# SERIES 35-65 - 60730-2-5 Compliant

## 24 VAC Microprocessor-Based Hot Surface Ignition Control

**F-35-65H**
**February 2024**

## FEATURES

- Single or Multiple tries for ignition (TFI)
- Multiple options for ignition period, pre-purge, and inter-purge timings
- 120/240 field selectable line voltage for use with 120 VAC igniter option
- 24/120/240 VAC hot surface igniter models available
- Diagnostic LED
- Local and Remote flame sensing
- Quick connect terminals or Mate-N-Lok connectors
- Integral Brass Standoffs or Enclosure available
- Available one-hour automatic reset
- Available UART output for digital communications
- Meets 60730-2-5 Harmonized Standard

## APPLICATIONS

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

## DESCRIPTION

The Model 35-65 is a 24 VAC Microprocessor Based Hot Surface Ignition (HSI) Control designed for use in all types of gas-fired appliance where sparking is not desired. The control continually and safely monitors, analyzes and controls the proper operation of a gas burner. 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.

### Agency Certifications

Design Certified to ANSI Z21.20-2014 CAN/CSA C22.2 No. 60730-2-5-14 14 and UL 60730-2-5

RoHS Compliant


## SPECIFICATIONS

| | |
|---|---|
| Input Power | Control: 18-30 VAC 50/60 Hz (Class 2 transformer) |
| HSI Input Voltage | Line: 24, 120 or 240 VAC (L1 and L2 only) |
| Input Current | 350(RMS) mA @ 24 VAC, gas valve relays energized @ 25°C |
| Gas Valve | 2.0A @ 24 VAC<br>4.0A (Inrush) |
| Hot Surface Ignitor | 5A @ 24/120/240 VAC |
| Operating Temperature | -40°F to + 176°F<br>(-40°C to +80°C) |
| Storage Temperature | -40°F to + 185°F<br>(-40°C to +85°C) |
| Flame Sensitivity | 0.7uA minimum |
| Flame Failure Response Rate | 0.8 seconds maximum |
| Flame Failure Lockout Time | Varies by model,<br>315 seconds maximum |
| Gas Types | Natural, LP, or manufactured |
| Size (LxWxH)<br>Board Only | 5.5 x 3.75 x 1.5 inches<br>(13.97 x 9.53 x 3.8 cm) |
| Size (LxWxH)<br>with Cover | 5.7 x 4.0 x 1.6 inches<br>(14.45 x 10.15 x 4.1 cm) |
| Enclosure / Mounting | Noryl Gray Cover or<br>Integral standoffs |
| Moisture Resistance | Conformal coated to operate to 95% R.H. (Non-Condensing) Always avoid direct exposure to water. |
| Ingress Protection | Not Rated, Protection provided by appliance in which it is installed. |
| Tries for Ignition | One or Three |
| Tries for Ignition Periods | 4, 7, 10, or 15 seconds |
| Pre-purge and Inter-purge Timings | None, 15, or 30 seconds<br>Without pre-purge, there is a 2 second start-up delay. |
| Heat Up Times | 4, 6, 20, 40 seconds |
| Communications | Optional UART communication |

## SEQUENCE OF OPERATION / FLAME RECOVERY / SAFETY LOCKOUT

### Power Up

During power up, the Red LED shall briefly flash ON for about 1 second while the control performs a power on self test. The LED then turns OFF to indicate normal operation.

### Start Up - Heat Mode

When a call for heat is received from the thermostat, 24 VAC to TH, the control begins an optional pre-purge delay. Following the pre-purge period, 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 igniter is de-activated and flame is detected during the TFI, the gas valve remains on. 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 repeatedly flash 3 times indicating 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 and the LED will repeatedly flash 3 times.

### Flame Failure

If the established flame signal is lost from the burner, 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 LED will repeatedly flash 3 times.

### Lockout Recovery

Recovery from lockout requires resetting the thermostat, or removing power 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 35-65 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. The control also supports direct mounting to a standard 4-in. junction box. Secure the control in an area that will experience a minimum of vibration and remain below the maximum ambient temperature of 176°F (80°C).

All connections should be made with UL approved, 105°C rated, 18 gauge stranded wire with .054" minimum insulation thickness. Refer to the appropriate wiring diagram when connecting the 35-65 to other components in the system.

### Remote Sense Cable Requirements

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

Refer to Fenwal Controls datasheet F-05-1000 for details.

| | |
|---|---|
| **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 35-65 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**<br>The 35-65 control cannot be serviced by the user. If any control faults are detected, the 35-65 control 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.<br>Do not use aluminum wire, this can also lead to risk of fire. |

## TERMINAL DESIGNATIONS

| Name | Description | Terminal Type |
|---|---|---|
| R | 24 VAC Power | 1/4" male Q.C. |
| S1/240 | 240 VAC Ignitor | 1/4" male Q.C. |
| S1/120 | 120 VAC Ignitor | 1/4" male Q.C. |
| L1 | 120/240 VAC Input (Hot) | 1/4" male Q.C. |
| L2 | Neutral | 1/4" male Q.C. |
| S2 / FS | Ignitor / Remote Flame Sense | 1/4" male Q.C. |
| TH/W | Thermostat Input | 1/4" male Q.C. |
| MV1 | Main Valve Power | 3/16" x .031" male Q.C. |
| GND | Ground | 3/16" x .031" male Q.C. |
| P3 | Serial Coms TX, RX, Gnd | 0.025 pins 0.1 centers |
| P2 | Remote Diagnostic LED K, A | 0.025 pins 0.1 centers |

### Communications

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

## Wiring Diagrams

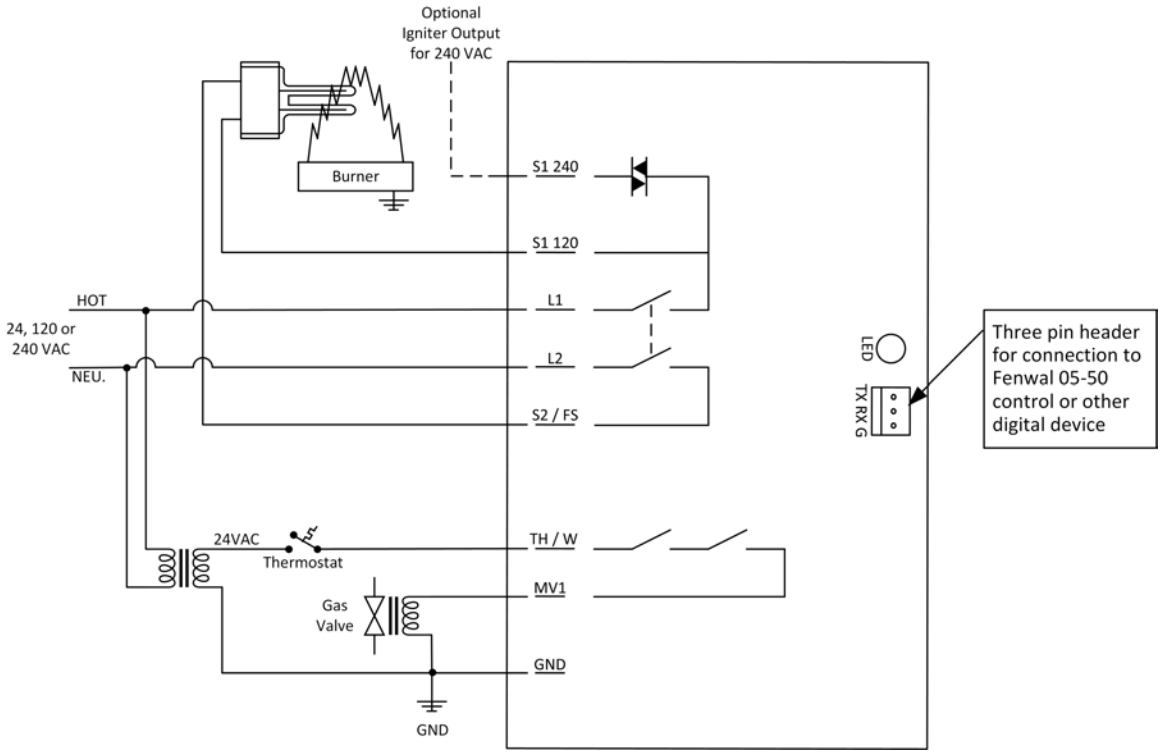



Figure 1. Local Sense

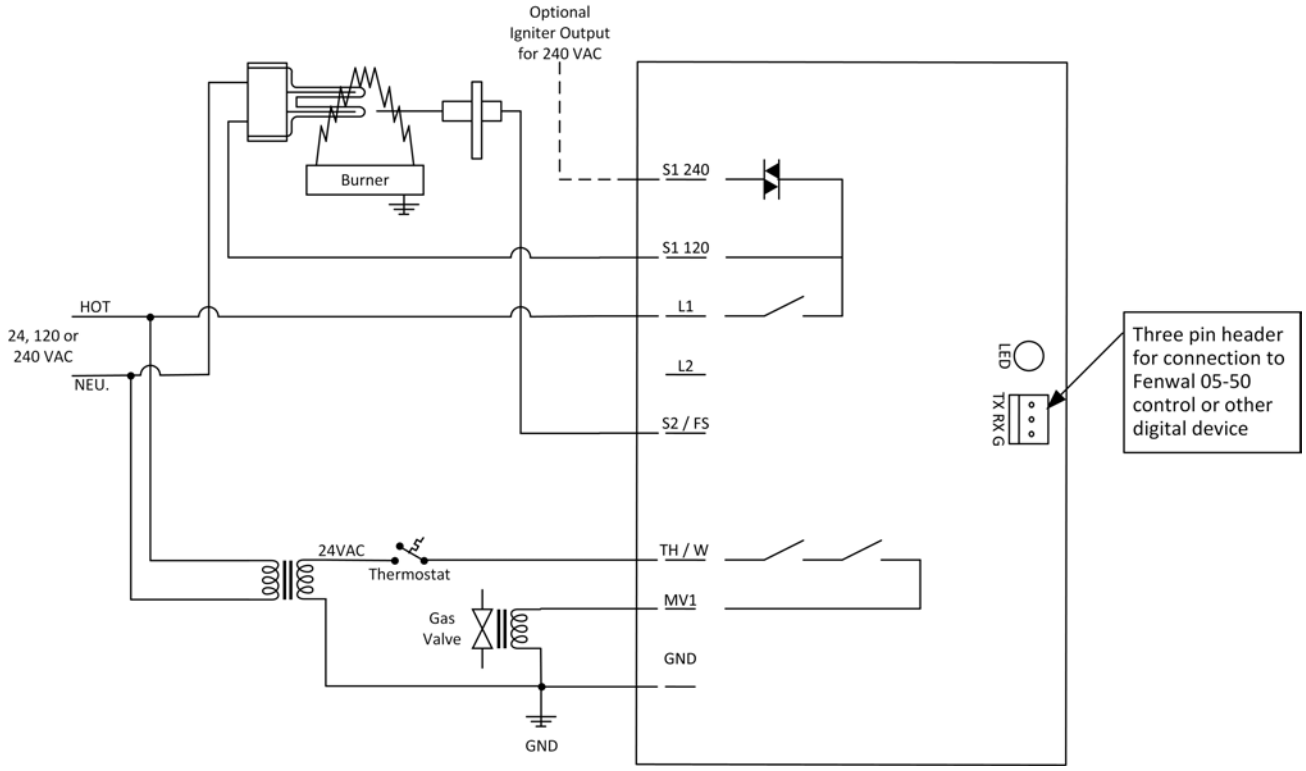



Figure 2. Remote Sense

## DIMENSIONS - INTEGRAL STANDOFF

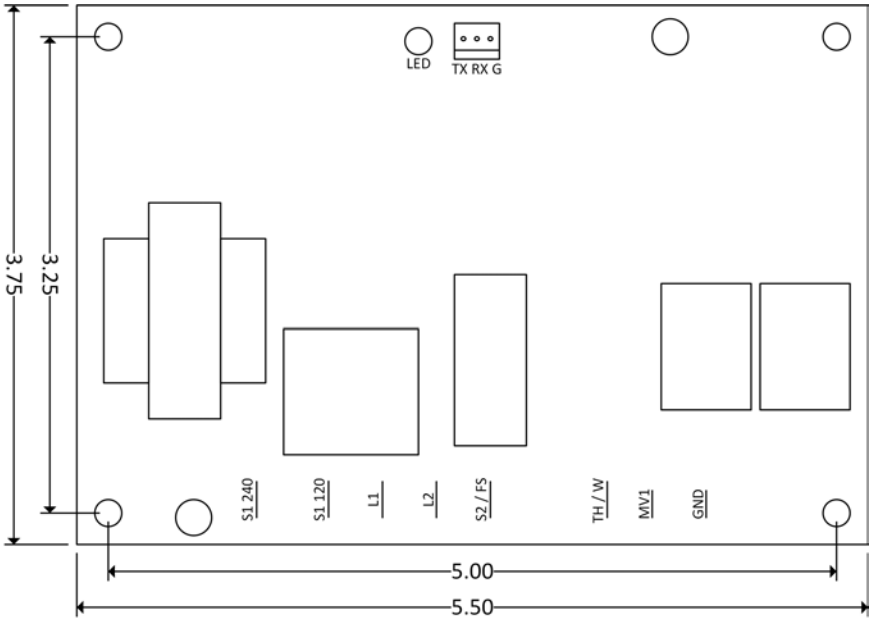



Figure 3. Board Only

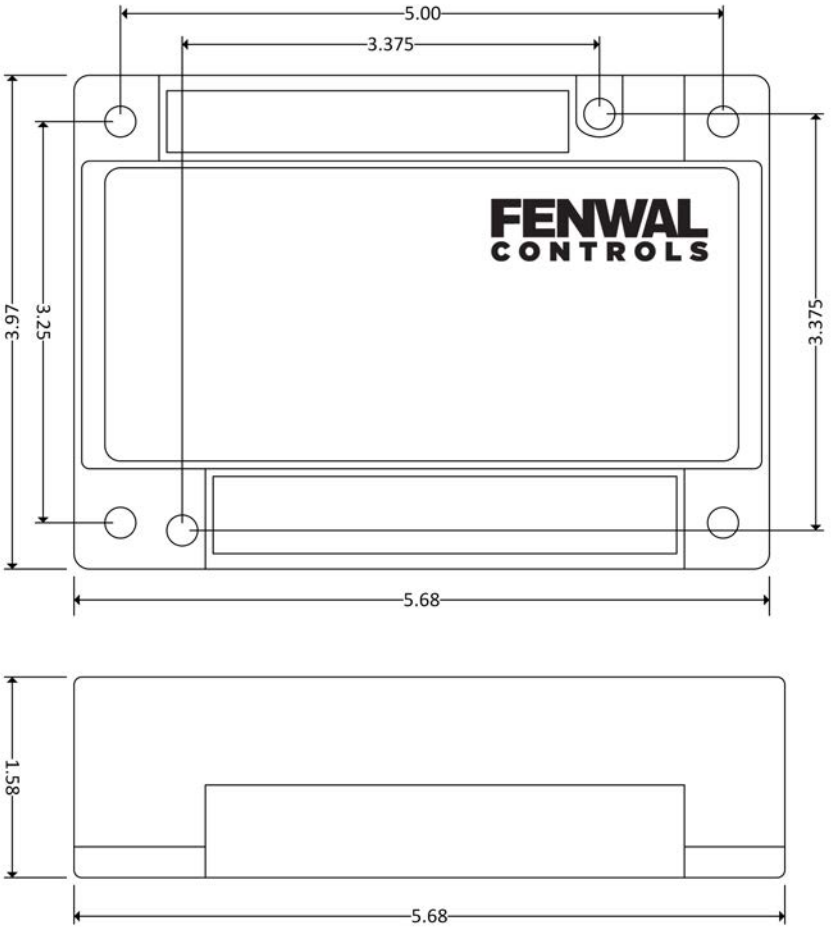



Figure 4. Control with Cover

## TROUBLESHOOTING

| Troubleshooting Guide | |
|---|---|
| **Symptom** | **Recommended Actions** |
| 1. Control does not start | A. Miswired<br>B. Transformer bad/battery fault<br>C. Fuse/circuit breaker fault<br>D. No voltage at PWR<br>E. Faulty control |
| 2. Thermostat on - no ignition | A. Miswired<br>B. Faulty thermostat, no voltage at thermostat terminal W<br>C. Failed igniter |
| 3. Valve on - no igniter | A. Miswired<br>B. Defective igniter<br>C. Open S1 cable<br>D. Faulty control |
| 4. Igniter on - no valve | A. Valve coil open<br>B. Open valve wire<br>C. Faulty control (check voltage between MV1 and GND) |
| 5. Flame okay during TFI - no flame sense after TFI | A. Faulty igniter<br>B. Faulty S1 wire<br>C. Poor ground at burner<br>D. Faulty control (check flame current) |

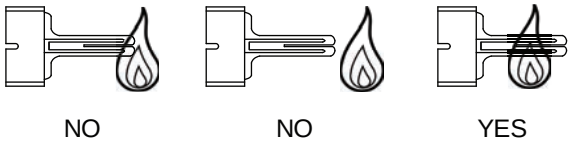
| Fault Conditions | |
|---|---|
| **LED Indication** | **Fault Mode** |
| Off | Standby & Normal Condition |
| Steady On | Internal Control Failure |
| 2 Flashes | False Flame |
| 3 Flashes | Ignition Lockout |
| 5 Flashes | Weak Flame Detected |

**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.

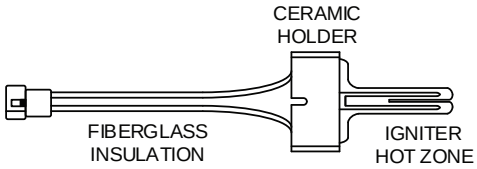
### Hot Surface Igniter

Proper location of the silicon 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.




### Typical Hot Surface Igniter




### Flame Current

Flame current is the current which passes through the flame from the sensor to ground to complete the primary safety circuit.

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

A 5 LED flash code is an indicator of a weak flame. Flame strength can also be measured through the UART connection. Consult Fenwal for further information.

### Internal Control Failure

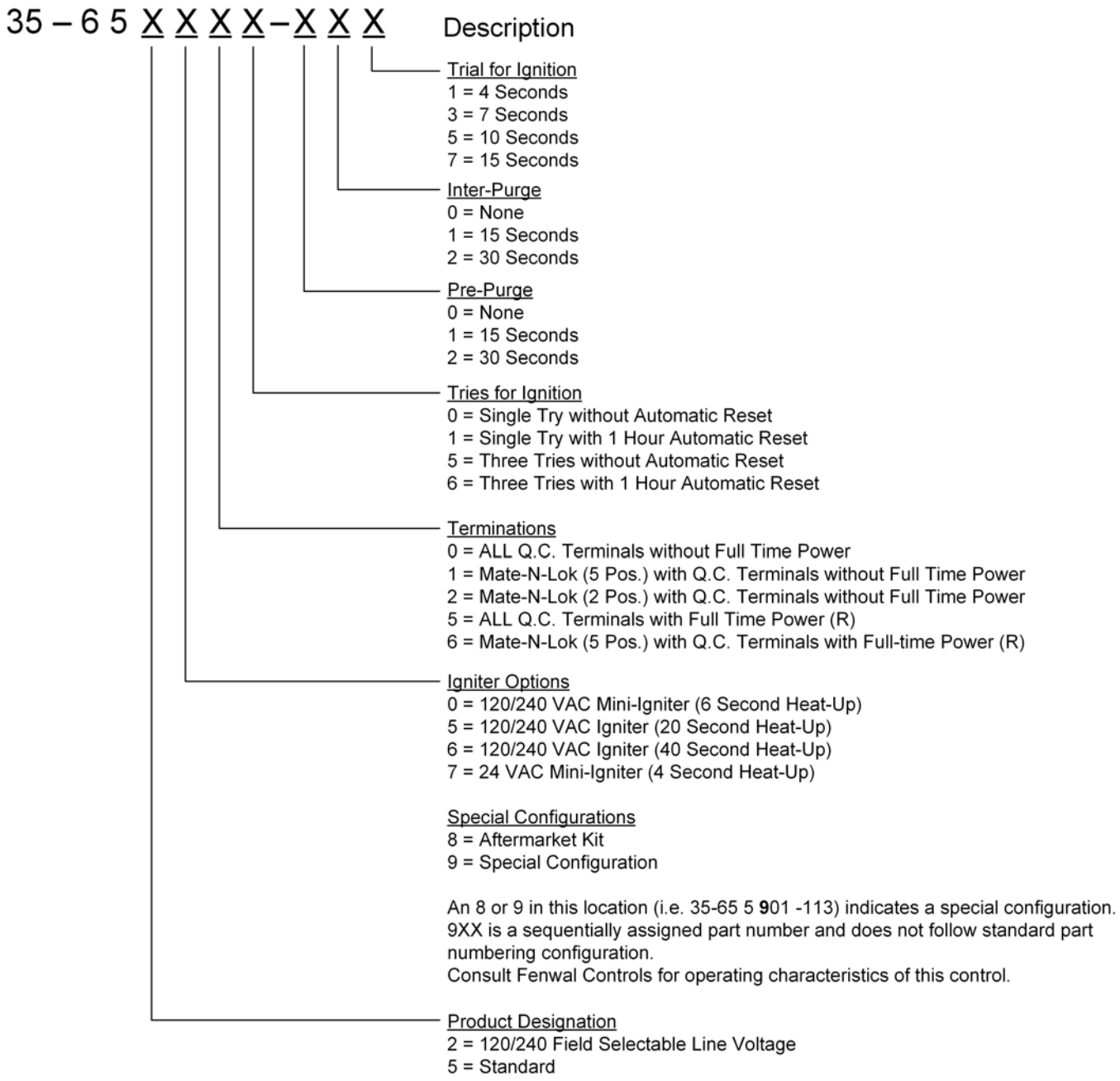
If the control detects a software or hardware error, all outputs are turned off. If this condition persists after an attempt to restart, then the control must be replaced.

**Note:** The control can only be replaced with the same model type control.

### Disposal

Do not discard in trash, recycle per local guidance.

## STANDARD PART NUMBER CONFIGURATION




35-655999-XXX Utilizes Fenwal Control's advanced Option ID # for additional options. Please consult fenwalcontrols.com or the factory for further information

35-6559XX-XXX Special configuration, consult Fenwal Controls for operating characteristics.

Consult Fenwal Controls for operating characteristics of this control.

***EXPORT INFORMATION (USA)***
Jurisdiction: EAR
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