



VR8203 Direct Ignition Combination Gas Controls

INSTALLATION INSTRUCTIONS

APPLICATION

These direct ignition gas controls are used in gas-fired commercial cooking appliances with up to 200 cfh capacity on natural gas. They include safety shutoff, a manual valve, two independently operated automatic operators, and a standard regulator. The first automatic operator is under control of a limit switch (normally closed), that shuts off gas flow when the limit is reached. The second automatic operator is under control of a thermostat or system controller and cycles appliance temperature.

These gas controls are factory-set for natural (and manufactured) gas or LP gas. Do not attempt to use a control set for natural (manufactured) gas on LP gas, or a control set for LP on natural (manufactured) gas. Controls can be converted from one gas to the other with a conversion kit (ordered separately). Order part no. 393691 to convert from natural (manufactured) to LP gas; order part no. 394588 to convert from LP to natural (manufactured) gas.

Body Pattern:

Straight through with 1/2 in. inlet and 1/2 in. outlet.

Pipe Adapters:

Angle and straight adapters available for 3/8, 1/2 and 3/4 in. pipe. See Table 1.

Voltage/Frequency:

24 Vac at 60 Hz.

Current Draw:

0.5A.

Ambient Temperature Range:

0°F to 175°F (-18°C to 79°C).

Table 1. Flange Part Numbers.

Inlet/Outlet Pipe Size	Flange Type	Part No.	
		Less Hex Wrench	With Hex Wrench
3/8 in. NPT	Straight	393690-1	393690-11
	Elbow	393690-2	393690-12
1/2 in. NPT	Straight	393690-6	393690-16
	Elbow	393690-3	393690-13
3/4 in. NPT	Straight	393690-4	393690-14
	Elbow	393690-5	393690-15

NOTE: Flange Kits include one flange with attached O-ring and four mounting screws. Kits include a 9/64 in. hex wrench, as noted.

Approvals:

American Gas Association design certificate: L2025006.
Canadian Gas Association design certificate: L2025006.
Australian Gas Association design certificate: 4214.
Approved for Delta C applications.

PLANNING THE INSTALLATION

WARNING

FIRE OR EXPLOSION HAZARD. CAN CAUSE PROPERTY DAMAGE, SEVERE INJURY, OR DEATH.

Follow these warnings exactly:

1. Review the installation as outlined in this section.
2. Plan for frequent maintenance as described in the Maintenance section.

When gas controls are used on heating appliances such as commercial cookers, agricultural equipment, industrial heating equipment and pool heaters, heavy demands are made on the controls. Special steps may be required to prevent nuisance shutdowns and control failure due to frequent cycling and severe environmental conditions related to moisture, corrosive chemicals, dust or excessive heat. These applications require Resideo Engineering review; contact your Sales Representative for assistance.

Review the following conditions that may apply to your specific installation and take the precautionary steps suggested.

Frequent Cycling

These controls are designed for use on appliances that typically cycle only three to four times an hour during the heating season. In year-round applications with greater cycling rates, the control can wear out more quickly. Perform a monthly check-out.

Water or Steam Cleaning

If a gas control gets wet, replace it. If the appliance is likely to be cleaned with water or steam, protect (cover) the



controls and wiring from water or steam flow. Mount the controls high enough above the bottom of the cabinet to avoid getting wet during normal cleaning procedures. NEMA 4 enclosure is recommended for the ignition module; see the Electronic Ignition Service Manual, 70-6604.

High Humidity or Dripping Water

Dripping water can cause the module to fail. Never install an appliance where water can drip on the controls. In addition, high ambient humidity can cause the gas control to corrode and fail.

If the appliance is in a humid atmosphere, make sure air circulation around the controls is adequate to prevent condensation. Also, regularly check out the system. NEMA 4 enclosure is recommended for the ignition module; see the Electronic Ignition Service Manual, 70-6604.

Corrosive Chemicals

Corrosive chemicals can attack the module and gas control, eventually causing a failure. If chemicals are used for routine cleaning, avoid contact with the controls. Where chemicals are suspended in air, as in some industrial or agricultural applications, NEMA 4 enclosure is recommended for the ignition module; see the Electronic Ignition Service Manual, 70-6604.

Dust or Grease Accumulation

Heavy accumulations of dust or grease can cause controls to malfunction. Where dust or grease can be a problem, provide covers for the module and the gas control to limit contamination. NEMA 4 enclosure is recommended for the ignition module; see the Electronic Ignition Service Manual, 70-6604.

Heat

Excessively high temperatures can damage controls. Make sure the maximum ambient temperature at the control does not exceed the rating of the control. If the appliance operates at very high temperatures, use insulation, shielding, and air circulation, as necessary, to protect the controls. Proper insulation or shielding should be provided by the appliance manufacturer; verify proper air circulation is maintained when the appliance is installed.

INSTALLATION

When Installing this Product...

- ① Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
- ② Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.
- ③ Installer must be a trained, experienced service technician.
- ④ After installation is complete, check out product operation as provided in these instructions.



WARNING

FIRE OR EXPLOSION HAZARD CAN CAUSE PROPERTY DAMAGE, SEVERE INJURY OR DEATH.

Follow these warnings exactly:

1. Disconnect power supply before wiring to prevent electrical shock or equipment damage.
2. To avoid dangerous accumulation of fuel gas, turn off gas supply at the appliance service valve before starting installation, and perform Gas Leak Test after completion of installation.
3. Always install sediment trap in gas supply line to prevent contamination of gas control.
4. Do not force the gas control knob. Use only your hand to turn the gas control knob. Never use any tools. If the gas control knob will not operate by hand, the gas control should be replaced by a qualified service technician. Force or attempted repair may result in fire or explosion.



CAUTION

Never apply a jumper across or short the valve coil terminals. This will burn out the heat anticipator in the thermostat or damage the electronic direct ignition (DI) module.

IMPORTANT

These gas controls are shipped with protective seals over inlet and outlet tapings. Do not remove seals until ready to connect piping.

Follow the appliance manufacturer instructions if available; otherwise, use the instructions provided on the following pages.

Converting Between Natural and LP Gas



WARNING

FIRE OR EXPLOSION HAZARD CAN CAUSE PROPERTY DAMAGE, SEVERE INJURY OR DEATH.

1. Do not use a gas control set for natural gas on an LP gas system or a gas control set for LP gas on a natural gas system.
2. When making conversion, main pilot burner orifices must be changed to meet appliance manufacturer specifications.

Refer to appliance manufacturer instructions for orifice specifications and changeover procedure. Gas controls are factory-set for natural (and manufactured) or LP gas. Do not attempt to use a control set for natural (manufactured) gas on LP gas, or a control set for LP on natural (manufactured) gas.

Gas controls can be converted from one gas to the other with a conversion kit (ordered separately). Order part no. 393691 to convert from natural (manufactured) to LP gas; order part no. 394588 to convert from LP to natural (manufactured) gas.

Install Adapters to Control

If adapters are to be installed on the gas control, mount them as follows:

Flanges:

- 1 Choose the appropriate flange for your application.
- 2 Remove seal over control inlet or outlet.
- 3 Assure O-ring is fitted in the groove of flange. If the O-ring is not attached or is missing, do not use flange.
- 4 With O-ring facing control, align the screw holes on the control with the holes in the flange. Insert and tighten the screws provided with the flange. See Fig. 1. Tighten the screws to 25 inch pounds of torque to provide a gas-tight seal.

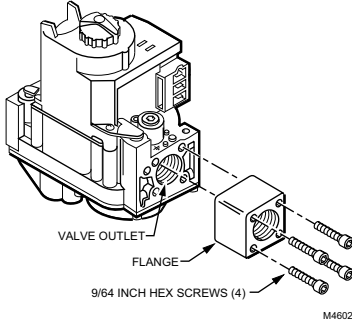


Fig. 1. Fasten flange to valve firmly, but do not overtighten screws.

Bushings:

- 1 Remove seal over control inlet or outlet.
- 2 Apply moderate amount of good quality pipe compound to bushing, leaving two end threads bare. On LP installation, use compound resistant to LP gas. Do not use Teflon tape.
- 3 Insert bushing in control and carefully thread pipe into bushing until tight.

Complete instructions below for installing piping, control, and wiring. Make certain the leak test you perform on the control after completing the installation includes leak testing the adapters and screws. If you use a wrench on the valve after the flanges are installed, use the wrench only on the flange, not on the control. Refer to Fig. 5.

Location

The combination gas control is mounted in the appliance vestibule on the gas manifold. If this is a replacement application, mount the gas control in the same location as the old control.

Locate the combination gas control where it cannot be affected by steam cleaning, high humidity, or dripping water, corrosive chemicals, dust or grease accumulation or excessive heat. To assure proper operation, follow these guidelines:

- Locate gas control in a well-ventilated area.
- Mount gas control high enough above the cabinet bottom to avoid exposure to flooding or splashing water.
- Assure the ambient temperature does not exceed the ambient temperature ratings for each component.
- Cover gas control if appliance is cleaned with water, steam, or chemicals or to avoid dust and grease accumulation.
- Avoid locating gas control where exposure to corrosive chemical fumes or dripping water is likely.

Install Piping to Gas Control

All piping must comply with local codes and ordinances or with the National Fuel Gas code (ANSI Z223.1 NFPA No. 54), whichever applies. Tubing installation must comply with approved standards and practices.

- 1 Use new, properly reamed pipe free from chips. When tubing is used, assure the ends are square, deburred and clean. All tubing bends must be smooth and without deformation.
- 2 Run pipe or tubing to the control. If tubing is used, obtain a tube-to-pipe coupling to connect the tubing to the control.
- 3 Install sediment trap in the supply line to the gas control. See Fig. 2.

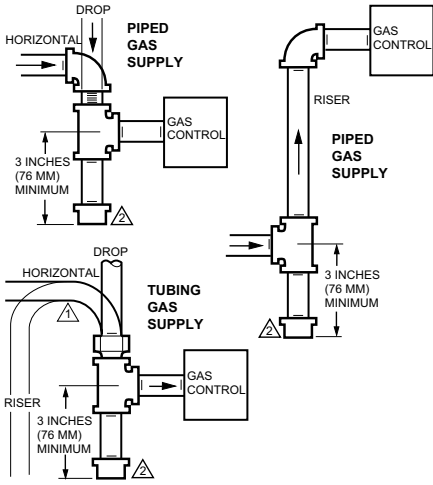
Install Control

- 1 This control can be mounted 0 to 90 degrees, in any direction, from the upright position of the gas control knob, including vertically.
- 2 Mount the control so gas flow is in the direction of the arrow on the bottom of the control.
- 3 Thread pipe into control. Do not thread pipe too far. Valve distortion or malfunction can result if the pipe is inserted too deeply; refer to Table 2.

Table 2. NPT Pipe Thread Length In In.

Pipe Size	Thread Pipe this Amount	Maximum Depth Pipe can be Inserted into Control
3/8	9/16	3/8
1/2	3/4	1/2
3/4	13/16	3/4

- 4 Apply a moderate amount of good quality pipe compound (do not use Teflon tape) to pipe only, leaving two end threads bare. On LP installations, use compound resistant to LP gas. See Fig. 3.
- 5 Remove seals over control inlet and outlet if necessary.
- 6 Connect pipe to control inlet and outlet. Use wrench on the square ends of the control. If a flange is used, place wrench on flange rather than on the control. Refer to Fig. 4 and 5.



- ⚠ ALL BENDS IN METALLIC TUBING SHOULD BE SMOOTH.
- ⚠ CAUTION: SHUT OFF THE MAIN GAS SUPPLY BEFORE REMOVING END CAP TO PREVENT GAS FROM FILLING THE WORK AREA. TEST FOR GAS LEAKAGE WHEN INSTALLATION IS COMPLETE.

Fig. 2. Sediment trap installation.

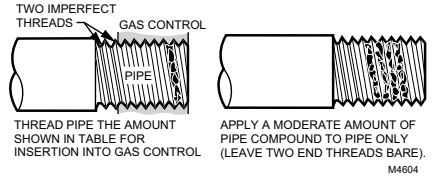


Fig. 3. Use moderate amount of pipe compound.

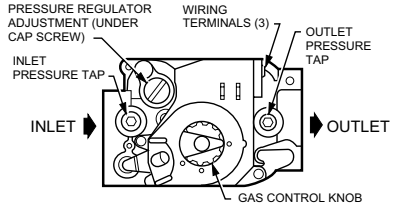


Fig. 4. Top view of gas control.

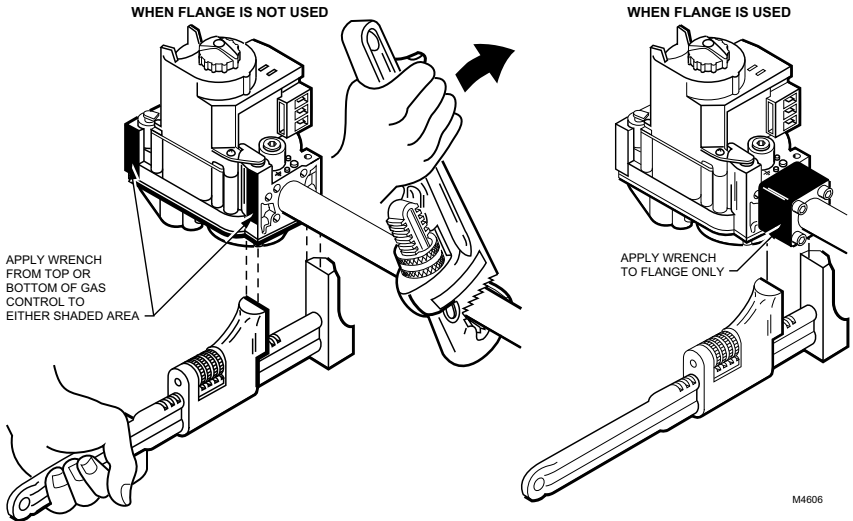


Fig. 5. Proper use of wrench on gas control with and without flanges.

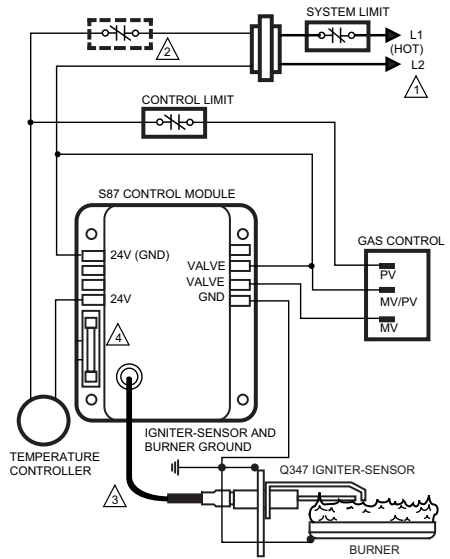
Wiring

Follow the wiring instructions furnished by the appliance manufacturer, if available, or use the general instructions provided below. Where these instructions differ from the appliance manufacturer, follow the appliance manufacturer instructions.

All wiring must comply with applicable electrical codes and ordinances.

Disconnect power supply before making wiring connections to prevent electrical shock or equipment damage.

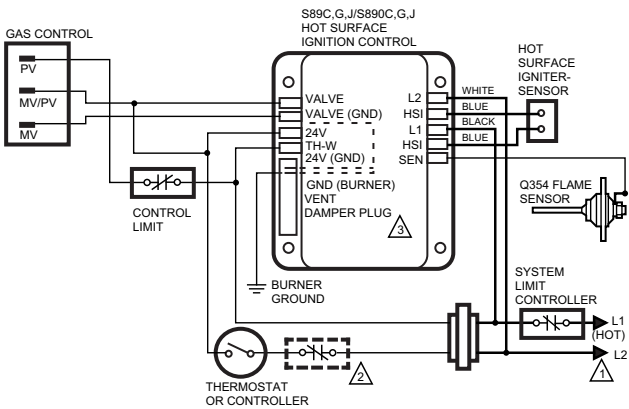
- 1 Check the power supply rating on the gas control and make sure it matches the available supply. Install the transformer, thermostat, and other controls as required.
- 2 Connect control circuit to gas control terminals. See Fig. 4, 6, and 7.
- 3 Adjust thermostat heat anticipator to 0.50A rating stamped on valve operator.



- 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
- 2 ALTERNATE SYSTEM LIMIT CONTROLLER LOCATION.
- 3 MAXIMUM IGNITER-SENSOR CABLE LENGTH: 3 FT (.9M) OR LESS.
- 4 3 A REPLACEABLE FUSE.

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Fig. 6. Wiring connections for VR8203 in S87 direct ignition system.



- 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED. MAKE SURE L1 AND L2 ARE NOT REVERSED; THIS WOULD PREVENT FLAME DETECTION.
- 2 ALTERNATE SYSTEM LIMIT CONTROLLER LOCATION.
- 3 SEN TERMINAL AND Q354 FLAME SENSOR ON D MODELS ONLY.

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Fig. 7. Wiring connections for VR8203 in S89 direct ignition system.

STARTUP AND CHECKOUT



WARNING

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1. Do not force the gas control knob on the appliance. Use only your hand to turn the gas control knob. Never use any tools.
2. If the knob will not operate by hand, the control should be replaced by a qualified service technician.

Gas Control Knob Settings

Gas control knob settings are as follows:

OFF: Prevents main gas flow through the control.

ON: Permits gas to flow into the control body. Under control of the thermostat and direct ignition module, gas can flow to the main burner.

NOTE: Controls are shipped with the gas control knob in the ON position.

Perform Gas Leak Test



WARNING


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Check for gas leaks with rich soap and water solution any time work is done on a gas system.

Gas Leak Test

- 1 Paint pipe connections upstream of gas control with rich soap and water solution. Bubbles indicate gas leak.
- 2 If leak is detected, tighten pipe connections.
- 3 Stand clear of main burner while lighting to prevent injury caused from hidden leaks that could cause flashback in the appliance vestibule. Light main burner.
- 4 With main burner in operation, paint pipe joints (including adapters) and control inlet and outlet with a rich soap and water solution.
- 5 If another leak is detected, tighten adapter screws, joints, and pipe connections.
- 6 Replace part if leak cannot be stopped.

Turn On System

Rotate the gas control knob counterclockwise  to ON.

Turn On Main Burner

Follow instructions provided by appliance manufacturer or turn thermostat up to call for heat.

Check and Adjust Gas Input and Burner Ignition



CAUTION

1. Do not exceed input rating stamped on appliance nameplate, or manufacturer recommended burner orifice pressure for size orifice(s) used. Make certain primary air supply to main burner is properly adjusted for complete combustion. Follow instructions of appliance manufacturer.
2. **IF CHECKING GAS INPUT BY CLOCKING GAS METER:** Make certain there is no gas flow through the meter other than to the appliance being checked. Other appliances must remain off with their pilots extinguished (or their consumption must be deducted from the meter reading). Convert flow rate to Btuh as described in Gas Controls Handbook, 70-2602, and compare to Btuh input rating on appliance nameplate.
3. **IF CHECKING GAS INPUT WITH MANOMETER:** Be sure gas control is in OFF position before removing outlet pressure tap plug to connect manometer (pressure gauge). Also turn gas control knob back to OFF when removing gauge and replacing plug. Before removing inlet pressure tap plug, shut off gas supply at the manual valve in the gas piping to the appliance or, for LP, at the tank. Also shut off gas supply before disconnecting manometer and replacing plug. Repeat Gas Leak Test at plug with main burner operating.

Standard Pressure Regulator



- 1 Check the manifold pressure listed on the appliance nameplate. Gas control outlet pressure should match the nameplate.
- 2 With the main burner operating, check the gas control flow rate using the meter clocking method or pressure using a manometer connected to the outlet pressure tap on the gas control. See Fig. 4.
- 3 If necessary, adjust the pressure regulator to match the appliance rating. See Table 3 for factory-set nominal outlet pressure and adjustment range.
 - a. Remove pressure regulator adjustment cap screw.
 - b. Using a screwdriver, turn inner adjustment screw clockwise  to increase or counterclockwise  to decrease gas pressure to burner.
 - c. Always replace cap screw and tighten firmly to prevent gas leakage.
- 4 If desired outlet pressure or flow rate cannot be achieved by adjusting the gas control, check gas control inlet pressure using a manometer at the gas control inlet pressure tap. If inlet pressure is in the normal range (see Table 3), replace gas control. Otherwise, take the necessary steps to provide proper gas pressure on the control.

Table 3. Pressure Regulator Specification Pressures in in. wc (kPa).

Type of Gas	Nominal Inlet Pressure Range	Factory Set Nominal Outlet Pressure	Setting Range
Natural	5.0-7.0 (1.2-1.7)	3.5 (0.9)	3-5 (0.7-1.2)
LP	12.0-14.0 (2.9-3.9)	10.0 (2.5)	8-12 (2-3)

Check Safety Shutdown Performance



WARNING

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Perform the safety shutdown test any time work is done on a gas system.

NOTE: Read steps 1 through 7 before starting, and compare to the safety shutdown or safety lockout tests recommended for the direct ignition (DI) module. Where they differ, use the procedure recommended for the module.

- 1 Turn off gas supply.
- 2 Set thermostat or controller above room temperature to call for heat.
- 3 Watch for ignition spark or for glow at hot surface igniter either immediately or following prepurge. See DI module specifications.
- 4 Time length of igniter operation. See DI module specifications.
- 5 After the module locks out, open the manual gas cock and make sure no gas is flowing to the burner.
- 6 Set the thermostat below room temperature and wait one minute.
- 7 Operate the system through one complete cycle to make sure all controls operate properly.

MAINTENANCE



WARNING

FIRE OR EXPLOSION HAZARD CAN CAUSE PROPERTY DAMAGE, SEVERE INJURY, OR DEATH.

Do not attempt to take apart the gas control or to clean it. Improper assembly and cleaning can cause unreliable operation.

Regular preventive maintenance is important in applications that place a heavy load on system controls such as those used in the commercial cooking and agricultural and industrial industries because:

- In many such applications, particularly commercial cooking, the equipment operates 100,000 to 200,000 cycles per year. Such heavy cycling can wear out the gas control in one to two years.

- Exposure to water, dirt, chemicals and heat can damage the gas control and shut down the control system. A NEMA 4 enclosure for the ignition module can reduce exposure to environmental contaminants. See Electronic Ignition Service manual, 70-6604.

The maintenance program should include regular check-out of the system as outlined in the Startup and Checkout section, and check-out of the control system as described in the appliance manufacturer literature.

Maintenance frequency must be determined individually for each application. Some considerations are:

- *Cycling frequency.* Appliances that may cycle 20,000 times annually should be checked monthly.
- *Intermittent use.* Appliances that are used seasonally should be checked before shutdown and again before the next use.
- *Consequence of unexpected shutdown.* Where the cost of an unexpected shutdown would be high, the system should be checked more often.
- *Dusty, wet, or corrosive environment.* Because these environments can cause the gas control to deteriorate more rapidly, the system should be checked more often.

Any control should be replaced if it does not perform properly on checkout or troubleshooting. In addition, replace any module if it is wet or looks like it has ever been wet. Protective enclosures, as described in the *Planning the Installation* section, are recommended regardless of checkout frequency.

SERVICE



WARNING

FIRE OR EXPLOSION HAZARD, CAN CAUSE PROPERTY DAMAGE, SEVERE INJURY OR DEATH.

Do not disassemble the gas control; it contains no replaceable components. Attempted disassembly or repair can damage the control.



CAUTION

Do not apply a jumper across (or short) the valve coil terminals even temporarily. Doing so can burn out the heat anticipator in the thermostat or damage the DI module.

If Main Burner will not Come On with Call for Heat

- 1 Confirm that gas control knob is in the ON position.
- 2 Adjust thermostat several degrees above room temperature.
- 3 Using ac voltmeter, measure voltage across mV terminals at gas control.
- 4 If no voltage is present, check control circuit for proper operation.
- 5 If proper control system voltage is present, replace gas control.

INSTRUCTIONS TO THE APPLIANCE OWNER FOR YOUR SAFETY, READ BEFORE LIGHTING



WARNING

IF YOU DO NOT FOLLOW THE WARNINGS BELOW AND THE LIGHTING INSTRUCTIONS EXACTLY, A FIRE OR EXPLOSION CAN RESULT IN PROPERTY DAMAGE, PERSONAL INJURY OR LOSS OF LIFE.



1. Before lighting, smell around the appliance area for gas. If the appliance uses LP (bottled) gas, be sure to smell next to the floor because LP gas is heavier than air. If you smell gas, immediately shut off the manual valve in the gas piping to the appliance or, on LP, at the tank. Do not try to light any appliance. Do not touch any electrical switch or use the phone. Leave the building and call your gas supplier. If your gas supplier cannot be reached, call the fire department.
2. Do not force the gas control knob on the appliance. Use only your hand to turn the gas control knob. Never use any tools. If the knob does not operate by hand, replace the control using a qualified service technician. Force or attempted repair may result in fire or explosion.
3. The gas control must be replaced if it has been flooded with water. Call a qualified service technician.
4. The gas control is a safety device. It must be replaced in case of any physical damage such as bent terminals, missing or broken parts, stripped threads, or evidence of exposure to heat.

IMPORTANT


Follow the operating instructions provided by the manufacturer of your heating appliance. The information below will be of assistance in a typical control application, but the specific controls used and the procedures outlined by the manufacturer of your appliance may differ, and require special instructions.

TO TURN ON THE APPLIANCE

STOP: Read the safety information above.

- 1 The lighting sequence on this appliance is automatic; do not attempt to manually light the main burner.
- 2 If the appliance does not come on when the thermostat is set several degrees above the control temperature, set the thermostat to the bottom of its range to reset safety control.
- 3 Remove burner access panel if provided on your appliance.
- 4 Turn the gas control knob (Fig. 4) clockwise  to OFF.
- 5 Wait five minutes to allow any gas in the combustion chamber to vent. If you smell gas in the appliance area or near the floor in an LP installation, immediately shut off the manual valve in the gas piping to the appliance or, on LP, at the tank. Do not touch any electrical switch or use the phone. Leave the building and call your gas supplier. If your gas supplier cannot be reached, call the fire department. Failure to do so may result in fire or explosion.
- 6 If you do not smell gas, turn knob on gas control counterclockwise  to ON.
- 7 Replace the burner access panel.
- 8 Reset the thermostat to the desired temperature.
- 9 If the burner does not come on when the control temperature is below the thermostat setting, turn gas control knob to OFF and contact a qualified service technician for assistance.

TO TURN OFF APPLIANCE

Turn the gas control knob clockwise  to OFF.



Resideo Technologies, Inc.
1985 Douglas Drive North, Golden Valley, MN 55422
1-800-468-1502

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