SERIES 35-61 - 60730-2-5 Compliant

24 VAC Microprocessor-Based Direct Spark Ignition Control with Inducer Blower Relay

F-35-61H
February 2024

FEATURES

- Safe start with DETECT-A-FLAME® flame sensing technology
- Custom pre-purge and inter-purge timings*
- Inducer blower control and airflow switch monitoring
- Single or three trials for ignition
- System diagnostic LED
- Flame current test points
- Local or remote flame sensing
- Automatic reset**
- True Alarm output or NC (Normally Closed Contact) available
- Meets 60730-2-5 Harmonized Standard

APPLICATIONS

- Gas furnaces
- Boilers
- Commercial cooking
- Water heaters
- Other gas-fired appliances

DESCRIPTION

The 35-61 is a 24 VAC direct spark ignition (DSI) control designed for use in all types of gas-fired appliances. The control uses a microprocessor to continually and safely monitor, analyze and control the proper operation of a gas burner and inducer blower. A diagnostic LED and optional UART communications make troubleshooting easy and ensures safe and efficient operation.

The optional UART communications offers advanced diagnostic data and connectivity with the Fenwal ConnectedControl series 05-50 Wi-Fi device.

Export Information (USA)

Jurisdiction: EAR
ECCN: EAR99

Agency Certifications

C22.2 No.0:20
ANSI Z21.20-2014
CAN/CSA C22.2 No. 60730-1:13

RoHS Compliant

SPECIFICATIONS

Input Power	Control: 18-30 VAC 50/60Hz (Class 2 transformer)
Line Voltage	120 or 240 VAC 50/60 Hz (L1 & IND contacts only)
Input Current	300 mA @24 VAC with gas valve and inducer blower relays energized (control only)
Gas Valve	2.0A max @ 24 VAC
Inducer Blower	3.0 FLA @ 120 VAC (6.0 LRA) 1.5 FLA @ 240 VAC (3.0 LRA) 1/4 H.P. Motor
Operating Temperature	-40°F to +176°F (-40°C to +80°C)
Storage Temperature	-40°F to +185°F (-40°C to +85°C)
Flame Sensitivity	0.7 µA minimum
Flame Failure Response	0.8 seconds maximum
Gas Types	Natural, LP, or manufactured
Spark Rate:	50/60 sparks/sec
Size (LxWxH) with enclosure	5.69 x 3.94 x 1.87 inches (14.45 x 10.01 x 4.75 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, 15 or 30 seconds available
Post-purge Time	0, 30 or 60 seconds available
Ignition Method	Sparking pulses 600 mS On, 400 mS Off
Communications	Optional UART communication

SEQUENCE OF OPERATION / FLAME RECOVERY / SAFETY LOCKOUT

Power Up / Stand By

Upon applying power to 24VAC(R), the control will reset, perform a self-check routine, flash the diagnostic LED and enter the idle state.

Start Up - Heat Mode

When a call for heat is received from the thermostat supplying 24 VAC to TH/W, the control will check the pressure switch for normally open contacts. The inducer blower is then energized. Once the pressure switch contacts close, a pre-purge delay begins. Following the pre-purge period, the gas valve is energized and sparking commences for the Trial for Ignition (TFI) period.

When flame is detected during the TFI, the sparking process is terminated and the gas valve and inducer blower remain energized. The thermostat, pressure switch and burner flame are constantly monitored to assure proper system operation. When the thermostat is satisfied and the demand for heat terminates, the gas valve is immediately de-energized. The control initiates an optional post-purge period before de-energizing the inducer blower.

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 de-energize and the control will go into lockout. The inducer blower will turn off following the optional post-purge period. The LED will indicate the fault code for ignition lockout.

MULTI TRIAL MODEL

Should the burner fail to light or the flame is not detected during the TFI period, the gas valve will de-energize. The control will then go through an inter-purge delay before an additional ignition attempt. The control attempts two additional ignition trials before de-energizing the gas valve and entering lockout. The inducer blower will turn off following the optional post-purge period. The LED will indicate the fault code for ignition lockout.

FLAME FAILURE - RE-IGNITION MODE

If the established flame signal is lost while the burner is operating, the control will respond within 0.8 seconds by immediately energizing the H.V. spark for the TFI period in an attempt to relight the flame. If the burner does not light within the TFI, the gas valve will immediately de-energize and single try models will enter lockout. On multi-try models, a new TFI sequence will begin after an inter-purge delay. Multi-try models perform two additional attempts to light the burner. If the burner relights, normal operation resumes. If the burner does not relight, the control will enter lockout and the inducer blower will turn off following the optional post-purge period.

FLAME FAILURE-RECYCLE MODE

With the "Recycle After Loss of Flame" option, 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 inter-purges. If the burner relights, normal operation resumes. If the burner does not relight, the control will enter lockout and the inducer blower will turn off following the optional post-purge period.

Lockout Recovery

Recovery from lockout requires a reset by either cycling the thermostat, or removing 24 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.

Combustion Airflow Fault

Combustion airflow is continually monitored during an ignition and burn sequence by the pressure switch (PSW). If during the initial call for heat, the switch contacts are in the closed position (stuck closed) the blower will not start and after 30 seconds the diagnostic LED will flash a 1 flash pattern. The control remains in this state until either the PSW switch opens or the call for heat is removed. If the PSW opens operation continues from pre-purge.

If the PSW remains open after the blower has been energized for 30 seconds, the diagnostic LED starts flashing 1 flash for air flow fault. This state persists for the defined Air-fault Lockout delay if the PSW does not close. When the Air-Fault Lockout delay expires, the blower shuts off and the control enters Lockout (3 flash). The control remains in the lockout state until either the thermostat or power is removed; and if enabled, an auto-restart restarts the startup sequence.

When the PSW closes after blower activation, any interruption to the PSW results in an indication of air-flow fault and the Air-fault lockout timer starts. Recovery of the PSW prior to the Lockout Timer expiring will restart the ignition sequence with an interpurge time delay.

MOUNTING AND WIRING

The Series 35-61 control is not position sensitive and can be mounted vertically or horizontally. The case may be mounted on any surface with #6 sheet metal screws. The control also supports direct mounting to a standard NEC 4-in. junction box.

CAUTION	**Label all wires prior to disconnection when servicing or replacing controls. Wiring errors can cause improper and dangerous operation. A functional checkout of a replacement control should always be performed.**
CAUTION	**The control must be mounted and located in a manner which protects components from exposure to water (dripping, condensate, spraying, rain). Any control that has been exposed to water must be replaced.**
WARNING	**All wiring must be done in accordance with both local and national electrical code, and by a trained technician. Wiring must be at least #18 AWG /AWM rated for 105°C or higher.**
WARNING	**The control uses voltages of shock hazard potential. Wiring and initial operation must be done by qualified service technician.**
WARNING	**Operation outside specifications could result in failure of the Fenwal product and other equipment with injury to people and property.**
WARNING	**Do not disconnect any electrical loads while the automatic gas ignition control is powered. Disconnect power prior to installation, service, or replacement of the control.**
WARNING	**RISK OF EXPLOSION OR FIRE** **The control cannot be serviced by the user. If any control faults are detected, the control must be replaced by a qualified service personnel. Risk of explosion or fire can result if the control module has been opened or with any attempts to repair, voiding the warranty. Do not use aluminum wiring as this can also lead to risk of fire.**

Terminal Designations		
Terminal	**Description**	**Quick Connect (inch)**
TH/W	Thermostat Input	1/4”
PSW	Pressure Switch Input	1/4”
V1	Valve Power (output)	3/16”
NC	Alarm (normally closed contact)	1/4”
IND	Inducer Blower (output)	1/4”
L1	120/240 VAC Input (hot)	1/4”
24VAC/R	24 VAC Supply Power	1/4”
V2	Valve Ground	3/16”
GND	System Ground	3/16”
S1	Remote Flame Sensor	3/16”
H.V.	High Voltage Output	Varies by model
P3	Serial Coms TX, RX, Gnd	0.025 pins 0.1 centers
P2	Remote Diagnostic LED K, A	0.025 pins 0.1 centers

Wiring Diagrams - 35-61

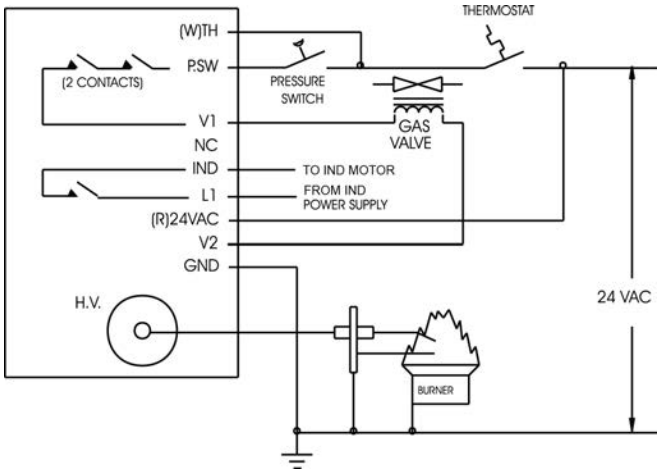


Figure 1. Local Sense

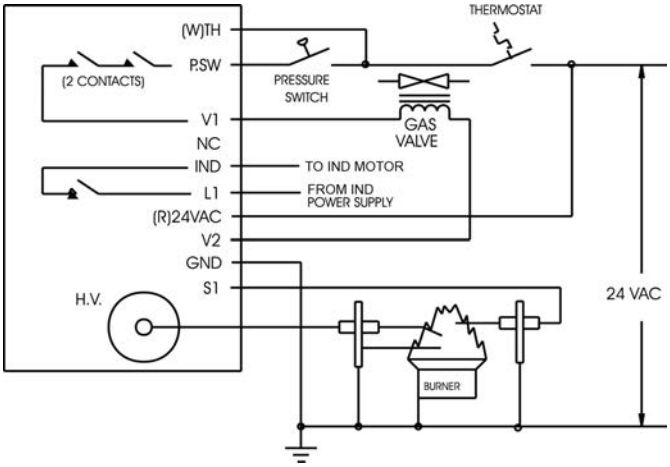


Figure 2. Remote Sense

High Voltage and Remote Sense Cable Requirements

The HV Ignition Cable must meet a voltage rating of 25 KV and an insulation rating of 200 °C. Recommend length of 3ft (.9m) or less. Consult factory for longer lengths.

Remote flame sense cable must meet a voltage rating of 250V and an insulation rating of 200 °C. Recommended length of 10ft (3m) or less. Consult Factory for longer lengths.

Communications

A communications option is available. Asynchronous serial with 5v single level swing. Consult factory for details.

TROUBLESHOOTING

Troubleshooting Guide	
Symptom	**Recommended Actions**
1. Control does not start	A. Miswired B. 24 VAC transformer fault C. Fuse circuit breaker fault D. Faulty control, check LED for fault codes
2. Thermostat on - no spark	A. Miswired B. Faulty thermostat, no voltage at thermostat terminal TH/W C. Faulty control, check LED for fault codes
3. Blower on - no TFI after purge delay	A. Miswired B. Flame fault C. Airflow fault (check voltage at PSW) D. Faulty control (check voltage between L1 & IND)
4. Valve on - no spark during TFI	A. Shorted electrode - establish 1/8-inch gap B. Check high voltage cable C. Miswired
5. Spark on - valve off	A. Valve coil open B. Valve wire disconnected C. Faulty control, check voltage at gas valve terminal V1
6. Flame okay during TFI - no flame sense after TFI	A. Check electrode position B. Check high voltage wire C. Poor ground at burner D. Poor flame, check flame current

Diagnostic LED Fault Conditions	
LED Indication	**Fault Mode**
Steady On	Internal Control Failure
1 Flash	Airflow Fault
2 Flashes	Flame without call for heat
3 Flashes	Ignition Lockout
5 Flashes	Weak Flame

Note: During a fault condition, the LED will toggle on for 100ms and off for 300ms as needed to indicate fault code. The code will repeat every 3.2 seconds. Removing power from the control clears the fault code.

Green LED Operation	
Steady On	Idle/Power On
Slow Flash	Active Call
Fast Flash	Burning

Note: The Green and Red LEDs cannot be on simultaneously. The RED LED overrides if active.

Internal Control Failure

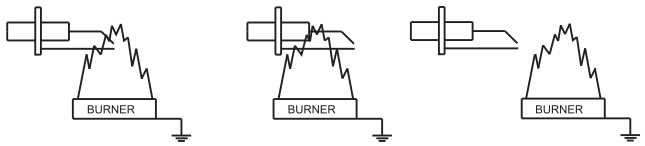
If the control detects a software or hardware error, all outputs are turned off and the LED displays a Steady On condition. If this condition persists after an attempt to restart, then the control must be replaced.

Flame Fault

If at any time the gas valve fails to completely close and maintains a flame, the flame sense circuit will detect it and energize the inducer blower. Should the valve later close completely removing the flame signal, the inducer blower will be turned off following the optional post purge period.

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:



YES NO NO

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. To measure flame current, connect a True RMS or analog DC micro-ammeter to the FC+ and FC- terminals. Readings should be 1.0 µA DC or higher. If the meter reads negative or below "0" on scale, meter leads are reversed. Re-connect 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.

Disposal

End of life proper disposal of control required.

DIMENSIONS

Quick Connect Models

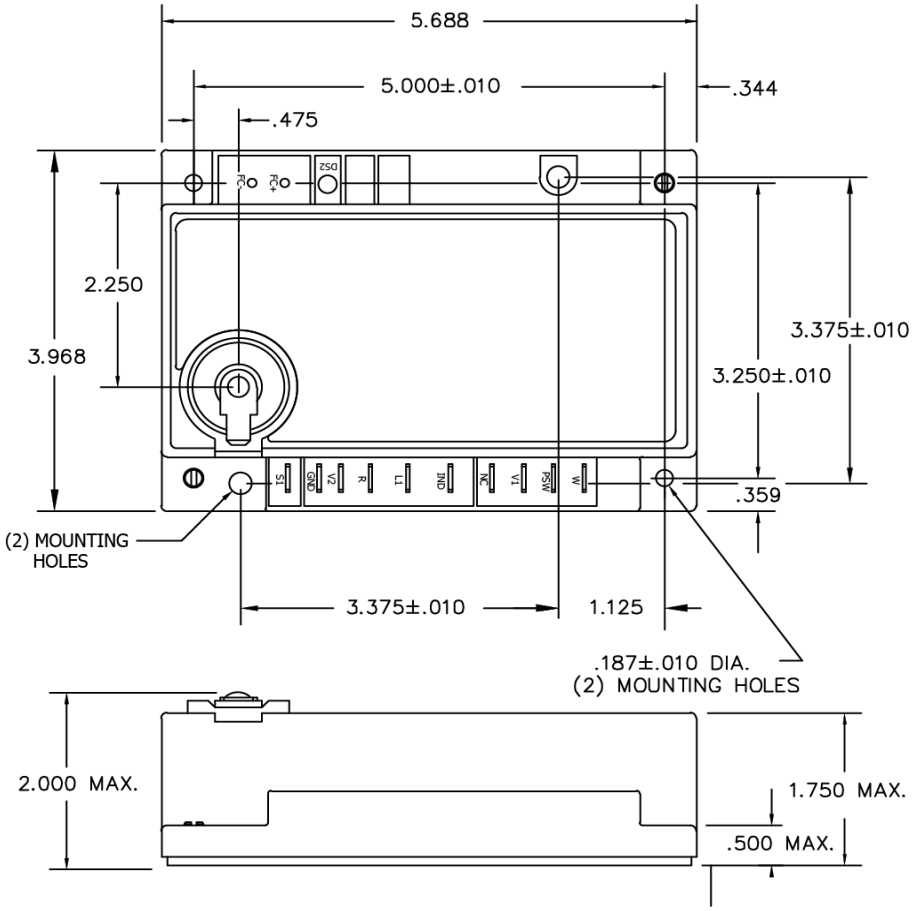


Figure 3. Standard Enclosure

Note: All dimensions are in inches.

PART NUMBER CONFIGURATION

SERIES 35-615 X X X - X X X

Product Designation
2 = Standard CE Approved Model*
3 = Special CE Approved Model*
5 = Standard
8 = Aftermarket Kit
9 = Special Configuration

A 3, 8 or 9 in this location (i.e. 35-61 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

Tries for Ignition and Methods for Flame Sense
0 = Single Try - Local Sense
1 = Single Try - Remote Sense
5 = Three Tries - Local Sense
6 = Three Tries - Remote Sense

Post-Purge
0 = No Post-Purge (TH/W input only)
1 = No Post-Purge
2 = 30 Second Post-Purge
3 = 60 Second Post-Purge

*On CE Approved models, pre-purge time cannot exceed inter-purge time and automatic reset is not permitted.

EXPORT INFORMATION (USA)
Jurisdiction: EAR
Classification: EAR99
This document contains technical data subject to the EAR.

FENWAL CONTROLS

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

