G67 Intermittent Pilot Ignition Controls

The G67 Intermittent Pilot Ignition Control is used to automatically light a pilot burner and energize the main burner gas valve of a heating system in response to the thermostat’s call for heat. When the heating load is satisfied, the thermostat opens and the G67 de-energizes the pilot and main burner gas valves. The G67 can be used with equipment with a maximum firing rate of 117 kW (400,000 Btu/hr). Any application over 117 kW (400,000 Btu/hr) must be approved in advance by the Johnson Controls Application Engineering Department.

All G67 applications must use redundant gas valves. Consideration must be given to the temperature of the surface on which the G67 is mounted. These controls are suitable for operation over a temperature range of -40 to 66°C (~40 to 150°F).
## Table 1: Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ignition Type</td>
<td>Indirect</td>
</tr>
<tr>
<td>Ignition Source</td>
<td>High voltage spark, capacitive discharge</td>
</tr>
<tr>
<td>Maximum High Voltage Cable Length</td>
<td>1,220 mm (48 in.) recommended</td>
</tr>
<tr>
<td>Flame Detection Means</td>
<td>Flame rectification</td>
</tr>
<tr>
<td>Flame Detection Types</td>
<td>Remote sensing</td>
</tr>
<tr>
<td>Minimum Flame Current</td>
<td>0.2 microampere</td>
</tr>
<tr>
<td>Flame Failure Response Time</td>
<td>0.8 second, maximum</td>
</tr>
<tr>
<td>Spark Gap</td>
<td>2.5 mm (0.1 in.), nominal</td>
</tr>
<tr>
<td>Ignition Trial Times</td>
<td>Infinite</td>
</tr>
<tr>
<td>Power Requirements</td>
<td>Control: 24 VAC, 50/60 Hz, nominal</td>
</tr>
<tr>
<td></td>
<td>Operation Current: 0.15A nominal + valves</td>
</tr>
<tr>
<td>Contact Rating</td>
<td>Main Valve: 2A continuous, 5A inrush</td>
</tr>
<tr>
<td></td>
<td>Pilot Valve: 2A continuous, 5A inrush</td>
</tr>
<tr>
<td>Ambient Operating and Storage Temperature</td>
<td>-40 to 66°C (-40 to 150°F)</td>
</tr>
<tr>
<td>Humidity</td>
<td>95% RH non-condensing</td>
</tr>
<tr>
<td>Types of Gas</td>
<td>Natural (Liquefied Petroleum (LP), manufactured, mixed, or LP gas-air mixture may be used in a well vented or outdoor application)</td>
</tr>
<tr>
<td>Packaging</td>
<td>Bulk pack supplied to original equipment manufacturer (individual pack optional).</td>
</tr>
<tr>
<td>Bulk Pack Quantity</td>
<td>50</td>
</tr>
<tr>
<td>Bulk Pack Weight</td>
<td>12 kg (27 lb)</td>
</tr>
<tr>
<td>Agency Listing</td>
<td>IAS (AGA/CGA) Certificate Number C2154020</td>
</tr>
<tr>
<td>Specification Standards</td>
<td>ANSI Standard Z21.20, CSA C22.2-No. 199</td>
</tr>
</tbody>
</table>

*The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.*
The following definitions describe operating conditions:

**Trial for Ignition**--Period during which the pilot valve and spark are activated attempting to ignite gas at the main burner.

**Run**--Main gas valve remains energized and spark is turned off after successful ignition.

**Flameout**--Loss of proven flame. Should a flameout occur, the main valve closes and the spark recurs within 0.8 seconds.

The G67 ignition control may only be used for two types of applications:

- well ventilated or outdoor application
- power vent or induced draft application

Use the G67B( ) only on rooftop, excess air, and power vented gas burning equipment.

When using the G67, the appliance or equipment must be approved by a recognized testing agency in accordance with the applicable American National Standards. See *Table 1: Specifications*. No other application is permissible.

The G67 solid-state ignition control lights a pilot burner by a spark. Pilot gas is ignited and burns during each run cycle (intermittent pilot). Main burner and pilot gas are extinguished during the Off cycle.

The main gas valve will not open until the pilot flame has been proven by the sensing circuit. Should a loss of flame occur, the main valve closes and the spark recurs within 0.8 seconds.
Figure 2 illustrates the sequence of operation for the G67 control.
On a call for heat from the system thermostat, the G67 ignition control simultaneously opens the pilot valve and supplies a continuous spark to the pilot burner’s electrode. When the pilot burner gas ignites, the pilot flame sensor detects the pilot flame and signals the G67 to energize the main gas valve and discontinue the spark. The main gas valve will not be energized until the flame sensor detects the presence of the pilot flame.

If the pilot flame goes out (with the thermostat still calling for heat), the G67 will de-energize the main gas valve and provide a continuous spark at the pilot burner’s electrode. When the pilot flame is re-ignited and detected by the pilot flame sensor, the main gas valve is energized and the spark is shut off. The G67 ignition control de-energizes the pilot gas valve and main burner gas valve when the thermostat stops calling for heat.

**Sequence of Operation**

Figure 2: Sequence of Operation
### Installation and Wiring

**IMPORTANT:** These instructions are intended as a guide for qualified personnel installing or servicing Johnson Controls ignition controls. Carefully follow all instructions in this sheet and all instructions on the appliance. Limit repairs, adjustments, and servicing to the operations listed in this sheet or on the appliance.

**WARNING:** Fire or Explosion Hazard. Avoid serious injury by carefully following precautions in this sheet and all instructions on the appliance. Limit repairs, adjustments, and servicing to the operations listed in this sheet or on the appliance.

**WARNING:** Fire or Explosion Hazard. If the control is installed in an area that is exposed to water (dripping, spraying, rain, etc.), it must be protected. If the control has been exposed to water in any way, do not use it.

**CAUTION:** Equipment Damage Hazard. Do not mount the control where it will be exposed to direct infrared radiation from the main burner or to temperatures in excess of the maximum product temperature rating.

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### Ignition Control

**WARNING:** Shock Hazard. Avoid electrical shock and equipment damage. Disconnect electrical power and turn off gas before wiring control.

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### Location/Mounting

Choose a location that provides the shortest, direct cable route to the spark electrode, flame sensor assembly. Easy access to the terminals is desired for wiring and servicing. The G67 may be mounted in any position. Mount the control on a grounded metal surface with No. 8 machine or No. 6 sheet metal screws.
To mount the G67 ignition control:

1. Attach the flame sensor securely to the pilot burner. The tip of the sensor is intended for direct exposure to the flame.
2. Connect the sensor lead to the flame sensor and to Terminal 4 on the G67.
3. Attach the high voltage cable from the pilot burner electrode to the ignition transformer on the G67.
4. Install the terminal boot to cover the exposed ignition transformer terminal.

⚠️ **CAUTION:** **Equipment Damage Hazard.** Connect the high voltage cable to the spark transformer terminal and spark electrode (pilot burner assembly) before applying power to the control. Ensure the ground wire is attached to the pilot burner and control ground terminal strip.

⚠️ **CAUTION:** **Equipment Damage Hazard.** Locate all limit and operating controls in series with the thermostat terminal (THS 2) on the ignition control.

Refer to Figures 3, 4, and 5 for wiring schematic and wiring diagrams. All wiring should be in accordance with the National Electrical Code (NEC) and all other local codes and regulations. The high voltage spark transformer cable must not be in continuous contact with a metal surface. Use standoff insulators. Ensure that the flame sensor wire and the high voltage spark transformer cable are separated from one another by a minimum distance of 6.35 mm (1/4 in.) and are not wrapped around any pipe, other wiring, or accessories.

Check the voltage rating marked on the control and make sure it is suited to the application. Use an NEC Class 2 transformer to provide 24 VAC under maximum load, including valves. A transformer having excessive primary impedance due to poor coupling will affect the ignition potential.
Power is wired directly to R (Common) on the thermostat and Terminal 6 on the G67.

Figure 3: Wiring Schematic for G67 Self-Checking Control

Figure 4: Wiring Diagram for G67A( )
**WARNING:** Fire or Explosion Hazard. Avoid personal injury or property damage by making sure the control functions properly and there are no gas leaks. Follow this checkout and startup procedure before leaving the installation.

**WARNING:** Fire or Explosion Hazard. Do not attempt to check out this system by manually lighting the pilot. This could energize the main valve.

Make sure all components function properly by performing the following shutoff test.

1. Temporarily disconnect the flame sensor by removing the sensor cable from Terminal 4 on the G67.
2. With power off and gas on, purge gas lines of all air. Using a soap solution, check for positive gas seal at the valve inlet and on all upstream pipe connections.
3. Close the main manual shutoff valve and wait 5 minutes. Then turn the valve to the On position.
4. Turn on power to the appliance and turn the thermostat to a high setting.

   Note: If the system is power vented, the vent motor should operate.
   The G67 initiates sparking at the pilot burner/spark igniter and opens the pilot valve. Pilot burner gas ignites; main burner must not ignite.

5. Turn down the thermostat for 30 seconds (to reset the system), then turn it up again.

6. Disconnect the main valve lead from Terminal 3 on the G67. Connect a DC microammeter in series with the flame sensor lead and Terminal 4 on the control (observe correct polarity). The DC current should be 0.2 microampere or greater. If it is less, see the Service Checkout Procedures section.

7. Turn down the thermostat, disconnect the microammeter, and reconnect the main valve lead and the sensor lead.

8. Turn up the thermostat. The G67 initiates sparking at the pilot burner/spark igniter and opens the pilot valve. After the pilot gas ignites, the flame sensor detects the presence of pilot flame and the control energizes the main valve and de-energizes the spark.

9. Turn down the thermostat. The main gas and pilot flame should extinguish. Verify successful ignition at least three times before leaving the installation.
The anticipator setting is normally equal to the ignition system current draw, plus that of the pilot and main valve.

Due to variations in appliance wiring and valves, it is advisable to measure the actual current draw of the heating system at the thermostat location. Measuring this current can be accomplished by opening the thermostat contacts (lowering the set point) and installing an AC ammeter across the terminals, or by using a clamp-on ammeter with a 10-turn multiplier attached to the terminals. See Figure 6.

**Figure 6: Measuring the Thermostat Current**
If the system does not function properly, determine the cause using the procedures in this section.

Before proceeding with troubleshooting the system, check the following:

- Are all mechanical and electrical connections tight?
- Is the system wired correctly?
- Is gas inlet pressure per manufacturer’s specifications?
- Is the system powered?
- Is the thermostat calling for heat?

There are three potential system failure conditions:

- no spark, and system does not work
- spark present, but pilot does not light
- pilot lights, but main valve does not come on

Determine the failure condition, then use the respective flowchart on the following pages to troubleshoot the system. Perform the procedures in the Checkout and Startup Procedure section after any servicing.
Start

Is Lead 5 connected securely to ground? (Visually check)

Yes

Are thermostat contacts closed?

Yes

Is 24 VAC present between Terminal 6 and ground?

No

Connect securely

Yes

Is 24 VAC present between Terminal 2 and ground?

No

Check wiring. Check for proper voltage at transformer primary and secondary. Repair as necessary.

Yes

Is high voltage cable connected securely to spark transformer?

No

Connect securely, then turn on supply voltage

Yes

Is high voltage cable brittle, burnt, or cracked?

Yes

Replace cable

No

Turn off supply voltage

Is spark gap 2.54 mm (0.1 in.) and located in pilot gas stream?

No

Replace G67

Yes

Is spark electrode ceramic cracked?

Yes

Replace electrode ceramic cracked

No

Correct or replace pilot burner, turn on supply voltage.

End

Is 24 VAC present between Terminal 1 and ground?

Yes

Close contacts

No

Is 24 VAC present between Terminal 2 and ground?

Yes

Is 24 VAC present between Terminal 6 and ground?

No

Connect securely

Yes

Check wiring. Check for proper voltage at transformer primary and secondary. Repair as necessary.

Is high voltage cable connected securely to spark transformer?

No

Connect securely, then turn on supply voltage

Yes

Is high voltage cable brittle, burnt, or cracked?

Yes

Replace cable

No

Turn off supply voltage

Is spark gap 2.54 mm (0.1 in.) and located in pilot gas stream?

No

Replace G67

Yes

Is spark electrode ceramic cracked?

Yes

Replace electrode ceramic cracked

No

Correct or replace pilot burner, turn on supply voltage.

End

Figure 7: No Spark, and System Does Not Work
Figure 8: Spark Present, but Pilot Does Not Light

Start

Is pilot valve wiring securely connected to Terminal 1 and ground?

Yes

Is 24 VAC present between Terminal 1 and ground?

Yes

Is inlet gas pressure per manufacturer's specifications?

Yes

Is gas at pilot?

Yes

Shield from drafts. Check for clean orifice. If OK, replace G67.

No

Correct or replace pilot

Is pilot spark gap 2.54 mm (0.1 in.) and located in pilot gas stream?

Yes

If OK, replace pilot

No

Make sure pilot line is not kinked or obstructed. Check for clean orifice.

Connect securely

Replace G67

Correct gas pressure

End
Start

Does spark stay on for more than 30 seconds after pilot lights?

Yes

Is 24 VAC present between Terminal 3 and ground?

No

Replace G67

Yes

Make sure sensor cable and high voltage cable are separated and not wrapped around any pipe or accessories.

Is inlet gas pressure per manufacturer's specifications?

No

Correct gas pressure

Yes

Is sensor cable securely connected to Terminal 4 and flame sensor?

No

Connect securely

Yes

Is sensor ceramic cracked?

No

Replace sensor

Correct problem

Is cable grounded out?

No

Replace cable

Yes

Is sensor or sensor connector shorted out to metal surface?

No

Correct short

Is there continuity and is sensor cable well insulated?

No

Replace G67

Yes

Disconnect main valve lead from Terminal 3 and sensor cable from Terminal 4. Observing correct polarity, connect DC microammeter between sensor cable terminal and Terminal 4.

If system still fails, clean pilot assembly, change the flame sensor length or orifice size, or replace G67.

Is DC current 0.2 microampere or greater with pilot only operation?

No

Yes

Replace G67

End

Figure 9: Pilot Lights, but Main Valve Does Not Come On
CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.

The G67 control is not field repairable. **Do not** attempt field repairs. Use only an exact or factory-recommended replacement control.

All other accessories, such as flame sensors, electrode assemblies, pilot assemblies, and leads can be obtained through the original equipment manufacturer or Johnson Controls distributor.