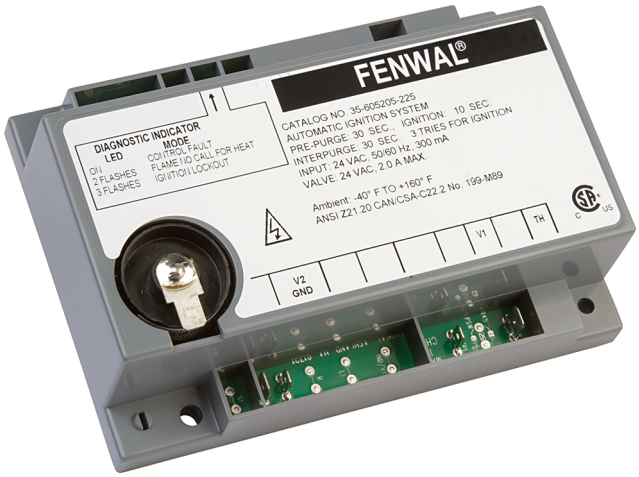
SERIES 35-60 - 60730-2-5 Compliant

24 VAC Microprocessor-Based Direct Spark Ignition Control

F-35-60H
February 2024

FEATURES

- Safe start with DETECT-A-FLAME® flame sensing technology
- Custom pre-purge and inter-purge timings*
- 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)
- Meets 60730-2-5 Harmonized Standard



APPLICATIONS

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

DESCRIPTION

The 35-60 is a 24 VAC direct spark ignition (DSI) 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. 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)
Input Current	300 mA @24 VAC with gas valve relay energized (control only)
Gas Valve	2.0A max @ 24 VAC
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
Ignition Method	Sparking pulses 600 mS On, 400 mS Off
Communications	Optional UART communication

SEQUENCE OF OPERATION / FLAME RECOVERY / SAFETY LOCKOUT

Start Up - Heat Mode

When a call for heat is received from the thermostat supplying 24VAC to TH/W, the control will reset, perform a self-check routine, flash the diagnostic LED and begin a pre-purge delay. 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 remains energized. The thermostat and burner flame are constantly monitored to assure 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 de-energize and the control will go into lockout. 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 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 before de-energizing the gas valve and entering lockout. If the burner relights, normal operation resumes.

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.

Lockout Recovery

Recovery from lockout requires resetting the thermostat. 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 35-60 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.

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 service 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 with the end use appliance.**
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 it, and the warranty is void.** **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"
V1	Valve Power (output)	3/16"
NC	Alarm (normally closed contact)	1/4"
V2	Valve Ground	3/16"
GND	System Ground	1/4"
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 - 35-605

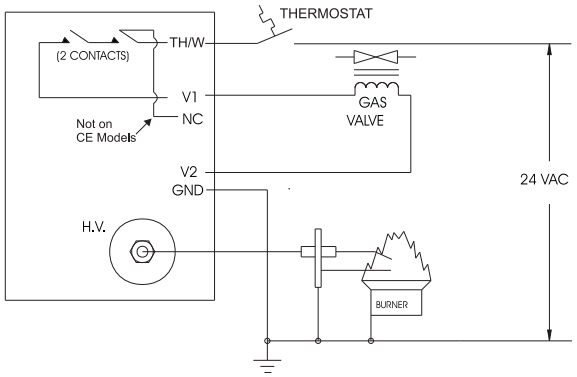


Figure 1. Local Sense

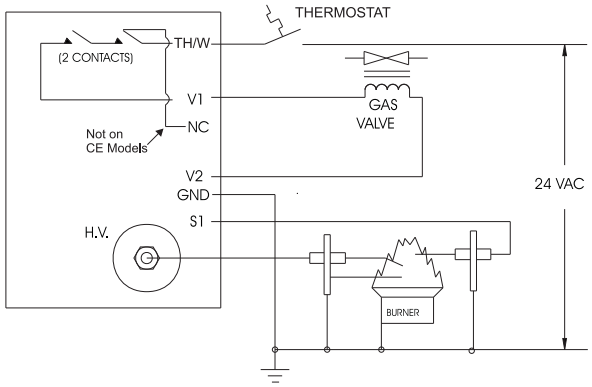


Figure 2. Remote Sense

Wiring Diagrams - 35-602

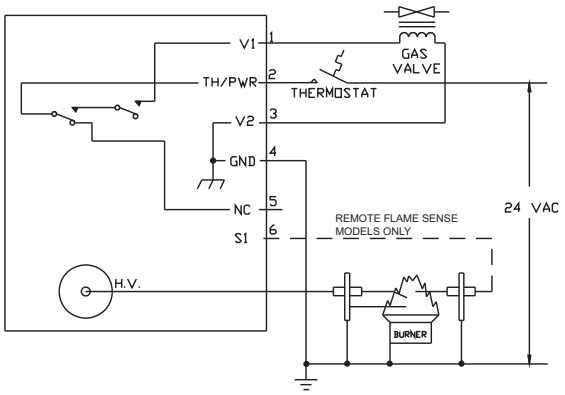


Figure 3. Smaller Footprint Wiring Diagram

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.

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. Valve on - no spark during TFI	A. Shorted electrode - establish 1/8-inch gap B. Check high voltage cable C. Miswired
4. Spark on - valve off	A. Valve coil open B. Valve wire disconnected C. Faulty control, check voltage at gas valve terminal V1
5. 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

Red LED Fault Conditions	
LED Indication	**Fault Mode**
Steady On	Internal Control Failure
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.

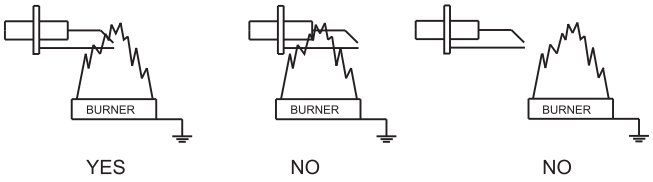
Green LED Fault Conditions	
LED Indication	**Fault Mode**
Steady On	Idle
Slow Flash	Call for Heat
Fast Flash	Burn Mode

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.

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.

Communications

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

Disposal

The control is not field reparable. At end of life proper, disposal of control is required.

DIMENSIONS

Quick Connect Models

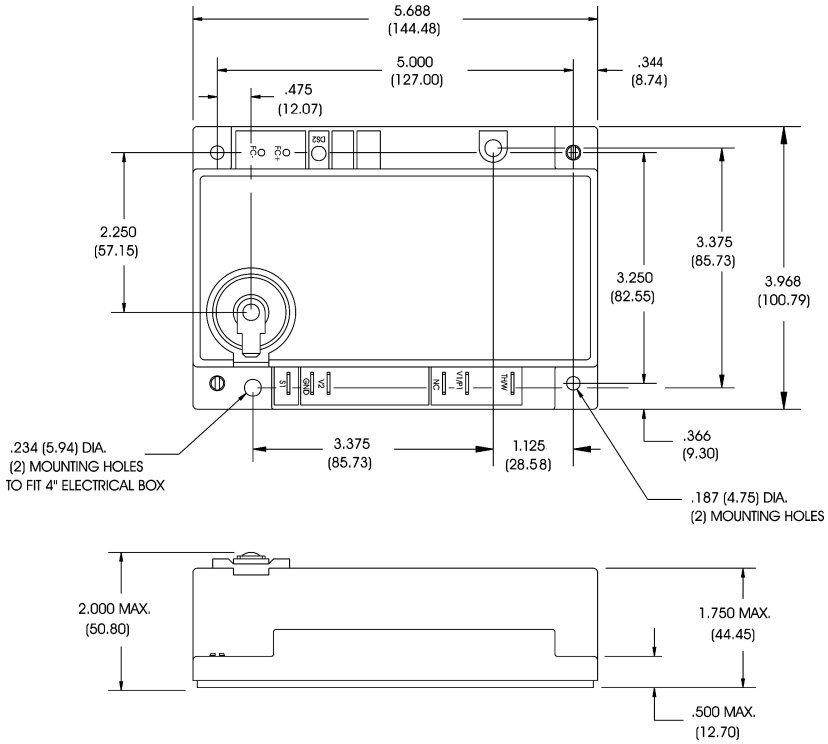


Figure 4. Standard Enclosure

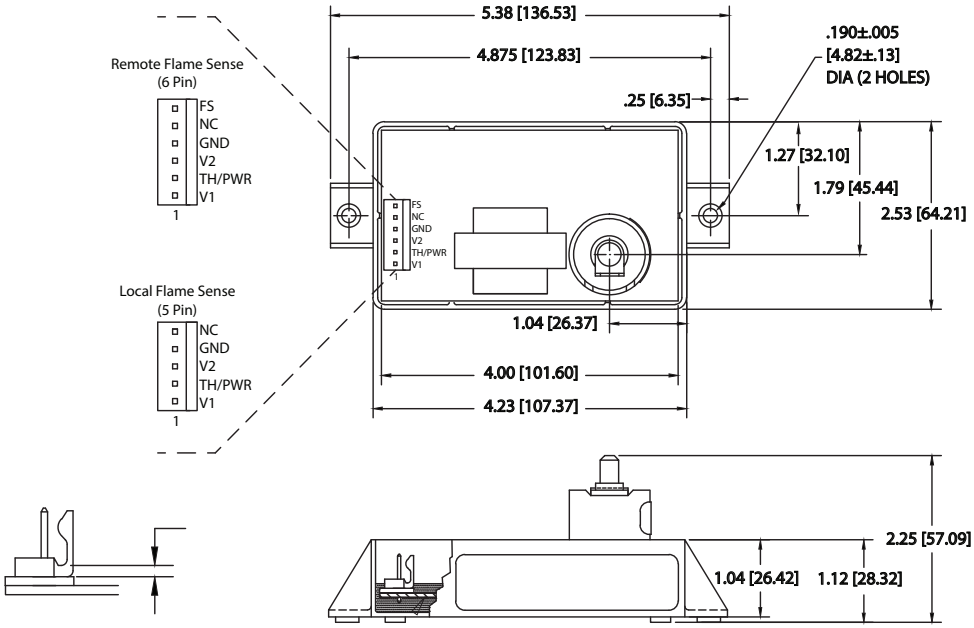


Figure 5. 35-602 Special Small Footprint Configuration

Note: All dimensions are in inches and [millimeters]

PART NUMBER CONFIGURATION

SERIES 35-605 X X X - X X X

Product Designation
5 = Standard
7 = Full Time Power - Standard UART
8 = Aftermarket Kit
9 = Special (following 2 digits will also be "9"

A 3, 8 or 9 in this location (i.e. 35-60 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

Enclosure
0 = Noryl Gray Enclosure
1 = Integral Standoffs
2 = HHVT w/Enclosure
3 = HHVT No Enclosure
9 = Advanced Option ID

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

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