SERIES 35-60 & 35-61
24 VAC Microprocessor Based Direct Spark Ignition Control with or without Combustion Blower Relay

FEATURES

- 24 VAC microprocessor based DSI control
- Pressure switch monitoring
- System diagnostic LED
- Alarm output (normally closed contact)
- Automatic reset 1 hour after lockout*
- Custom prepurge and interpurge timings**
- Multiple tries for ignition
- Remote or local flame sensing
- Flame sense test pins

APPLICATIONS

- Gas Furnaces
- Boilers
- Water Heaters
- Commercial Cooking
- Other Similar Appliances

DESCRIPTION

The Series 35-60 and 35-61 are 24 VAC Microprocessor Based Direct Spark Ignition Controls designed for use in all types of heating applications. The control utilizes a microprocessor to continually and safely monitor, analyze and control the proper operation of the gas burner. Value added features such as combustion blower control, LED diagnostics, automatic one hour reset, and flame current test pins highlight the controls benefits.

Agency Certifications

UL Component Recognized System.
Design certified to UL 372, file MH8817.
Software conforms to UL 1998 requirements.

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

CE Approved to EN 298:2003
Certified to Standards AG206 and AG210

SPECIFICATIONS

<table>
<thead>
<tr>
<th>Input Power</th>
<th>Voltage</th>
<th>Control: 18 to 30 VAC 50/60 Hz (Class 2 Transformer) Line: 120 or 240 VAC (L1 &amp; IND contacts only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td></td>
<td>300 mA max @ 24 VAC with blower and gas valve relay energized (Control only)</td>
</tr>
<tr>
<td>Output (Contact Ratings)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gas Valve</td>
<td></td>
<td>2.0A max @ 24 VAC</td>
</tr>
<tr>
<td>Combustion Blower (Model 35-61 only)</td>
<td></td>
<td>3.0 FLA @ 120 VAC (6.0 LRA) 1.5 FLA @ 240 VAC (3.0 LRA) 1/4 H.P. Motor</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td></td>
<td>-40°F to +176°F (-40°C to +80°C)</td>
</tr>
<tr>
<td>Flame Sensitivity</td>
<td></td>
<td>0.7 μA minimum</td>
</tr>
<tr>
<td>Flame Failure Response Time</td>
<td></td>
<td>0.8 seconds maximum</td>
</tr>
<tr>
<td>Types of Gas</td>
<td></td>
<td>Natural, LP, or manufactured</td>
</tr>
<tr>
<td>Spark Rate</td>
<td></td>
<td>Line frequency (50/60 sparks/sec.)</td>
</tr>
<tr>
<td>Size (LxWXH)</td>
<td></td>
<td>5.684” x 3.934” x 1.875” (with cover) 5.281” x 3.718” x 2.080” (edge connect)</td>
</tr>
<tr>
<td>Enclosure</td>
<td></td>
<td>Gray (Noryl N-190) fire retardant plastic</td>
</tr>
<tr>
<td>Moisture Resistance</td>
<td></td>
<td>Conformal coated to operate non-condensing to 95% R.H. Care must be taken to protect module from direct exposure to water</td>
</tr>
<tr>
<td>Weight</td>
<td></td>
<td>8 oz including cover</td>
</tr>
<tr>
<td>Tries for ignition</td>
<td></td>
<td>One or three try versions available</td>
</tr>
<tr>
<td>Trial for ignition Periods</td>
<td></td>
<td>4.0, 7.0, 10.0, or 15.0 seconds standard Contact factory for other settings</td>
</tr>
<tr>
<td>Prepurge &amp; Interpurge</td>
<td></td>
<td>None, 15, or 30 seconds depending on model. Without prepurge there is a one second delay before the first try for ignition</td>
</tr>
<tr>
<td>Edge Connect Version</td>
<td></td>
<td>Optional Edge connect model for replacement product</td>
</tr>
</tbody>
</table>

* Automatic reset after 1 hour is not allowed for CE approved models
** Prepurge time cannot exceed interpurge time on CE models
Power Up / Stand By

35-61 Models only:
Upon applying power (24 volts) to 24VAC(R), the control will reset, perform a self check routine, flash the diagnostic LED, and enter the thermostat scan state.

Call for Heat

35-60 Models:
When a call for heat is received from the thermostat supplying 24 volts to TH/W, the control will reset, perform a self check routine, flash the diagnostic LED, and a pre-purge delay begins. Following the pre-purge period the gas valve is energized and sparks commence for the trial for ignition period.

35-61 Models:
When a call for heat is received from the thermostat supplying 24 volts to TH/W, the control will check the pressure switch for normally open contacts. The combustion blower is then energized and once the pressure switch contacts close, a pre-purge delay begins. Following the pre-purge period the gas valve is energized and sparks commence for the trial for ignition period.

Ignition - 35-60:
When flame is detected during the trial for ignition, sparks are shut off immediately and the gas valve remains energized. The thermostat and main burner flame are constantly monitored to assure the system continues to operate properly. When the thermostat is satisfied and the demand for heat ends, the main valve is de-energized immediately.

Ignition - 35-61:
When flame is detected during the trial for ignition, sparks are shut off immediately and the gas valve and combustion blower remain energized. The thermostat, pressure switch, and main burner flame are constantly monitored to assure the system continues to operate properly. When the thermostat is satisfied and the demand for heat ends, the main valve is de-energized immediately, the control senses the loss of flame signal and initiates a post-purge period (optional) before de-energizing the combustion blower.

Failure to Light

SINGLE TRIAL MODEL
Should the main burner fail to light, or flame is not detected during the trial for ignition period, the control will go into lockout. The valve will be turned off immediately. For the 35-61 series, the combustion blower will be turned off following the optional post purge period.

MULTI TRIAL MODEL
Multi-try Models will attempt two additional ignition trials before going into lockout. The valve relay will be de-energized immediately, and for the 35-61 Series the combustion blower will be turned off following the optional post purge period.

Lockout and Reset
Recovery from lockout requires a manual reset by either resetting the thermostat or removing 24 volts from 24 VAC(R) for a period of 5 seconds.

If the thermostat is still calling for heat after one hour the control will automatically reset and attempt to ignite the burner again.

Flame Failure - Re-Ignition
If the established flame signal is lost the control will respond within 0.8 seconds. The HV spark will be energized for a trial ignition period in an attempt to relight the burner. If the burner does not light the control will de-energize the gas valve. Multi-try models will make two more attempts to relight the burner. If the burner does not relight the control will go into lockout as noted above in “Failure to Light”. If flame is re-established, normal operation resumes. Recycle mode, which closes the valve and executes a pre-purge delay is available as an option.

Combustion Airflow Problems - Lockout

35-61 Models only:
Combustion air flow is continually monitored during an ignition sequence by the pressure switch (PSW). If during the initial call for heat the switch contacts are in the closed position for 30 seconds without the Combustion Blower being energized, an air flow fault will be declared and the control will remain in this mode with the combustion blower off.

If the pressure switch remains open for more than 30 seconds after the combustion blower output (L1 & IND) is energized, an air flow fault will be declared and the control will stay in this mode with the combustion blower on, waiting for the pressure switch to close. When proper air flow is detected from the pressure switch input (PSW) the control begins the prepurge period with a normal ignition sequence following.

If the air flow signal is lost while the burner is firing, the control will immediately de-energize the gas valve and the combustion blower will remain on. If the call for heat remains, the control will wait for proper air flow to return. If proper air flow is not detected after 30 seconds an air flow fault signal will be declared. If proper air flow is detected at any time, a normal sequence will begin with the prepurge period.

Flame Fault
If at any time the main valve fails to close completely and maintains a flame, the flame sense circuit will detect it and energize the combustion blower. Should the main valve later close completely removing the flame signal, the combustion blower will be turned off following the optional post purge period.
**PROPER ELECTRODE LOCATION**

Proper location of the electrode assembly is important for optimum system performance. It is recommended that electrode assembly be mounted temporarily using clamps or other suitable means so that the system can be checked before permanently mounting the assembly. The electrode assembly should be located so that the tips are inside the flame envelope and about 1/2 inch (1 cm) above the base of the flame. See Figure 3 below.

**CAUTIONS:**
1. Ceramic insulators should not be in or close to the flame.
2. Electrode assemblies should not be adjusted or disassembled. Electrodes should have a gap spacing of 0.125± 0.031 in (3.12± 0.81 mm). If this spacing is not correct, the assembly must be replaced. Electrodes are NOT field adjustable.
3. Exceeding the temperature limits can cause nuisance lockouts and premature electrode failure.

**WARNING:**
Operation outside specifications could result in failure of the Fenwal product and other equipment with injury to people and property.
**FLAME SENSOR CURRENT CHECK**

**SERVICES CHECKS**

Flame current is the current which passes through the flame from the sensor to ground. The minimum flame current necessary to keep the system from lockout is .7 microamps. To measure flame current, connect a DC microammeter to the FC-FC+ terminals per figure. Meter should read .7 uA or higher. If the meter reads below “0” on scale, meter leads are reversed. Disconnect power and reconnect meter leads for proper polarity.
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 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.