SERIES 35-52 "HARMONIZED"

12 VDC Microprocessor Based Direct Spark Ignition Control

F-35-52-04
December 2019

FEATURES

- Single or Multiple tries for ignition (TFI)
- Multiple options for TFI, pre, and inter-purge timings
- Meets UL 60730-2-5 Harmonized Standards
- Local flame sensing
- Standard Edge and Pin connector
- Integral Standoffs for mounting
- Optional one-hour automatic reset

APPLICATIONS

- Recreational Vehicles (including boats/marine)
  - Furnace, Water Heaters
- Mobile Heating Equipment
  - Agricultural Heaters
  - Construction Equipment

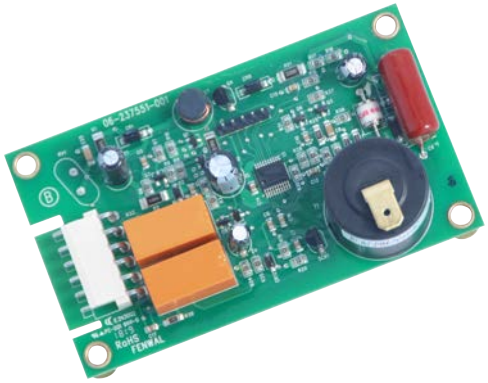
DESCRIPTION

The Model 35-52 "Harmonized" is a 12 VDC Microprocessor Based Direct Spark Ignition Control designed for use in all types of heating applications such as RV gas furnaces and other similar appliances. The control utilizes a microprocessor to continually and safely monitor, analyze and control the proper operation of the gas burner. Includes capability for multiple ignition tries and is backward compatible with previous Fenwal Controls 12 VDC controls and competitive models.

Agency Certifications

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

Compliant with current RoHS standards



SPECIFICATIONS

Input Power	Control: 9.0 to 15 VDC from a storage battery or full wave rectified unfiltered 50/60 HZ AC
Input Current	200 mA @ 12 VDC, gas valve relays energized (control only)
Gas Valve	1.0A @ 12 VDC
Operating Temperature	-40°F to + 176°F (-40°C to +80°C)
Flame Sensitivity	0.7 uA minimum
Flame Failure Response Rate	0.8 seconds maximum
Flame Failure Lockout Time	Varies by model, 300 seconds maximum
Flame Detector Self-check Rate	Once per second minimum
Gas Types	Natural, LP, or manufactured
Spark Rate	16 sparks per second
Size (LxWxH)	4.0 x 2.3 x 1.5 inches (10.16 x 5.85 x 3.8 cm)
Enclosure / Mounting	Uncovered with 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	5, 7, 10, or 25 seconds
Pre-purge and Inter-purge Timings	None, 15, or 25 seconds Without pre-purge, there is a 2 second start-up delay.

SEQUENCE OF OPERATION / FLAME RECOVERY / SAFETY LOCKOUT

Start Up - Heat Mode

When a call for heat/power-up is received from the thermostat, 12 VDC to PWR, the control will reset 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.

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.

Flame Failure

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 a manual reset by either 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 35-52 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 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 35-52 to other components in the system.

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 rated for 105°C or higher.

WARNING	The 35-52 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 Controls product and other equipment with injury to people and property.

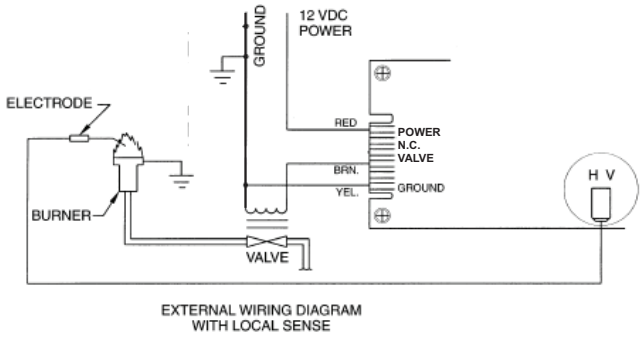
WARNING	Do not disconnect battery or any electrical loads while the automatic gas ignition control is powered.

TERMINAL DESIGNATIONS

Name	Description	Terminal Type	Location	Wire Color*
PWR	Power	6 Edge-connect or .156 pin	1	Red
NC	NC Contact	6 Edge-connect or .156 pin	3	Blue
V1	Gas Valve	6 Edge-connect or .156 pin	4	Brown
GND	Ground	6 Edge-connect or .156 pin	6	Yellow
HV	H.V. Spark	1/4" male Q.C.		

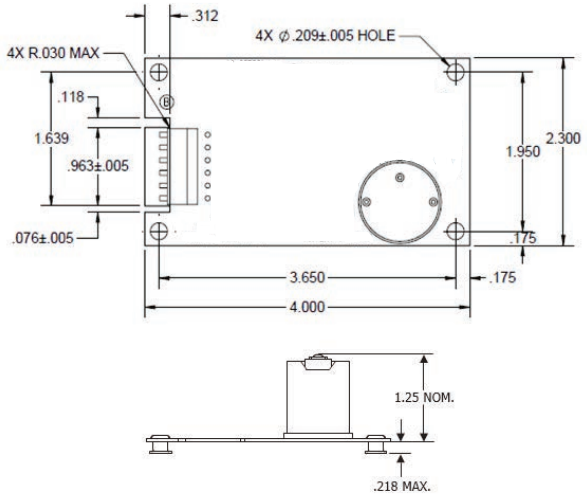
*Colors for Fenwal Controls wire harnesses
Note: Location 2 and 5 are unused.

WIRING DIAGRAM



EXTERNAL WIRING DIAGRAM WITH LOCAL SENSE

DIMENSIONS - INTEGRAL STANDOFF



CONTROL WIRE HARNESS

The wiring harness designed for the 35-53 may also be used on the 35-52, note that the orange and black wires are not used. Standard wire lengths are 12, 18, 24 30, 36 and 48 inches.

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

High Voltage and Remote Sense Cable Requirements

The HV Ignition Cable should have a voltage rating of 25KV and an insulation rating of 200C. Suppression type UL 3257 or SAE J2031 ratings are recommended. 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.

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

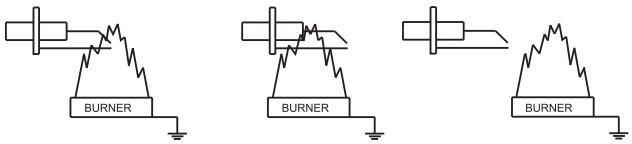
SPARK ELECTRODES/FLAME SENSORS

Critical for gas-fired appliances, proper design, construction, and application assures reliable ignition and optimal performance. Fenwal Controls uses only glazed Alumina ceramics and certified rod materials suitable up to 2175°F (1190°C). Spark electrodes typically have a 0.125" gap between the high voltage (HV) rod tip and the ground rod or burner. Flame sensors are a single rod used in flame rectification circuit of the ignition control to confirm the presence (or absence) of the flame.

Refer to Fenwal Controls datasheet F-22-100 for details.

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 in (3.12 mm), unless otherwise specified by the appliance manufacturer. Larger gaps may not perform as intended in all conditions. 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 to the user during normal operation.

Flame Current Measurement

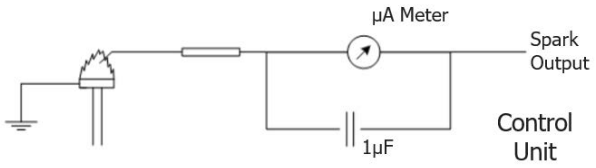
Flame current is the current which passes through the flame from the sensor to ground to complete the primary safety circuit. The minimum flame current necessary to keep the system from lockout is 0.7µA. To measure flame current:

1. Disconnect Input Voltage.
2. Insert a 0-50µA DC meter and capacitor in series with the sensor electrode and wire as shown below.

The meter should read 0.7µA or higher while flame is established. If the meter reads below "0" on the scale, the meter leads are reversed. Disconnect power and reconnect meter leads for proper polarity.

CAUTION

When monitoring flame current, use a 1.0µF, 250 VDC bypass capacitor to protect the meter from damage.



TROUBLESHOOTING

WARNING

Risk of Explosion or Fire

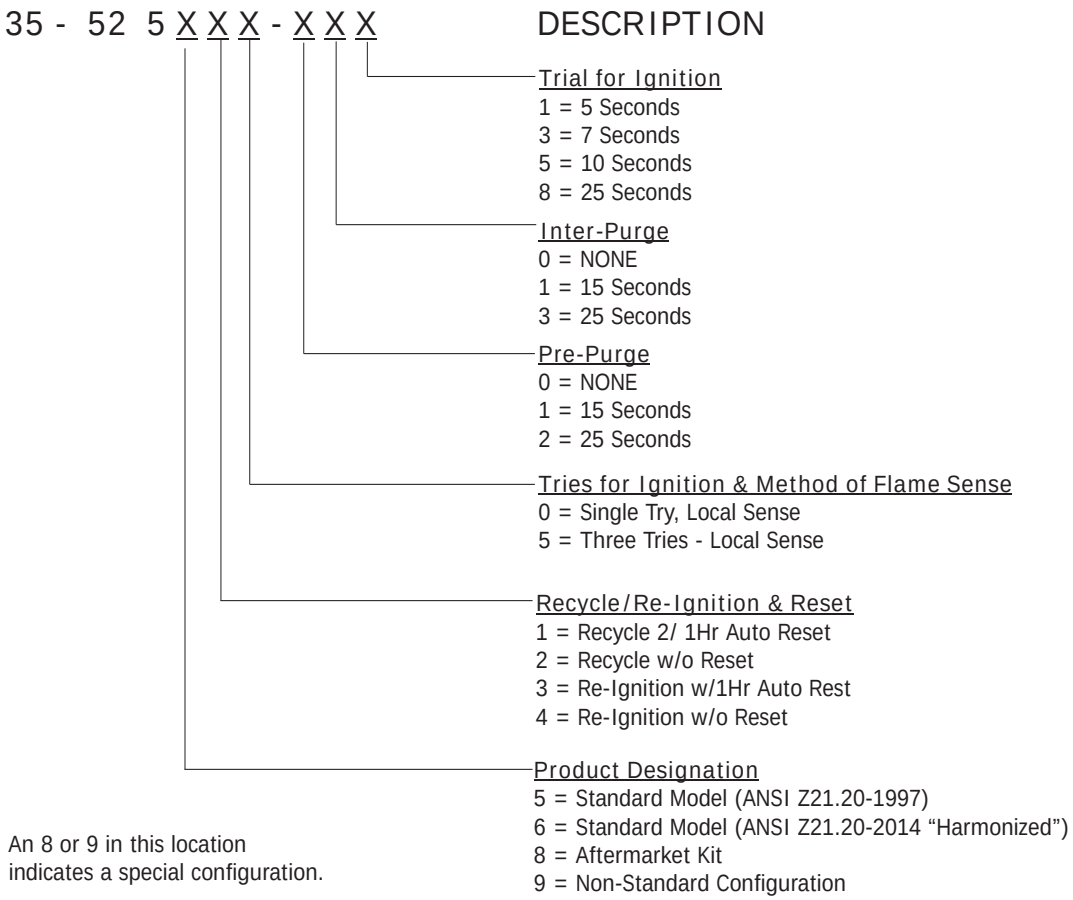
The 35-52 control cannot be serviced by the user. If any control faults are detected, the 35-52 control must be replaced by qualified service personnel. Risk of explosion or fire can result if the control module has been opened or with any attempts to repair it, and the warranty is void.

Troubleshooting Guide	
Symptom	**Recommended Actions**
1. Dead	A. Miswired B. Transformer bad/battery fault C. Fuse/circuit breaker fault D. No voltage at PWR E. Faulty control
2. Valve on, no spark	A. Miswired B. Shorted electrode C. Open HV cable D. Faulty control
3. Spark on, no valve	A. Valve coil open B. Open valve wire C. Faulty control (check voltage between V1 and GND)
4. Flame okay during TFI, no flame sense (after TFI)	A. Faulty electrode B. Faulty HV wire C. Poor ground at burner D. Faulty control (check flame current)

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.

PART NUMBER CONFIGURATION



An 8 or 9 in this location
indicates a special configuration.

Consult Fenwal Controls
for operating characteristics of this control.

EXPORT INFORMATION (USA):
Jurisdiction: EAR
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