

G891 Pulse Ignition Control

Application

The G891 Pulse Ignition Control is a microprocessor-based, direct spark ignition control that initiates combustion for the high efficiency pulse furnace. The G891 is designed for ignition of natural, Liquefied Petroleum (LP), manufactured, mixed, or LP gas-air mixtures.

The G891 also provides:

- sequencing of ignition source and supervision of burner operation
- four additional ignition trials in the event successful ignition is not accomplished on the initial trial
- complete ignition sequence retry after 60 minute shutoff period
- inducer motor control
- thermostat contact monitoring
- system operating status LED that assists in system troubleshooting
- keyed wiring connector

All G891 applications must use redundant gas valves. Any application over 400,000 Btu/hr must be approved in advance by Johnson Controls Application Engineering.

Table 1: Specifications

Specification	Rating
Line Voltage	120 VAC, 50/60 Hz, nominal
Operating Voltage	24 VAC, 50/60 Hz, nominal
Maximum Current Load on Transformer	0.625A
Thermostat Heat Anticipator Setting	0.1A nominal + main valve load
Contact Ratings Valve Inducer	2A steady, 5A inrush @ 24 VAC 1/20 hp @ 120 VAC
Minimum Flame Sensing Current	0.5 microamperes DC
Flame Failure Response Time	0.8 second
Flame Establishing Period	8 seconds*
Ignition Activation Period	7.5 to 8 seconds*
Prepurge Time	30 seconds*
Postpurge Time	30 seconds*
Trial for Ignition Time	8 seconds*
Number of Trials before Automatic Retry	5
Automatic Retry Delay Period	60 minutes*
Operating and Storage Temperature	-40 to 160°F (-40 to 71°C)
Humidity	95% RH non-condensing
Types of Gas	Natural, Liquefied Petroleum (LP), manufactured, mixed, LP gas-air mixture
Agency Approvals	IAS (AGA, CGA)
Agency Test Standards	ANSI Z21.20, CAN/CSA-C22.2 No. 199

* Timings based on 60 Hz operation. Timings increase 20% for 50 Hz operation.

Sequence of Operation

On a call for heat from the system thermostat, the G891 ignition control begins its sequence of operation (see Figure 1).

- *Prepurge*--Within one second of thermostat contact closure, the ignition control energizes the relay providing power to the inducer motor. The inducer motor runs for 30 seconds. The spark and gas valve are not activated during this period. Once the prepurge period expires, the trial for ignition begins.
- *Trial for Ignition*--After the 30 second prepurge period, the spark and gas valve are activated in an attempt to light the main burner. During the 8 second trial time, the gas valve is energized for all 8 seconds, the spark is activated for the first 7.5 seconds, and the control attempts to prove main burner flame during the last 0.5 seconds. If flame is not sensed, the control proceeds to interpurge. If flame is sensed, it proceeds to a run condition.

- *Interpurge*--If the flame is not proven within the last 0.5 second of the trial, the ignition control de-energizes the gas valve and spark, and holds the inducer on. Once the interpurge period expires, the control proceeds to another trial (if failed trials was less than five) or to the retry delay period (if failed trials was equal to five).
- *Retry Delay Period*--If the control fails to prove ignition after five trials, it proceeds to the retry delay period. During retry delay, all control outputs (valve, spark, and inducer) are de-energized for 60 minutes. Once the 60 minutes expires, the control attempts another series of ignition trials, beginning with prepurge.
- *Run*--If the flame is proven within the last 0.5 second of the trial, the control enters a run condition. The inducer is de-energized, the gas valve is kept open, and the spark remains off. The control remains in this condition until the thermostat is satisfied or until a flameout is detected.
- *Flameout*--If, during the run state, the main burner flame sense signal is lost, the main valve is de-energized within 0.8 second. The control then proceeds to another trial for ignition, beginning with prepurge.
- *Postpurge*--Once the thermostat is satisfied, the inducer motor restarts and runs for the 30 second postpurge period.

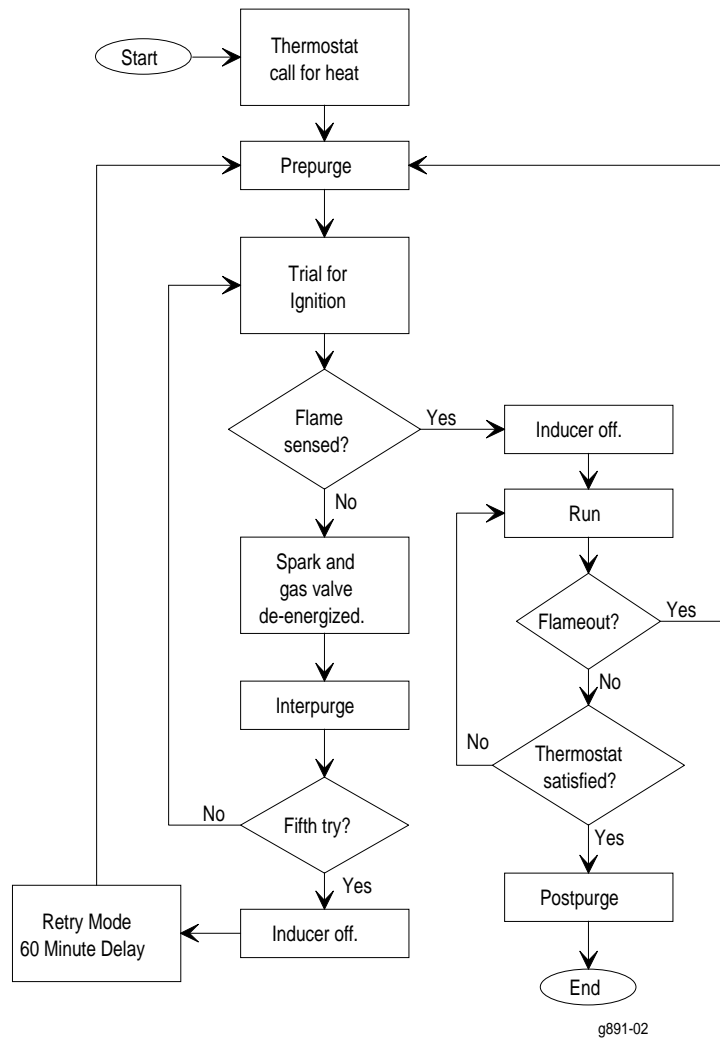
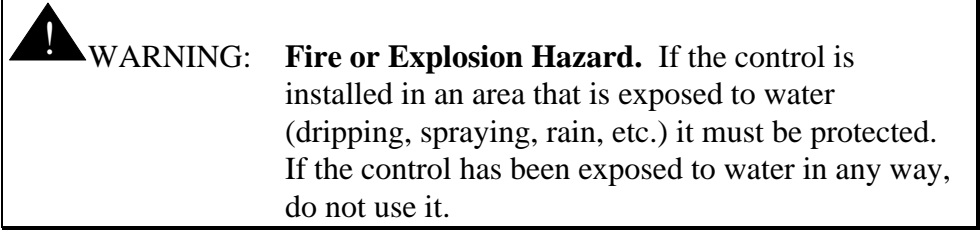


Figure 1: Sequence of Operation

Installation and Wiring

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

Mounting



Choose a location with the shortest direct cable route to the spark igniter and flame sensor. Refer to Figure 2 for mounting dimensions. Use four No. 8 machine or No. 6 sheet metal screws through the mounting holes in the enclosure.

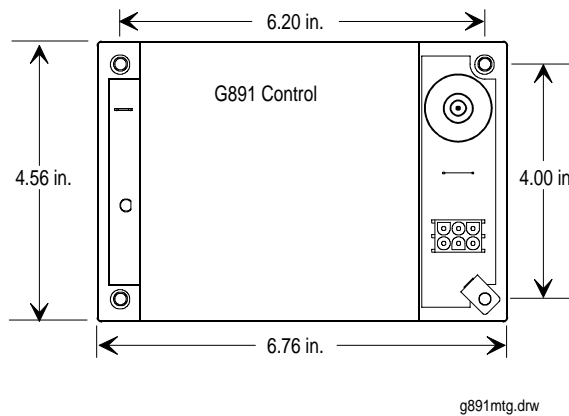
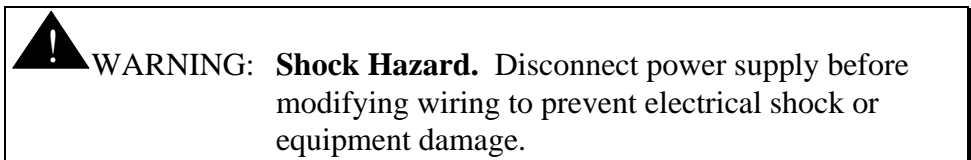


Figure 2: Mounting Dimensions

Wiring



Check the voltage rating marked on the control or in Table 1 to be sure it is suited to the application. Use an NEC Class 2 transformer, such as a Johnson Controls Y65, to provide 24 VAC under maximum load, including the valve.

All wiring should be in accordance with the National Electrical Code and all other local codes and regulations. The high voltage spark cable must not be in continuous contact with a metal surface. Use standoff insulators. Be certain the flame sensor wire and the high voltage spark cable are separated from one another by a minimum of 1/4 inch, and not wrapped around any pipe, other wiring, or accessories.

The schematic in Figure 3 shows a typical wiring hookup for the G891. Connections such as the gas valve, thermostat input, and inducer motor are connected to the control with a keyed plug connector. All limit and operating controls must be located in series with the thermostat.

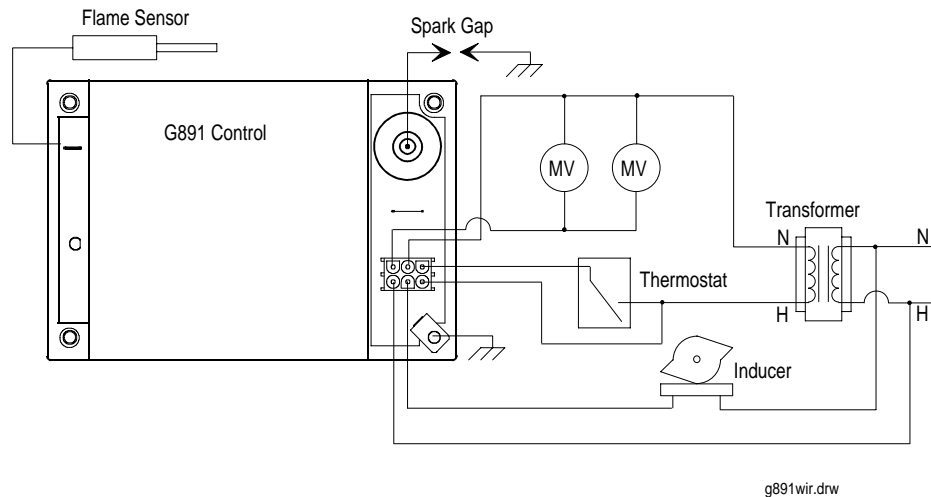


Figure 3: Wiring Diagram for G891

Checkout and Startup Procedures

! 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.

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

1. With the gas and thermostat off, turn on power to the appliance.
2. Turn the thermostat to a high setting and verify that the control goes through the operating sequence to a shutoff condition (LED flashing).

Note: The burner will not light because the gas is off.

3. Turn the thermostat off.
4. Turn gas on and purge gas lines of all air.
5. Check for gas leaks with a soap solution.
6. Turn the thermostat to a high setting and verify successful ignition and a normal run condition for at least three minutes.
7. Do a leak check on all pipe joints downstream of the gas valve.
8. Turn the thermostat down for at least 30 seconds and then back up again. Verify successful ignition at least three times before leaving the installation.

Service Procedures

If the system does not function properly, determine the cause using the procedures in this section.

Preliminary Checks

Before proceeding with troubleshooting the system, check the following:

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

Flash Codes

The G891 control features a diagnostic LED. The LED indicates the following system status:

- *On*--Normal operation.
- *Flashing*--Control is in 60 minute retry delay.
- *Off*--Unit is in lockout. Recycle power to re-initiate ignition sequence.

Failure Conditions and Corrective Action

Refer to the appliance manufacturer's recommended troubleshooting guidelines. If unavailable, determine the failure condition and use the following service tips to troubleshoot the system.

Table 2: No Spark and System Does Not Work

Possible Causes	Corrective Actions
System in lockout (LED off)	Recycle power to appliance.
System in retry (LED flashing)	Wait for retry delay period to expire or recycle power to appliance.
Spark cable not secured tightly to control	Secure correctly.
Spark cable cracked, burnt, or brittle	Replace spark cable.
Spark cable in continuous contact with metal surface	Use standoff insulators or re-route cable.
Spark igniter ceramic cracked	Replace spark igniter.
Spark gap greater than 0.1 inch	Re-gap or replace spark igniter.
Defective ignition control	Replace ignition control.


Table 3: Spark is Present But Main Burner Will Not Light

Possible Causes	Corrective Actions
24 VAC not present at main valve terminal on ignition control	Replace ignition control.
Main valve wiring lacking continuity or good insulation	Replace wiring.
24 VAC present at main valve terminals, but main valve does not open	Replace gas valve.
Incorrect gas pressure	Adjust gas pressure to appliance specifications or contact local gas company.
Spark gap not located in gas stream	Re-locate spark igniter.

Table 4: Main Burner Lights But Does Not Stay Lit

Possible Causes	Corrective Actions
Flame sensor cable in contact with spark cable	Separate cables.
Flame sensor cable lacking continuity or good insulation	Replace cable.
Flame sensor ceramic cracked	Replace flame sensor.
Flame sensor electrode dirty	Clean with steel wool or replace.
Flame sensor positioned incorrectly	Position flame sensor so that top half is exposed to the blue portion of flame.
Poor grounds	Make certain a ground screw is inserted through the ground lug on the ignition control.
Defective ignition control	If flame sensing current is above the recommended level (0.5 microamperes) and main burner will not stay lit, then replace ignition control.

Repairs and Replacement

	<p>CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.</p>
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Do not attempt field repairs to the ignition control. Use only an exact or recommended replacement control. For a replacement control or accessories, contact the original equipment manufacturer or authorized wholesaler.



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FAN 121
Installation Sheets Manual
Printed in U.S.A.