

VR8204; VR4204 Intermittent Pilot Dual Automatic Valve Combination Gas Controls

The VR8204 AND VR4204 Intermittent Pilot Dual Automatic Valve Combination Gas Controls are used in gas-fired, intermittent pilot appliances. The controls include a safety shutoff, a manual valve, two automatic operators, a pressure regulator, a pilot adjustment screw and a conduit cover (VR4204 only).



- VR8204 used with S8600, S8610 and S8620 Control Modules.
- VR4204 used with 120 Vac intermittent ignition modules.
- VR8204 for use with 24 Vac heating appliances and VR4204 for use with 120 Vac heating appliances that burn natural or manufactured gas, or liquified petroleum (LP) gas.
- Capacity rated at 150 cfh at 1 in. wc pressure drop [4.2 m³/hr at 0.25 kPa].
- Solenoid-operated first automatic valve opens on thermostat call for heat and closes when call for heat ends.
- Diaphragm-operated second automatic valve opens under control of the regulator and closes if gas or power supply is interrupted.
- Two-position gas control knob has ON and OFF positions.
- All adjustments and wiring connections are accessible from top of the control.
- Compact size.
- Straight-through body pattern; right angle adapters available for inlet and outlet.
- 1/2 in. inlet and 1/2 in. outlet; adapters available for 3/8 or 3/4 in.

- Adjustable servo regulator effectively maintains almost constant gas output pressure under wide fluctuations in gas supply pressure.
- Inlet and outlet screens included.
- Pilot filter included.
- Wiring terminal block color-coded orange to indicate intermittent pilot control.
- May be installed at any angle between 0 and 90 degrees from the upright position, including vertically.
- 1/4 in. male quick-connect terminals for electrical connections.
- 0° F to 175 F° [-18° C to +79° C] temperature range standard; -40° F to 175° F [-40° C to +79° C] available.
- Inlet and outlet pressure taps provided; both taps accessible from top of control.
- Standard-, slow- and step-opening models available.

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Specifications

IMPORTANT: The specifications given in this publication do not include normal manufacturing tolerances. Therefore, this unit may not exactly match the listed specifications. Also this product is tested and calibrated under closely controlled conditions, and some minor differences in performance can be expected if those conditions are changed.

TRADELINE® MODELS

TRADELINE controls are selected and packaged to provide ease of stocking, ease of handling and maximum replacement value. TRADELINE model specifications are the same as those of standard models except as noted below.

TRADELINE MODEL AVAILABLE: VR8204A Dual Automatic Combination Gas Control for Intermittent Pilot Systems. Models for natural or LP gas.

ADDITIONAL FEATURES:

- 3/8 in. bushing.
- 3/4 in. straight flange assembly (with O-ring and screws).
- Tool for flange hex screws.
- Pilot compression fitting.

STANDARD MODELS

MODELS: VR8204 and VR4204 Dual Automatic Valve Combination Gas Controls for use in Intermittent Pilot Systems. VR8204 for use with S8600, S8610 and S8620 Modules. VR4204 for use with 120 Vac modules. See Table 1 for model specifications.

SUPPLY VOLTAGE:

VR4204: 120 Vac, 60 Hz.

VR8204: 24 Vac, 60 Hz.

(50/60 Hz models available on request.)

TABLE 1—MODEL SPECIFICATIONS.

Model No. Suffix Letter	Opening Charac- teristic	Type of Gas	Standard Factory Regulator Settings		Optional Factory Regulator Settings		Range of Field Adjustment	
			in. wc	kPa	in. wc	kPa	in. wc	kPa
VR8204A,M VR4204M	Standard	Natural	3.5	0.9	3 to 5	0.7 to 1.2	3 to 5	0.7 to 1.2
		LP	10.0	2.5	8 to 12	2 to 3	8 to 12	2 to 3
VR8204C,P VR4204P	Step- opening	Natural	Step—0.7, 0.9, 1.2 or 1.7, as ordered ^a Full Rate—3.5	Step—0.17 0.22, 0.30 or 0.48 as ordered ^a Full Rate—0.9	Step—0.7, 0.9, 1.2 or 1.7 as ordered ^a Full Rate—3 to 5	Step—0.17 0.22, 0.30 or 0.48, as ordered ^a Full Rate— 0.7 to 1.2	Step— none; Full Rate— 3-5	Step— none; Full Rate— 0.7 to 1.2
		LP	Step—1.4, 2.5, 4.0 or 5.5, as ordered ^a Full Rate—10	Step—0.35, 0.62, 0.99 or 1.37 as ordered ^a Full Rate—2.5	Step—1.4, 2.5, 4.0 or 5.5, as ordered ^a Full Rate— 8 to 12	Step—0.35, 0.62, 0.99 or 1.37, as ordered ^a Full Rate—2 to 3	Step— none; Full Rate— 8-12	Step— none; Full Rate— 2 to 3
VR8204H,K VR4204H	Slow- opening	Natural	3.5	0.9	3 to 5	0.7 to 1.2	3 to 5	0.7 to 1.2
		LP	10.0	2.5	8 to 12	2 to 3	8 to 12	2 to 3

^aStep pressure is not adjustable.

Ordering Information

When purchasing replacement and modernization products from your TRADELINE® wholesaler or your distributor, refer to the price sheets for complete ordering number, or specify:

1. Order number, TRADELINE, if desired.
2. Natural or LP gas.
3. Step pressure on VR4204C,P and VR8204C,P.
4. Accessories, if desired.
5. Order separately: pilot burner, igniter-sensor, transformer, limit controller, and thermostat or controller as required.

If you have additional questions, need further information, or would like to comment on our products or services, please write or phone:

1. Your local Honeywell Home and Building Control Sales Office (check white pages of your phone directory).
2. Home and Building Control Division Customer Satisfaction
Honeywell Inc., 1885 Douglas Drive North
Minneapolis, Minnesota 55422-4386 (612) 951-1000

In Canada—Honeywell Limited/Honeywell Limitee, 740 Ellesmere Road, Scarborough, Ontario M1P 2V9. International Sales and Service Offices in all principal cities of the world. Manufacturing in Australia, Canada, Finland, France, Germany, Japan, Mexico, Netherlands, Spain, Taiwan, United Kingdom, U.S.A.

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. Do not bend pilot tubing at gas control or pilot burner after compression fitting has been tightened, or gas leakage at the connection may result.
4. Always install sediment trap in gas supply line to prevent contamination of gas control.
5. 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 may burn out the heat anticipator in the thermostat or damage the electronic intermittent pilot (IP) 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 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 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. Assure that the O-ring is fitted into the groove of the flange. If the O-ring is not attached or missing, do not use the flange.
4. With O-ring facing the 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. 2. 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 installations, 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 installation below for piping, installing control, connecting pilot tubing 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. See Fig. 6.

USING ADAPTERS TO SOLVE SWING RADIUS PROBLEMS

In some field service applications, it is difficult or impossible to thread the control onto the gas supply pipe because of space limitations. Usually this problem can be resolved by using an adapter. The adapter is installed on the end of the supply pipe in place of the gas control, following the same precautions and instructions that are used for installing the gas control. After the adapter is installed, the gas control is attached to the adapter as outlined above. Note that the use of an adapter increases the overall length of the gas control.

Fig. 2—Fasten flange to control with 25 inch-pounds torque.

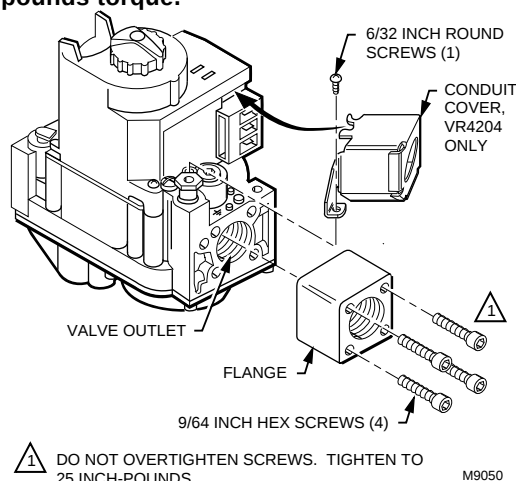
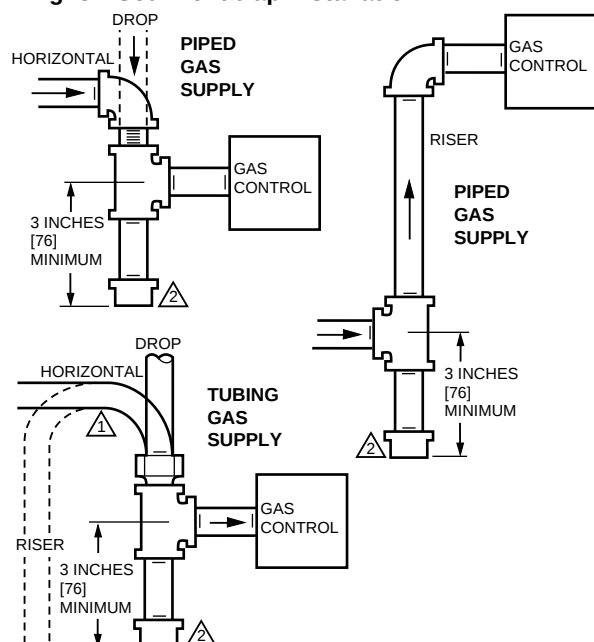


Fig. 3—Sediment trap installation.



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 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. 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. 3.

Install Control

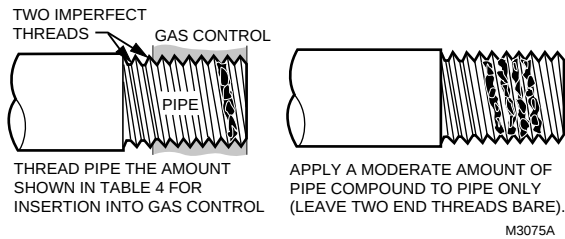
1. This control can be mounted 0-90 degrees, in any direction, including vertically, from the upright position of the gas control knob.
2. Mount the control so gas flow is in the direction of the arrow on the bottom of the control.
3. Thread pipe into control or adapter. *Do not thread pipe too far.* 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.

Fig. 4—Use moderate amount of pipe compound.



5. Remove seals over control inlet and outlet if necessary.

6. Connect pipe to control inlet and outlet. Use wrench only on the square ends of the control. If an adapter is used,

place wrench on adapter rather than control. Refer to Figs. 5 and 6.

Fig. 5—Top view of gas control.

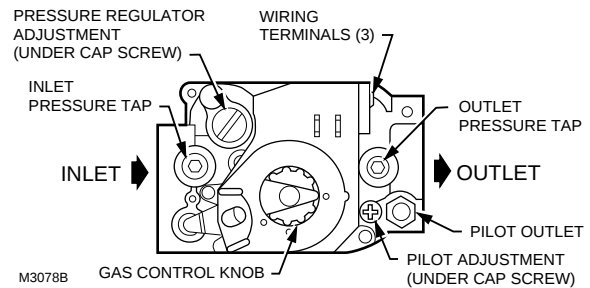
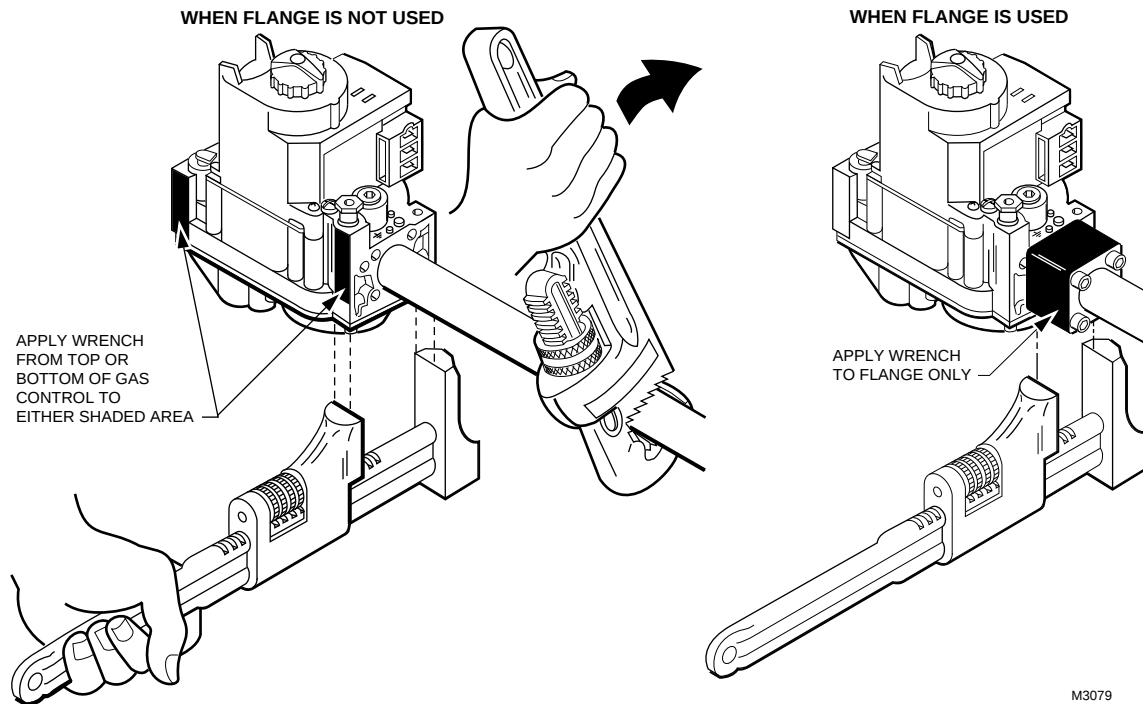


Fig. 6—Proper use of wrench on gas control with and without flanges.



Connect Pilot Gas Tubing

1. Cut tubing to desired length and bend as necessary for routing to pilot burner. Do not make sharp bends or deform the tubing. Do not bend tubing at control after compression nut has been tightened, because this may result in gas leakage at the connection.

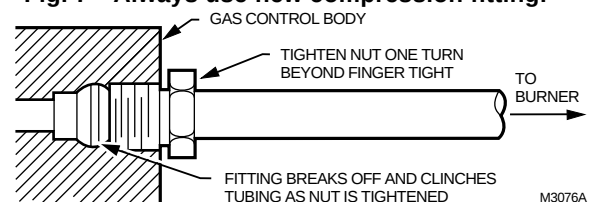
2. Square off and remove burrs from end of tubing.

3. Unscrew brass compression fitting from the pilot outlet (Fig. 5). Slip the fitting over the tubing and slide out of the way.

NOTE: When replacing a control, cut off old compression fitting and replace with the compression fitting provided on the combination gas control. Never use the old compression fitting because it may not provide a gas-tight seal.

4. Push tubing into the pilot gas tapping on the outlet end of the control until it bottoms. While holding tubing all the way in, slide fitting into place and engage threads; then turn until finger tight. Tighten one more turn with wrench. Do not overtighten. Refer to Fig. 7.

Fig. 7—Always use new compression fitting.



5. Connect other end of tubing to pilot burner according to pilot burner manufacturer instructions.

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 thermostat and other controls as required.

2. For VR4204, 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.

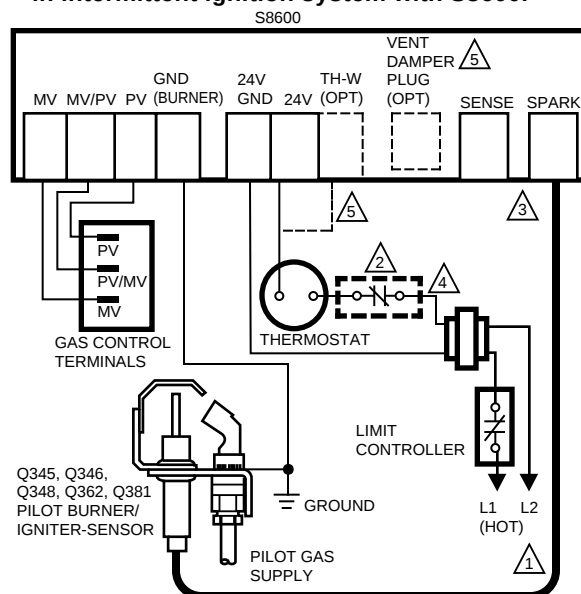
3. Connect control circuit to gas control terminals. See Figs. 5, 8 and 9.

NOTE: Use leadwires with insulated terminals.

4. For VR4204, make sure the conduit cover is in position and secured to the gas valve with the screw provided. See Fig. 2.

5. Adjust thermostat heat anticipator as instructed in the appliance manual (i.e., usually 0.1A for VR4204; 0.5A for VR8204).

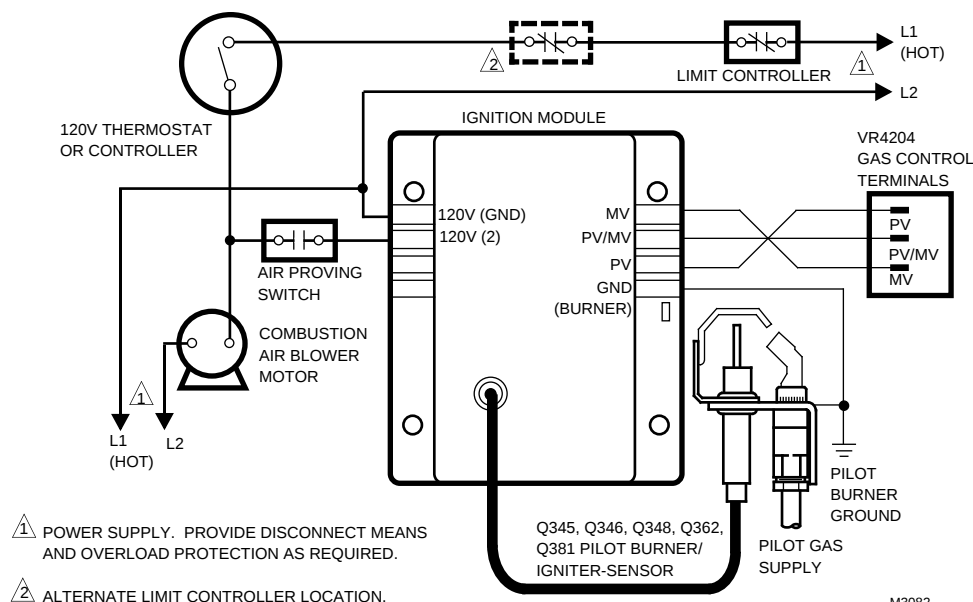
Fig. 8—Wiring connections for 24 volt control in intermittent ignition system with S8600.



- 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
- 2 ALTERNATE LIMIT CONTROLLER LOCATION.
- 3 MAXIMUM WIRE LENGTH 3 ft [9 m].
- 4 CONTROLS IN 24V CIRCUIT MUST NOT BE IN GROUND LEG TO TRANSFORMER.
- 5 FOR MODULE WITH TH-W TERMINAL AND VENT DAMPER PLUG, CONNECT THERMOSTAT TO TH-W. LEAVE 24V OPEN. DO NOT REMOVE VENT DAMPER PLUG.

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Fig. 9—Wiring connections for 120 volt control in intermittent ignition system.



- 1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.
- 2 ALTERNATE LIMIT CONTROLLER LOCATION.

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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, the control should be replaced by a qualified service technician.

GAS CONTROL KNOB SETTINGS

Gas control knob settings are as follows:

- OFF: Prevents pilot and main gas flow through the control.
ON: Permits gas to flow into the control body. Under control of the thermostat and intermittent pilot module, gas can flow to the pilot and main burners.

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

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.

PERFORM GAS LEAK TEST



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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 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.

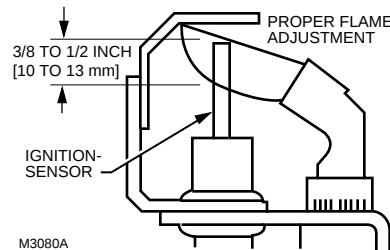
ADJUST PILOT FLAME

The pilot flame should envelop 3/8 to 1/2 in. [10 to 13 mm] of the tip of the igniter-sensor. See Fig. 10.

To adjust pilot flame:

1. Remove pilot adjustment cover screw. See Fig. 5.
2. Turn inner adjustment screw clockwise  to decrease or counterclockwise  to increase pilot flame.
3. Always replace cover screw after adjustment. Tighten firmly to prevent gas leakage.

Fig. 10—Proper flame adjustment.



CHECK SAFETY SHUTDOWN PERFORMANCE



WARNING

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Perform the safety shutdown test every 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 intermittent pilot (IP) 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 spark at pilot burner either immediately or after prepurge. See IP module specifications.
4. If module has timed ignition, time length of spark operation. See IP module specifications.
5. After the module locks out, open manual gas cock and make sure no gas is flowing to pilot or main burner. *With modules that continue spark until pilot lights or system is shut down manually, pilot should light when manual gas cock is opened.*
6. Set thermostat below room temperature and wait one minute.
7. Operate system through one complete cycle to make sure all controls operate properly.

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 appliance manufacturer instructions.
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 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 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. 5.
3. If necessary, adjust pressure regulator to match appliance rating. See Table 4A or 4B for factory set nominal outlet pressure and adjustment 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 to 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 nominal range (see Table 4A or 4B), 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 using the meter clocking method or pressure using a manometer connected to the outlet pressure tap on the gas control. See Fig. 5.
3. If necessary, adjust pressure regulator to match appliance rating. See Table 4A or 4B for factory set nominal outlet pressure and adjustment range.
 - a. Remove pressure regulator adjustment 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 using a manometer at the gas control inlet pressure tap. If inlet pressure is in the nominal range (see Table 4A or 4B), 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 4A—PRESSURE REGULATOR SPECIFICATION PRESSURES (in. 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-opening	Natural	5.0 - 7.0	—	3.5	—	3.0 - 5.0
	LP	12.0 - 14.0	—	10.0	—	8.0 - 12.0
Step-opening	Natural	5.0 - 7.0	0.9	3.5	—	3.0 - 12.0
	LP	12.0 - 14.0	2.2	10.0	—	8.0 - 12.0

TABLE 4B—PRESSURE REGULATOR SPECIFICATION PRESSURES (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-opening	Natural	1.2 - 1.7	—	0.9	—	0.7 - 1.2
	LP	2.9 - 3.9	—	2.7	—	2.0 - 3.0
Step-opening	Natural	1.2 - 1.7	0.2	0.9	—	0.7 - 1.2
	LP	2.9 - 3.9	0.9	2.7	—	2.0 - 3.0

Maintenance

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

- In many such applications, particularly commercial cooking, the equipment operates 100,000-200,000 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.

The maintenance program should include regular check-out of the control; see Startup and Checkout section, and regular check-out of the control system; see the appliance manufacturer's 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.* Since these environments can cause the gas control to deteriorate more rapidly, the system should be checked more often.

Gas valves exposed to high ammonia conditions; i.e., those used in greenhouses or animal barns, may fail in one or two years. Contact your Honeywell sales representative to request a gas valve with corrosion resistant construction.

The system should be replaced if:

- It does not perform properly on checkout or troubleshooting.
- The gas control knob is hard to turn.
- The gas control is likely to have operated for more than 200,000 cycles.

Operation

The VR8204/VR4204 gas controls provide ON-OFF manual control of gas flow. In the OFF position, gas flow to both pilot and main burners is mechanically blocked. In the ON position, gas flows to the pilot burner and the main burner under control of the thermostat, the intermittent pilot (IP) module, and the two automatic main valves.

SYSTEM OPERATION WITH MODULE

When the thermostat calls for heat, the IP module is energized. The IP module, in turn, activates the first automatic valve of the gas control. Pilot gas is allowed to flow through the control to the pilot burner. Simultaneously, the IP module generates a spark at the igniter-sensor and lights the pilot. The pilot flame is sensed by the igniter-sensor, and spark generation ends.

After the pilot is lit, the IP module energizes the solenoid for the second automatic valve operator and gas flows to the main burner (the first automatic valve remains energized). The second automatic valve diaphragm, controlled by the

servo pressure regulator, opens and adjusts gas flow as long as the system is powered and the pilot is burning. The servo pressure regulator monitors outlet pressure to provide an even flow of gas to the main burner. Loss of power (thermostat satisfied) de-energizes the IP module and closes both automatic valves. The system is ready to return to normal service when power is restored through the thermostat.

Loss of pilot flame, or flame too small to reliably light main burner, closes the second automatic valve operator. The IP module then attempts to restart pilot. On IP modules with lockout timers, the first automatic valve closes after the lockout period. On IP modules without lockout timers, the trial for ignition continues indefinitely and the first automatic valve remains open.

If pilot flame is restarted successfully, main burner is reopened, and gas flows to main burner as described above. Gas control operation is described in more detail below.

VALVE POSITION DURING THERMOSTAT OFF CYCLE

The valve is positioned as shown in Fig. 13 when the:

- manual gas control knob is in the ON position.
- thermostat is not calling for heat.

The first automatic valve is closed. The second automatic valve operator is de-energized, closing the channel to the pressure regulator, and opening a channel to the underside of the second automatic valve diaphragm. The combination of spring pressure under the second automatic valve diaphragm and lack of outlet pressure hold the diaphragm firmly closed. Gas flow to the pilot burner is blocked by the first automatic valve and gas flow to the main burner is blocked by both valves.

WHEN THERMOSTAT CALLS FOR HEAT

When the thermostat calls for heat, the trial for pilot ignition begins. The first automatic valve solenoid is energized by the module and opens, allowing gas to flow to the pilot burner. Gas also flows to the second automatic valve operator, but is mechanically blocked at the operator. See Fig. 11.

After the pilot lights and the pilot flame is sensed by the igniter-sensor, the second automatic valve solenoid is energized by the module, and the second automatic operator valve disc is lifted from its seat. See Fig. 12. This diverts gas flow from the second automatic valve diaphragm and causes a reduction of pressure on the underside of this diaphragm. The reduced pressure on the bottom of the automatic valve diaphragm repositions the diaphragm down-

ward, away from the valve seat, allowing gas to flow to the main burner.

STANDARD REGULATION

During the ON cycle, the servo pressure regulator provides close control of outlet pressure, even if inlet pressure and flow rate vary widely. Any outlet pressure change is immediately reflected back to the pressure regulator diaphragm, which repositions to change the flow rate through the regulator valve, and thus through the automatic valve.

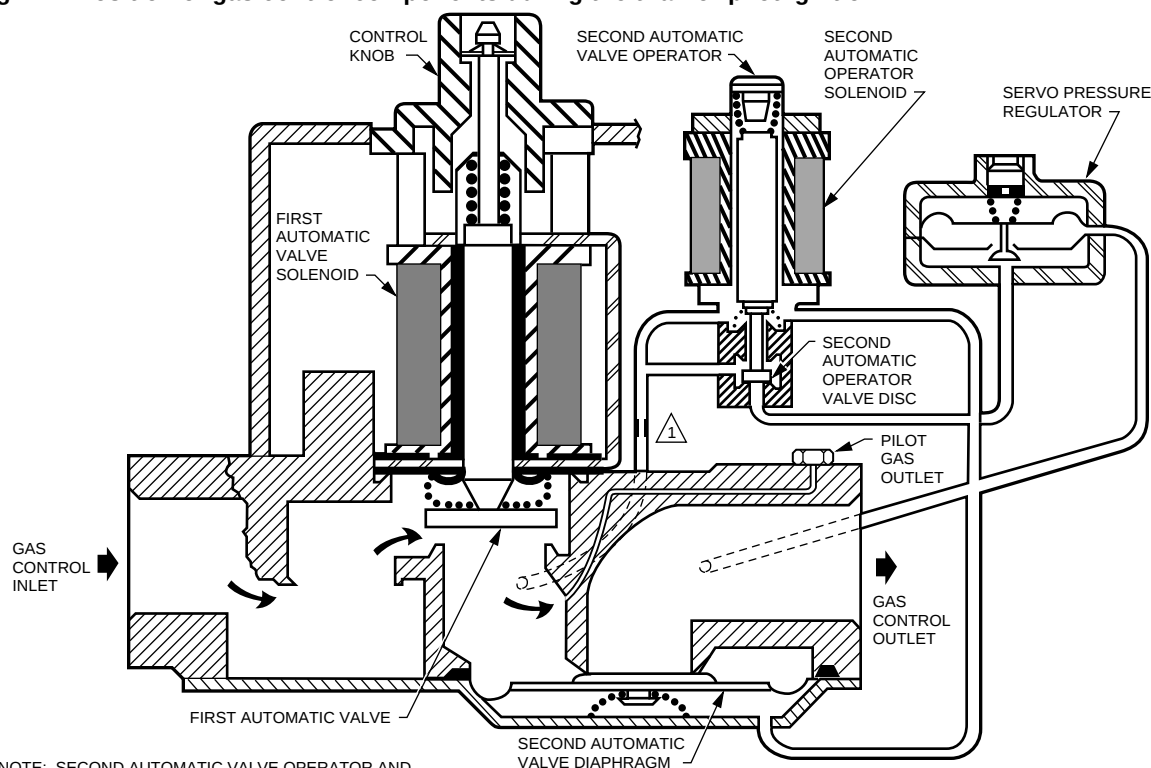
If outlet pressure begins to rise, the pressure regulator diaphragm moves slightly higher, allowing less gas flow to the gas control outlet. This increases gas pressure under the automatic valve diaphragm and repositions the valve disc closer to the seat. Thus, flow of gas through the second automatic valve is reduced, and outlet pressure falls to the desired level.

If outlet pressure begins to fall, the pressure regulator diaphragm moves slightly lower, allowing more gas flow to the gas control outlet. This decreases gas pressure under the second automatic valve diaphragm and repositions the valve disc further from the seat. Thus, flow of gas through the second automatic valve is increased, and outlet pressure rises to the desired level.

SLOW-OPENING REGULATION

Slow-opening gas controls function the same as standard models except that when the thermostat calls for heat, the second automatic valve opens gradually.

Fig. 11—Position of gas control components during the trial for pilot ignition.



NOTE: SECOND AUTOMATIC VALVE OPERATOR AND SERVO PRESSURE REGULATOR SHOWN OUTSIDE GAS CONTROL FOR EASE IN TRACING GAS FLOW.

1 SLOW-OPENING GAS CONTROL HAS A GAS FLOW RESTRICTOR IN THIS PASSAGE.

M9127

Opening is slowed because a flow restrictor in the passage from the second automatic operator slows the rate at which gas pressure is reduced under the second automatic valve diaphragm after the second automatic operator opens. Outlet pressure to the main burner increases gradually from 0 in. wc [0 kPa] to rated output pressure within 3-6 seconds (for an 80,000 Btuh furnace at 7 in. wc [1.8 kPa] inlet pressure and 3.5 in. wc [0.9 kPa] outlet pressure).

STEP-OPENING REGULATION

Step-opening gas controls actually combine two pressure regulators, one for the low pressure and one for the full-rate pressure. When the thermostat calls for heat, the automatic operator valve disc opens. The low pressure regulator maintains outlet pressure at the preset step rate for several seconds. Then the regulator valve is forced fully open by the timing diaphragm, which is operated by bleed

gas. When the low pressure regulator is fully open, the high pressure regulator maintains the desired full-rate outlet pressure as described for the standard regulator.

The step model requires approximately 60 seconds to reset once the main burner goes off. If it is re-energized within 60 seconds, it may bypass or shorten the length of the low pressure step. The burner may relight at the full flow rate.

WHEN THE CALL FOR HEAT ENDS

When the call for heat ends, the first automatic valve and the second automatic valve operator close, bypassing the regulator(s) and shutting off the main burner and the pilot. As pressure inside the gas control and underneath the automatic valve diaphragm equalizes, spring pressure closes the second automatic valve to provide a second barrier to gas flow.

Fig. 12—Position of gas control components during thermostat off cycle.

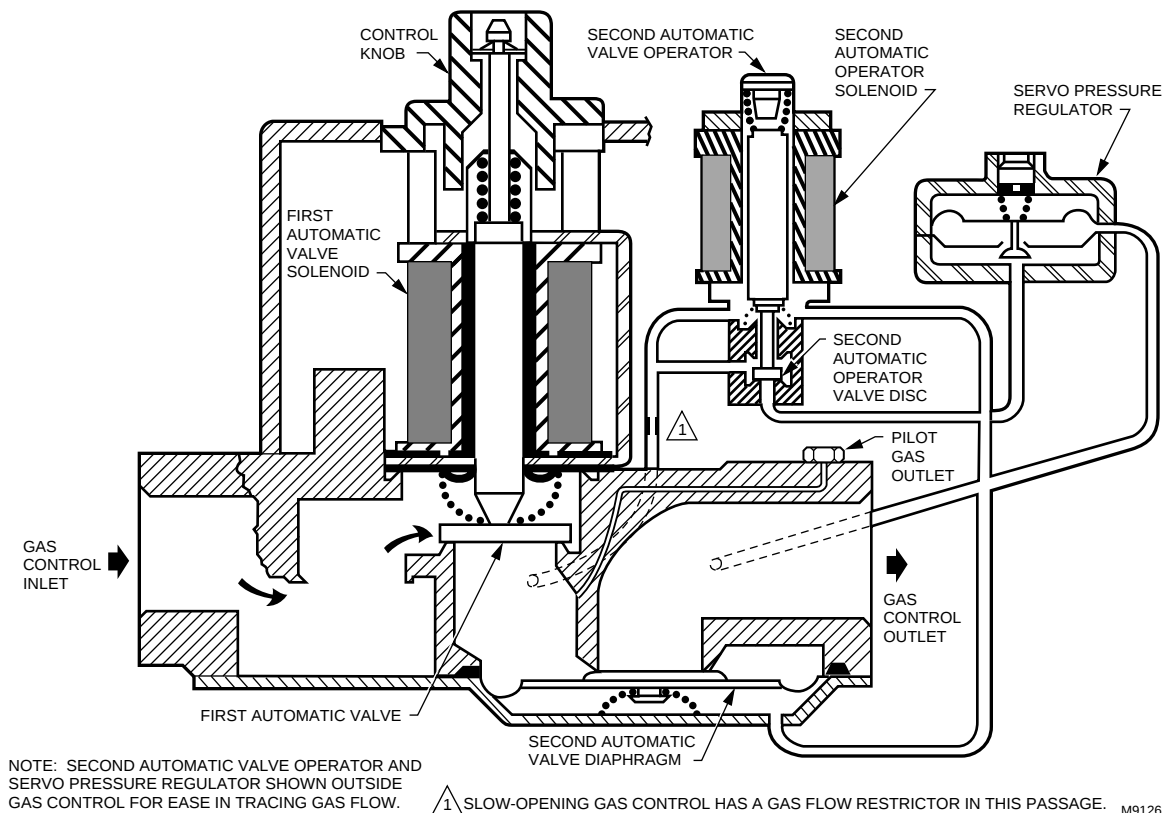
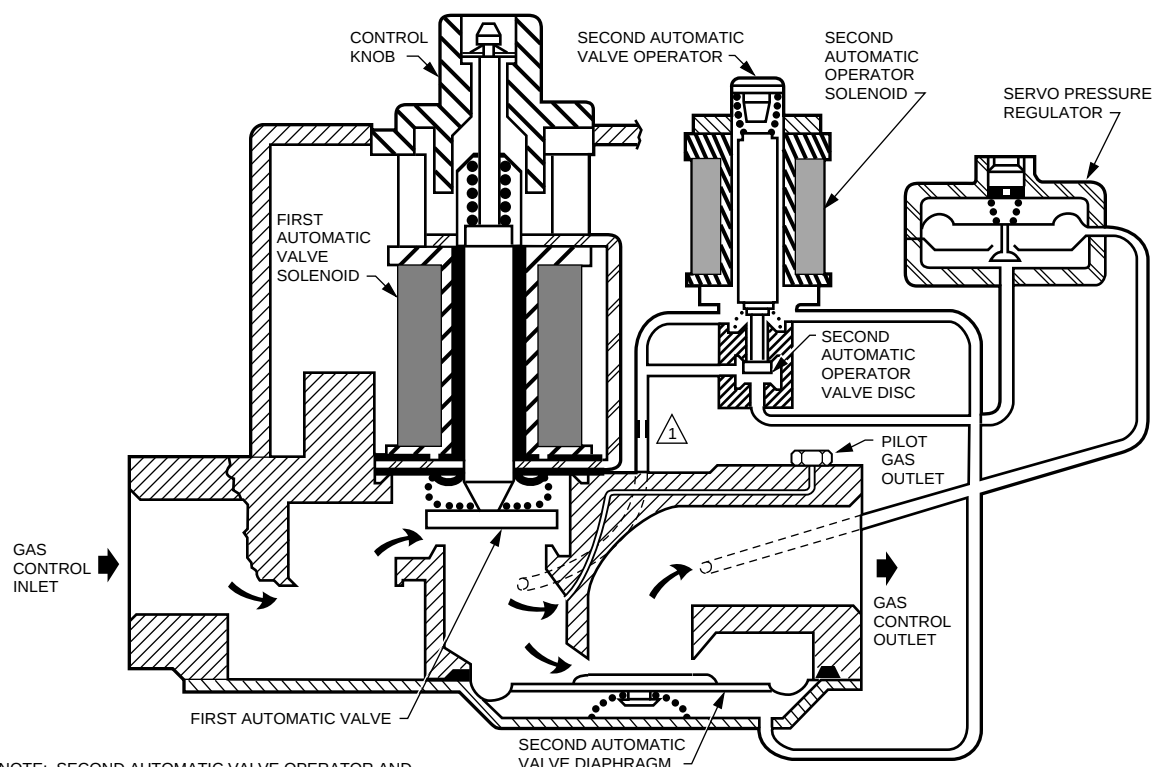


Fig. 13—Position of gas control components during burner on cycle.



NOTE: SECOND AUTOMATIC VALVE OPERATOR AND SERVO PRESSURE REGULATOR SHOWN OUTSIDE GAS CONTROL FOR EASE IN TRACING GAS FLOW.

⚠ SLOW-OPENING GAS CONTROL HAS A GAS FLOW RESTRICTOR IN THIS PASSAGE. M9125

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 may 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 electronic module.

IF MAIN BURNER WILL NOT COME ON WITH CALL FOR HEAT

1. Confirm that the gas control knob is in the ON position.
2. Adjust thermostat several degrees above room temperature.
3. Using ac voltmeter, check for voltage at gas control.
 - If pilot lights, measure across MV/PV and MV.
 - If pilot does not light, measure across MV/PV and PV before safety lockout occurs.
4. If voltage is incorrect or not present, check control circuit for proper operation.
5. If voltage is present, replace gas control.

IMPORTANT: Allow 60 seconds after shutdown before re-energizing step-opening model to ensure lightoff at step pressure.

**INSTRUCTIONS TO THE HOMEOWNER
FOR YOUR SAFETY, READ BEFORE OPERATING**



WARNING

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 can 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, requiring 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 pilot.*
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 the burner access panel if provided on your appliance.
4. Turn the gas control knob (Fig. 5) 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 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. Do not try to light any appliance. *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 burner access panel.
8. Reset thermostat to desired temperature.
9. If appliance will not operate, turn the gas control knob to OFF and contact a qualified service technician for assistance.

TO TURN OFF APPLIANCE

VACATION SHUTDOWN: Set the thermostat to the desired room temperature while you are away.

COMPLETE SHUTDOWN: Push in the gas control knob slightly and turn clockwise  to OFF. Do not force. Appliance will completely shut off. Follow the Instructions to the Homeowner above to resume normal operation.

Honeywell

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