



VR4205 Direct Ignition Combination Gas Controls

INSTALLATION INSTRUCTIONS

APPLICATION

These direct ignition gas controls are used in gas-fired appliances with up to 200 cfh capacity on natural gas. They include safety shutoff, a manual valve, two automatic operators, pressure regulator, pilot adjustment and a conduit cover. See Table 1 for temperature ranges and regulator types.

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 2. Flange kits include one flange with attached O-ring, four mounting screws, a 9/64 in. hex wrench and Instructions.

ELECTRICAL RATINGS:
Voltage and Frequency: 120 Vac, 60 Hz.
Thermostat Heat Anticipator Setting: 0.1A
Current Draw: 0.1A

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 with standard or slow opening regulators 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 gas to natural (manufactured) gas. Controls with step opening regulators cannot be converted.

Table 1. Model Number Suffix Letter Designation

Model No. Suffix Letter	Ambient Temperature Range	Regulator Type
H	0° F to 175° F [-18° C to 79° C]	Slow-opening
M	-40° F to 175° F [-40° C to 79° C]	Standard
P		Step-opening

Table 2. Adapter (Flange) Part Numbers

Inlet/Outlet Pipe Size	Flange Type	Part No. Without 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.

APPROVALS:
American Gas Association design certificate:
UP-70-57A.
Canadian Gas Association design certificate:
1029-CC-8375.
Australian Gas Association certificate: 4214.
Approved for Delta C applications.

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 knob will not operate by hand, replace the control using a qualified service technician. Force or attempted repair may result in fire or explosion.

⚠ CAUTION

1. Never apply a jumper across or short the valve coil terminals. This may burn out the heat anticipator in the thermostat or damage the electronic direct ignition (DI) module.
2. When a gas control is installed external to the appliance, a conduit cover must be installed.

IMPORTANT:

1. These gas controls are shipped with protective seals over inlet and outlet tapings. Do not remove seals until ready to connect piping.
2. When a gas control is installed external to the appliance, a conduit cover MUST be installed. Make sure that conduit cover is placed over the flange before rotating the conduit cover into position.

Follow the appliance manufacturer's instructions if available; otherwise, use the instructions below as a guide.

CONVERTING CONTROL FROM NATURAL GAS TO LP GAS APPLICATION (OR LP GAS TO NATURAL GAS APPLICATION)

⚠ WARNING

FIRE OR EXPLOSION HAZARD CAN CAUSE PROPERTY DAMAGE, SEVERE INJURY OR DEATH
Always change the main burner orifices when converting from natural to LP gas or from LP to natural gas. Follow appliance manufacturer's specifications and instructions. 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.

Controls with standard or slow opening regulators 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. Controls with step opening regulators cannot be converted.

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. Check to ensure that the 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.

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 thread pipe carefully into bushing until tight. Complete instructions below for piping, installing 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 flanges are installed, use the wrench only on the flange, not on the control.

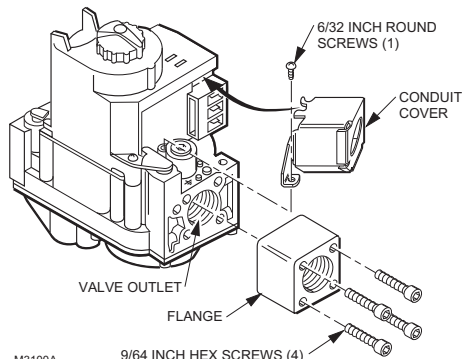


Fig. 1. Firmly fasten flange to valve, but do not overtighten screws.

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.

Do not locate the gas control where it may be affected by steam cleaning, high humidity, 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 to avoid dust and grease accumulation.
- Avoid locating gas control where exposure to corrosive chemical fumes or dripping water are likely.

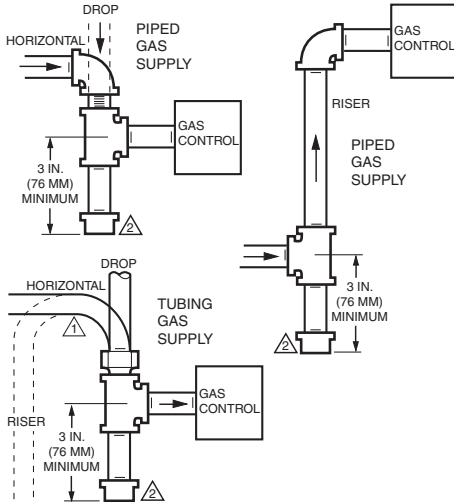
Install Piping to Control

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. If tubing is used, make sure 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 0-90 degrees, in any direction including vertically, from the upright position of the gas control knob.
2. Mount the control so gas flow is in the direction of the arrow on the bottom of the control.
3. Thread pipe the amount shown in Table 3 for insertion into control. *Do not thread pipe too far.* Valve distortion or malfunction may result if the pipe is inserted too deeply.



⚠ 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. M3077B

Fig. 2. Sediment trap installation.

Table 3. 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 the flange rather than on the control. Refer to Figs. 4 and 5.

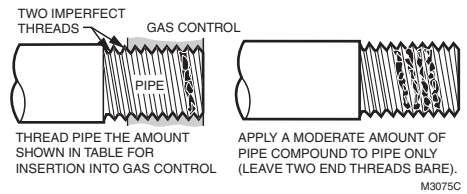


Fig. 3. Use moderate amount of pipe compound.

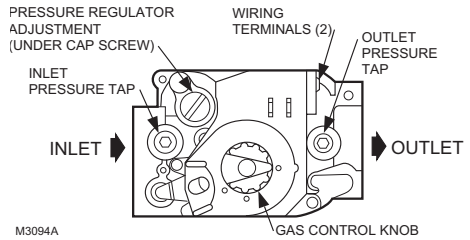
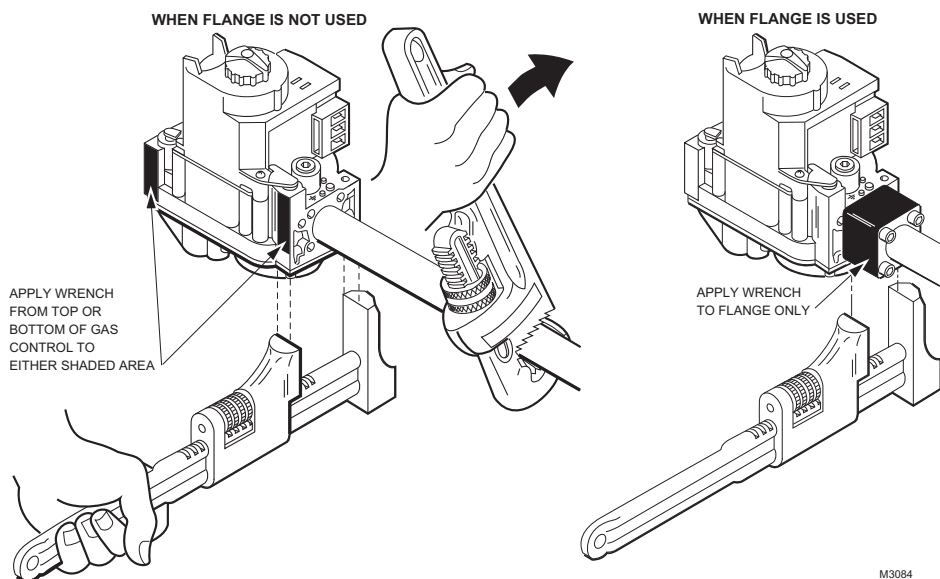


Fig. 4. Top view of gas control.



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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's, follow the appliance manufacturer's instructions.

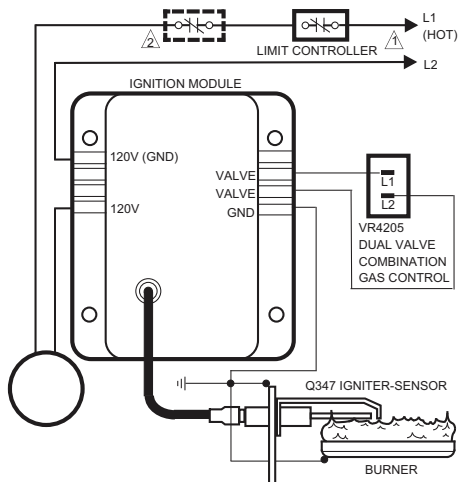
All wiring must comply with applicable electrical codes and ordinances, including insulated quick connect terminals.

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

1. Check the power supply rating on the valve and make sure it matches the available supply. Install transformer, thermostat, and other controls as required.
2. When the gas control is installed external to the appliance, install the conduit cover on the conduit fitting. Do not secure conduit cover at this time.
3. Connect control circuit to gas control terminals. See Figs. 4 and 6.

NOTE: Use leadwires with insulated terminals.

4. Make sure conduit cover is in position and secured to the gas valve with the screw provided. See Fig. 1.
5. Adjust thermostat heat anticipator as instructed in appliance manual (i.e., usually 0.1A).



⚠ POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

⚠ ALTERNATE LIMIT CONTROLLER LOCATION.

M3090A

Fig. 6. Wiring connections for 120 volt control in direct ignition system.

STARTUP AND CHECKOUT



WARNING

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

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, replace the control using 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 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 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 up thermostat 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's 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 form 70-2602, Gas Controls Handbook, and compare to Btuh input rating on appliance nameplate.
3. IF CHECKING GAS INPUT WITH MANOMETER: Be sure gas control is in PILOT position before removing outlet pressure tap plug to connect manometer (pressure gauge). Also turn gas control knob back to PILOT 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 main burner operating, check gas control flow rate by using the meter clocking method or check pressure by using a manometer connected to the outlet pressure tap on the gas control. See Fig. 4.
3. If necessary, adjust pressure regulator to match appliance rating. See Tables 4 and 5 for factory set nominal outlet pressure and adjustment setting range.
 - a. Remove pressure regulator adjustment cap screw.
 - b. Using 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 by using a manometer at the gas control inlet pressure tap. If inlet pressure is in the normal range (see Tables 4 and 5), replace gas control. Otherwise, take the necessary steps to provide proper gas pressure on the control.

Slow-opening and Step-opening Pressure Regulators

1. Check the full rate manifold pressure listed on the appliance nameplate. Gas control full rate outlet pressure should match this rating.

2. With main burner operating, check gas control flow rate by using the meter clocking method or check pressure by using a manometer connected to the outlet pressure tap on the gas control. See Fig. 4.

3. If necessary, adjust pressure regulator to match appliance rating. See Tables 4 and 5 for factory set nominal outlet pressure and adjustment setting range.

a. Remove pressure regulator adjustment cap screw.

b. Using 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 by using a manometer at the gas control inlet pressure tap. If inlet pressure is in the normal range (see Tables 4 and 5), replace gas control. Otherwise, take the necessary steps to provide proper gas pressure to the control.

5. STEP-OPENING PRESSURE REGULATORS ONLY. Carefully check burner lightoff at step pressure. Make sure burner lights smoothly and without flashback to orifice. Make sure all ports remain lit. Cycle burner several times, allowing at least 30 seconds between cycles for regulator to resume step function. Repeat after allowing burner to cool. Readjust full rate outlet pressure, if necessary, to improve lightoff characteristics.

Table 4. Pressure Regulator Specification Pressures in in. wc.

Model Type	Type of Gas	Nominal Inlet Pressure Range	Factory Set Nominal Outlet Pressure		Adjustment Setting Range	
			Step	Full Rate	Step	Full Rate
Standard, slow	Natural	5.0-7.0	--	3.5	--	3-5
	LP	12.0-14.0	--	10.0	--	8-12
Step	Natural	5.0-7.0	0.9	3.5	None	3-5
	LP	12.0-14.0	2.2	10.0	None	8-12

Table 5. Pressure Regulator Specification Pressures in kPa.

Model Type	Type of Gas	Nominal Inlet Pressure Range	Factory Set Nominal Outlet Pressure		Adjustment Setting Range	
			Step	Full Rate	Step	Full Rate
Standard, slow	Natural	1.2-1.7	--	0.9	--	0.7-1.2
	LP	2.9-3.9	--	2.5	--	2-3
Step	Natural	1.2-1.7	0.2	0.9	None	0.7-1.2
	LP	2.9-3.9	0.5	2.5	None	2-3

CHECK SAFETY LOCKOUT (SLOW-OPENING CONTROLS ONLY)

1. With the system power off and the thermostat set to call for heat, manually shut off the gas supply.

2. Energize ignitor control and start timing safety lockout time. When spark ignition terminates, stop timing. When using the VR4205H slow-opening control, the specified ignitor control safety lockout time must exceed 8.5 seconds for system to function properly.

3. After spark cutoff, manually reopen gas control knob. No gas should flow to the main burner.

4. Reset system by adjusting thermostat below room temperature, waiting 30 seconds, and moving up thermostat setting to call for heat. Normal ignition should occur.

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 1-7 below before starting and compare to the safety shutdown or safety lockout tests recommended for the direct ignition (DI) module. When 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 manual gas cock and make sure no gas is flowing to burner.

6. Set thermostat below room temperature and wait one minute.

7. Operate system through one complete cycle to make sure all controls operate properly.

SERVICE



WARNING

FIRE OR EXPLOSION HAZARD CAN CAUSE PROPERTY DAMAGE, SEVERE INJURY OR DEATH
Do not take this control apart; 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 may burn out the heat anticipator in the thermostat or damage the 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 L1 and L2 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 HOMEOWNER FOR YOUR SAFETY, READ BEFORE OPERATING



WARNING

FIRE OR EXPLOSION HAZARD CAN CAUSE PROPERTY DAMAGE, SEVERE INJURY OR DEATH
Follow these warnings exactly:

1. Main burner is lit automatically. Do not manually light.
2. Before lighting main burner, smell around the appliance for gas. Be sure to smell next to floor because LP gas is heavier than air.
3. IF YOU SMELL GAS:
 - Turn off the gas supply at the appliance service valve. On LP gas systems, turn off gas supply at the gas tank.
 - Do not light any appliances in the house.
 - Do not touch electrical switches or use the phone.
 - Leave the building and use a neighbor's phone to call your gas supplier.
 - If you can not reach your gas supplier, call the fire department.
4. Do not force the gas control knob. Use only your hand to push down or turn the gas control knob. Never use any tools. If the gas control knob will not operate by hand, replace the gas control using a qualified service technician. Force or attempted repair may result in a fire or explosion.
5. The gas control must be replaced in case of any physical damage, tampering, 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 FURNACE

STOP: READ THE SAFETY WARNING INFORMATION ABOVE.

1. The lighting sequence on this appliance is automatic; DO NOT ATTEMPT TO MANUALLY LIGHT THE MAIN BURNER.
2. If the furnace does not come on when the thermostat is set several degrees above room 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 then smell gas in the appliance area or near the floor for 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 burner access panel.
8. Reset thermostat to desired temperature.
9. If burner does not come on when room temperature is below thermostat setting, turn gas control knob to OFF and contact a qualified service technician for assistance.

TO TURN OFF APPLIANCE

Turn gas control knob clockwise to OFF.



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