

SERIES 35-63J



INSTALLATION INSTRUCTIONS FOR REPLACING JOHNSON CONTROLS G77X AND OTHER MODELS WITH FENWAL SERIES 35-63J IP IGNITION CONTROL

A UTC Fire & Security Company

APPLICATIONS

The Fenwal 35-63J series Intermittent Pilot Ignition Control (35-63J) is a microprocessor based ignition control suitable for replacing many existing intermittent pilot ignition controls from various manufacturers.

The 35-63J is a direct form, fit, and functional replacement for the discontinued Johnson G77x series controls. The 35-63J is available in a number of timing configurations that match popular G77x applications providing a better solution than a universal type aftermarket control. The most common applications are listed in "Control Cross Reference" on page 2.

The 35-63J is suitable for many types of heating applications including commercial cooking, furnaces, boilers, and water heaters that require intermittent pilot ignition, burner supervision through flame rectification, and safety shutoff. It is designed for use with Natural, LP, and mixed gases used in gas-fired appliances.

The microprocessor circuit design of the 35-63J provides precise, repeatable timing and operating sequences. High energy spark output and excellent flame sense characteristics provide reliable burner operation. The on-board diagnostics with LED output make troubleshooting easy and ensure safe and efficient operation.

FEATURES

- Safe start and full-time flame sensing
- Wide variety of prepurge and interpurge timings
- Single or three trials for ignition
- Diagnostic LED with Fenwal error codes
- Three ground terminals for ease of wiring
- Remote or local flame sense options
- Automatic 5 min or 1 hour reset after lockout options

AGENCY CERTIFICATIONS



CSA Design certified to ANSI Z21.20,
CAN/CSA C22.2 No. 199-M99




SPECIFICATIONS

Input Power	Control: 18-30 VAC 50/60 Hz (Class 2 Transformer)
Input Current Drain	200 mA @ 24 VAC with gas and pilot relays energized (Control only)
Main Gas Valve	2.0A max (continuous)
Pilot Gas Valve	2.0A max (continuous)
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	0.3 μ A minimum
Flame Failure Response or Reignition Time	0.8 seconds minimum
Flame Detector Self-check Rate	Once per second minimum
Flame Failure Lockout Time	Varies by model, 500 seconds maximum
Types of Gas	Natural, LP, or manufactured
Spark Rate	Remote sense (50/60 Hz) Local sense (25/30 Hz)
Size (LxWxH)	4.70 x 3.10 x 2.50 inches (11.94 x 7.87 x 6.35 cm)
Moisture Resistance	Conformal coated to operate non-condensing to 95% R.H.
Tries for Ignition	One or three try versions available
Trial for Ignition Periods	8, 25, 50, 85, and 120 seconds available
Pre-purge Timings	None, 4, 15, or 30 seconds available
Inter-purge Timings	None, 15, 30, or 45 seconds available

CONTROL CROSS REFERENCE


Manufacturer/ Model Number	
Johnson Controls	Fenwal Replacement
G770KGA-1,3	35-63J101-011
G770KHA-2	35-63J101-011
G770LGA-1,2	35-63J103-013
G770LGC-1,2,3,4,10	35-63J103-013
G770LHA-1,2	35-63J103-013
G770LHC-1	35-63J103-013
G770MGA-1,2,5	35-63J101-015
G770MHA-2	35-63J101-015
G770MGC-1,3	35-63J101-415
G770MHC-1	35-63J101-415
G770NGA-1	35-63J103-017
G770NGC-4,5,6,7	35-63J103-017
G770NHA-1	35-63J103-017
G770NHC-1	35-63J103-017
G770RHA-2	35-63J103-017
G77RJA-1	35-63J103-017
G775RGA-1,2,3	35-63J103-017
G775RHA-1,2	35-63J103-017
G775RJD-1,2,13,14,15	35-63J103-117
G776RGD-11,14	35-63J303-117
G775LHA-1 (remote flame sense)	35-63J103-013
G779LHA-1 "Universal" (set-up for Remote flame sense)	35-63J103-013
G779LHA-1 "Universal" (set-up for Local flame sense)	35-63J102-013


INSTALLATION GUIDELINES


 CAUTION	<p>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.</p>
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MOUNTING AND WIRING

The 35-63J is not position sensitive and can be mounted vertically or horizontally. The case may be mounted on any surface with #6 sheet metal screws.

 WARNING	<p>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.</p>
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 WARNING	<p>All wiring must be done in accordance with both local and national electrical code. Wiring must be at least #18 AWG rated for 105°C or higher.</p>
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 WARNING	<p>The 35-63J uses voltages of shock hazard potential. Wiring and initial operation must be done by qualified service technician.</p>
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 WARNING	<p>Operation outside specifications could result in failure of the Fenwal product and other equipment with injury to people and property.</p>
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Wiring Terminal Names		
JCI G77x	Fenwal 35-63J	Description
2 THS	THS	Thermostat Input
1 PV	PV	Pilot Valve Power
3 MV	MV	Main Valve Power
Ground Plate	_GND	Valve Ground
Ground Plate	GND_	Valve Ground
Ground Plate	GND	System Ground
BLIND	BLIND	No Connection
4 SENSE	SENSE	Remote Flame Sensor

HIGH VOLTAGE TERMINAL CONNECTION

The Fenwal 35-63J uses a Rajah (spark plug) type HV connection which is common to most controls. If the control being replaced does not utilize a Rajah connection, the HV spark cable will need to be replaced or re-terminated using a Rajah style female mating connector.

ROLLOUT SWITCH

Some control applications may have a separate rollout switch directly connected to the old ignition control. In this case, the rollout switch (normally closed) should be connected directly to the THS terminal on the 35-63J. Verify the rollout switch is wired in series (downstream) with the thermostat signal. The old THS wire should be left unconnected and insulated to prevent the possibility of a short-circuit.

VENT DAMPER CONNECTIONS

The 35-63J does not include an integral vent-damper connector. When replacing an older control (in applications using a vent damper) that has a standard 6-pin vent damper plug, the vent damper wires from the plug must be re-terminated and connected as follows:

Note: If the old control has a vent damper plug (with a jumper between pins 2 and 3), but the heating appliance has no vent damper, then ignore this section.

Pin # on Damper Plug	System Connection
1	Full-time 24VAC Hot
2	Call for Heat signal (from damper)
3	Fused 24 VAC (not used)
4	24VAC Common
5	24 VAC from Thermostat
6	Not Used

- To connect the Vent Damper, the wire from Pin 1 should be connected to 24VAC Hot from the supply transformer.
- The wire from pin 2 should be connected to the Thermostat input (THS) on the 35-63J control. This should be the only wire attached to the THS terminal.
- The wire from Pin 4 connects directly to the 24VAC Common.
- The wire from pin 5 should be connected directly to the Thermostat (call for heat signal) and not to the 35-63J control.

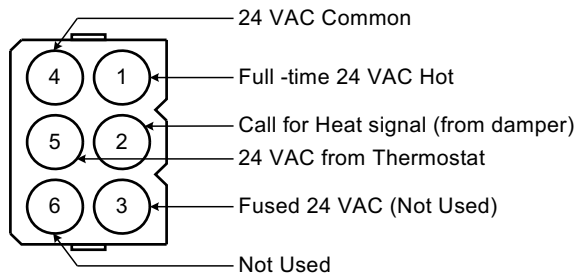


Figure 1. Wire Sideview of Plug

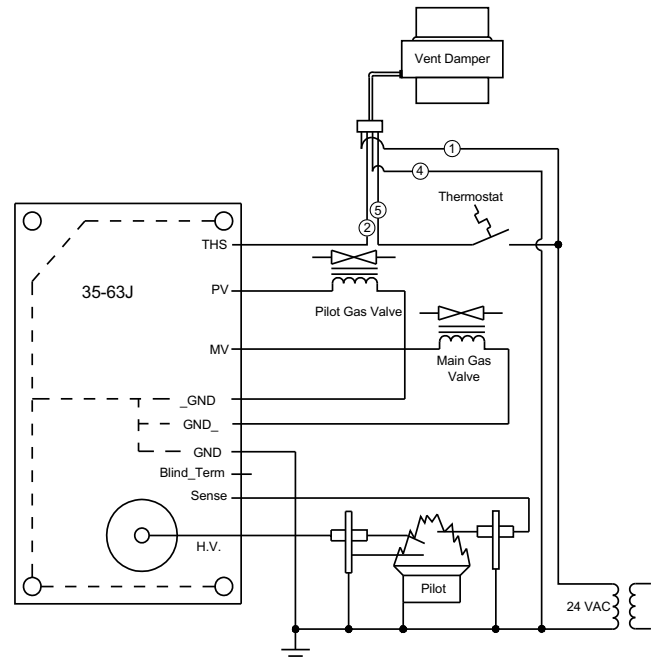


Figure 2. Vent Damper Wiring Diagram

VENT DAMPER CHECKOUT

During the checkout of the new control, you must confirm the proper operation of the vent damper as follows:

- With the system in standby (no call for heat) the vent damper should be driven closed by the 24 VAC power.
- When the Thermostat calls for heat, the vent damper starts to open. After the damper is fully open, the 35-63J then sees the 24 VAC call for heat at the THS input and begins the normal ignition sequence.

WIRING DIAGRAMS

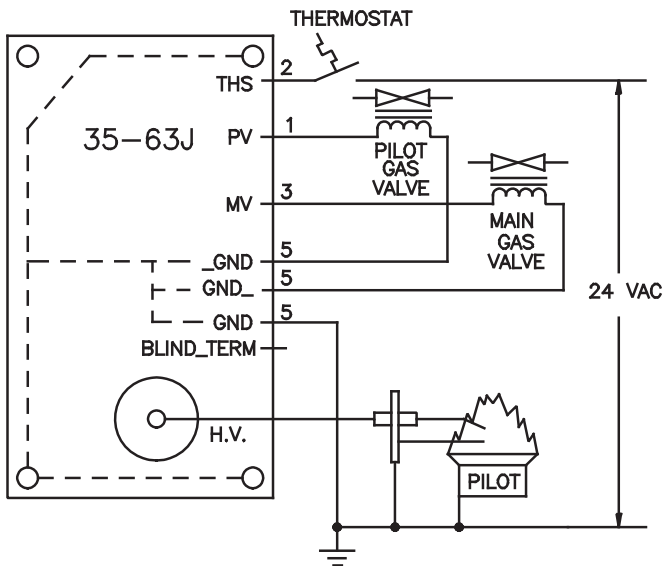


Figure 3. Local Sense Wiring

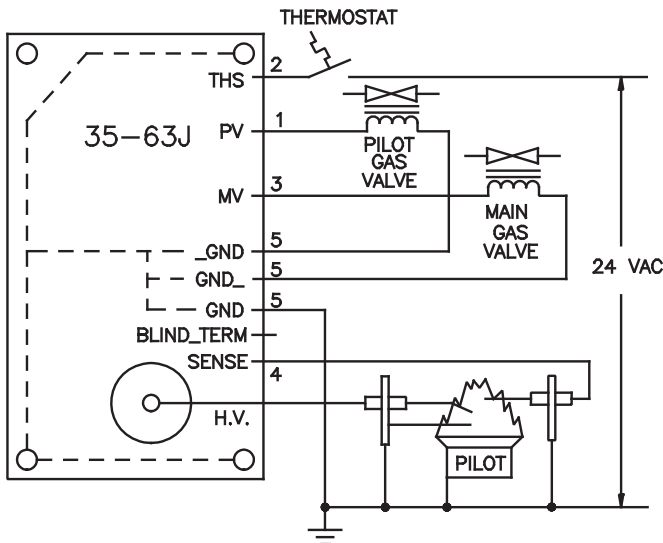


Figure 4. Remote Sense Wiring

CHECKOUT



Risk of Explosion or Fire

Verify there are no gas leaks by using a rich soap and water solution on all joints and pipe connections. Never use a match or lighter to test for the presence of gas. Failure to test properly before operation can lead to explosion or fire and may result in severe injury or death.

Test the gas control system after any service or component changes to the appliance using the following method:

1. Perform a visual check of all piping, burners, and venting. Check all wiring for integrity and proper electrical and ground connections. Verify the pilot burner is properly grounded.
2. With the gas supply and thermostat off, turn on power to the appliance.
3. Turn the thermostat to a setting high enough to initiate a call for heat. Verify the ignition control proceeds through the operating sequence to a safety shutoff (lockout) condition. (The burner will not light because the gas is shut off)
4. Turn off the thermostat.
5. Turn on the gas supply, and purge the gas lines of air. Check for gas leaks on all joints upstream of the gas valve with a soap solution.
6. Turn the thermostat to a setting high enough to initiate a call for heat. Verify the ignition control proceeds through the operating sequence to a normal run (burner lit) condition. Confirm there are no gas leaks downstream of the gas valve using a soap solution.
7. Turn the thermostat setting down below the room temperature. Verify the main and pilot burner flames go out.

SEQUENCE OF OPERATION / FLAME RECOVERY / SAFETY LOCKOUT

START UP - HEAT MODE

When a call for heat is received from the thermostat supplying 24 volts to THS the following sequence occurs in the order listed:

1. The control resets and then performs a self check routine, flashing the diagnostic LED once in the first two seconds.
2. The control begins a pre-purge delay.
3. Following the pre-purge period, the control energizes the pilot gas valve. The main gas valve remains de-energized until the pilot flame is detected.
4. The control enables the high voltage spark output for the trial for pilot ignition period.
5. When the control detects the presence of pilot flame during the trial for ignition, the control terminates the sparking process and energizes the main gas valve.
6. The thermostat and pilot burner flame are constantly monitored to assure the system continues to operate properly.
7. When the thermostat is satisfied and the demand for heat ends, both the pilot and main gas valves are de-energized immediately.

FAILURE TO LIGHT - LOCKOUT

SINGLE TRIAL MODEL

Should the pilot burner fail to light, or if the pilot flame is not detected during the trial for ignition period, the control performs the following actions:

1. The control enters ignition lockout.
2. Both the pilot and main gas valves are de-energized immediately.
3. The LED indicates the fault code for ignition lockout.

MULTI TRIAL MODEL

Should the pilot burner fail to light, or if the pilot flame is not detected during the first trial for ignition period, the control performs the following actions:

1. The pilot and main gas valves are de-energized.
2. The control then goes through an interpurge delay before another ignition attempt.
3. The control attempts two additional ignition trials before going into lockout and the pilot and main gas valve relays are de-energized immediately.
4. The LED indicates the fault code for ignition lockout.

LOCKOUT RESET

Recovery from lockout requires a manual reset by either recycling the thermostat or removing 24 volts for a period of 5 seconds. On models with automatic reset, if the thermostat is still calling for heat after 5 minutes the control will automatically reset and attempt to ignite the burner.

FLAME FAILURE RESPONSE

RECYCLE MODE (STANDARD)


With "recycle after loss of flame", upon loss of pilot flame, both the pilot and main gas valves are de-energized immediately. After the flame recycle delay, the control attempts to relight the pilot flame. Multi-try models allow three tries for ignition including inter-purges. If the pilot burner relights, normal operation resumes. If the pilot burner does not relight, the control will go into lockout as described in "Failure to Light - Lockout" on page 5.

RE-IGNITION MODE (OPTIONAL)

If the established pilot flame signal is lost while the burner is operating, the control will respond within 0.8 seconds by de-energizing the main gas valve. The control then energizes the HV spark for the programmed TFI period in an attempt to relight the pilot burner. If the pilot burner does not light within the TFI, the pilot gas valve is de-energized immediately and on multi-try models a new TFI sequence begins.

If the pilot burner does not relight, the control will lockout as previously described in "Failure to Light - Lockout" on page 5. Multi-try models will make 2 more attempts to light the burner. If the pilot flame is re-established, normal operation resumes.

TROUBLESHOOTING

 WARNING	<p>Risk of Explosion or Fire The 35-63J ignition control cannot be serviced by the user. If any control faults are detected, the 35-63J control module must be replaced by 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.</p>
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Before troubleshooting the system, check the following items:

- Verify all mechanical and electrical connections are secure and tight.
- Verify all system wiring is correct.
- Verify there is a proper system ground. The igniter, flame sensor, and ignition module must share a common ground with the burner. *Nuisance shutdowns are often caused by a poor or erratic ground.*
- Perform the instructions in "Checkout" on page 4, as the first step in any troubleshooting.
- Verify that the system is powered and that the thermostat is calling for heat.
- If the control proceeds to an error code on the red diagnostic LED, troubleshoot per the Fault Conditions table below:

Fault Conditions	
LED Indication	Fault Mode
Off	Normal Operation
2 Flashes	Pilot flame without call for heat
3 Flashes	Ignition Lockout
Steady On	Internal Control Failure

The LED will flash on for 1/4 second, then off for 1/4 second during a fault condition. The pause between fault codes is 3 seconds.

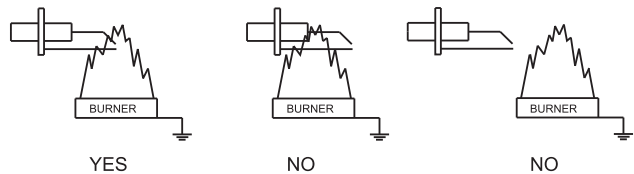
INTERNAL CONTROL FAILURE

If the control detects an error in its software or hardware, 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.

Troubleshooting Guide	
Symptom	Probable Cause
1. Control does not start	A. Mis-wired B. 24 VAC Transformer bad C. Fuse/Circuit breaker bad (no power) D. Bad control, check LED for steady on or flashing codes.
2. Thermostat on - no spark	A. Mis-wired B. Bad thermostat, no voltage at thermostat terminal THS C. Bad control, check LED for steady on or flashing codes.
3. Valve on - no spark during TFI	A. Shorted electrode B. Verify 1/8th inch spark gap. C. Check high voltage cable.
4. Spark on - valve off	A. Gas Valve coil open B. Valve wire disconnected C. Bad control, check voltage between gas valve terminals PV or MV and GND.
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

PROPER ELECTRODE LOCATION

Proper location of the electrode assembly is important for optimal 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.



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

STANDARD PART NUMBER CONTROL CONFIGURATION

<p>35 – 6 3 J <u>X</u> <u>X</u> <u>X</u> – <u>X</u> <u>X</u> <u>X</u></p>	<p>Description</p> <p><u>TRIAL FOR PILOT IGNITION</u> 1 = 8 Seconds 3 = 25 Seconds 5 = 50 Seconds 7 = 85 Seconds 8 = 120 Seconds</p> <p><u>INTER-PURGE (RECYCLE DELAY)</u> 0 = None (Single try models only) 1 = 15 Seconds 2 = 30 Seconds 3 = 45 Seconds</p> <p><u>PRE-PURGE</u> 0 = None 1 = 15 Seconds 2 = 30 Seconds 4 = 4 Seconds</p> <p><u>TRIES FOR IGNITION & METHOD OF FLAME SENSE</u> 0 = Single Try - Local Sense 1 = Single Try - Remote Sense 2 = Single Try - Local Sense with 5 Minute Automatic Reset 3 = Single Try - Remote Sense with 5 Minute Automatic Reset 5 = Three Tries - Local Sense 6 = Three Tries - Remote Sense 7 = Three Tries - Local Sense with 5 Minute Automatic Reset 8 = Three Tries - Remote Sense with 5 Minute Automatic Reset</p> <p><u>ENCLOSURE</u> 0 = Noryl Gray Enclosure 1 = Integral Stand-Offs 2 = Board Only</p> <p><u>OPTIONS</u> 1 = Recycle After Loss of Flame (Standard) 3 = 1 Hour Auto Reset (in place of 5 minutes) 5 = Re-Ignition After Flame Loss 9 = Special OEM Configuration</p>
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DIMENSIONS

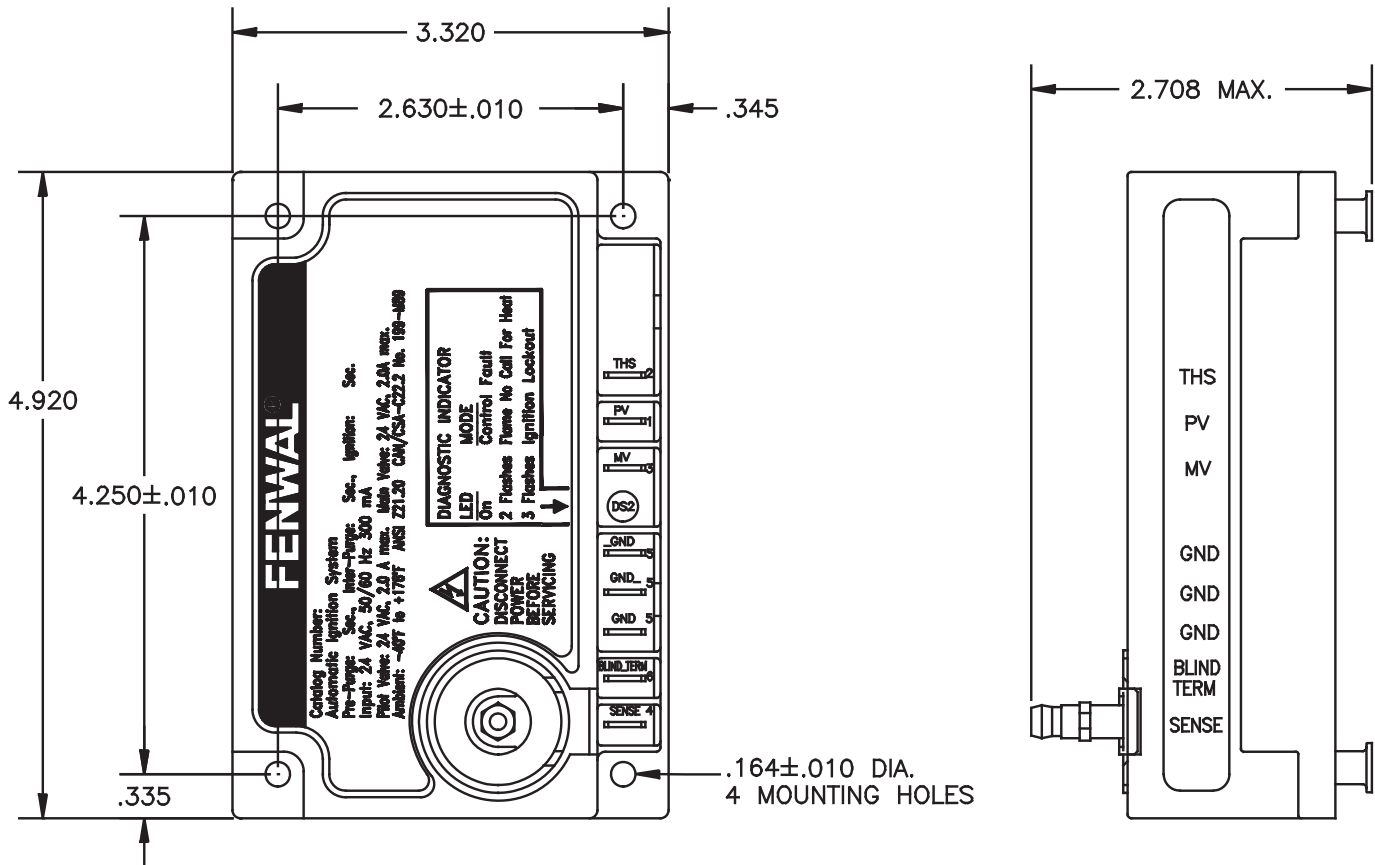


Figure 5. Control Dimensions with Cover