GM-7000 Series Multi-function Gas Control Valve

GM-7000 Series

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Figure 1: GM-7000 Series Multi-function Gas Control Valve

Application

The GM-7000 Series multi-function gas valve works in conjunction with an electronic sequence control unit to provide fully automatic control for residential and light commercial heating, cooking, drying, and other light commercial applications.

The range of options provide application flexibility by offering different valve types, adjustment methods, body connections, and solenoid configurations. Typical applications include free-standing and wall-hung boilers for residential hydronic heating, commercial cooking appliances, and commercial tumbler dryers.
### Table 1: Specifications

<table>
<thead>
<tr>
<th>Types of Gas</th>
<th>1st (Manufactured Gas), 2nd (Natural Gas), and 3rd (Liquid Petroleum [LP] Gas) Family Gases</th>
</tr>
</thead>
</table>
| Maximum Operating Pressure | North America: 1/2 psi  
Europe: 100 mbar; Class A (EN 161)  
50 mbar; Class B (EN 161) |
| Maximum Differential Pressure | 20 mbar (8 in. W.C.) |
| Reverse Pressure Ratings | 150 mbar (60 in. W.C.) Minimum; Class A (EN 161)  
50 mbar (20 in. W.C.) Minimum; Class B (EN 161) |
| Regulator Classification | Direct-acting Regulator: Class B (EN 88)  
Lever-acting Regulator: Class C (EN 88) |
| Direct-acting or Lever-acting Regulator Pressure Range | Natural Gas: 5 to 15 mbar (2 to 6 in. W.C.)  
LP Gas: 22.5 to 30 mbar (9 to 12 in. W.C.) |
| Permissible Ambient Temperature | 0 to 70°C (32 to 158°F) |
| Body Connections | 3/8 or 1/2 in. NPT or Rp with Flange Connection Holes (M4 x 0.7 mm pitch x 6 mm deep) |
| Valve Torsion Group | Group 2 (EN 88 and EN 161) |
| Pressure Taps | 9.0 mm (0.35 in.) Outlet Tap Spigot; Optional 1/8 in. NPT or Rp Inlet Tap |
| Pilot Connection | Optional 6 mm, 4 mm, 1/4 in., or Blank Plug |
| Dirt Strainer | 0.5 mm (0.02 in.) Mesh |
| Operating Time Rating | 100% Continuous |
| Valve Timings | Closing Time: \( \leq 1 \text{ Second} \)  
Opening Time: \( \leq 1 \text{ Second} \)  
Dead Time: \(< 1 \text{ Second} \) |
| Power Rating | 16 VA per Coil; Class A (EN 161)  
9.5 VA per Coil; Class B (EN 161) |
| Electrical Connections | 3-pin Solenoid Coil: 2 x 6.35 mm (1/4 in.) Terminals  
+ 6.35 mm (1/4 in.) Earth Ground Terminal  
2-pin Solenoid Coil: 2 x 6.35 mm (1/4 in.) Terminals  
+ Earth Ground Screw Connection |
| Coil Insulation Class | Class F |
| Agency Listings | IAS (AGA/CGA) Certificate Number C0197003  
EC Type Examination Certificate Number C87AP57  
Australian Gas Association Certificate Number 4518 |
| Specification Standards | EN 88, EN 126, EN 161, and EN 12067-1  
Standards Complying with the EMC Directive  
Standards Complying with the Low Voltage Directive  
Canadian Standard CAN 1-6.3 and 1-6.5  
ANSI Standards, Z21.21 and Z21.78  
Australian Standard 209, Class 2 to AGA 214 |

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.

Refer to the GM-7000 Product Bulletin (LIT-4350300) for necessary information on the operating and performance specifications of this product.
**Installation**

**IMPORTANT:** This technical bulletin is intended as a guide for authorized service personnel installing or servicing Johnson Controls products. 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:** Explosion hazard. The system must meet all applicable codes. Improper installation may cause gas leaks, explosions, property damage, and injuries.

**WARNING:** Explosion hazard. To prevent leakage of upstream gas, shut off the gas supply at the main manual shutoff valve before installing or servicing the GM-7000 valve.

**CAUTION:** Equipment damage. To prevent damage to the valve when mounting to pipework, do not use a wrench on any surface other than the casting flats provided at the inlet and outlet ends of the valve body.

Perform the following procedure to install the GM-7000 valve.

1. Mount the valve. The GM-7000 valve may be mounted on a horizontal manifold with the magnetic operators (solenoid coils) pointed up (vertical) or in any position not exceeding 90° from the vertical. The valve may also be mounted on a vertical manifold in any position around its axis (see Figure 2). Do not install the solenoid coils upside down. Install vertically wherever possible.

![Figure 2: GM-7000 Valve Mounting Position](image)

**Figure 2: GM-7000 Valve Mounting Position**

2. Ensure that the specified maximum ambient temperature is not exceeded (see Table 1).
3. Ensure that the power supply voltage is compatible with the required control valve voltage.

4. When installing the valve on the manifold, ensure the gas flows through the valve body in the direction indicated by the arrow on the body. If the valve is installed with the gas flow in the opposite direction of the arrow, leakage can occur.

5. If installing a valve with threaded connections, use an approved pipe joint sealing compound on male threads before assembly. An optional thread lubricant may have been factory applied to the first two or three threads of the inlet and outlet to avoid galling. Take care to see that excess compound is removed after mounting the flanges to the pipe work. Threads of pipe and nipples must be smooth and free of tears and burrs. Steam clean all piping to remove foreign substances such as cutting oil or thread chips.

6. If installing a valve with flanged connections, ensure that all mating surfaces are free from burrs and loose particles. Ensure that gaskets and O-ring seats are correctly positioned in mating flanges. Ensure that approved jointing compounds are not excessively applied.

7. When pilot tube connection is necessary, connect the pilot tubing to the threaded pilot connection on the underside the of the valve body (see Figure 3) and run the tube to the pilot burner within the appliance. Connect the pilot tube to the valve by means of an optional compression fitting. Refer to the Accessories section for pilot tube compression fittings.

![Figure 3: Underside of Valve with Direct-acting Regulator](image-url)
8. Check for leakage before making any valve adjustments.
   a. Shut off the gas at the main manual shutoff valve and open the pressure connection between the manual shutoff valve and the GM-7000 valve.
   b. Connect air tubing with a maximum pressure of 1-1/2 times the valve’s maximum operating pressure (as indicated on the valve) to the opened pressure connection.
   c. Paint all valve body connections with a rich soap and water solution.

If bubbles occur, this is an indication of a leak. To stop a leak, tighten joints and connections. Replace the part if the leak cannot be stopped.

If bubbles do not occur, remove the air tubing and close the pressure connection.

9. Make wiring connections. Refer to the Wiring section for specific wiring instructions.

10. Determine outlet pressure by applying power to the valve and energizing both valve solenoids. Use the outlet pressure tap connection on the underside of the valve body to monitor the outlet pressure. The outlet pressure tap is a bleed hole with a cast spigot, sealed with a threaded brass needle screw. (See Figure 3.) To monitor the outlet pressure, turn the screw in a counterclockwise direction one or two turns and fit a 9 mm diameter flexible tube over the cast spigot. After all valve adjustments have been made and the desired outlet pressure has been obtained, remove the flexible tube. Tighten the needle screw by turning it clockwise with a slotted screwdriver until hand tight, sealing the bleed hole.

11. Check for leakage at the bleed hole. Paint the bleed hole with a rich soap and water solution (or use acceptable gas leak detection equipment). If bubbles occur this is an indication of a gas leak. To stop a leak, tighten the needle screw. Replace the valve if the leak cannot be stopped.
12. If installing a valve with manual flow adjustment, set the valve to the desired outlet flow rate. Refer to the Adjustments section for specific adjustment procedure. After setting the valve flow rate, ensure that the outer plastic tamper-proof cap is replaced. See Figure 4.

![Figure 4: GM-7 Model with Manual Flow Adjustment](image1)

13. If installing a valve with a pressure regulator, set the valve to the desired outlet pressure. Refer to the Adjustments section for specific adjustment procedures. After setting the valve outlet pressure, ensure that the leak-limiting seal cap is replaced. See Figures 5 and 6.

![Figure 5: GM-7 Model with Direct-acting Regulator](image2)
Figure 6: GM-7 _4_ and GM-7 _5_ Models with Lever-acting Regulator

14. Before leaving the installation, observe at least three complete operating cycles to ensure that all components are functioning correctly.
**WARNING:** **Shock hazard.** Disconnect the power supply before making electrical connections to avoid electrical shock or equipment damage. Ensure that the operating voltage is identical to the information on the product identification label.

**CAUTION:** **Equipment damage hazard.** For 24 VAC applications, the ground wire must **not** be connected to prevent possible grounding of the 24 VAC transformer secondary.

A number of configurations for the electrical connections are available. The basic model is supplied with 6.35 x 0.8 mm (1/4 in.) male tag terminals and connections should be made using 6.35 x 0.8 mm (1/4 in.) female, fully insulated push-on terminals. The earth terminal is clearly labeled with the earth ground symbol.

The electrical wiring to a twin solenoid valve from an electronic intermittent proven pilot ignition system is comprised of two line wires, a common wire, and an independent earth ground wire. Wiring can be done using a single 4-wire cable. The wiring connections for a 4-wire cable are shown in Figure 7.

Route the electrical connection for the valve solenoid actuators from the burner sequence control to the valve and make the wiring connections in accordance with Figure 8 for 2-pin models and Figure 9 for 3-pin models.

**Note:** Models with a 3-pin connection can also be connected using a pre-wired electrical plug and socket. See *Accessories*.

![Figure 7: Twin Solenoid Wiring Using 4-wire Cable](image-url)
Figure 8: 2-pin Electrical Connections (230V Only)

*M Connect only one coil to earth ground. The pilot or the main solenoid can be grounded.*
Do not connect the earth ground when using a 24 VAC model to prevent possible grounding of the 24 VAC transformer secondary.

110/120 VAC and 230 VAC models require both coils to be connected to earth ground.

Figure 9: 3-pin Electrical Connections
**Adjustments**

**IMPORTANT:** All adjustments must be made in conjunction with the gas appliance and in accordance with the appliance manufacturer’s instructions. Only authorized personnel should make adjustments. See each version for specific adjustments.

**WARNING:** Explosion hazard. The minimum flow rate of the valve must not be adjusted below the minimum safe working rate of the appliance.

**GM-7 _2_**

The GM-7 _2_ model has manual flow adjustment through the use of an adjustable screw located on the underside of the valve. The screw adjusts the position of the flow plug within an internal flow orifice, which determines the flow rate through the valve.

To adjust the flow, remove the outer plastic tamper-proof cap to expose the adjusting screw (see Figure 4). Turn the screw (using a suitable screwdriver or wrench) in a counterclockwise direction to increase the flow or in clockwise direction to decrease the flow.

**GM-7 _3_**

The GM-7 _3_ model has a direct-acting pressure regulator. The regulator can be adjusted by turning the adjusting screw to determine the compression of the regulator spring against the regulator diaphragm.

To adjust the outlet pressure, remove the leak-limiting seal cap to expose the adjusting screw (see Figure 5). Turn the screw (using a suitable screwdriver) in a clockwise direction to increase or in a counterclockwise direction to decrease the outlet pressure of the valve.

**GM-7 _4_**

The GM-7 _4_ model has a right-handed lever-acting pressure regulator. Right-handed orientation is determined by the position of the adjustment when looking into the inlet connection of the valve. The lever-acting pressure regulator can be adjusted by turning the adjusting screw to determine the compression of the regulator spring against the regulator diaphragm.

To adjust the outlet pressure, remove the leak-limiting seal cap to expose the adjusting screw (see Figure 6). Turn the screw (using a suitable screwdriver) in a clockwise direction to increase or in a counterclockwise direction to decrease the outlet pressure of the valve.
The GM-7_5_ model has a left-handed lever-acting pressure regulator. Left-handed orientation is determined by the position of the adjustment when looking into the inlet connection of the valve. The lever-acting pressure regulator can be adjusted by turning the adjusting screw to determine the compression of the regulator spring against the regulator diaphragm.

To adjust the outlet pressure, remove the leak-limiting seal cap to expose the adjusting screw (see Figure 6). Turn the screw (using a suitable screwdriver) in a clockwise direction to increase or in a counterclockwise direction to decrease the outlet pressure of the valve.
This procedure requires the use of a voltmeter or multimeter.

WARNING: Personal injury hazard. Before performing this procedure, refer to any specific instructions issued by the appliance manufacturer with regard to servicing their equipment. Such instruction must take precedence over this procedure. If in doubt, replace the entire valve.

Figure 10: Burner Ignition Troubleshooting

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This flowchart illustrates the steps to troubleshoot burner ignition issues, including checking the main electrical switch, gas supply, thermostat, solenoid, solenoid voltage, spark occurrence, and burner pressure, among other factors. Each decision point is designed to help isolate the cause of a malfunction, leading to potential replacements or adjustments.
Table 2: Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-profile Cover</td>
<td>GO-9403-0000</td>
</tr>
<tr>
<td>Electrical Plug and Socket Connector for 9.5 VA, 3-pin Solenoid</td>
<td>GO-9104-0000</td>
</tr>
<tr>
<td>Electrical Plug and Socket Connector for 16 VA, 3-pin Solenoid</td>
<td>GO-9101-0000</td>
</tr>
<tr>
<td>7/16 in. x 24 Pilot Blank Plug</td>
<td>GO-9052-0000</td>
</tr>
<tr>
<td>6 mm Breakaway Pilot Compression Fitting</td>
<td>GO-9060-0000</td>
</tr>
<tr>
<td>4 mm Breakaway Pilot Compression Fitting</td>
<td>GO-9661-0000</td>
</tr>
<tr>
<td>1/4 in. Breakaway Pilot Compression Fitting</td>
<td>GO-9662-0000</td>
</tr>
<tr>
<td>Conversion Kit for Non-regulation</td>
<td>GM-70-CBP</td>
</tr>
<tr>
<td>Conversion Kit with LP Spring</td>
<td>GM-70-CLP</td>
</tr>
</tbody>
</table>

Repairs and Replacement

Field repairs must not be made except for replacement of the solenoid coils. For a replacement coil or valve, contact the nearest Johnson Controls representative or the original equipment manufacturer.

⚠️ CAUTION: Equipment damage hazard. Label all wires prior to disconnection when servicing valves. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

Table 3: Replacement Solenoid Coils

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 VAC; 50/60 Hz; 3-pin Class B (9.5 VA) Coil</td>
<td>GO-9622-0000</td>
</tr>
<tr>
<td>24 VAC; 50/60 Hz; 3-pin Class A (16 VA) Coil</td>
<td>GO-9632-0000</td>
</tr>
<tr>
<td>110/120 VAC; 50/60 Hz; 3-pin Class B (9.5 VA) Coil</td>
<td>GO-9621-0000</td>
</tr>
<tr>
<td>110/120 VAC; 50/60 Hz; 3-pin Class A (16 VA) Coil</td>
<td>GO-9631-0000</td>
</tr>
<tr>
<td>230 VAC; 50/60 Hz; 2-pin Class B (9.5 VA) Coil</td>
<td>GO-9610-0000</td>
</tr>
<tr>
<td>230 VAC; 50/60 Hz; 3-pin Class B (9.5 VA) Coil</td>
<td>GO-9620-0000</td>
</tr>
<tr>
<td>230 VAC; 50/60 Hz; 3-pin Class A (16 VA) Coil</td>
<td>GO-9630-0000</td>
</tr>
</tbody>
</table>