a Veri-Flame when the ignition transformer is connected to terminal 4.

Limits and Interlocks Test

Periodically check all interlock and limit switches by manually tripping them during burner operation to make sure they cause the system to shut down.



WARNING

- **Never operate a system that is improperly adjusted or has faulty interlocks or limit switches. Always replace faulty equipment with new equipment before resuming operation. Operating a system with defective safety equipment can cause explosions, injuries, and property damage.**

*Indicated by the illuminated red “Flame Failure” LED on the Veri-Flame front cover.

Maintenance and Troubleshooting

Introduction

This section is divided into two parts. The first part describes the maintenance procedures, and the second part helps you to identify problems that may occur and gives recommendations on how to solve these problems.

Preventative maintenance is the key to a reliable, safe and efficient system. The following are suggested guidelines for periodic maintenance. Burners in severe environments or operational conditions should be checked more frequently.

NOTE: The monthly and yearly lists are an average interval. If your environment is dirty, then the intervals may be shorter. Check with local authorities having jurisdiction on their recommended maintenance schedules.



CAUTION

- **Turn off the power to the burner and controls before proceeding with burner inspection.**

Monthly Checklist

1. Inspect flame-sensing devices for good condition and cleanliness. Keep scanner lenses clean with a soft, damp cloth, since small amounts of dust will measurably reduce the flame signal strength. Wash the flamerod electrode and insulator with soap and water, then rinse and dry thoroughly.
2. Test all the alarm systems for proper signals.
3. Check ignition spark electrodes and check proper gap.
4. Test interlock sequence of all safety equipment as described on page 25: manually make each interlock fail, noting what related equipment closes or stops as specified by the manufacturer.
5. Test flame safeguard by manually shutting off gas to the burner.

Yearly Checklist

1. Test (leak test) safety shut-off valves for tightness of closure.
2. Test pressure switch settings by checking switch movements against pressure setting and comparing with actual impulse pressure.
3. Visually check ignition cable and connectors.
4. Make sure that the following components are not damaged or distorted:
 - the burner nozzle
 - the spark plugs
 - the flame sensors
 - the flame tube or combustion block of the burner

Troubleshooting

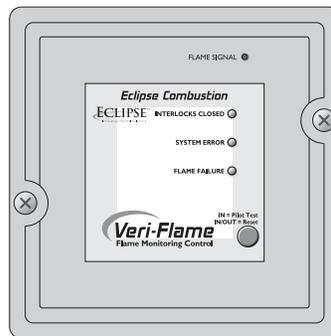
Problem	Possible Cause	Solution
Cannot initiate a start sequence	Main valve is not closed	Check the main valve closed switch. No voltage on V (or D)
	Air pressure switch has not made contact	Check the air pressure switch adjustment
		Check the air filter
		Check the blower rotation
		Check the outlet pressure from the blower.
		No voltage on 6 after 8 is on
	High pressure gas switch has tripped	Check the incoming gas pressure; adjust the gas pressure if necessary
		Check the pressure switch setting and operation
		No voltage to 7
	Low gas pressure switch has tripped	Check the incoming gas pressure; adjust the gas pressure if necessary
		Check the pressure switch setting and operation
No voltage to 7		
Malfunction of the flame safeguard system such as a short-out flame sensor or electrical noise in the sensor line	Have a qualified electrician troubleshoot and correct the problem	
Purge cycle not completed	Check the switch setting	
	Check the air switch	
Main power is off	Make sure the power to the control system is on	
No power to the control unit	Have a qualified electrician troubleshoot and correct the problem	
Scrambled messages on the remote display	Electrical interference	Check the grounding in the system. Separate the communication cable. Move the ignition circuit.
"Unsafe Air Short" message appears on the display	Improperly adjusted air switch	Check the air switch settings
	Air switch either shorted or it is wired incorrectly	Check the wiring to the air switch
Burner flame fails but no flame failure indication occurs	A faulty scanner	Check the scanner as explained in the "Maintenance" section above
	Improperly connected sensor wires	Check the wiring diagram in the "System Installation" chapter of this manual
	Electrical interference from other current carrying wires	See Figures 5.1, 5.2, 5.3 and their associated notes in the "System Installation" chapter of this manual
Voltage reading is greater than 15 VDC at "Test Point" on Veri-Flame faceplate	Improper grounding	Check grounding of neutral at the control power transformer

LED Status

This section describes the status of operating conditions based on the LED or combination of LEDs which are lit on the front cover of each Veri-Flame model.

LED Status and Conditions for Veri-Flame No Purge Models

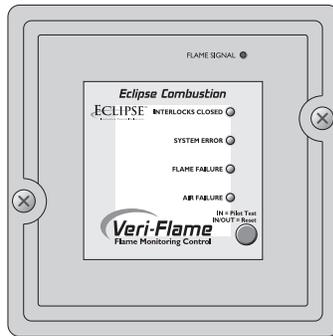
LED(s) Lit	Possible Cause
Interlocks Closed	The interlocks are closed (normal operation), power on terminal 7.
System Error	<ol style="list-style-type: none"> 1. The flame detected is out of sequence, flame signal light is on. 2. The sensor is "runaway," flame signal light is on. 3. Inductance is detected on sensor wires, flame signal light is on. 4. Voltage wired into terminals 3, 4, or 5. 5. Internal relay contacts welded. 6. Internal controller failure. 7. Main valve closed switch defective, no power to V.
Flame Failure	<ol style="list-style-type: none"> 1. Pilot flame is not established in selected TFI. 2. Main flame is not established in selected TFI. 3. Main flame fails within 35 seconds of TFI. 4. Flame failed during operation in non-recycle mode. 5. Flame failed 35 seconds after TFI and was not established after try in recycle mode.



No Purge Model

LED Status and Conditions for Veri-Flame Purge Models

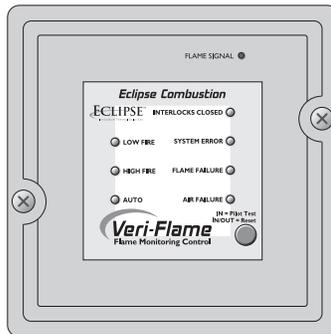
LED(s) Lit	Possible Cause
Interlocks Closed	The interlocks are closed (normal operation), power on terminal 7.
System Error	<ol style="list-style-type: none"> 1. The flame detected is out of sequence, flame signal light is on. 2. The sensor is “runaway”, flame signal light is on. 3. Inductance is detected on sensor wires, flame signal light is on. 4. Voltage wired into terminals 3, 4 or 5. 5. Internal relay contacts welded. 6. Internal controller failure. 7. Air flow switch closed before start-up. 8. Main fuel valve switch opens after shutdown or before start-up, no power to V.
Flame Failure	<ol style="list-style-type: none"> 1. Pilot flame is not established in selected TFI. 2. Main flame is not established in selected TFI. 3. Main flame fails within 35 seconds of TFI. 4. Flame failed during operation in non-recycle mode. 5. Flame failed 35 seconds after TFI and was not established after one try in recycle mode.
Air Failure	<ol style="list-style-type: none"> 1. Air flow switch not closed within ten seconds of start-up. 2. Air flow switch is open during timing cycle. 3. Air flow switch is open during firing cycle.



Purge Model

LED Status and Conditions for Veri-Flame Modulation Models

LED(s) Lit	Possible Cause
Interlocks Closed	The interlocks are closed (normal operation), power on terminal 7.
System Error	<ol style="list-style-type: none"> 1. The flame detected is out of sequence, flame signal light is on. 2. The sensor is “runaway”, flame signal light is on. 3. Inductance is detected on sensor wires, flame signal light is on. 4. Voltage wired into terminals 3, 4 or 5. 5. Internal relay contacts welded. 6. Internal controller failure. 7. Air flow switch closed before start-up. 8. Main fuel valve switch opens after shutdown or before start-up, no power to V.
Flame Failure	<ol style="list-style-type: none"> 1. Pilot flame is not established in selected TFI. 2. Main flame is not established in selected TFI. 3. Main flame fails within 35 seconds of TFI. 4. Flame failed during operation in non-recycle mode. 5. Flame failed 35 seconds after TFI and was not established after one try in recycle mode.
Air Failure	<ol style="list-style-type: none"> 1. Air flow switch not closed within ten seconds of start-up. 2. Air flow switch is open during timing cycle. 3. Air flow switch is open during firing cycle.
Interlocks Closed and Auto	Burner in run mode, firing rate determined by automatic controller (normal operation).
Interlocks Closed and High Fire	Purge high sequence (normal operation).
Interlocks Closed and Low Fire	Purge low sequence (normal operation).



Modulation Model

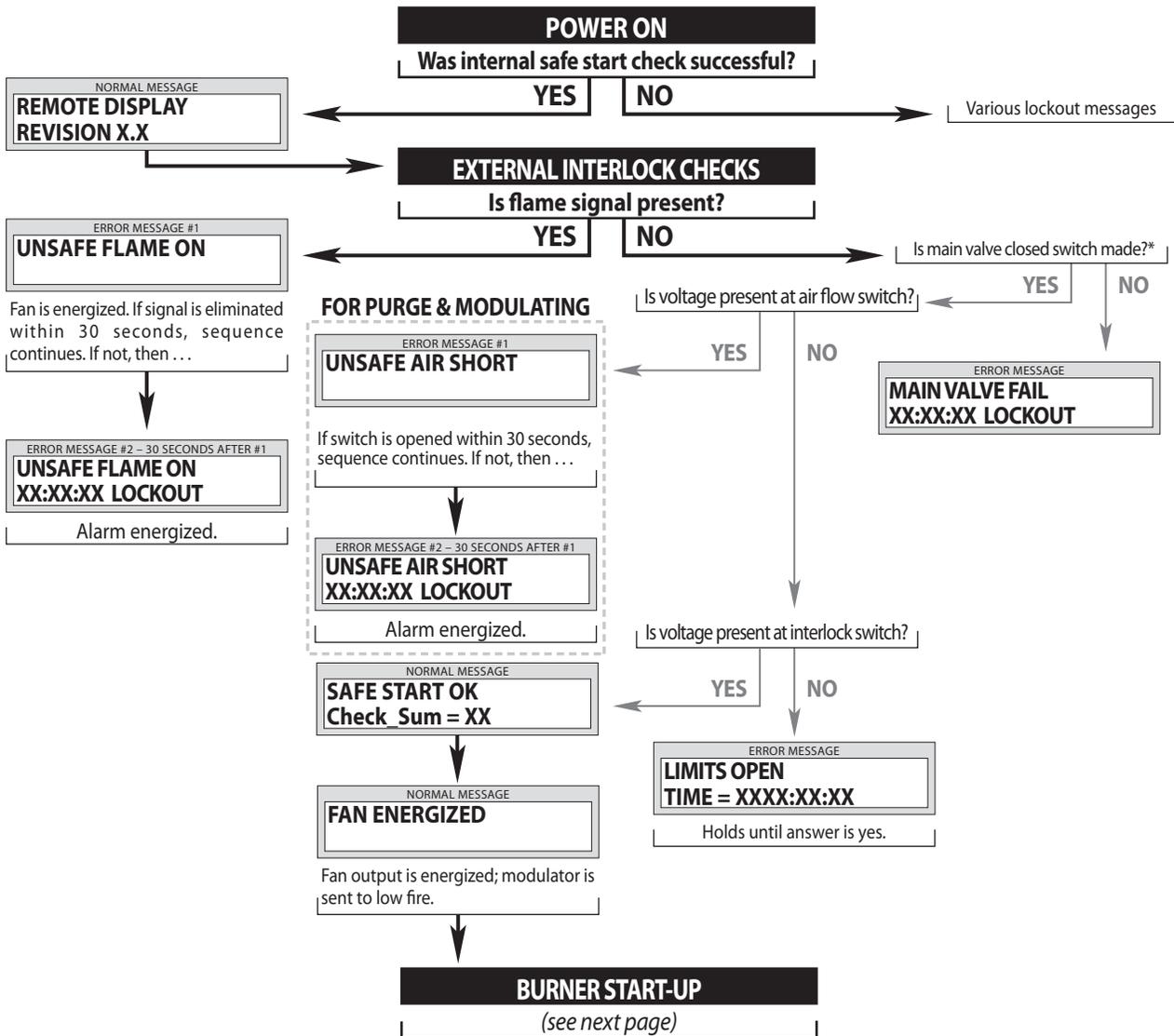
Remote Display Messages

Introduction

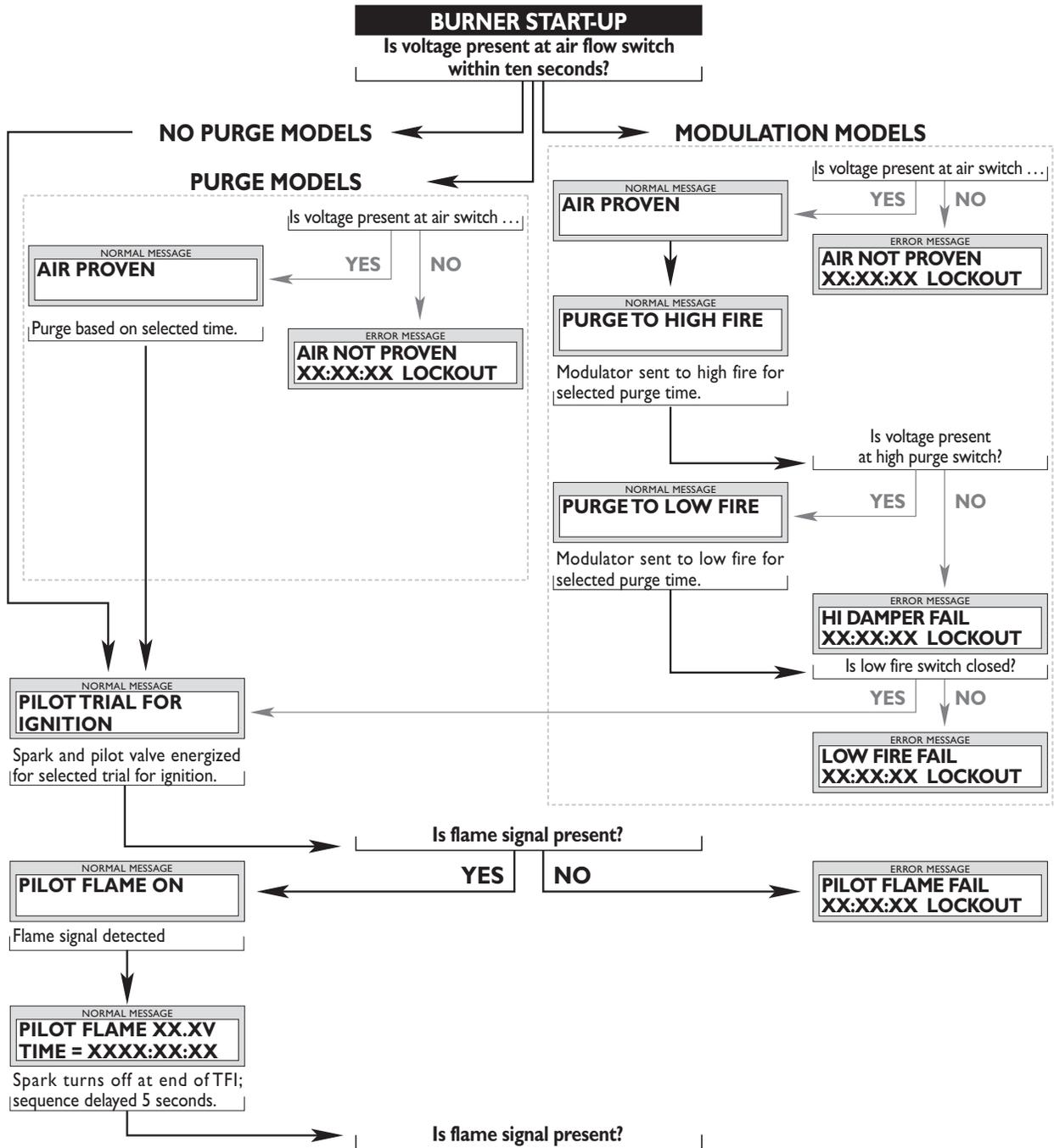
This section describes how the optional remote display is used with the Veri-Flame. The remote display provides LCD messages which monitor the status of the Veri-Flame's functions as well as any lockout conditions. This section is divided into two parts or tables:

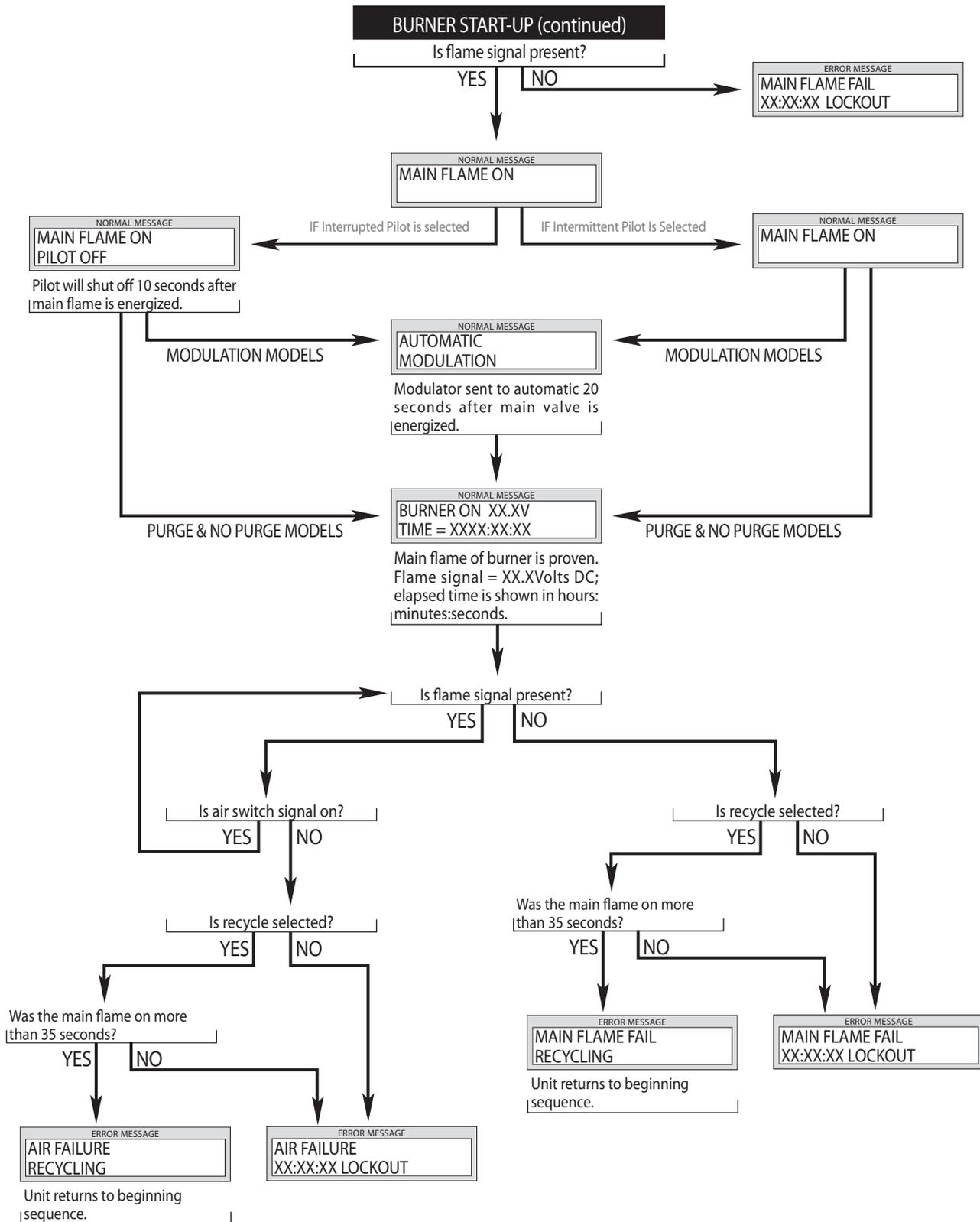
Veri-Flame Operating Sequence

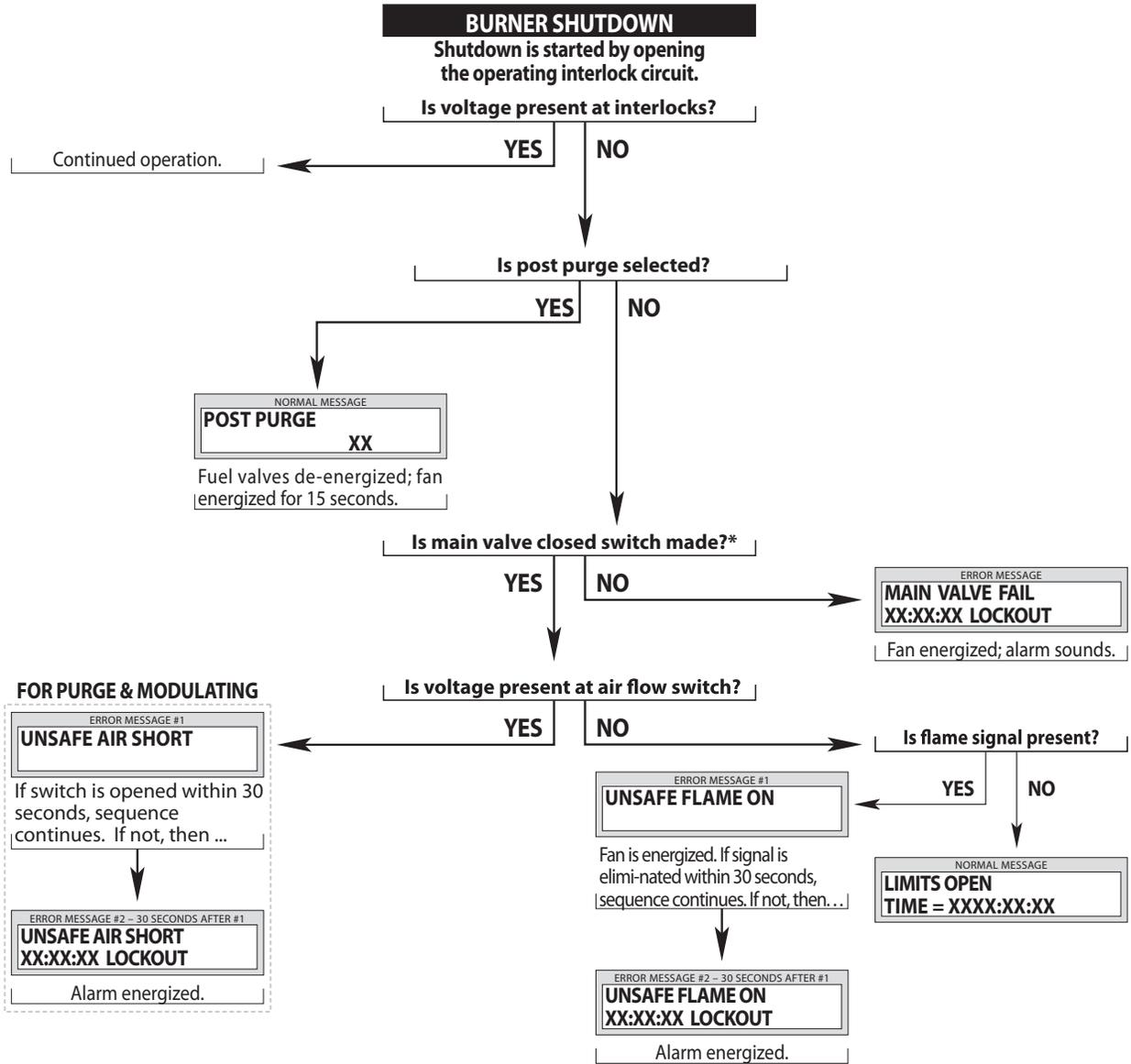
This section describes the start-up and shutdown monitoring sequences of the Veri-Flame and how the progress (or halt) of the sequence can be monitored by the messages on the remote display.



* Applies to purge and no purge models only.







* Applies to purge and no purge models only.

Remote Display Diagnostic Messages

This section alphabetically lists and explains the diagnostic messages which can appear on the remote display.

Message	Type	Explanation
Air Failure XX:XX:XX Lockout	Lockout	For purge & modulation models: Combustion air flow limit switch opened for more than two seconds once initially proven.
Air Failure Recycling	Status	For purge & modulation models: Combustion air flow limit switch opened; if "recycle" has been selected, the Veri-Flame will restart the sequence after air failure (see "Recycle Mode" on page 13).
Air Not Proven XX:XX:XX Lockout	Lockout	For purge & modulation models: Combustion air flow limit switch did not make within ten seconds of fan being energized.
Air Proven	Status	For purge & modulation models: Combustion air flow limit switch closed within ten seconds of fan being energized.
Automatic Modulation	Status	For modulation models only: Modulating motor is sent to automatic operation.
Burner on XX.XV Time = XXXX:XX:XX	Status	Main flame of burner is proven in the automatic modulation mode; flame strength is XX.XV (volts DC). Elapsed time is shown in hours:minutes:seconds.
D-Internal Fail XX:XX:XX:XX Lockout	Lockout	For modulation models only: Internal control failure; replace controller.
Fan Energized	Status	For purge & modulation models: Blower motor is energized at the start of pre-purge.
Flame Failure XX:XX:XX Lockout	Lockout	Main flame lost during operation in the automatic modulation mode.
HI Damper/POVC XX:XX:XX Lockout	Lockout	For modulation models only: High damper or high purge rate switch did not make at the end of pre-purge to high fire.
K-Internal Fail XX:XX:XX Lockout	Lockout	Internal control failure; replace controller.
L-Internal Fail XX:XX:XX Lockout	Lockout	Internal control failure; replace controller.
Limits Open Time = XXXX:XX:XX	Status	The controller has completed its internal checks and is standing by for the interlocks to close.
Low Fire Fail XX:XX:XX Lockout	Lockout	For modulation models only: Low fire switch is open just prior to pilot trial for ignition.
Main Flame Fail XX:XX:XX Lockout	Lockout	Main flame was not established during the main burner trial for ignition.
Main Flame Fail Recycling	Status	Main flame lost during automatic modulation; control will recycle once if "recycle" has been selected.
Main Flame ON	Lockout	Main valve has been energized and main flame proven during trial for ignition.
Main Flame ON Pilot OFF	Status	Pilot valve is de-energized and main flame is on.
Main Valve Fail XX:XX:XX Lockout	Lockout	For purge and no purge models: Main valve closed switch is open before start-up or after burner shutdown.
Pilot Flame Fail XX:XX:XX Lockout	Lockout	Pilot flame was not established during the pilot trial for ignition.
Pilot ON	Status	Pilot flame is proven; transformer is de-energized; remaining countdown for pilot trial for ignition is.
Pilot Trial for Ignition	Status	Pilot valve and ignition transformer are energized; countdown for pilot trial for ignition begins.

Message	Type	Explanation
Post Purge	Status	For purge & modulation models: 15 second post purge is started on burner shutdown.
Program Switch Error XX:XX:XX Lockout	Lockout	DIP switch improperly set or changed during cycle.
Purge to High Fire	Status	For modulation models only: Modulating motor is sent to high fire.
Purge to Low Fire	Status	For modulation models only: Modulating motor is sent to low fire.
Relay Fail XX:XX:XX Lockout	Lockout	Internal relay(s) fail initial check. Check ratings. If lockout still occurs after overload is eliminated, replace control.
Safe Start OK	Status	Control has completed internal safe-start check.
Unsafe Short	Status	For purge & modulation models: Combustion air switch is closed before start-up or after shutdown; control holds start-up until switch reopens; if interlocks close before switch opens, alarm is energized.
Unsafe Air Short XX:XX:XX Lockout	Lockout	For purge & modulation models: Same conditions as above, except the interlocks close before the switch reopens, causing a lockout and the alarm being energized.
Unsafe Flame ON	Hold	Flame signal - actual, induced, or runaway scanner - is detected before start-up or after shutdown. The fan is energized. If the cause is corrected within 30 seconds, as in afterburn, the control will turn off the fan and continue the sequence.
Unsafe Flame ON XX:XX:XX Lockout	Lockout	Same conditions as above, except the cause has not been corrected within 30 seconds, resulting in a lockout and the alarm being energized.
Unsafe Flame Purge	Hold	For purge & modulation models: Flame signal - actual, induced, or runaway scanner - is detected during the selected purge time period. The fan is energized. If the cause is corrected within 30 seconds, as in afterburn, the control will turn off the fan and continue the sequence.
Unsafe Flame Purge XX:XX:XX Lockout	Lockout	For purge & modulation models: Same conditions as above, except the cause has not been corrected within 30 seconds, resulting in a lockout and the alarm being energized.
V-Internal Fault XX:XX:XX Lockout	Lockout	Internal control failure; replace controller.
Watchdog Fail XX:XX:XX Lockout	Lockout	Internal control failure; replace controller.
XXXXXXX XXXXXTESTXX	Status	In combination with other messages, shows the control is in the minimum pilot test mode.



Appendix

Conversion Factors

Metric to English

From	To	Multiply By
actual cubic meter/h (am ³ /h)	actual cubic foot/h (acfh)	35.31
normal cubic meter/h (Nm ³ /h)	standard cubic foot /h (scfh)	38.04
degrees Celsius (°C)	degrees Fahrenheit (°F)	(°C x 9/5) + 32
kilogram (kg)	pound (lb)	2.205
kilowatt (kW)	Btu/h	3415
meter (m)	foot (ft)	3.281
millibar (mbar)	inches water column ("w.c.)	0.402
millibar (mbar)	pounds/sq in (psi)	14.5 x 10 ⁻³
millimeter (mm)	inch (in)	3.94 x 10 ⁻²
MJ/Nm ³	Btu/ft ³ (standard)	26.86

Metric to Metric

From	To	Multiply By
kiloPascals (kPa)	millibar (mbar)	10
meter (m)	millimeter (mm)	1000
millibar (mbar)	kiloPascals (kPa)	0.1
millimeter (mm)	meter (m)	0.001

English to Metric

From	To	Multiply By
actual cubic foot/h (acfh)	actual cubic meter/h (am ³ /h)	2.832 x 10 ⁻²
standard cubic foot /h (scfh)	normal cubic meter/h (Nm ³ /h)	2.629 x 10 ⁻²
degrees Fahrenheit (°F)	degrees Celsius (°C)	(°F - 32) x 5/9
pound (lb)	kilogram (kg)	0.454
Btu/h	kilowatt (kW)	0.293 x 10 ⁻³
foot (ft)	meter (m)	0.3048
inches water column ("w.c.)	millibar (mbar)	2.489
pounds/sq in (psi)	millibar (mbar)	68.95
inch (in)	millimeter (mm)	25.4
Btu/ft ³ (standard)	MJ/Nm ³	37.2 x 10 ⁻³



Notes

