



# V8205, VR8205 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, one or two automatic operators and a pilot adjustment. See Table 1 for model differences and Table 2 for temperature ranges and regulator types.

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

- 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 3.

Table 1. Direct Ignition Combination Gas Control Models.

| Model  | Voltage/Frequency | Number of Automatic Operators | Gas Control Knob Positions | Current Draw |
|--------|-------------------|-------------------------------|----------------------------|--------------|
| V8205  | 24V/60 Hz         | One                           | OFF-ON                     | 0.30A        |
| VR8205 | 24V/60 Hz         | Two                           | OFF-ON                     | 0.5A         |

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

Table 2. Model Number Suffix Letter Designation.

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

- Approvals:**
- American Gas Association design certificate: L2025006.
  - Canadian Gas Association design certificate: L2025006.
  - Australian Gas Association design 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. The installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.

Table 3. Flange Part Numbers.

| Inlet/Outlet Pipe Size | Flange Type | Part Number        |                 |
|------------------------|-------------|--------------------|-----------------|
|                        |             | Without Hex Wrench | With Hex Wrench |
| 3/8 inch NPT           | Straight    | 393690-1           | 393690-11       |
|                        | Elbow       | 393690-2           | 393690-12       |
| 1/2 inch NPT           | Straight    | 393690-6           | 393690-16       |
|                        | Elbow       | 393690-3           | 393690-13       |
| 3/4 inch NPT           | Straight    | 393690-4           | 393690-14       |
|                        | Elbow       | 393690-5           | 393690-15       |

## 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, call a qualified service technician to replace the gas control. Force or attempted repair can result in fire or explosion.

## CAUTION

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

### IMPORTANT:

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

Follow the appliance manufacturer instructions if available; otherwise, use the instructions provided below.

## 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.

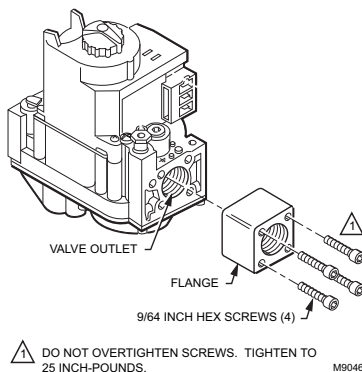
Gas controls with standard or slow opening regulators can be converted from one gas to the other with a conversion kit (ordered separately). Order part no. 393691 to convert from natural (manufactured) to LP gas; order part no. 394588 to convert from LP to natural (manufactured) gas. Controls with step 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 gas control inlet or outlet.
3. Make sure the O-ring fits into the flange groove. If the O-ring is not attached or is missing, do not use the flange.
4. With the O-ring facing the gas control, align the screw holes on the gas 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 gas 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 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 the control. Refer to Fig. 5. Insert bushing in gas control and carefully thread pipe into the bushing until tight.

## 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:

To safeguard 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 are 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. If tubing is used, make sure the ends are square, deburred and clean. Make sure all tubing bends are smooth and without deformation.
2. Run pipe or tubing to the gas control. If tubing is used, obtain a tube-to-pipe coupling to connect the tubing to the gas control.
3. Install sediment trap in the supply line to the gas control. See Fig. 2.

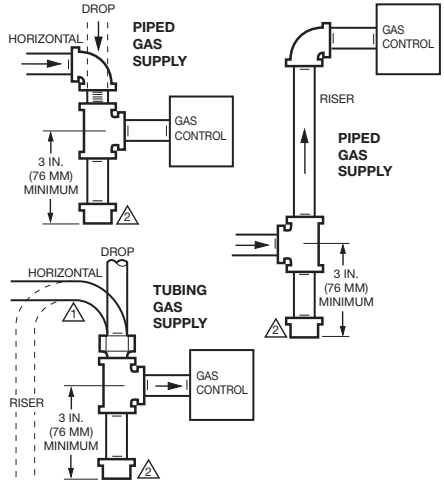
## Install Control

1. This control can be mounted from 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 may result if the pipe is inserted too deeply, refer to Table 4.

Table 4. 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 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. M3077C

Fig. 2. Install sediment trap.

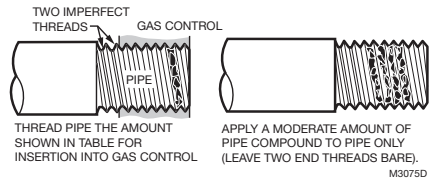


Fig. 3. Use moderate amount of pipe compound.

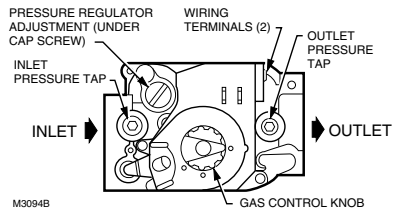


Fig. 4. Top view of gas control.

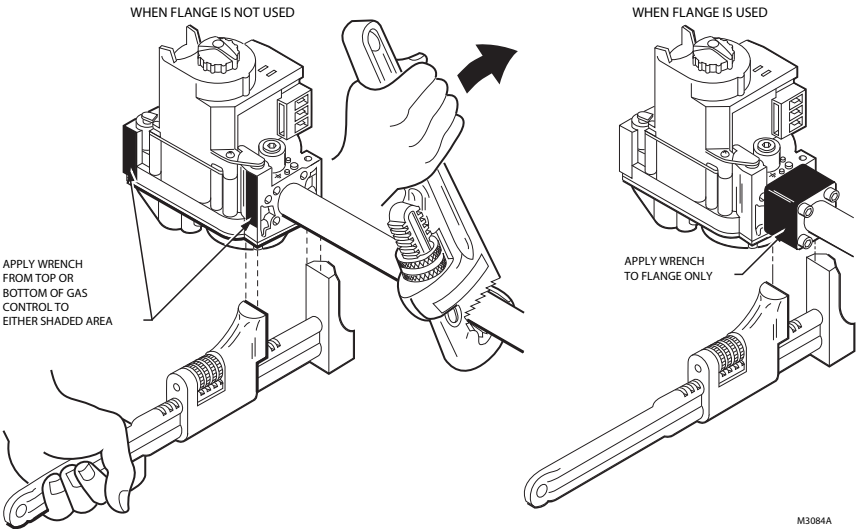


Fig. 5. Proper use of wrench on gas control with and without flanges.

## 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's 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 trans-former, 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.

NOTE: Use leadwires with insulated terminals.

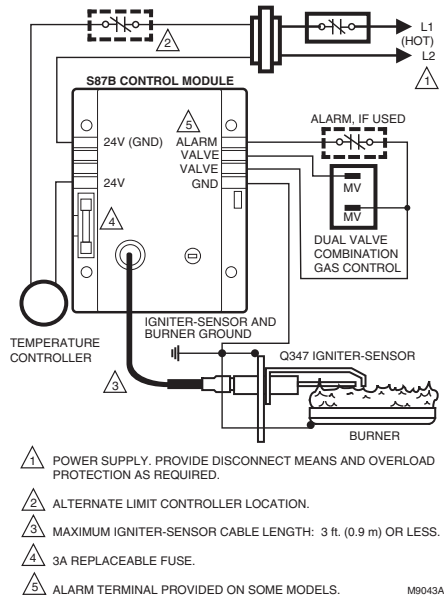


Fig. 6. Wiring connections for 24 volt control in S87 direct ignition system.

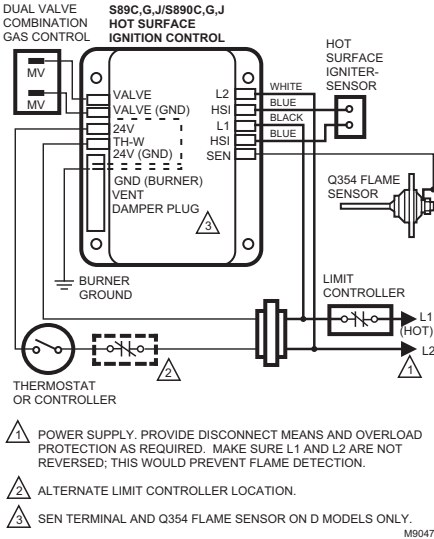


Fig. 7. Wiring connections for 24 volt control in S89 direct ignition system.

## Gas Leak Test

1. Paint all pipe connections upstream of the gas control with a rich soap and water solution. Bubbles indicate a gas leak.
2. If a gas leak is detected, tighten the pipe connection.
3. Stand clear while lighting main burner to prevent injury caused from hidden gas leaks that could cause flashback in the appliance vestibule. Light the main burner.
4. With the main burner in operation, paint all pipe joints (including flanges) and gas 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 the part if gas leak can not 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 to Main Burner

## CAUTION

1. Do not exceed the input rating stamped on the appliance nameplate, or manufacturer recommended burner orifice pressure for the size orifice(s) used. Make certain the primary air supply to the main burner is properly adjusted for complete combustion (refer to the appliance manufacturer instructions).
2. IF CHECKING GAS INPUT BY CLOCKING THE 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, form 70-2602, and compare to Btuh input rating on appliance nameplate.
3. IF CHECKING GAS INPUT WITH A MANOMETER (PRESSURE GAUGE): 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.

## STARTUP AND CHECKOUT

### WARNING

**Fire or Explosion Hazard**  
Can cause property damage, severe injury, or death.

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

## Gas Control Knob Settings

The gas control knob settings are as follows:

OFF: Prevents gas flow to main burner.

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

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

## Perform Gas Leak Test

### WARNING

**Fire or Explosion Hazard**  
Can cause property damage, severe injury, or death.

Check for gas leaks with rich soap and water solution anytime work is done on a gas control.

3.

If necessary, adjust the pressure regulator to match the appliance rating. Refer to Table 5 or 6 for the factory set nominal outlet pressures and adjustment setting ranges.

a.

Remove the pressure regulator adjustment cap screw.

b.

Using a screwdriver, turn the inner adjustment screw clockwise  to increase or counter-clockwise  to decrease the main burner gas pressure.

c.

Always replace the cap screw and tighten firmly to safeguard proper operation.

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 5 or 6), replace gas control. Otherwise, take the necessary steps to provide proper gas pressure on the control.
3.

If necessary, adjust the pressure regulator to match the appliance rating. Refer to Table 5 or 6 for factory set nominal outlet pressures and adjustment ranges.

a.

Remove the pressure regulator adjustment cap screw.

a.

Using a screwdriver, turn the inner adjustment screw clockwise  to increase or counter-clockwise  to decrease the main burner gas pressure.

a.

Always replace the cap screw and tighten firmly to safeguard proper operation.

4.

If desired outlet pressure or flow rate can not 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 5 or 6), 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.

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 using the meter clocking method or pressure using a manometer connected to the outlet pressure tap on the gas control. See Fig. 4.

Table 5. Pressure Regulator Specification Pressures in Inches wc.

| Model Type     | Type of Gas | Nominal Inlet Pressure Range | Factory Set Nominal Outlet Pressure |           | Setting Range |            |
|----------------|-------------|------------------------------|-------------------------------------|-----------|---------------|------------|
|                |             |                              | Step                                | Full Rate | Step          | Full Rate  |
| Standard, slow | Natural     | 5.0 - 7.0                    | —                                   | 3.5       | —             | 3.0 - 5.0  |
|                | LP          | 12.0 - 14.0                  | —                                   | 10.0      | —             | 8.0 - 12.0 |
| Step           | Natural     | 5.0 - 7.0                    | 0.9                                 | 3.5       | None          | 3.0 - 5.0  |
|                | LP          | 12.0 - 14.0                  | 2.2                                 | 10.0      | None          | 8.0 - 12.0 |

Table 6. Pressure Regulator Specification Pressures in kPa.

| Model Type     | Type of Gas | Nominal Inlet Pressure Range | Factory Set Nominal Outlet Pressure |           | 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       | —             | 2.0 - 3.0 |
| 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          | 2.0 - 3.0 |

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 lock-out time. When spark ignition terminates, stop timing.

When using the VR8205H step-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 thermostat setting up to call for heat. Normal ignition should occur.

Check Safety Shutdown Performance



WARNING

Fire or Explosion Hazard  
Can cause property damage, severe injury, or death.  
Perform the safety shutdown test anytime work is done on a gas system.

NOTE: Read steps 1 through 7 below 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 the 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 the 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 disassemble the gas control; it contains no replaceable components. Attempted disassembly or repair can damage the gas 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. Make sure the gas control knob is in the ON position.
2. Adjust the thermostat several degrees above room temperature.
3. Using an ac voltmeter, check for voltage across MV terminals at gas control.
4. If voltage is not present, check control circuit for proper operation.
5. If proper control circuit voltage is present, replace gas control.

## Instructions To The Homeowner (For Your Safety, Read Before Lighting)

### WARNING

#### **Fire or Explosion Hazard**

**If you do not follow the warnings below and the lighting instructions exactly, a fire or explosion can result with 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 will 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 re-placed 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 Furnace

### **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 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 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. Don't 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 don't 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 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 the gas control knob clockwise  to OFF.



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