SERIES 35-75

120 VAC Microprocessor-Based Hot Surface Ignition Control

FENWAL®

F-35-75
July 2016

FEATURES

- Safe start with DETECT-A-FLAME® flame sensing technology
- Custom pre-purge and inter-purge timings
- Single or three trials for ignition
- Local or remote flame sensing
- Thermostat/Power off or Automatic reset
- Flame current test points
- Open board with standoffs or potted

APPLICATIONS

- Commercial cooking
- Infrared burners
- Construction and agriculture heaters
- Other gas-fired appliances

DESCRIPTION

The 35-75 is a 120 VAC hot surface ignition (HSI) control designed for use in all types of gas-fired appliances. The control uses a microprocessor circuit to provide precise, repeatable timing and operating sequences. The 35-75 control supports a variety of 120 VAC igniters up to 5 amps.

Export Information (USA)

Jurisdiction: EAR
ECCN: EAR99

Agency Certifications

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

SPECIFICATIONS

Input Power	102 to 138 VAC, 50/60 Hz
Input Current	100 mA @120 VAC with gas valve relay energized (control only)
Gas Valve	1.5A max @ 120 VAC
Hot Surface Igniter	5.0A max @ 120 VAC
Operating Temperature	-40°F to +175°F (-40°C to +80°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
Size (LxWxH) with enclosure	5.38 x 2.53 x 1.50 inches (13.67 x 6.43 x 3.81 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
Tries for Ignition	One or three try versions available
Trial for Ignition Periods	4, 7, 10, 15 seconds available
Pre-purge and Inter-purge Timings	0, 5, 15 or 30 seconds available

SEQUENCE OF OPERATION / FLAME RECOVERY / SAFETY LOCKOUT

Power-Up/Standby

Upon applying power 120 VAC to the L1 terminal, the control will reset, perform a self-check routine, and enter the thermostat scan state.

Call for Heat

When a call for heat is received from the thermostat supplying 120 VAC to the TH terminal, the control will check the flame sense input to verify no flame is present and an optional prepurge period begins. After the pre-purge, the Igniter is energized for the heat-up period, and then the gas valve is energized for the Trial for Ignition (TFI) period.

When the flame is detected during the TFI, the igniter is deactivated and the gas valve remains on. The thermostat and burner flame are constantly monitored to ensure proper system operation. When the thermostat is satisfied and the demand for heat ends, the gas valve is immediately de-energized.

Failure to Light - Lockout

SINGLE TRIAL MODEL

Should the burner fail to light, or a flame is not detected during the TFI period, the gas valve will be de-energized and the control will go into lockout.

MULTI-TRIAL MODEL

Should the burner fail to light or the flame is not detected during the first TFI period, the gas valve will de-energize. The control will then go through an inter-purge delay before attempting another TFI period. The control attempts two additional ignition trials before de-energizing the gas valve and entering lockout.

FLAME FAILURE-RECYCLE MODE

Upon loss of flame, the gas valve is de-energized and the control proceeds to inter-purge before attempting to relight the flame. Multi-try models permit three tries for ignition including interpurges. If the burner relights, normal operation resumes. If the burner does not relight, the control will enter lockout.

Lockout Recovery

Recovery from lockout requires a manual reset by either resetting the thermostat, or removing 120 VAC for a period of 5 seconds. On models with automatic reset, if the thermostat is still calling for heat after one hour, then the control will automatically reset and attempt to ignite the burner.

MOUNTING AND WIRING

The Series 35-75 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 80°C (175°F).

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 35-75 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 product and other equipment with potential for injury to people and property.

Terminal Designations

Terminal	Pin Location	Description	Wire Color
S1	1	Remote Sense	Orange
HS1	2	Igniter Power	Gray
L1	3	120VAC Input	Red
TH	4	Thermostat	Black
L2	5	Neutral	White
V1	6	Valve Power	Brown
V2	7	Valve Neutral	Yellow
HS2	8	Igniter Return (or NC Contact)	Blue
B.GND	9	Burner Ground	Green
FC+, FC-	P2	Flame Current Test Pins	-

Wiring Diagrams - 35-75

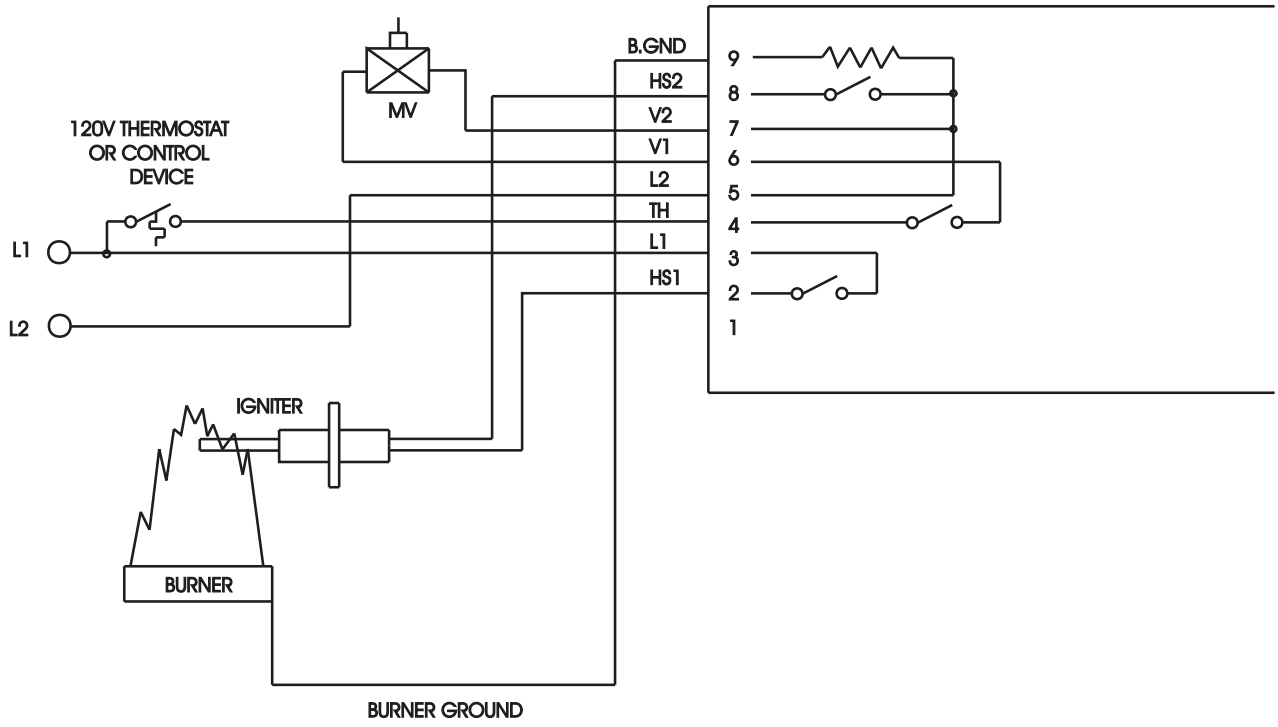


Figure 1. Local Sense

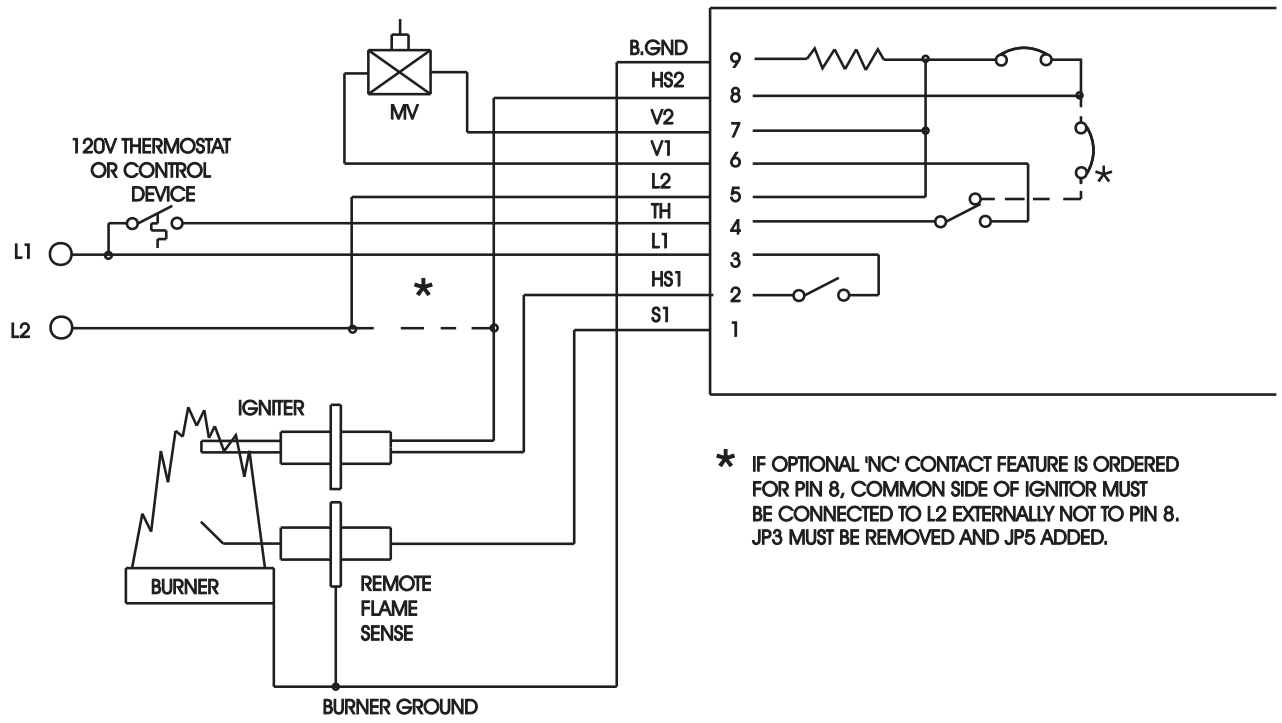


Figure 2. Remote Sense

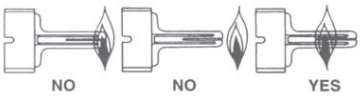
TROUBLESHOOTING

Troubleshooting Guide	
Symptom	**Recommended Actions**
1. Control does not start	A. Miswired B. No 120VAC at L1 C. Fuse or circuit breaker fault D. Faulty control
2. Valve on - no igniter	A. Defective igniter B. Miswired C. Faulty control, check voltage at igniter
3. Igniter on - valve off	A. Valve coil open B. Valve wire disconnected C. Faulty control, check voltage at gas valve terminal V1
4. Flame okay during TFI - no flame sense after TFI	A. Faulty igniter B. Check remote sensor wire on S1 C. Poor ground at burner D. Poor flame, check flame current E. Check for proper L1, L2 polarity

Hot Surface Igniter

Proper location of the hot surface igniter is important to achieve optimum system performance for both ignition and flame sensing. See figure below.

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



Flame Current Measurement

Flame current is the current that passes through the flame from sensor to ground. To measure flame current, connect a True RMS or analog DC micro-ammeter to the FC+ and FC- terminals on connector P2. Readings should be 1.0 µA DC or higher. If the meter reads negative or below "0" on scale, meter leads are reversed. Reconnect leads with proper polarity.

Alternately, a Digital Voltmeter may be used to measure DC voltage between FC+ and FC- terminals. Each micro-amp of flame current produces 1.0 VDC. For example, 2.6 VDC equates to 2.6 µA.

A good burner ground that matches the control ground is critical for reliable flame sensing.

DIMENSIONS

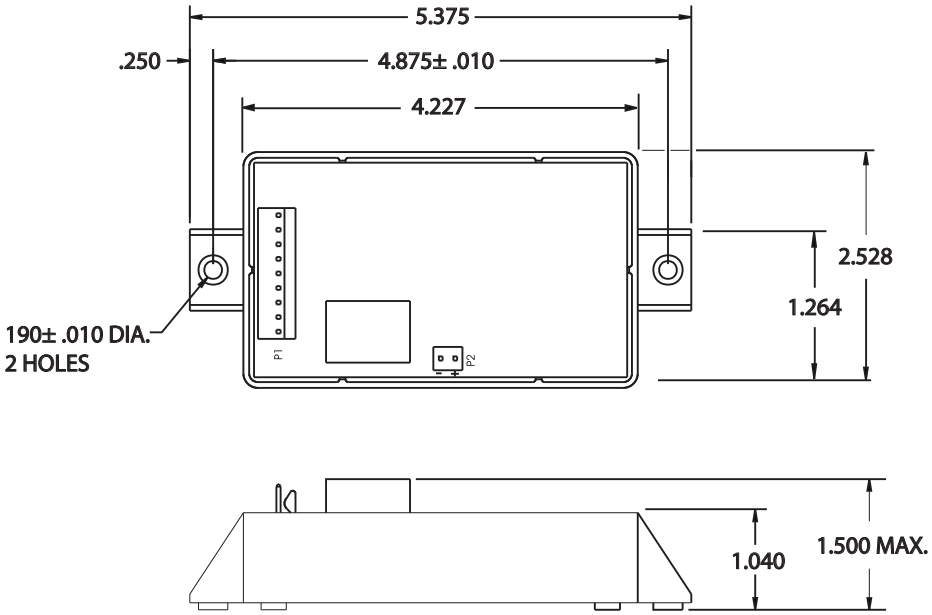


Figure 3. Potted (P/N: 35-7552XX-XXX)

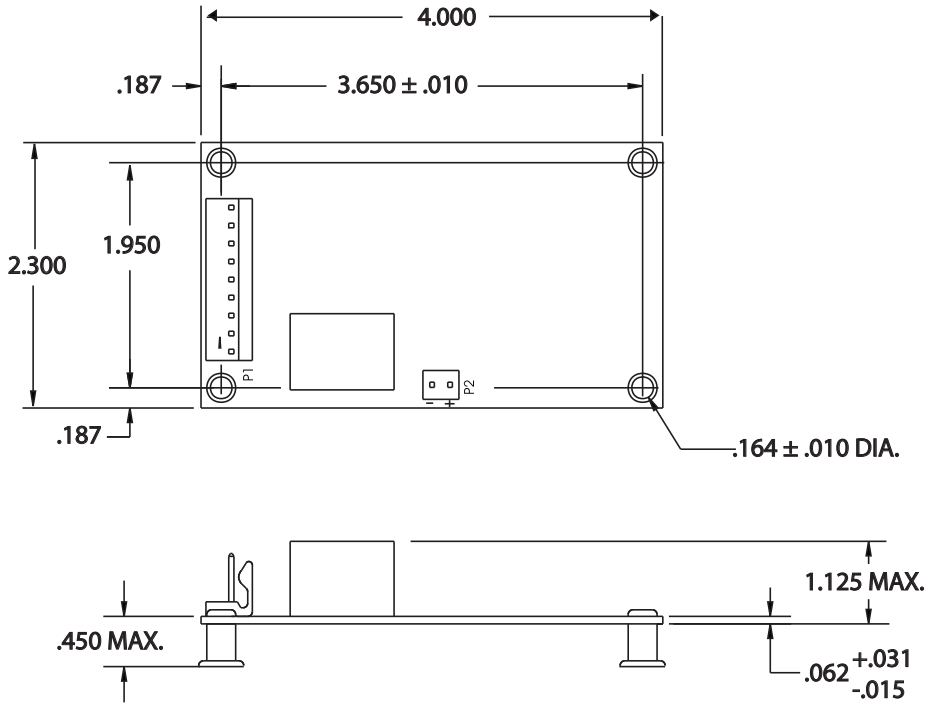


Figure 4. Integral Standoff (P/N: 35-7554XX-XXX)

Note: All dimensions are in inches

PART NUMBER CONFIGURATION

SERIES 35-755 X X X - X X X

Configuration and Wiring Options
2 = Potted Multi-Pin Connector
4 = Integral Standoffs Multi-Pin Connector
8 = Aftermarket Kit
9 = Special Configuration

An 8 or 9 in this location
(i.e. 35-75 5 901 -113)
indicates a special configuration.
9XX is a sequentially assigned
part number and does not follow
the standard part numbering configuration.

Consult Fenwal for operating characteristics
of this control.

Trial for Ignition
1 = 4 Seconds
3 = 7 Seconds
5 = 10 Seconds
7 = 15 Seconds

Inter-Purge
0 = None (Single Try Only)
1 = 15 Seconds
2 = 30 Seconds

Pre-Purge
0 = None
1 = 15 Seconds
2 = 30 Seconds
5 = 5 Seconds

Tries for Ignition, Flame Sense Method and Reset Method

0 = 1 try, local sense	Thermostat / power off reset
1 = 1 try, remote sense	Thermostat / power off reset
2 = 1 try, local sense	Automatic reset
3 = 1 try, remote sense	Automatic reset
5 = 3 try, local sense	Thermostat / power off reset
6 = 3 try, remote sense	Thermostat / power off reset
7 = 3 try, local sense	Automatic reset
8 = 3 try, remote sense	Automatic reset

Heat-Up Time and Igniter Options
1 = 6 Seconds, Coorstek 601
2 = 30 Seconds, Coorstek 101
3 = 15 Seconds, Coorstek 607
5 = 20 Seconds, Coorstek 271
6 = 40 Seconds, Coorstek 201, 501

Fenwal Controls, Kidde-Fenwal Inc.
400 Main Street
Ashland, MA 01721
Tel: 800-FENWAL-1
Fax: 508-881-7619
www.fenwal.com