



## 24 VAC Proven Hot Surface Ignition Control with Combustion Blower Relay Microprocessor Based

35.67.02

### FEATURES

- Proven pressure switch input
- Combustion fan output
- 24/120/240 VAC hot surface ignitor models available
- ASME CSD-1 compatible models available (consult factory)
- Pre-purge and lockout indicator outputs
- Diagnostic LED
- Multiple trials for ignition
- Thermostat, pushbutton or remote reset
- Remote diagnostic LED
- Remote flame sensor option
- Flame current test pins

### APPLICATIONS

Commercial and industrial appliances with combustion chambers in excess of 400K BTU. Applications requiring CSD-1 certification.

### DESCRIPTION

The Series 35-67 is a hot surface ignition system in which the ignition source is proven to be capable of ignition prior to the gas valve being opened and is suitable for appliances over 400K BTU. Models compatible to the requirements of ASME standard CSD-1 are available.

The microprocessor circuit design provides precise, repeatable timing sequences for ignition times and purge times (pre-, inter-, and post-) as well as multiple tries for ignition. The control also continuously monitors the pressure switch, thermostat and main burner flame to ensure safe system operation. On-board diagnostics with LED output provide assistance with troubleshooting to ensure safe and efficient burner operation.

### Agency Certifications



Design certified by CSA International to CAN C22.2 #199-M89 and ANSI Z21.20 for Automatic Ignition Systems, including UL1998 Software Review.



### SPECIFICATIONS

INPUT VOLTAGES	DESCRIPTION
<b>Control</b>	18 to 30 VAC, 400mA max (not including gas valve)
<b>Line</b>	24/120/240 VAC (L1 & L2 only, voltage depends on model)
<b>Thermostat</b>	18 to 30 VAC 30mA max (incl. Gas Valve)
<b>Pressure Switch</b>	18 to 30 VAC 25mA max
<b>Hot Surface Element</b>	24/120/240 VAC 5A max
<b>Output Ratings</b>	
<b>Inducer Fan</b>	Relay: 15A max or 1/3HP @ 120 or 240 VAC
<b>Hot Surface Element</b>	5.0A max @ 24, 120 or 240 VAC
<b>Gas Valve Rating</b>	5.0A max @ 24 VAC
<b>Lockout &amp; Pre-Purge Indicators</b>	1.0A max @ 24 VAC
<b>Operating Temperature</b>	-40°F to +165°F (-40°C to +73°C)
<b>Flame Sensitivity</b>	4.0mA minimum
<b>Flame Failure Response Time</b>	0.8 seconds max
<b>Types of Gas</b>	Natural, LP, or manufactured
<b>Ignitor</b>	24 VAC, 120 VAC, or 240 VAC mini-ignitors and silicon carbide ignitors depending on model
<b>Enclosure</b>	Gray (Noryl N-190)
<b>Moisture Resistance</b>	Conformal coated to operate non-condensing to 95% R.H. Care must be taken to protect module from direct exposure to water
<b>Size with enclosure</b>	See Figures 6 & 7
<b>Weight</b>	8oz including options and cover

## SEQUENCE OF OPERATION

### 1. POWER-UP.

Power is applied to the full time 24 volt input. The micro-processor will start a self-check routine of about five seconds. After this delay, the LED will come on and the control is ready to start a new call for heat.

#### For Manual Reset Button Models Only

Models of the 35-67 with non-volatile lockout (manual reset button), the microprocessor will check memory to determine if the control should remain in lockout.

**Lockout Present.** The lockout indicator output will turn on, and the LED will repeatedly flash three times. To reset the control, the Reset Button must be pushed.

**Not in Lockout.** The control is ready to start a new call for heat.

### 2. CALL FOR HEAT.

The thermostat is turned on. The combustion fan relay will turn on.

**Proof of Pressure Switch.** The control will look for a signal from the pressure switch, indicating that the fan has come on.

**Pre-Purge Delay.** When the pressure switch signal is seen, the pre-purge delay will start. The pre-purge indicator output will turn on.

### 3. HEAT-UP.

After the pre-purge delay, power will be applied to the hot surface ignition element. The pre-purge indicator will turn off.

**Current Proving.** The 35-67 will monitor the current through the ignition element. When the current reaches a pre-determined level, the LED will flash once.

**Dwell Time.** From the point when the current has been proven, there will be a delay called dwell time. Dwell time assures that the ignition element has sufficient time to reach ignition temperature.

**4. IGNITION.** When dwell time is completed, the gas valve will open. The ignition element will turn off 2 seconds before the end of the ignition period.

#### No Flame.

**Single Trial for Ignition.** The control will go to post-purge, and then lockout.

**Three Trials for Ignition.** The control will make two additional purge/heatup/ignition cycles. If a flame is not proven, the control will go to post-purge, and then lockout.

#### Flame is Proven.

The gas valve will remain on beyond the normal ignition period. This continues as long as signals are present for the flame, thermostat and pressure switch.

**5. LOSS OF FLAME SIGNAL.** The gas valve will turn off.

Depending on the model chosen:

**Single Trial for Ignition Models.** A new trial for ignition cycle will start.

**Three Trial for Ignition Models.** Three new ignition cycles will start.

*continued above >*

**Post-Purge.** After all ignition cycles are complete, the control will enter post-purge. The combustion fan will remain on.

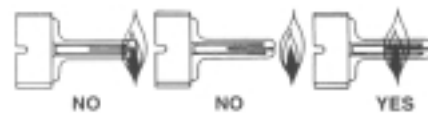
**Lockout.** After post-purge is complete, the combustion fan will turn off. The Lockout Indicator output will turn on. The LED will repeatedly flash three times

## SILICON CARBIDE IGNITOR

Proper location of the silicon carbide ignitor is important to achieve optimum system performance for both ignition and flame sensing. See Figure 1.

**NOTE:** The temperature of the ceramic holder should not exceed the manufacturer's specifications.

Figure 1



## TYPICAL HOT SURFACE IGNITOR

Figure 2

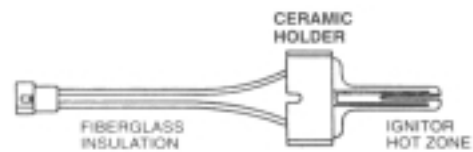
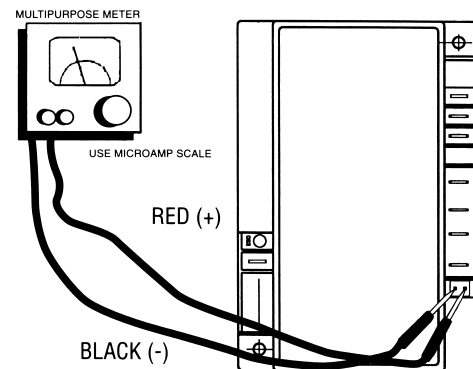


Figure 3



Flame current is the current that passes through the flame from the sensor to ground. The minimum flame current necessary to keep the system from lockout is 4.0 microamps. To measure flame current, connect an analog DC micro-ammeter to the FC terminals per figure 5. Meter should read 4.0 mA or higher. If meter reads below "0" on scale, meter leads are reversed. Disconnect power and reconnect meter leads for proper polarity.

## MOUNTING AND WIRING

The 35-67 is not position sensitive and can be mounted vertically or horizontally. The control may be mounted on any surface and fastened with #6 sheet metal screws. Secure the control in an area that will experience a minimum of vibration and remain below the maximum ambient temperature of 80°C (175°F). All connections should be made with UL approved, 105°C (221°F) rated 18 gauge stranded wire with .054" minimum insulation. Refer to Figure 4A and Figure 5A on Page 5 when connecting the 35-67 to other components in the system.

### TERMINAL DESIGNATIONS - P1 CONNECTOR

Table 1

MULTI-PIN CONNECTOR AMP P/N 1-770849-1 PINS AMP P/N 350980-1		
PIN LOCATION	WIRE COLOR	DESCRIPTION
	ORANGE	Lockout Indicator
1	RED	Thermostat
2	VIOLET	Lockout Indicator (Ground Side)
3	GRAY	Pressure Switch
4	BROWN	Gas Valve
5	BLUE	24 VAC (Full Time)
6		No Connection (Standard Version)
7	YELLOW	Reset Button (Manual Reset Only)
7	GREEN	Ground
8	WHITE	Pre-Purge Indicator
9		
10	BLACK	Remote Sense
11		

### TERMINAL DESIGNATIONS - P2 & P3 CONNECTOR

Table 2

TERMINAL	DESCRIPTION	MULTI-PIN CONNECTOR	QUICK CONNECTS
S1	Ignitor	AMP 2-520183-2 PINS 350919-3	¼ inch optional
L1	24, 120 or 240VAC Input (Hot)	AMP 2-520183-2 PINS 350919-3	¼ inch optional
L2	Neutral	AMP 2-520183-2 PINS 350919-3	¼ inch optional
S2	Ignitor	AMP 2-520183-2 PINS 350919-3	¼ inch optional
F1	Inducer Power Supply		¼ inch optional
F2	Inducer Blower	MOLEX 22-01-2021	¼ inch optional
P3	Remote LED Connector	PINS 08-500114 AMP 61260-1	
FC+ & FC-	Flame Current Test Pins		



#### CAUTION:

Label all wires prior to disconnection when servicing the control. Wiring errors can cause improper and dangerous operation. A functional checkout of a replacement is recommended.



#### WARNING:

Operation outside specifications could result in failure of the Fenwal product and other equipment with injury or death to people and damage to property. Service to this product should only be performed by a qualified technician

## ON BOARD DIAGNOSTICS

LED INDICATION	FAULT MODE
Steady OFF	Internal Control Failure
2 Flashes	Erroneous Flame Signal
3 Flashes	Lockout
6 Flashes	Valve Relay Problem

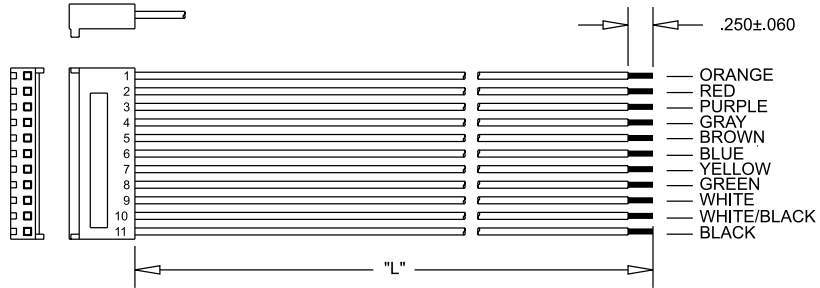
## TROUBLESHOOTING GUIDE

SYMPTOM	RECOMMENDED ACTIONS
Control will not start up	A. Miswired B. 24 VAC Transformer bad C. Fuse/Circuit breaker bad D. Bad control, check LED for steady or flashing codes
Thermostat on and no igniton	A. Miswired B. Bad thermostat, no voltage at thermostat terminal C. Failed ignitor
Valve on - no ignitor	A. Defective ignitor B. Miswired C. Bad control, check voltage at ignitor
Ignitor on - no valve	A. Valve coil open B. Open valve wire C. Bad control, check voltage at gas valve terminal
Flame okay during TFI but no flame sense after TFI	A. Bad ignitor B. Bad wire C. Poor ground at burner D. Poor flame, check flame current

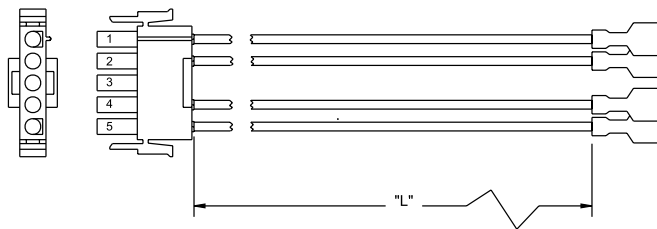
## CONTROL WIRE HARNESS

Select the proper harness based on the 35-67 control's termination connection. Once the terminal configuration is determined, complete the part number by replacing the last two digits ("XX") with the length in inches ("I" dimension). Standard wire lengths are 12, 18, 24, 30, 36 and 48 inches. Example 05-129845-018 = 18 inches. For other lengths, please contact Fenwal

**Part Number: 05-129845-0XX**

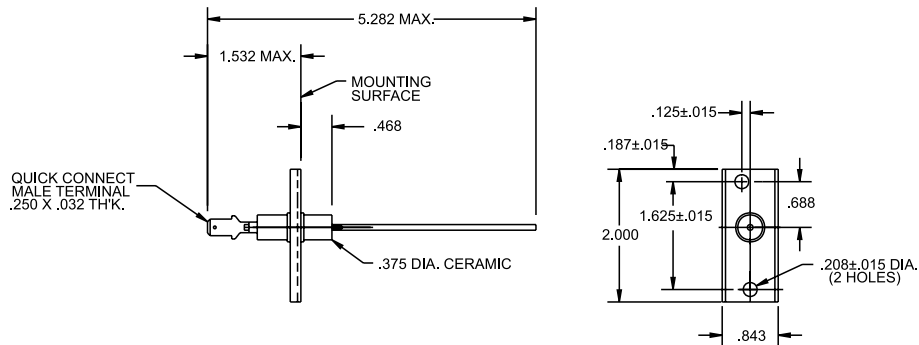


**Part Number: 05-128981-XXX**

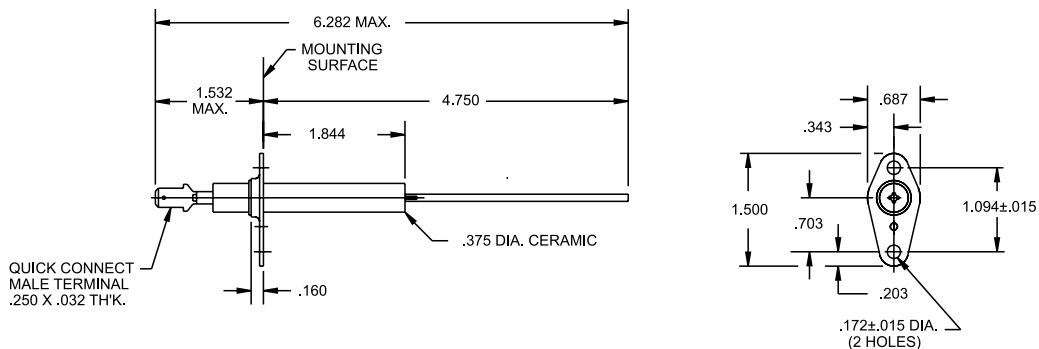


## REMOTE FLAME SENSE ROD

**Part Number: 22-100001-080**



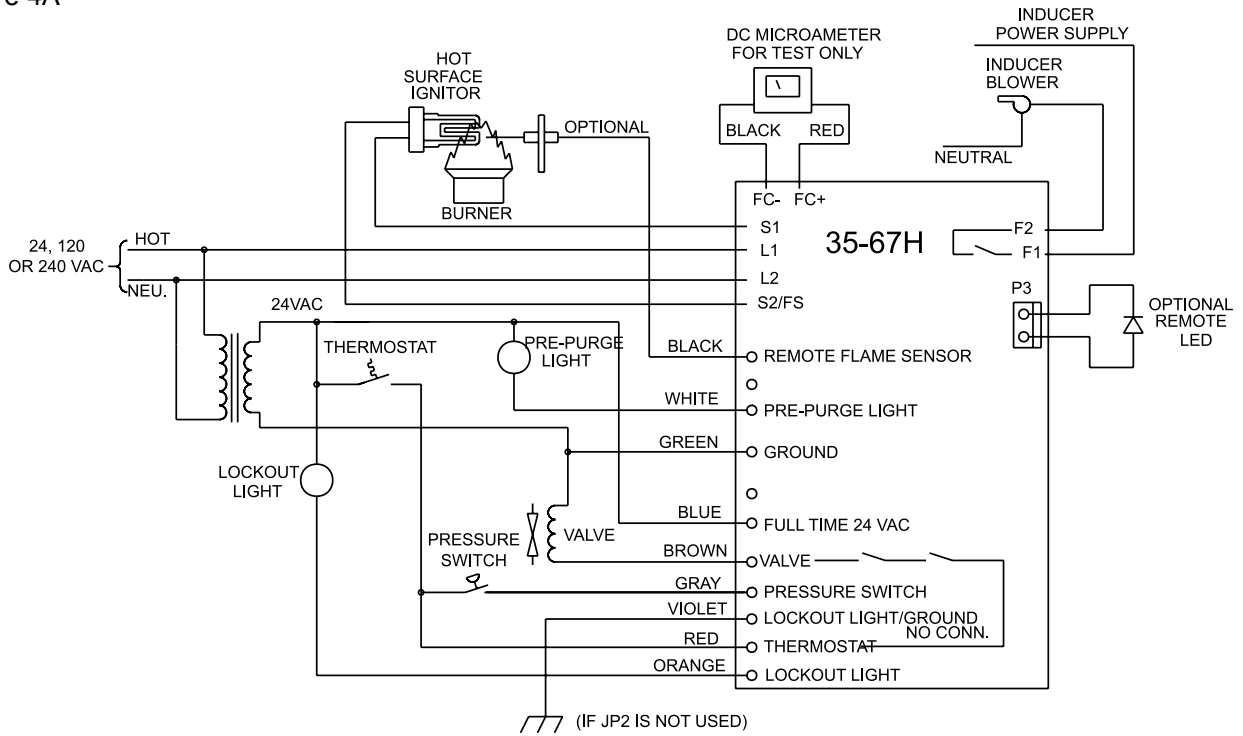
**Part Number: 22-100001-110**



# STANDARD DESIGN - AUTOMATIC RESET

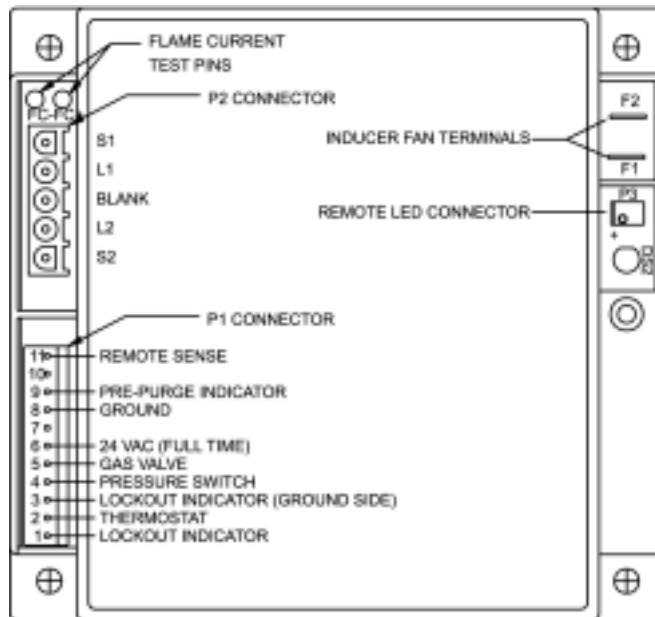
## WIRING

Figure 4A



## PIN LAYOUT

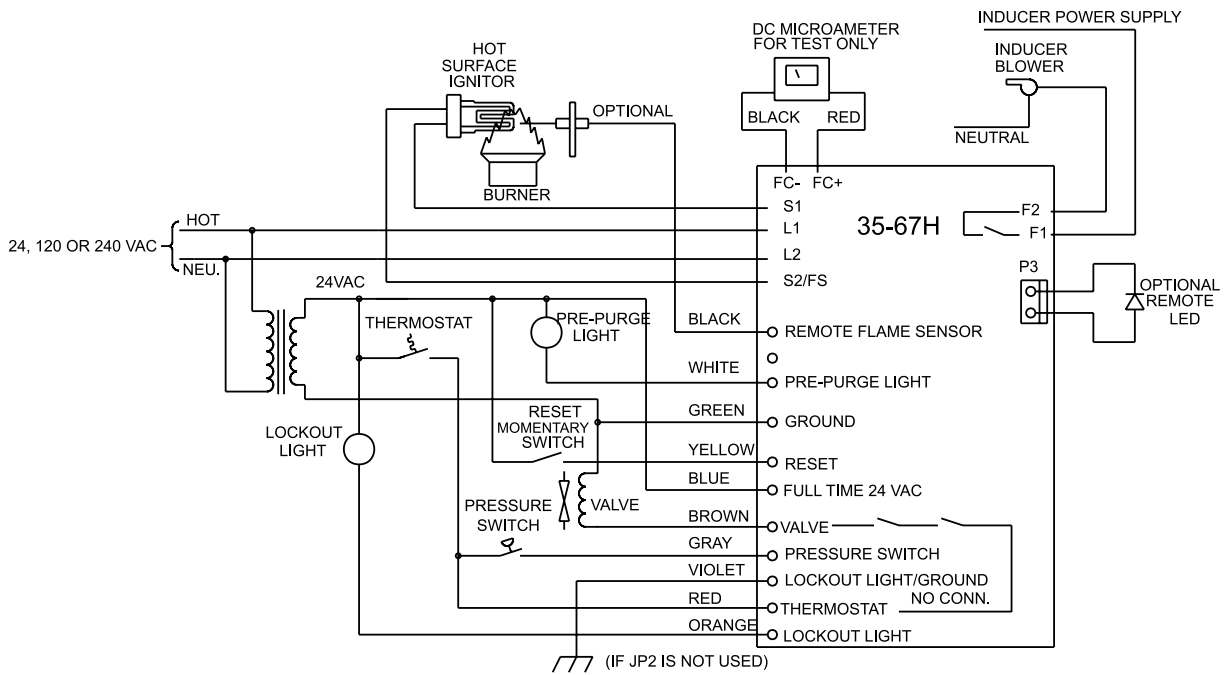
Figure 5A



# OPTIONAL DESIGN - MANUAL RESET

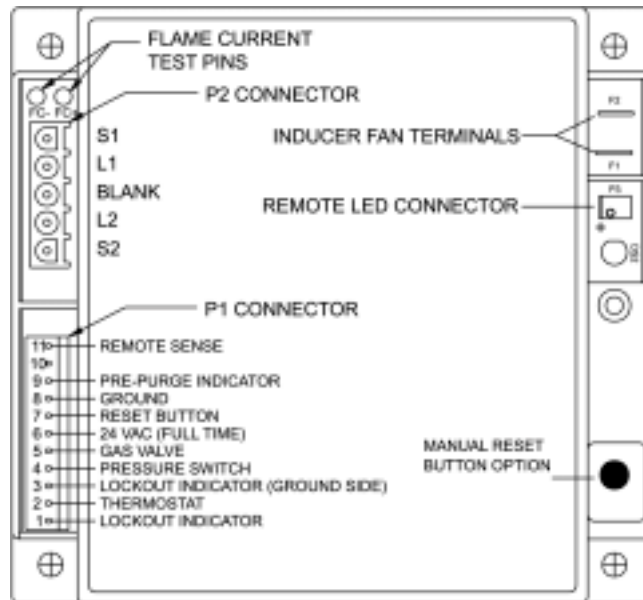
## WIRING

Figure 4B



## PIN LAYOUT

Figure 5B



# DIMENSIONS

Figure 6

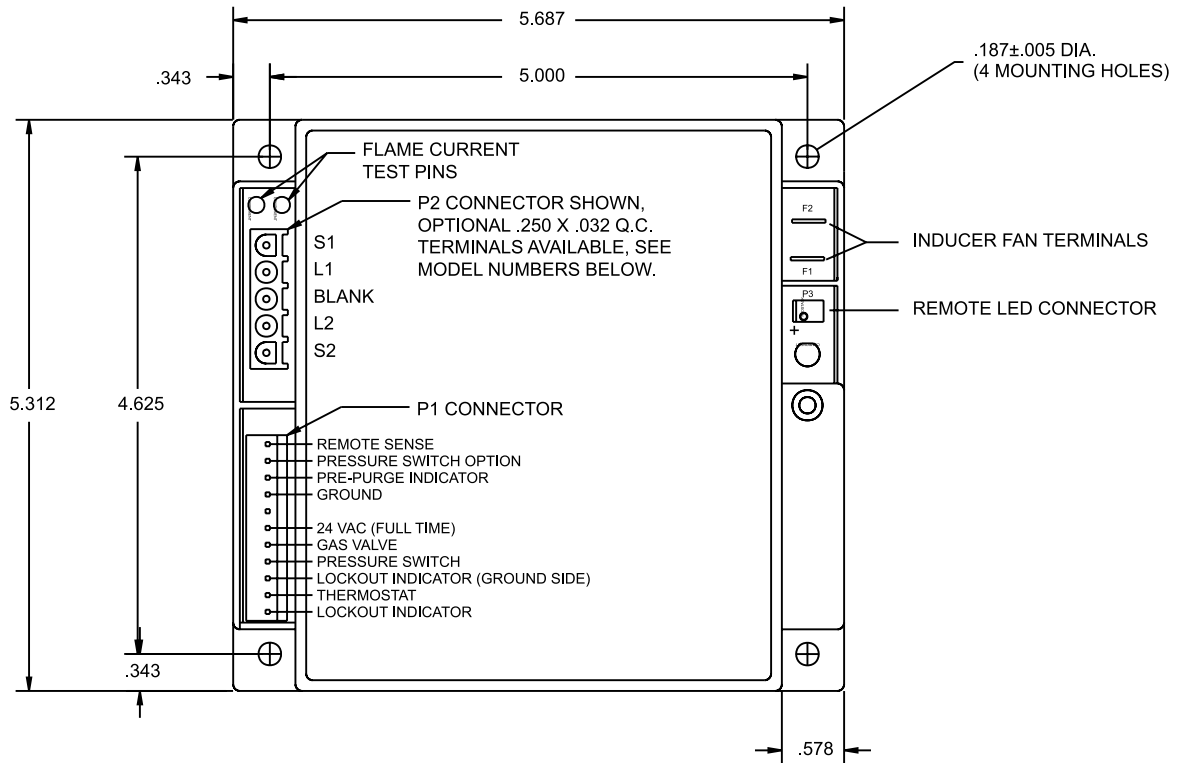
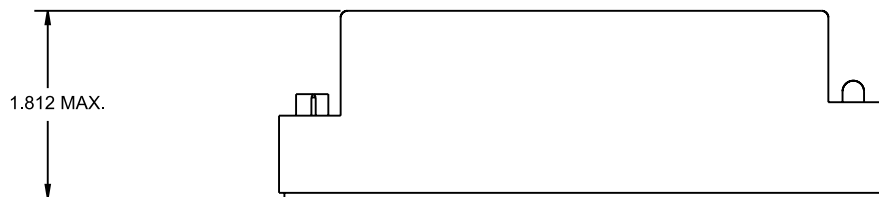


Figure 7



# CONTROL CONFIGURATION

35 - 67 X X X X - X X X

## Description

### Trial for Ignition

- 0 = 2 Seconds
- 1 = 4 Seconds
- 3 = 7 Seconds
- 5 = 10 Seconds
- 7 = 15 Seconds

### Proving Current (Amps)

- 0 = 0.8
- 1 = 0.5
- 3 = 2.1
- 4 = 2.3
- 5 = 2.7
- 6 = 3.1
- 7 = 3.3

### Purge Timing

- 0 = 0 Prepurge, 0 Interpurge, 0 Postpurge
- 1 = 15 Prepurge, 15 Interpurge, 0 Postpurge
- 2 = 30 Prepurge, 30 Interpurge, 0 Postpurge
- 3 = 0 Prepurge, 15 Interpurge, 0 Postpurge (3 Try Units Only)
- 4 = 0 Prepurge, 30 Interpurge, 0 Postpurge (3 Try Units Only)
- 5 = 15 Prepurge, 15 Interpurge, 30 Postpurge (Full Time Power)
- 6 = 30 Prepurge, 30 Interpurge, 30 Postpurge (Full Time Power)
- 7 = 0 Prepurge, 15 Interpurge, 15 Postpurge (Full Time Power)
- 8 = 0 Prepurge, 30 Interpurge, 30 Postpurge (Full Time Power)

### Tries For Ignition

- 0 = Single Try - Local Sense. Recycle On Flame Loss
- 1 = Single Try - Remote Sense. Recycle On Flame Loss
- 2 = Single Try - Local Sense. Lockout On Flame Loss
- 3 = Single Try - Remote Sense. Lockout On Flame Loss
- 5 = Three Tries - Local Sense. Recycle On Flame Loss
- 6 = Three Tries - Remote Sense. Recycle On Flame Loss
- 7 = Three Tries - Local Sense. Lockout On Flame Loss
- 8 = Three Tries - Remote Sense. Lockout On Flame Loss

### Dwell Time

- 0 = 4 Seconds
- 1 = 6 Seconds
- 5 = 20 Seconds
- 7 = 40 Seconds

### Proven Pressure Switch, Full Time Power, Termination

- 0 = No Full Time Power, Q.C. Terminals, No Local Reset Button
- 1 = No Full Time Power, Mate-N-Lock, No Local Reset Button
- 2 = Full Time Power, Q.C. TERMINALS, No Local Reset Button
- 3 = Full Time Power, Mate-N-Lock, No Local Reset Button
- 4 = No Full Time Power, Q.C. Terminals, Local Reset Button
- 5 = No Full Time Power, Mate-N-Lock, Local Reset Button
- 6 = Full Time Power, Q.C. Terminals, Local Reset Button
- 7 = Full Time Power, Mate-N-Lock, Local Reset Button
- 8 = Aftermarket Kits (Consult Factory for Special Number)
- 9 = Special OEM Features (Consult Factory for Special Number)

### Other Features

- 0 = No Indicators With No Inducer
- 1 = No Indicators With Inducer
- 2 = No Indicators With No Inducer
- 3 = Indicators and Inducer
- 9 = Manual Reset (Standard Includes Indicators and Inducers)



400 MAIN STREET, ASHLAND, MA 01721  
TEL: (508) 881-2000 FAX: (508) 881-6729  
www.fenwalcontrols.com

These instructions do not purport to cover all the details or variations in the equipment described, nor do they provide for every possible contingency to be met in connection with installation, operation and maintenance. All specifications are subject to change without notice. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to KIDDE-FENWAL, Inc., Ashland, Massachusetts.