

# ROYAL HEAT 240 / 360 GAS FURNACE INSTRUCTIONS



**SIEBRING**

Manufacturers of Quality Equipment Since 1910

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Included: Robertshaw Gas Valve Installation Pamphlet,  
Honeywell L4064 Fan & Limit Pamphlet, Honeywell  
Q327 Pilot Burners Pamphlet, H17 Pilot Valve.

**CONDITION OF SALE  
SIEBRING MANUFACTURING, INC.  
GEORGE, IA 51237**

Pursuant to Magnuson-Moss Warranty Federal Trade Commission Improvement Act P.L. 93-637, 88 STAT.2183-2193; U.P.C. 2301-2312 (Jan. 4, 1975), the following limited warranty will now replace all prior warranties issued by Siebring Manufacturing, Inc.

We warrant the equipment manufactured by us to be free from defects in material and workmanship under normal use and service, our obligation under this warranty being limited to replacing at our factory any product, or parts thereof, which shall within one year after delivery thereof to the original purchaser be returned to us with transportation (UPS Ground) charges prepaid, and which our examination shall disclose to our satisfaction to have been thus defective. We neither assume nor authorize any other person to assume for us any other liability in connection with such equipment. "Overnight", "Next Day" or any shipping method other than UPS Ground will be the responsibility of the customer. This warranty shall not apply to any equipment which shall have been repaired or altered outside of our factory in any way so as to affect its stability and reliability, nor which has been subject to misuse, negligence or accident, nor to any equipment, which shall have been operated beyond factory rated capacity. We shall not be liable for consequential damages caused by defective materials, equipment or parts warranted by their respective manufacturers.

Any implied warranty (including the warranty of merchantability), to the extent permitted by law, is excluded.

We will not grant any allowance for any repairs or alterations without written approval of an executive officer, and we reserve the right to make changes in design, or to make additions to, or improvements in, our products without imposing any obligations upon the company to install them on products previously manufactured.



## **FOR YOUR SAFETY**

IF YOU SMELL GAS:

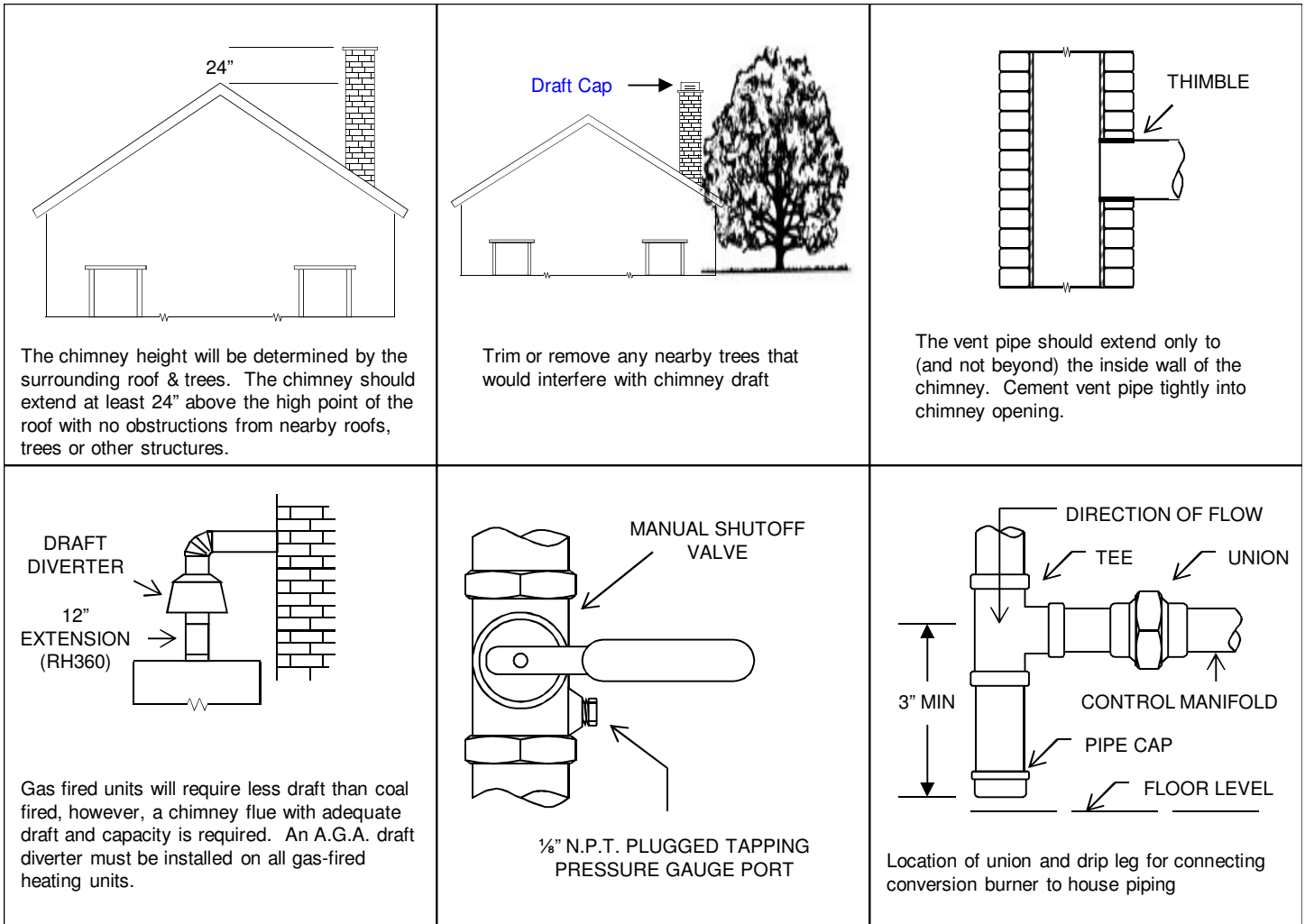
1. OPEN WINDOWS.
2. DON'T TOUCH ELECTRICAL SWITCHES.
3. EXTINGUISH ANY OPEN FLAMES.
4. DO NOT TRY TO LIGHT THE FURNACE
5. IMMEDIATELY CALL YOUR GAS SUPPLIER.

**WARNING:** Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.

## **GENERAL INFO:**

This unit complies with the American National Standard for Gas Unit Heaters (special units, which are not AGA certified, may also use this manual).

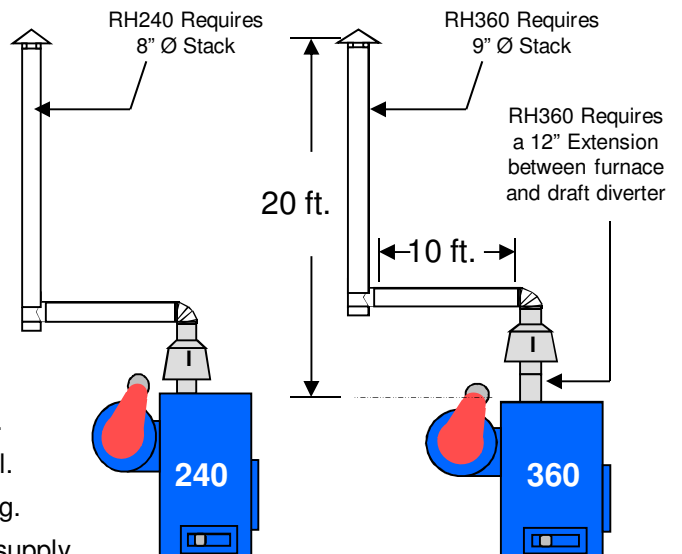
1. The installation must conform with all local codes, or, in the absence of local codes, it must follow the National Fuel Gas Code, ANSI Z223.1-1988.
2. All installation and servicing must be handled by qualified personnel.
3. This furnace should not be operated in an explosive or dusty environment.
4. This unit can be set up to run on Natural Gas or Liquid Propane (LP) gas. The orifices must be sized appropriately for each gas type and pressure.
5. The draft hood provided with each furnace must be installed vertically in the same air space as the furnace. This unit must be vented.
6. If this unit is used to heat an adjacent area, (not the same airspace as the furnace is in) an adequate air return area must be provided.
7. In greenhouses, this unit may be positioned on four (4) concrete block or bricks.
8. In garages, this unit should be suspended with at least 7' of clearance under the furnace. In garages, install this unit in accordance with the Standard for Repair Garages ANSI / NFFA 88B and follow all local codes that apply.
9. In aircraft hangars, this unit should be suspended with at least 10' of clearance from the wings or engine cowling, based on the highest aircraft normally stored in the hangar. Install this furnace in accordance with the Standard for Aircraft Hangars ANSI / NFPA 409.
10. Do not locate this unit closer than 12" to any combustible material, this includes the chimney, all four sides and top of the unit. The furnace may be set on any suitable non-combustible material.
11. Do not locate any items within 12" of the burner opening. This includes the combustion air supply and the blower inlets. Floor drafts can cause pilot outages.
12. If installed in parking structures, the Standard for Parking Structures ANSI / NFPA 88A should be followed.



# ROYAL Heaters

## General Information & Instructions

- Unit crated weights: 240 = 640 lbs. / 360 = 780 lbs.
- Always use double wall pipe on gas units.
- Never have less than .02 - .04 inches of draft in the chimney.
- Always use black metal piping for gas (Nat./L.P.) installations.
- Rule of thumb for chimneys = 2' vertical for every 1' horizontal.
- Always check with the gas company on appropriate pipe sizing.
- Always check with the gas company to ensure adequate fuel supply.
- Never reduce the size of chimney from the furnace to the draft cap.
- Never run exhaust fans in any building while furnaces are in operation.
- Always vent gas fumes. Gas fumes not vented can cause death to plants, animals and humans.
- The draft diverter must always be installed VERTICALLY unless otherwise stated by Siebring Mfg. Warranty will be void if venting does not meet local codes for gas venting.



## NEW INSTALLATIONS

### Electrical Information

#### **Important!**

Before beginning any electrical work, be certain the electrical supply is disconnected. For the furnace to operate properly, it must be wired exactly as outlined in this manual.



An electrical diagram has been provided in this manual and on the face of the furnace.

1. If any wires as originally supplied are replaced, they should be replaced with type "T" wires, with a 63 °F (35 °C) rise wire in similar colors.
2. Follow all local codes when wiring this furnace.
3. This furnace must be electrically grounded in accordance with the National Electrical Code, ANSI / NFPA 70.

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<u>WIRE SIZE</u>	<u>RATING @ 140°</u>	<u>LINE LOSS WITH 15AMP LOAD IN 100' COPPER WIRE</u>
14-3	15 AMP	8.0 VOLTS LOSS
12-3	20 AMP	5.5 VOLTS LOSS
10-3	30 AMP	3.0 VOLTS LOSS
8-3	40 AMP	1.9 VOLTS LOSS

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### Wire Size for 115 & 230 Volt Single Phase Circuits

Distance – Motor to Fuse or Motor to Meter Box

MOTOR HP	100 FT.		200 FT.		300 FT.		500 FT.	
	115V	230V	115V	230V	115V	230V	115V	230V
1/4	# 14	# 14	# 10	# 12	# 8	# 10	# 6	# 8
1/3	# 12	# 14	# 10	# 12	# 6	# 10	# 4	# 8
1/2	# 10	# 12	# 8	# 10	# 6	# 8	# 4	# 6
3/4	# 10	# 12	# 6	# 10	# 4	# 8	# 2	# 6
1	# 8	# 10	# 6	# 8	# 4	# 6		# 4
1 1/2	# 4	# 10	# 0	# 8		# 6		# 4
2		# 8		# 6		# 4		# 2
3		# 8		# 6		# 4		# 2
5		# 6		# 4		# 2		# 0



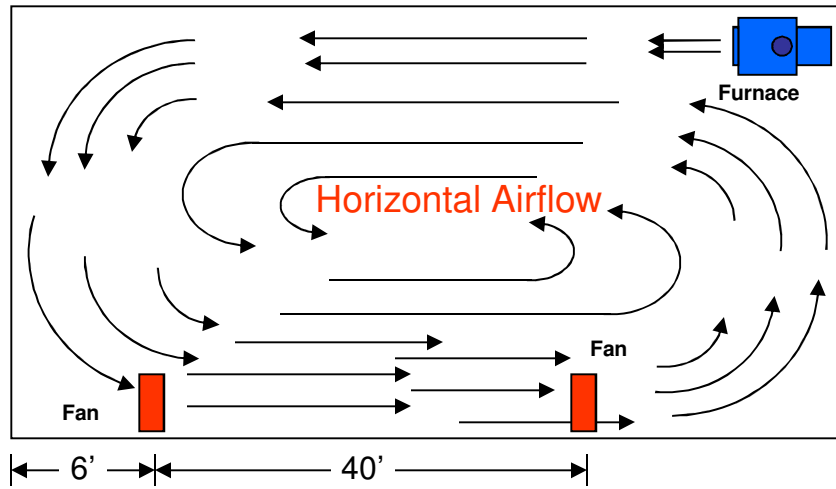
## PLACEMENT:

This unit is designed to be used in various configurations. In greenhouses it may be positioned directly on the ground or suspended from the greenhouse structure. In aircraft hangars or garages, the unit will need to be suspended.

1. This unit may be suspended if necessary. Suitable framework, capable of handling the weight of the furnace, can be fabricated from angle, channel or tubing material. An eye bolt can be inserted in each corner or end of the angles, channels or beams to provide 4 corner support (4 req.). These bolts can then be installed thru a suitable ceiling joist etc.
2. Obviously, the structure must be strong enough to carry the additional weight of the furnace, snow load and any possible future modifications or additions.  
240 RH – 650#, 360 RH – 780#.
2. In greenhouses, this unit is normally installed on four (4) bricks setting directly on the ground. A variety of openings can be supplied on these furnaces.
3. The furnaces require:
  - A. 12" distance to any combustible material. (See General Info for exceptions)
  - B. 12" of space for combustion air and blower supply air.
  - C. Approximately 1 sq. ft. of inlet area per 150,000 BTU/hr input. In many cases, normal building cracks make up more than this area.
  - D. Approximately 5 sq. ft. of return air area. The heated air must have a free path out of and back to the furnace. DO NOT restrict the discharge vents.
  - E. A barometric device (supplied by the manufacturer) in the same room as the furnace. On the RH360 model, a 12" extension must be installed between the barometric device and the furnace to prevent back draft and to prevent flue gases from entering the blower inlet.
  - F. Plenty of access space for servicing the blower motor, burner, etc. Access must also be provided to reach the gas valve and shut offs in case of an emergency.
  - G. That all local codes are followed when installing the regulation flue pipes.

# Placement Options

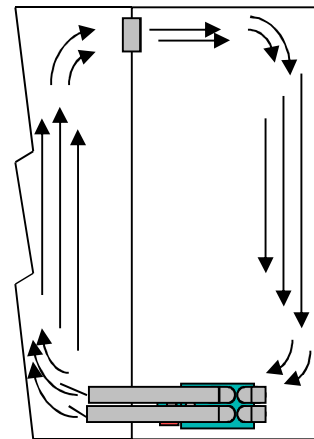
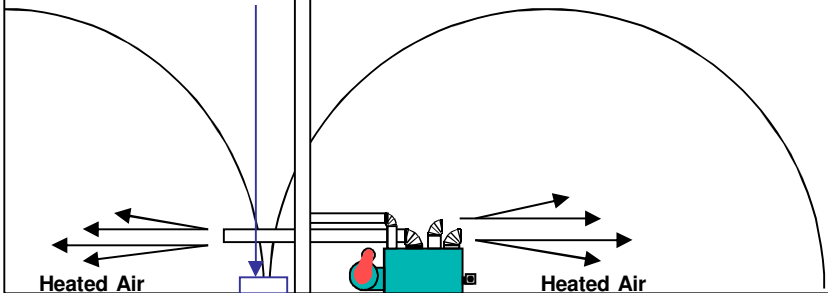
## End Broadcast & Fan



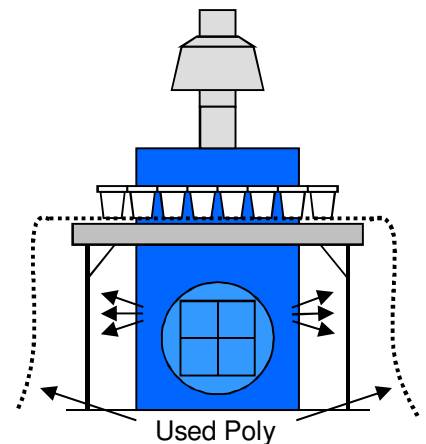
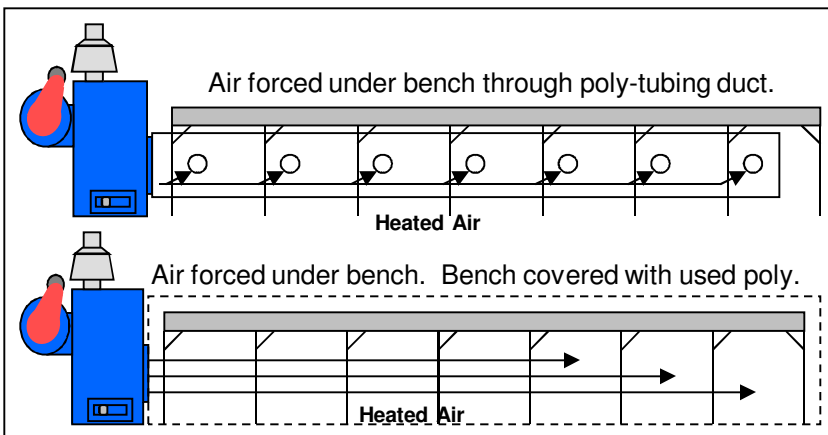
## Inter – House Heating

**Note:**

- 24" sq. air returns (fan assist) on each end of the greenhouse
- One heat unit for two houses is not recommended



## Under Bench Heating



## VENTING

Vent connectors serving Category I & Category II heaters shall not be connected into any portion of mechanical draft systems operating under positive pressure.

This furnace is equipped with a blocked vent shut off system.

DO NOT attempt to run this furnace until a qualified service man has checked the installation.

## INSTALLATION

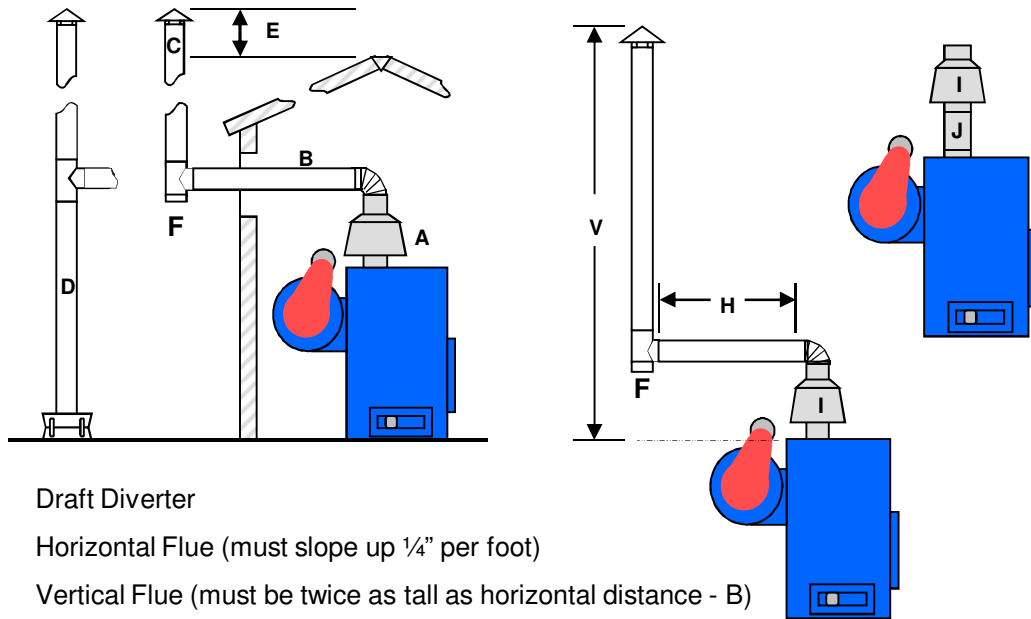
The installation must conform with local building codes or in the absence of local codes, the installation must conform with the National Fuel Code, ANSI Z223.1

Your furnace has been provided with a Draft Hood. This device must be used. This furnace also requires a blocked vent shut off device or spill switch (snap disc). The electrical schematic shows how this device is wired into the furnace controls. This device must be reset each time the sensor detects a venting failure. If the Blocked Vent switch has locked the system out, contact a qualified service man before attempting to restart the furnace.

NOTE: Negative room pressures in buildings with exhaust fans will cause the blocked vent device to lock the gas valve out. (Heating will cease)

## GENERAL RULES

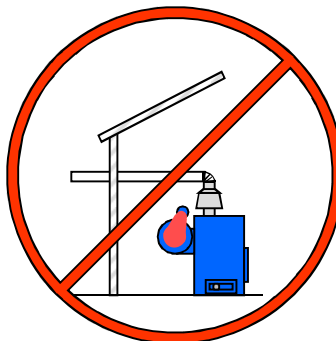
1. Do not reduce the stack size anywhere in the entire vent system..
2. The stack must not be closer than 12" to any combustible material.
3. All horizontal runs must slope upwards not less than 1/4" per foot from the heater towards the vertical riser or extension.
4. All horizontal runs must be supported to prevent sagging.  
The venting may be supported by steel strap or wires around the tube and tied up to any convenient overhead support. Supports must be provided at each connection.
5. Each connection should be secured by at least three sheet metal screws. More may be necessary depending upon installation.
6. The stack must be installed in such a manner to prevent accumulation of condensation.
7. If required, the stack must have a method of draining the condensation.
8. Use any type B flue or vent connectors. Unless local codes specify a superior type of flue or vent connectors.
9. Venting failures can be caused by adverse weather, exhaust fans being on at the same time as the furnace, inadequate make up air supply, lack of down-draft cap, etc.
10. Never allow less than 2' vertical pipe for each 1' of horizontal vent pipe.
11. Draft should never be less than .02" WC nor over .05" WC.



- A. Draft Diverter
  - B. Horizontal Flue (must slope up ¼" per foot)
  - C. Vertical Flue (must be twice as tall as horizontal distance - B)
  - D. Alternate stack design for free standing support
  - E. Chimney should extend 2 – 4 feet above high point of roof
  - F. A "Tee" instead of an elbow is recommended on the bottom of the vertical stack to facilitate water drainage and chimney cleaning. Install a cap on the bottom of the "Tee".
- "V" – Vertical Chimney Height (must be at least twice as long as "H")
- "H" – Horizontal Pipe (must slope upwards away from furnace, ¼" per foot of horizontal distance)
- "I" – Draft 0.02 to 0.04 inches of water column (measure below draft diverter)
- "J" – Install 12" to 24" riser between draft diverter and top of furnace.

**DO NOT OPERATE THIS UNIT WITHOUT VERTICAL FLUE PIPE!**

**PROPER DRAFT MUST BE MAINTAINED TO PREVENT DANGEROUS GASES FROM ENTERING THE BUILDING.....**





### **CO Level Standards**

**ASHRAE** American Society of Heating, Refrigerating and Air Conditioning Engineers - Standard 62-89

ASHRAE states the ventilation air shall meet the outdoor air standard. See U.S. EPA standards below.

**EPA** Environmental Protection Agency

EPA recommends 9 ppm or lower as an ambient air quality goal averaged over eight hours.

EPA recommends 35 ppm or lower as an ambient air quality goal averaged over one hour.

**OSHA** Occupational Safety and Health Administration

The maximum allowable concentration (50 ppm) for a worker's continuous exposure in any eight hour period.

**ANSI Z21.1** American National Standards Institute

Maximum concentration (200 ppm) allowed from an unvented space heater, when measured on an air-free basis.\*

Maximum concentration (400 ppm) allowed in furnace flue gas, when sampled on an air-free basis.\*

Maximum concentration (800 ppm) allowed from an unvented gas oven, when measured on an air-free basis.\*

\*Instruments can determine the amount of CO on an air-free basis by first measuring the amount of O<sub>2</sub> and CO present in the sample, and then calculating by the equation below:

$$\frac{20.9}{20.9 - O_2} \times CO = CO \text{ Air-Free}$$

This compensates for the amount of excess air provided by the burner. Excess air from a burner dilutes the products of combustion and causes a test for CO to be understated. A CO **air-free** measurement eliminates the excess air dilution.

**Maximum Capacity of Cubic Feet of Undiluted Propane Gas per Hour of Internal Pipe Size**

**Specific Gravity of 0.60                      1 Cubic Foot = 1000 BTU**

Gas - Natural                      Inlet Pressure - 1.0 PSI                      Pressure Drop - 0.3 WC

PIPE SIZE	PIPE DESIGNATION	ACTUAL PIPE I.D.	LENGTH IN FEET													
			10	20	30	40	50	60	70	80	90	100	125	150	175	200
			MAXIMUM CAPACITY IN CUBIC FEET OF GAS PER HOUR													
1/2	SDR 9.33	0.660"	153	105	84	72	64	58	53	50	46	44	39	35	32	30
3/4	SDR 11	0.860"	305	210	169	144	128	116	107	99	93	88	78	71	65	60
1	SDR 11	1.077"	551	379	304	260	231	209	192	179	168	159	141	127	117	109
1 1/4	SDR 10	1.328"	955	656	527	451	400	362	333	310	291	275	243	221	203	189
1 1/2	SDR 11	1.554"	1442	991	796	681	611	547	468	439	415	368	333	306	285	
2	SDR 11	1.943"	2590	1780	1430	1224	1224	983	841	841	789	745	661	598	551	512

**Specific Gravity of 1.50                      1 Cubic Foot = 2520 BTU**

Gas - Undiluted Propane                      Inlet Pressure - 11.0 WC                      Pressure Drop - 0.5 WC

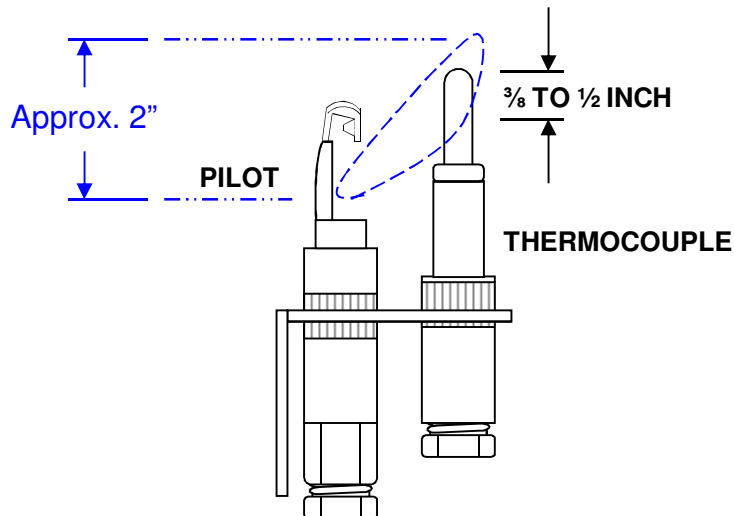
PIPE SIZE	PIPE DESIGNATION	ACTUAL PIPE I.D.	LENGTH IN FEET													
			10	20	30	40	50	60	70	80	90	100	125	150	175	200
			MAXIMUM CAPACITY IN CUBIC FEET OF GAS PER HOUR													
1/2	SDR 9.33	0.660"	340	233	187	160	142	129	119	110	103	98	87	78	72	67
3/4	SDR 11	0.860"	680	467	375	321	285	258	237	221	207	196	173	157	145	135
1	SDR 11	1.077"	1227	844	677	580	514	466	428	398	374	353	313	284	261	243
1 1/4	SDR 10	1.328"	2126	1461	1173	1004	890	807	742	690	648	612	542	491	452	420
1 1/2	SDR 11	1.554"	3211	2207	1772	1517	1344	1218	1121	1042	978	924	819	742	683	635
2	SDR 11	1.943"	5769	3965	3184	2725	2415	2188	2013	1873	1757	1660	1471	1333	1226	114

# Furnace Adjustments

## **Pilot Adjustment**

The pilot flame should bathe the thermocouple in flame (1 ½” – 2”). Each gas valve has a pilot flame adjustment. Remove the screw beside the pilot gas line on the gas valve.

The adjustment screw is down in this threaded hole. Turn counter-clockwise to increase flow.



## **Pilot Burner Adjustment (on gas valve):**

1. Remove Pilot adjustment cap.
2. Adjust pilot key to provide properly sized flame. 2” preferred. Clock-wise to decrease, counter clock-wise to increase
3. Replace pilot adjustment cap.
4. Leak test.

**To Light Pilot** – Follow procedures on page 3, “Operating Instructions” of the “Robertshaw Installation Data” insert in the rear of the manual.

## **Main Burner Adjustment**

The gas system should have its pressure tested. See Rating Plate for required pressures.

See “Robertshaw Installation Data” in appendix for more information about these valves.

The gas valve has an adjustable pressure regulator. The largest screw on the top of the gas valve must be removed to gain access to the adjustment screw. Turn clock-wise to increase the flow.

## **Blower Belt Adjustment**

The blower belt must be loose enough that ½” to 1” of belt deflection can be obtained with a gentle push on the belt, mid-point between pulleys. **Furnace power must be off while performing this check.**

## **Fan & Limit Adjustments**

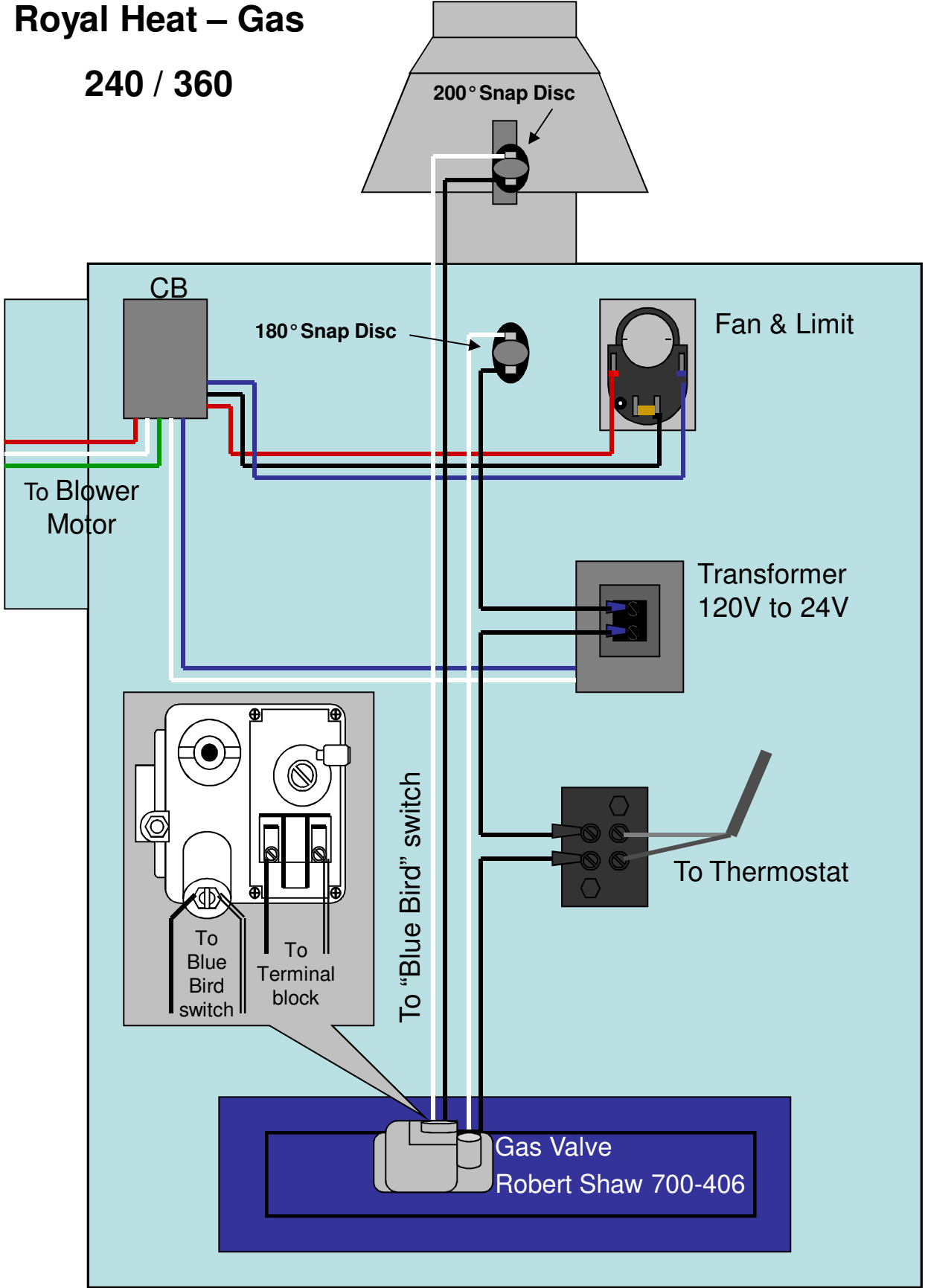
Each fan and limit has three settings. Before making any adjustments, the rotating dial must be held in place with one finger or thumb while another finger on the other hand is used to change the setting, being careful not to damage or strain the sensing element.

- Fan Stop 80° - 90° User Selectable
- Fan Start 110° - 120° User Selectable
- High Limit 170° - 180°



# Royal Heat – Gas

240 / 360



# TROUBLESHOOTING

1. Blower motor – heats up and trips out thermal protector on motor or the main breaker on power source.
  - A. Belt tension too tight
    - Loosen belt (1/2" – 1" deflection)
  - B. Electrical supply wiring & distance exceeded
    - Install correct wire gauge, usually larger
  - C. Blower bearing will not turn freely
    - Replace or oil bearings
  - D. Bad motor (amp draw, shorted...)
    - Take motor to authorized repair center or replace
  - E. Higher amp draw due to lack of air restriction
    - Replace or reinstall blower inlet guards (increase outlet restriction on furnace)
2. Blower motor – does not start
  - A. Reset button or auto-reset device on motor
    - Push in to reset (manual)
    - Allow motor to cool, reset will be automatic
  - B. Bad motor
    - Take motor to authorized repair center or replace
  - C. Fan & limit switch (defective)
    - Check settings (factory 90° / 110° / 170°) or replace
  - D. Loose wire or connection
    - Tighten / secure as required
3. Blower shakes (vibrations)
  - A. Belt tension/condition
    - Correct tension or replace belt
  - B. Pulley condition
    - Check for split, worn or bent pulley
  - C. Blower bearing
    - Replace as required
  - D. Blower wheel condition / dust build-up
    - Replace or clean, check for missing balance weights

# TROUBLESHOOTING

(continued)

4. Unable to light pilot
  - A. First time light attempt – air in gas line  
Purge air from gas line (test gas supply pressure)
  - B. Blocked pilot orifice  
Clean or replace
  - C. Check gas supply  
Gas line connected? Valve open?
  - D. Pilot out of adjustment  
Open up needle valve (counter clock-wise to increase)
  - E. Blocked or defective gas valve  
Replace gas valve
5. Pilot won't stay lit after releasing gas cock dial, goes out immediately
  - A. Inadequate pilot gas flow  
Clean orifice with compressed air / increase pilot gas flow (CCW)
  - B. Bad thermocouple / corroded connection to gas valve  
Replace, clean, check/tighten connections on gas valve
  - C. Bad gas valve  
Replace by qualified service person
  - D. Downdraft through furnace  
Draft hood installed? Exhaust fan on?
6. Pilot won't stay lit (intermittently) goes out at night...
  - A. Inadequate pilot gas flow  
Clean pilot orifice / increase needle valve flow
  - B. Weak thermocouple  
Replace
  - C. Draft through furnace  
Is draft diverter installed? Exhaust fan on? Weak pilot gas flow

## TROUBLESHOOTING

(continued)

7. Main burner will not light – test gas pressure
  - A. Thermostat not calling for heat  
Raise thermostat setting / replace thermostat
  - B. Check preceding pilot tips  
Proceed as required
  - C. Bad transformer  
Replace if 120V in, nothing out. 24V is correct
  - D. Bad gas valve  
Replace by qualified technician
8. Main burner lights weakly – test gas pressure, tank level
  - A. L.P. – Inadequate gas tank temperature or evaporation area
  - B. Tank valve undersized and freezing up.  
Increase valve size / capacity
  - C. Supply piping too small  
Increase pipe size
  - D. Wrong gas type  
Check gas type, replace orifices, pilot...
  - E. Bad gas valve  
Replace by qualified technician
  - F. Poor gas quality  
Connect to good gas supply
  - G. Gas pressure too low to unit  
Increase line pressure
  - H. Too many heaters on an inadequate supply line  
Re-engineer full “Heater On” gas demand
9. Main burner lights harshly, delayed ignition
  - A. Gas pressure too high  
Decrease gas pressure, see “Robertshaw Installation Data”
  - B. Wrong gas type  
Check gas type, replace orifices, pilot...
  - C. Bad gas valve  
Replace by qualified technician
  - D. Pilot too small  
See pilot troubleshooting section
  - E. Incorrect orifices  
Check correct orifice size, replace as required

# TROUBLESHOOTING

(continued)

10. Blower motor starts and stops frequently (while main burner is on)
  - A. Improperly set fan & limit switch
    - Set switch to proper temperatures (90° / 110° / 170°)
  - B. Defective fan & limit switch
    - Replace
  - C. Furnace is not at full firing rate
    - See main burner section
11. Discharge air too hot / too cold
  - A. Check firing rate
    - Check gas pressures, orifice size
  - B. Improperly set fan & limit switch
    - Set switch to proper temperatures (90° / 110° / 170°)
  - C. Defective fan & limit
    - Replace
  - D. Blower belt slipping / blower speed is improper
    - Correct belt tension / check motor or blower pulley size

*Special Note: Contact gas supplier to engineer gas unit demands and distribution systems*

## **RH240 / RH360 Parts**

1. Draft Diverter
2. Snap Disc - 200° (Draft Diverter)
3. 12" X 9" Ø Pipe extension (RH360 only)
4. Breaker box
5. 25 Amp Breaker
6. Fan & Limit Switch
7. Snap Disc – 180° (Furnace Shell)
8. 24V Transformer
9. Terminal Block, low voltage
10. Blower Motor \* (RH240 - ¾ HP, RH360 – 1 HP) DO NOT  
Replace blower motor with farm duty or manual reset model
11. Drive (motor) Pulley (RH240 – 4 ½", RH360 – 3 ¾")
12. Motor Mount Bracket (RH240 – Small, RH360 – Large)
13. Drive Belt (RH240 – 47", RH360 – 49")
14. Driven (blower) Pulley – 9"
15. Blower (RH240 – Small Lau, RH360 – Large Lau)
16. Belt Guard
17. Blower Guard (not shown)
18. Burner Tray (specify 240 or 360)
19. High Limit "Blue Bird" safety device
20. Orifice (L.P. # 63 / Nat. # 52)
21. Aluminum Tubing
22. Gas Valve
23. ¾" Street Elbow
24. ¾" X 12" Pipe Nipple
25. Tray Cover (360 only)
26. Manifold (specify 240 or 360)
27. Thermocouple
28. Pilot assembly (L.P.- Black fitting / Nat. – Silver fitting)

# RH240 / RH360 Parts

