# SERIES 35-72P

## 120 VAC Microprocessor-Based Pilot Ignition Control

**F-35-72P**
**March 2020**

## FEATURES

- Continuous ignition whenever flame is not sensed
- Single spark and sense (local flame sensing)
- Main valve energized whenever flame is sensed
- Open board with standoffs or potted

## APPLICATIONS

- Environmentally safe replacement for pilot re-lighter and mercury flame switch systems
- Control of main gas valve in attended or manual pilot ignition systems
- Proof of flame indicators
- Any 120 VAC pilot re-lighter application
- Commercial cooking equipment

## DESCRIPTION

The 35-72P is a 120VAC pilot ignition control for controlling a main gas valve and igniting and monitoring the pilot flame on burners and gas-heating equipment. The microprocessor-based circuit design provides high energy sparking, dependable flame sensing, and failsafe control of the main gas valve.

It is an ideal "green" solution for replacing pilot re-lighter and mercury flame switch systems in many cooking appliances (see Figure 3 for a typical application wiring diagram). It can also be used for 120VAC pilot re-lighter applications by simply not connecting the main gas valve output.

The 35-72P is also suited for use in specialty applications not requiring direct gas valve control. The V1 output can be used to indicate presence of flame and the 120VAC output level interfaces easily to diagnostic panels or other control systems.

### Export Information (USA)

Jurisdiction: EAR
ECCN: EAR99

### Agency Certifications

Design Certified to ANSI Z21.20, CAN/CSA C22.2 No. 199-M89

**Replaces Mercury Flame Switch + Pilot Re-lighter System**


## SPECIFICATIONS

| | |
|---|---|
| Input Power | 102 to 138 VAC, 50/60 Hz |
| Input Current | 50 mA @120 VAC with gas valve relay energized (control only) |
| Gas Valve | 1.5A max @ 120 VAC |
| Operating Temperature | -40°F to +160°F (-40°C to +71°C) |
| Storage Temperature | -40°F to +185°F (-40°C to +85°C) |
| Flame Sensitivity | 1.0 µA minimum |
| Flame Failure Response | 0.8 seconds maximum |
| Flame Detector Self-check Rate | Once per second minimum |
| Gas Types | Natural, LP, or manufactured |
| Spark Rate | 50/60 sparks/sec (Line frequency) |
| Size (LxWxH) with enclosure | 5.38 x 2.53 x 2.35 inches (13.67 x 6.43 x 5.97 cm) |
| Moisture Resistance | Conformal coated to operate non-condensing to 95% R.H. Module should not be exposed to water |
| Ingress Protection | Not rated, protection provided by appliance in which it is installed |

## PART NUMBERS

| Part Number | Description |
|---|---|
| 35-725917-000 | Potted Module |
| 35-725914-000 | Open Board with Standoffs |

## SEQUENCE OF OPERATION

### Start Up - Normal Operation

Whenever 120VAC is supplied to the L1 terminal the control will perform a self-check routine and commence sparking until flame is detected.

When flame is detected, the spark is shut off and the main gas valve output is energized. The pilot burner flame is constantly monitored to ensure that the system is functioning properly. When the 120VAC is removed from L1, the gas valve is de-energized immediately and the flame is extinguished.

### Failure to Prove Flame

Should the pilot burner fail to light or flame is not detected, the main gas valve remains de-energized and the control continues sparking in attempt to light the pilot.

### Failure of Established Flame

If the established flame signal is lost while the burner is operating, the control responds within 0.8 seconds by de-energizing the main gas valve and begins sparking. The sparking will continue until the pilot flame is re-established, at which point sparks will terminate and the main gas valve is energized so that normal main burner operation resumes.

## MOUNTING AND WIRING

The Series 35-72P control 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 160°F (71°C).

All connections should be made with UL Approved, 105°C rated, 18 gauge, stranded, .054" thick insulated wire. Refer to the appropriate wiring diagram when connecting the 35-72P to other components in the system.

| | |
|---|---|
| **CAUTION** | All wiring must be performed in accordance with both local and national electrical codes. |

| | |
|---|---|
| **CAUTION** | Label all wires prior to disconnection when servicing controls. Wiring errors may cause improper and dangerous operation. A functional checkout of a replacement control should always be performed. |

| | |
|---|---|
| **WARNING** | This product uses voltages of shock hazard potential. Wiring and initial operation must be performed by a qualified service technician. |

| | |
|---|---|
| **WARNING** | Operation outside specifications could result in failure of the Fenwal Controls product and other equipment with potential for injury to people and property. |

| **Terminal Designations** | | | |
|---|---|---|---|
| **Terminal** | **Description** | **Pin Location** | **Wire Color** |
| **Single Spark and Sense** | | **6-Pin Connector** | |
| B. Gnd | Burner Ground | 1 | Purple |
| V1 | Valve Power | 2 | Brown |
| L2 | Line Neutral | 3 | White |
| L1 | 120 VAC Input (Hot) | 4 | Black |
| Not Used | | 5 | |
| V2 | Valve Neutral | 6 | Yellow |

## Wiring Diagrams - 35-72P

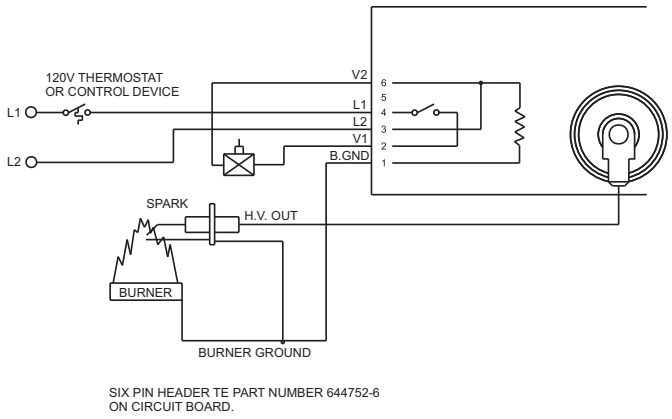


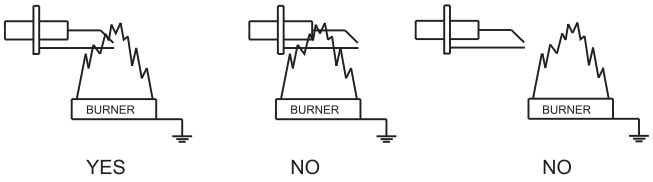

Figure 1. Local Sense

## TROUBLESHOOTING

| Troubleshooting Guide | |
|---|---|
| **Symptom** | **Recommended Actions** |
| 1. Control does not start | A. Miswired<br>B. No 120VAC at L1<br>C. Fuse or circuit breaker fault<br>D. Faulty control |
| 2. No Spark output | A. Shorted electrode - establish 1/8-inch gap<br>B. Check high voltage cable<br>C. Miswired |
| 3. Main gas valve remains off after sparks stop | A. Valve coil open<br>B. Valve wire disconnected<br>C. Faulty control, check voltage at gas valve terminal V1 |
| 4. Pilot flame observed but sparks continue (no flame sense) | A. Check electrode position<br>B. Check high voltage wire<br>C. Poor ground at burner<br>D. Poor flame, check flame current<br>E. Check for proper L1, L2 polarity |

### Proper Electrode Location

Proper location of electrode assembly is important for optimum system performance. The electrode assembly should be located so that the tips are inside the flame envelope and about 1/2-inch (1.2 cm) above the base of the flame as shown:




**Notes:**

- Ceramic insulators must not be in or close to the flame.
- Electrode assemblies must not be adjusted or disassembled. Electrodes are NOT field adjustable.
- Electrodes should have a gap spacing of 0.125± 0.031 in (3.12± 0.81 mm), unless otherwise specified by the appliance manufacturer. If spacing is not correct, the assembly must be replaced.
- Exceeding temperature limits can cause nuisance lockouts and premature electrode failure.
- Electrodes must be located where they are not exposed during normal operation.

### Flame Current Measurement

Flame current is the current that passes through the flame from sensor to ground. The minimum flame current necessary to keep the main valve energized is 1.0 µA. A good burner ground that matches the control ground is critical for reliable flame sensing.

### Flame Current Check: Local Sense

To measure flame current, disconnect input voltage, then insert a 0-50 µA DC meter and capacitor in series with the spark electrode per Figure 2. Reconnect input voltage and initiate call for heat. After sparking is complete and flame is established meter should read 1.0 µA or higher while flame is established. If meter reads below "0" on the scale, meter leads are reversed. Disconnect power and reconnect meter leads for proper polarity.

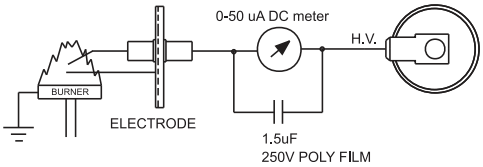



Figure 2. Local Sense

### Mercury Flame Switch Replacement

The 35-72P is an ideal replacement for environmentally hazardous Mercury Flame Switch applications. The 35-72P replaces both the pilot re-lighter and flame switch with a single control. In cooking applications the V1 output is energized with 120VAC whenever pilot flame is present allowing the temperature controller to safely cycle the main gas valve as needed.

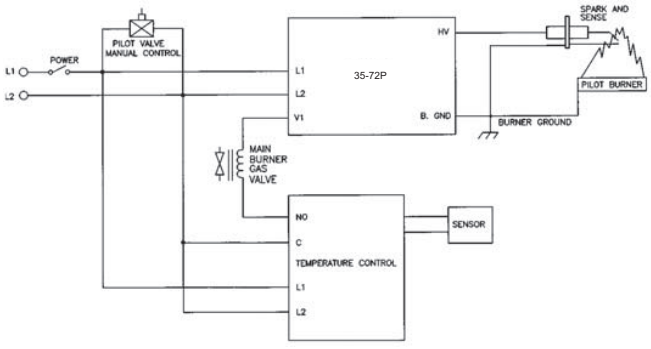



Figure 3. Mercury Flame Switch Replacement

## DIMENSIONS

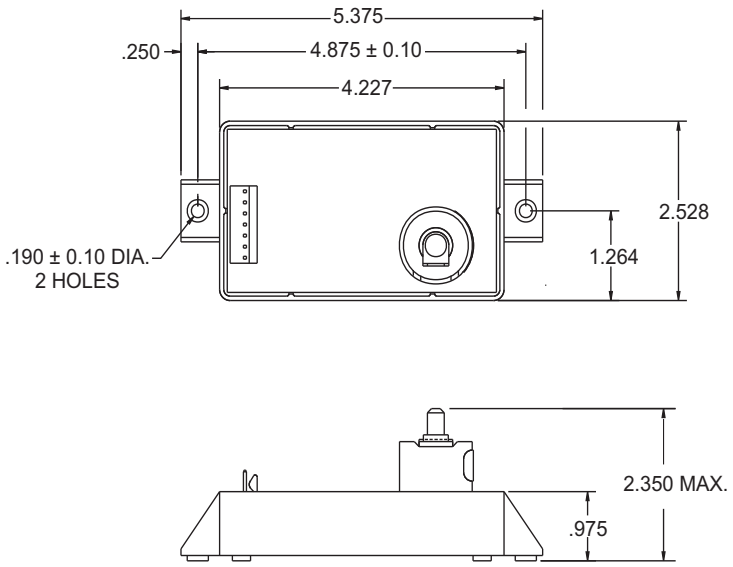



Figure 4. Potted (P/N: 35-725917-000)

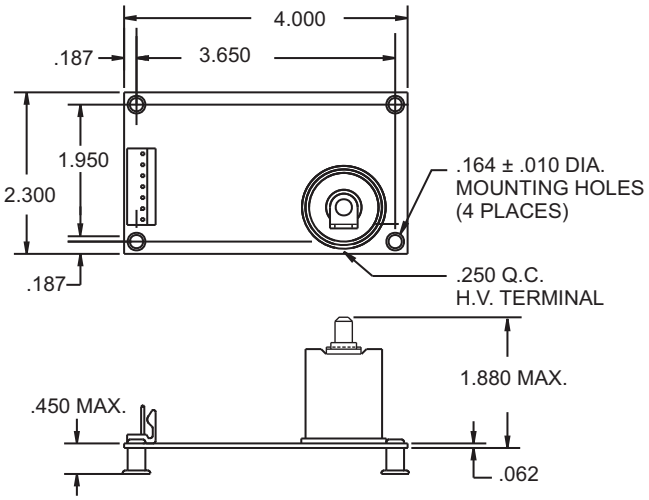



Figure 5. Integral Standoff (P/N: 35-725914-000)



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