RANSOME MANUFACTURING

Revised August 2014

RH SERIES
DIRECT-FIRED LP-GAS VAPORIZERS
OPERATION MANUAL

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Figure1-1 -- RH Series Vaporizers

1. GENERAL

1.01 This manual provides a physical and functional description and operating theory necessary for effective use of the Ransome RH Series direct-fired LP-Gas Vaporizers.

1.02 Ransome RH Series direct-fired Vaporizers provide an economical, dependable source of Liquefied Petroleum (LP) gas vapor for a wide range of applications up to 1,000 gallons per hour. RH50, RH80, RH120 and RH240 units are completely self-contained and require no outside power source. Larger units and all units equipped with pilot relighters require 115 Vac, 60 Hz power. They are individually factory-tested on Propane and shipped ready for use. The LP-Gas Inlet and Vapor Outlet are connected to the users system, the burner is activated, and the Ransome RH Series Vaporizer goes to work, quietly and automatically.

1.03 LP-Gas is stored as a liquid and used as a vapor. To change it to vapor, heat must be added at the following rates:

(a) From 785 BTU for each gallon of Propane at -44 degrees F to 441 BTU @1 32 degrees F.

(b) From 808 BTU for each gallon of Butane at 32 degrees F to 634 BTU @ 130 degrees F.

The liquid will then boil, changing to vapor at the rate of:

(c) 36.4 $ft.^3$ for each gallon of Propane.

(d) 31.3 $ft.^3$ for each gallon of Butane.

1.04 Ransome RH Series Vaporizers develop the heat required for vaporization through combustion of a small portion of the vapor generated. Operating on temperature control, the burner functions only as needed to create enough vapor to replace that being used.

1.05 Features of the RH Series Vaporizers include the following:

- Unique, trouble-free liquid inlet valve with only two moving parts is used on the RH50, RH80, RH120 & RH240 models, allowing quick filling of the Vaporizer Tube, while preventing LP-Gas carryover. Larger sizes use a reliable float switch and electric solenoid valve.
- Safe, dependable millivolt-powered gas control system maintains consistent vapor temperature under changing load conditions.
- Precision temperature switch, factory set and sealed against tampering, incorporates precious metal contacts for extended service life.
- Two-stage pressure regulation, used even in the smallest units, provides proper burner pressures and performance regardless of changes in tank pressures.
- A.S.M.E. code vaporizing tubes with integral heat exchage vanes and insulated ducts provide efficient vaporization with minimum burner input.
- The gas control valve is located inside the cabinet in a warm area, the regulators are mounted on the exterior of the cabinet to lessen the dangers of fire.
- Modular design provides maximum capacity in a compact, rectangular unit. Even the 1,000 gallon per hour size occupies less than 10.5 $ft.^2$.
- Double-Louvered combustion air baffles assure freedom from pilot outages even during adverse weather conditions. (For extreme conditions, optional electric pilot relighters are available).
- Stainless Steel guides assure perfect alignment of the burner to the vaporizer vessel thus preventing sooting and creating complete combustion.
- Models are available in a complete range of sizes from 50 gph to 1,000 gph Propane capacity, allowing the user to buy precisely the vaporization needed.
- All sizes are capable of infinite turndown and will maintain a ready supply of vapor from zero load to full capacity. At no load, only enough heat will be generated to maintain temperature and to prevent condensation.
- RH50, RH80 & RH120 Models are listed by Underwriters Laboratories, Inc. All sizes are listed by Factory Mutual Research Corporation.

Figure2-1 -- Typical RH Series Vaporizer (RH120)

How To Select A Direct-Fired Vaporizer

1.06 Determine total amount of LP-Gas Vapor required. Add up the maximum inputs of all the gas-using equipment in the system from manufacturers' data plates or literature, usually expressed in BTU/Hr. **Be sure this is correct.** If in doubt, contact manufacturers of equipment.

(a) Calculate required capacity as follows:

$$Q = \frac{Ht \times Fd}{91{,}690}$$

Where:

Q = Required Capacity Propane in Gallons/Hr.

H = Total input required, BTU/Hr.

Fd = Load Variation Factor; 1.1 for Gradual Load Changes, or 1.2 for Rapidly Fluctuating Load, 1.25 for Temperatures Below Minus 20 degrees F.

(b) Select a Vaporizer from Table 4-1 with at least as much capacity as determined in 1.06 (a). Section 1,06 (a) covers propane applications only.

2. PHYSICAL DESCRIPTION

2.01 The Ransome RH Series Vaporizers are all similar in design and construction. Designed for mounting on a concrete slab, outdoors, in varied weather conditions. The heat exchanger is mounted inside a heavy-gauge steel cabinet. A ceramic fiber insulation is provided between the Vaporizer Tube and the cabinet to minimize heat loss.

2.02 The principal difference between models is capacity, ranging from 50 gph to 1,000 gph. Models RH50, RH80, RH120 & RH240 utilize an internal Ball Float Valve to control LP-Gas level in the Vaporizer. The remainder of the series uses an external Float Valve Switch. Most of the system components are the same or similar between models, Capacity is increased by the Vaporizer Tube size and by paralleling Vaporizer Tubes.

2.03 Figures 2-1 and 2-2 illustrate a typical Vaporizer system, and are provided with key number callouts for all the major system elements and controls. Associated Table 2-1 provides a cross reference for each callout, identifying the respective element as to function and/or description.

Table 2-1 -- RH-Series Vaporizers

Key	Element	Function
1	Vaporizer Temperature Switch	Senses vapor temperature and provides electrical control of Burner Gas Control Valve.
2	Vaporizer Tube	Provides a vessel for heating LP-Gas to vapor.
3	Burner Gas Control Valve	Provides vapor flow control (ON/OFF) to Main Burner when Vaporizer Temperature Switch calls for heat, plus 100% shutoff of Pilot gas upon loss of Pilot flame.
4	Burner Ring Assembly	Provides a uniform flame for heating Vaporizer Tube.
5	Pilot Assembly	Provides a standing gas flame to light Main Burner.
6	Pilot Thermal Generator	Senses the Pilot temperature and provides a 750 millivolt energy to operate Burner Gas Control Valve.
7	Burner Pressure Tap	Connection point for an external pressure gauge.
8	Burner Shut-Off Valve	Provides manual shut-off of gas vapor to Burner Train.
9	Burner Gas Regulator	Provides two stages of vapor pressure regulation to Main Burner.

(Continued on page 4)

Table 2-1 -- RH-Series Vaporizers (Continued)

Key	Element	Function
10	Drip-Leg Valve	Provides: (a) For removing heavy ends accumulation from Burner Gas Train. (b) For purging air from Burner Gas Train.
11	Safety Relief Valve	Relieves vapor outlet pressure when pressure exceeds 250 P51G.
12	LP-Gas Vapor Outlet	Connection point to LP-Gas vapor line.
13	LP-Gas Inlet Assembly	Connection point LP-Gas liquid line.
14	Vent Stack	Provides an outlet for the products of combustion.
15	Electric Reignitor	Optional. Provides a convenient method of relighting Pilot flame and prevents pilot outage due to turbulent wind currents.
16	Power Connection	Provides a 115 Vac conduit connection for an Electric Reignitor. Optional on RH50, RH80, RH120 and RH240 units.

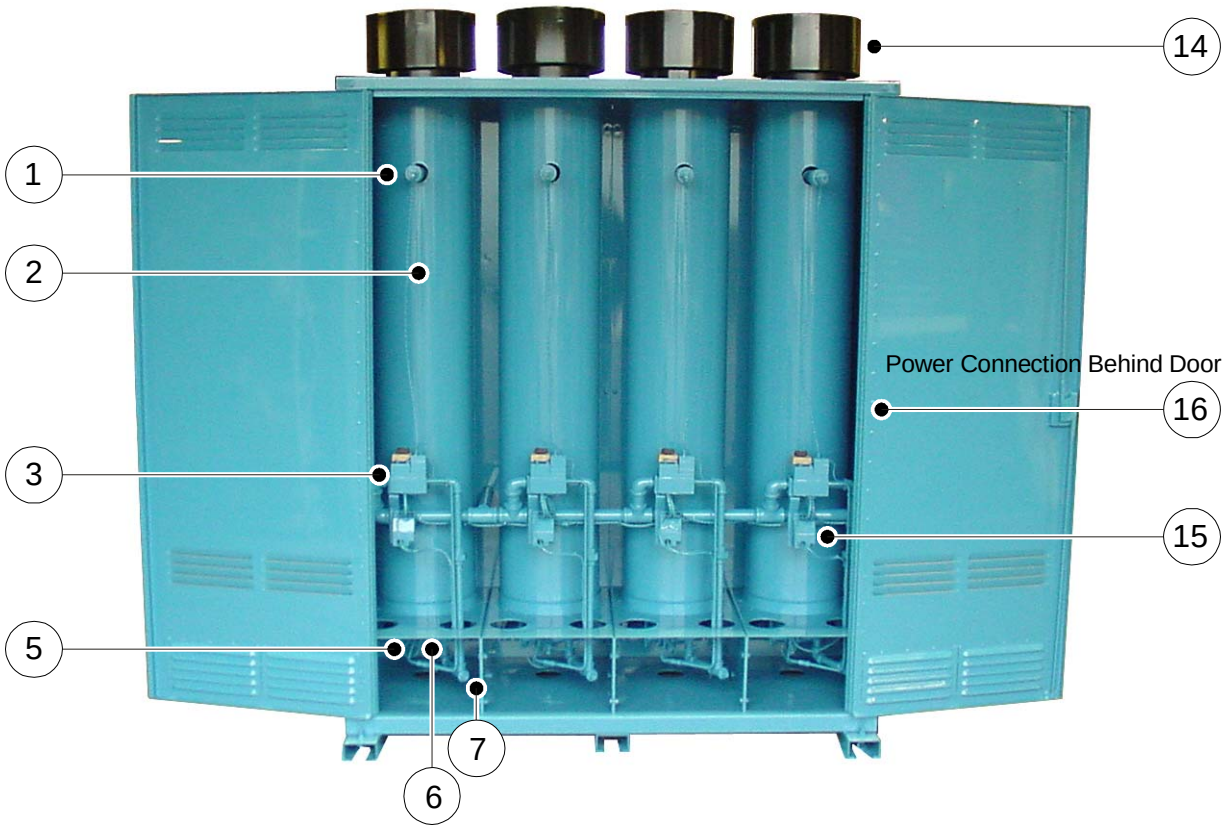
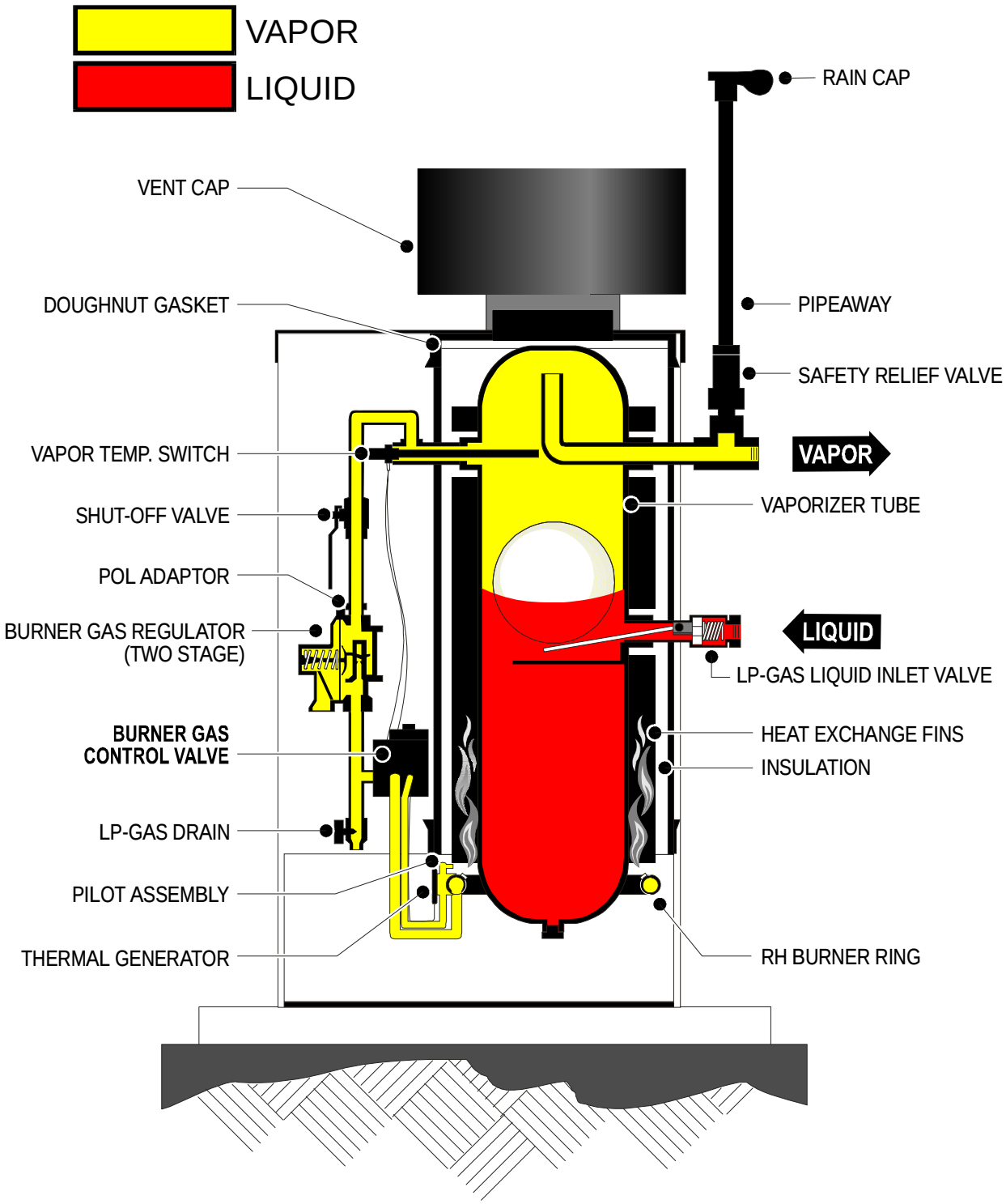


Figure2-2 -- Typical RH Series Vaporizer



General Schematic for RH50, RH80, RH120 and RH240 Vaporizers

3. FUNCTIONAL DESCRIPTION

3.01 Figure 3-1 illustrates the general schematic for the RH50, RH80, RH120 and RH240 Vaporizers and is functionally equivalent for all RH-Series Vaporizers.

3.02 LP-Gas is supplied to the Vaporizer Inlet from the users Storage Tank(s) System at a pressure dependent on temperature. (Refer to Table 3-1)

(a) RH50 through RH240 models use an internal ball float valve to limit liquid level and prevent flooding.

(b) RH200 through RH1000 models use an external float valve, for liquid level control.

Table 3-1
Storage Tank Pressure
vs.
Ambient Temperature Chart

Temp. (F)	Approx. Pressure (PSIG)	
	Propane	Butane
110	220.0	46.0
100	190.0	37.0
90	165.0	29.0
80	140.0	22.0
70	120.0	16.5
60	102.0	11.5
50	86.0	6.9
40	72.0	3.0
30	58.0	
20	47.0	
10	37.0	
0	28.0	
-10	20.0	
-90	13.5	
-30	8.0	
-40	3.6	

Burner Train

3.03 A small portion of the vapor supplied to the load is sampled, and used to supply the Burner Train. The Temperature Control Switch monitors the Vapor Outlet temperature and maintains it at 120 degrees F by switching on the Burner Gas Control Valve, Vapor passes through the Burner Shut-Off Valve to a two-stage Burner Gas Regulator, reducing the vapor pressure to 11" WC (Water Column). Vapor is supplied to the Burner Ring Assembly on demand and continuously to the Pilot Assembly by the Burner Gas Control Valve.

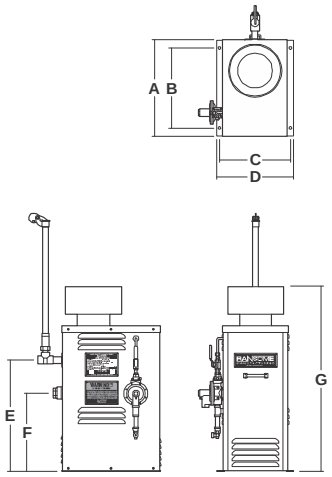
3.04 The Burner Gas Control Valve furnishes a small amount of vapor to maintain the Standing Pilot. This pilot is monitored by a Thermal Generator which generates about 750mV when the pilot is lit and at the correct temperature. The power output from the Pilot Thermal Generator is used to hold open a small pilot vapor supply valve. This system provides a fail safe mechanism. Should the pilot go out, the Thermal Generator output will drop releasing the pilot vapor supply valve and shutting off the pilot supply.

3.05 The principal purpose of the Burner Gas Control Valve is to supply vapor to the Burner Ring on demand. When the Vaporizer Tube temperature drops to less than 120 degrees F, the Temperature Control Switch contacts close and electrical energy passes to the Gas Control Valve. The Pilot lights this vapor as it reaches the Burner Ring Assembly. The Vaporizer Tube temperature increases, subsequently it reaches 120 degrees F causing the Temperature Control Switch to shut off the vapor to the burner.

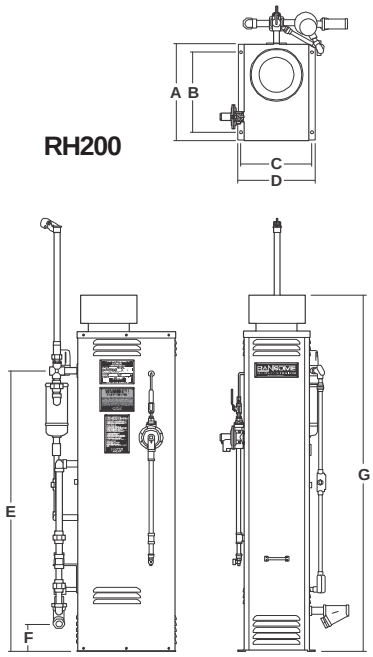
3.06 More efficient transfer is provided by Heat Transfer Fins welded to the Vaporizer Tube.

3.07 The Vapor Outlet Line pressure is monitored by a Safety Relief Valve which opens when the line pressure exceeds 250 PSIG. The user should provide a Shut-Off Valve and Outlet Pressure Regulator on the Vapor Outlet Line. The Pressure Regulator should not be over 24 inches from the Vaporizer.

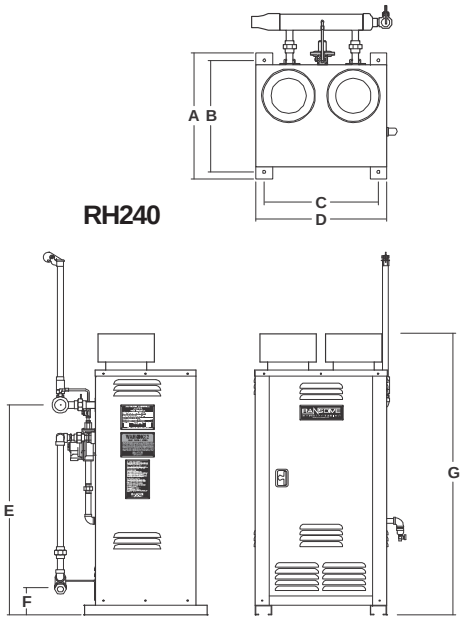
RH50, RH80 & RH120



RH200

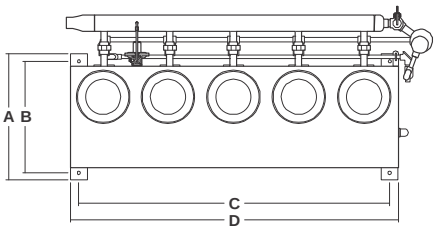


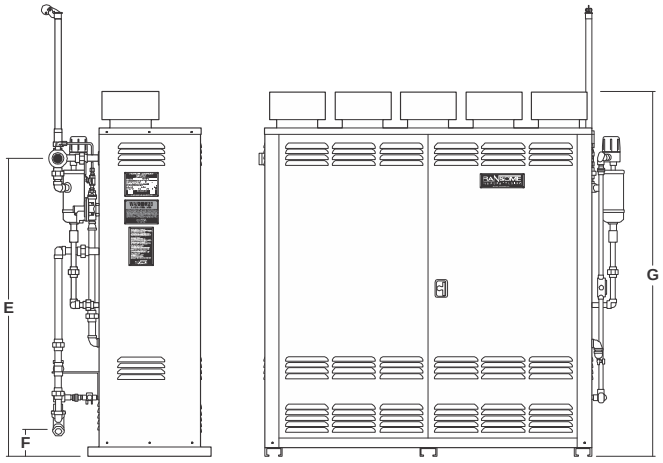
RH240



Model No.	Dimensions, Inches						
	A	B	C	D	E	F	G
RH50	20.375	17	15.25	16.5	23.5	16.5	39.25
RH80	20.375	17	15.25	16.5	33.5	26.5	49.25
RH120	20.375	17	15.25	16.5	40.875	33.875	55.5
RH200	20.375	17	15.25	16.625	59.5	8	75
RH240	26.25	23.25	24.5	28	42.813	8	60
RH400	26.25	23.25	24.5	28	63.25	8	77.375
RH600	26.25	23.25	38.375	41.875	63.25	8	77.375
RH800	26.25	23.25	52.25	55.75	63.25	8	77.375
RH1000	26.25	23.25	66.125	69.325	63.25	8	77.375

Model No.	Inlet Connection (NPT)	Outlet Connection (NPT)	Approx. Shipping Weight
RH50	.75 in.	1 in.	230 lbs.
RH80	.75 in.	1 in.	280 lbs.
RH120	.75 in.	1 in.	325 lbs.
RH200	1 in.	1 in.	565 lbs.
RH240	1 in.	2 in.	640 lbs.
RH400	1 in.	2 in.	945 lbs.
RH600	1 in.	2 in.	1,300 lbs.
RH800	1 in.	2 in.	2,050 lbs.
RH1000	1 in.	2 in.	2,500 lbs.





RH400, RH600, RH800 & RH1000

Figure4-1 -- RH Series Physical Specifications

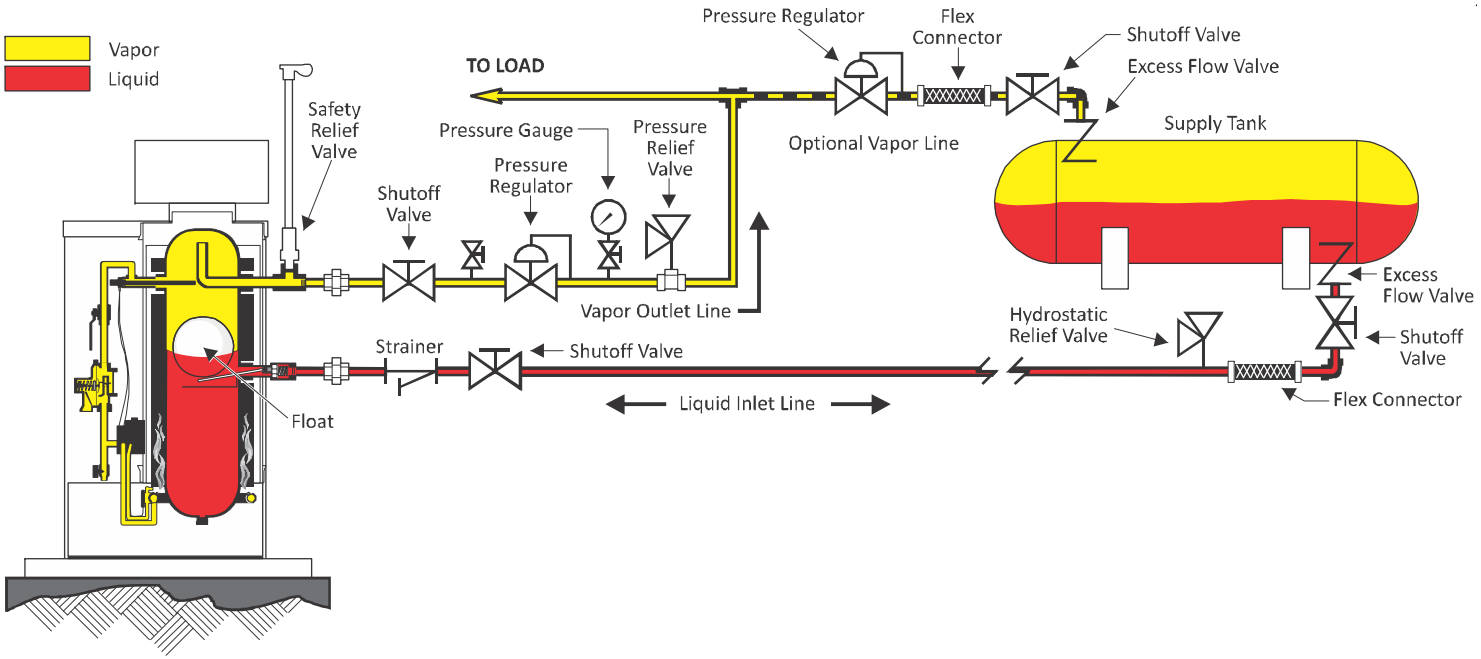


Figure 5-1 -- Typical RH Series Installation

NOTES:

1. Equipment, piping and installation must be in accordance with provisions of NFPA 58, and all applicable state, provincial and local codes.

2. Liquid pump may be required to provide sufficient pressure to inlet of vaporizer during conditions of low tank pressure.

3. Outlet pressure regulator should be no more than 24 inches from vaporizer outlet and located at or above centerline of vaporizer outlet.

4. Do not install a seperator, dripleg or other liquid trap upstream of outlet pressure regulator.

5. Regulator outlet pressure must be adjusted to a pressure below the vapor pressure of the saturated LP-Gas at lowest operating temperature or vapor may reliquefy in downstream piping.

6. Liquid piping system must allow for occasional reverse flow toward supply tank to prevent excessive pressures during operation.

7. If required by the Authority having Jurisdiction the Burner Control Regulator should be piped away to a safe distance from the vaporizer.

Table 4-1 -- RH Series Functional Specifications

Model	GPH Propane[2]	FT_3 Per Hour[1]	Millions of BTU/Hour[1]	Burner Input in BTU/Hour	Shipping Weight LBS.
RH50	50	1,820	4.58	90,870	205
RH80	80	2,912	7.34	129,040	245
RH120	120	4,368	11.00	145,020	285
RH200	200	7,280	18.34	227,970	380
RH240	240	8,748	21.96	290,040	640
RH400	400	14,560	36.68	455,940	920
RH600	600	21,840	55.01	683,910	1,380
RH800	800	29,120	73.35	911,880	1,840
RH1000	1000	36,400	91.69	1,139,850	2,300

NOTES:

1. For Propane LP Gas.
2. See Paragraph 1.06 for sizing information.

4. SPECIFICATIONS

4.01 Table 4-1 will provide the user with tabulated performance specifications for RH Series Vaporizers. Figure 4-1 illustrates the physical specifications of each RH Vaporizer. The user will find this useful when planning new installations.

5. OPERATION

5.01 The intent of Part 5 is to give the LP-Gas user general information on installation and start-up procedures for the Ransome RH Series Vaporizers. Each user's application will differ slightly, but it is hoped the user will gain from these generalized instructions.

5.02 After consultation with the Ransome Sales and Service Engineer or distributor and reviewing Figure 5-1, the user will make a plan for the LP-Gas storage and Vaporizer location.

5.03 When the Ransome Equipment arrives, examine the shipping container for obvious damage and then carefully unpack it. Inspect for obvious shipping damage. All claims for shipping damage should be made to shipper, not to Ransome or the Distributor. Obvious workmanship problems or incomplete shipments should be immediately referred to Ransome (or Distributor) following the warranty service procedures described in Part 6.

CAUTION

Only a trained, experienced vaporizer serviceman should inspect, test, start-up or service Ransome equipment.

Start Up and Operating Procedure

5.04 All RH Series Vaporizers are factory tested using commercial propane. Ransome Vaporizers are thoroughly tested at the factory and are assured to be free from leaks. However, vibration and jarring during subsequent handling, shipment and installation can cause leaks. The factory recommends:

(a) Use a good quality liquid leak detecting solution such as Sherlock, for leak checking. This is available for subfreezing temperatures as needed. A thorough leak test using this solution or equivalent leak detector must be conducted after installation and any leaks must be repaired prior to operation of the Vaporizer.

CAUTION

Do not use matches or other flames to conduct leak tests.

This start-up procedure assumes a complete, proper installation of the entire gas system including storage tank(s), valves, piping, bypass valves, etc., and including any required electrical power. All installations must be In accordance with NFPA No. 58 Standards, state, provincialor local regulations, codes and laws.

The procedure assumes use of clean, contamination-free LP-Gas. Close all valves in system prior to start-up. Then, proceed as follows:

STEP	PROCEDURE
1	Prime the system by slowly opening valves in the LP-Gas line one at a time between the Storage Tank and the RH Vaporizer inlet, starting at the Storage Tank. If a pump is incorporated, be sure to open valves on the Manual Bypass Line to avoid excessive differential pressure and possible damage. Do not start Pump at this time.
2	Slowly open RH Vaporizer Inlet Valve, admitting LP-Gas to Vaporizer Tube.
3	Slowly open Burner Train Shutoff Valve. The Pressure Gauge reading will rise until It becomes approximately equal to the pressure in the Storage Tank.
4	A considerable amount of air will be trapped in the Burner Train, which must be purged before the Pilot will light properly. (a) This can be done effectively through the 1/8 inch Drip-Leg Valve at the bottom of the Burner Train. (b) A safe way is to attach a small burner to the Drip-Leg Valve with a suitable length of tubing. (c) Hold a lighted portable LP-Gas torch over this small burner and open the Drip-Leg Valve to purge the trapped air, The small burner will light after the trapped air has been expelled. (d) Turn off the Drip-Leg Valve and allow the small burner to extinguish. Remove the pipe end extension.
5	Light the Vaporizer Pilot as follows: (a) **UNITS WITHOUT RE-IGNITOR** 1. Turn the Gas Control Valve Manual Knob to the PILOT. Press the PILOT Knob and light the Pilot with a match or suitable lighter. Hold it depressed for approximately one minute, then release it. The Pilot should stay on. 2. Follow the above procedure for additional Vaporizer Tubes, if applicable. (b) **UNITS WITH AN AUTOMATIC RE-IGNITOR** 1. Turn Gas Control Valve Manual Knob to OFF position. 2. Turn the Relighter Switch ON. Check that a spark occurs across the Spark Gap. If no spark occurs, check the input voltage, Religbter and the Burner ground. 3. Turn Gas Control Valve Manual Knob to the PILOT position. Press PILOT knob to light Pilot. Hold it depressed for approximately one minute, then release it. Observe that the Pilot flame is established within five sparks. When the flame starts, the sparking should stop. In some installations the

STEP	PROCEDURE
	electrode must heat up before the sparking ceases. If the sparking does not stop, check to assure electrode tip is in the flame, recheck the equipment ground connections. **IMPORTANT:** Ceramic insulator should not be inside the flame pattern. 4. Turn Gas Control Valve Manual Knob to OFF position. Sparking should reoccur. Repeat 3 above. 5. Follow the above procedure for additional Vaporizer Tubes, if applicable.
6	Turn Gas Control Valve Manual Knob to ON position. The Main Burner will ignite and will continue to operate until the Vaporizer Temperature Switch interrupts the control circuit.
7	When the Main Burner automatically shuts off, the Vaporizer will be at the proper temperature for operation.
8	Slowly open the Vapor Outlet Line valve to fill service line to load. Vaporizer is now on line ready to supply Vapor upon demand. It is recommended that the Vaporizer System be left ON to maintain temperature and eliminate possible corrosion from condensation.
9	For complete shutdown, close valve at Vaporizer inlet. Leave gas control ON until all residual gases are consumed. Turn Gas Control Valve to OFF position.

Note

A pump is not necessary for Vaporizer operation. However, in cold weather, vapor pressure in Storage Tank may not be sufficient to supply proper pressure to the user's load. This must be considered when the system is designed.

Maximum Pressure drop from inlet to outlet is as follows:

RH50	1 psi	RH400	1 psi
RH80	2 psi	RH600	2 psi
RH120	5 psi	RH800	3 psi
RH200	1 psi	RH1000	5psi
RH240	5 psi		

Control settings:

(a) Burner pressure -- 11 inches WC, with burners ON.

(b) Operating temperature Switch -- 120 ^{0}F.

6. MAINTENANCE

6.01 Maintenance procedures in Part 6 should be performed in accordance with local regulations and the user's maintenance plan.

Safety Precautions

6.02 The RH Series Vaporizers contain flammable gas under various pressures while in normal operation. Any gas leaks within the vaporizer system or in any part of the installation are potentially dangerous and must be eliminated immediately or a fire may occur. Any odor, gas or dark oily stains on joints or fittings indicate a possible gas leak. If such a leak does exist, pilots or other sources of ignition must be immediately extinguished. Electrical power should be disconnected at a location remote from the suspected leak.

6.03 Thorough inspections for leaks should be conducted frequently. Any leaks should be repaired immediately. Since this equipment, as well as any other components in the installation use threaded joints, gaskets, "O" rings and are subjected to vibration and thermal stresses, the possibility of leaks developing over a period of time is always present.

EMERGENCY INSTRUCTIONS

6.04 If a large leak is discovered, do not attempt to affect repair.

(a) Evacuate all personnel from the area.

(b) Call the Fire Department.

(c) If it can be done with SAFETY, shut off the Main Gas Supply Valve(s) at the LP-Gas Storage Tank(s).

The leak will stop when all gas downstream from the Gas Supply Valve(s) has been exhausted.

(d) Make certain all gas has dispersed before attempting repairs.

Routine Inspections

6.05 **The LP-Gas Liquid Inlet Valve(s)** should be inspected at least once a year, and more often if equipment is in heavy use and also at any time abnormality is detected. Ransome recommends replacing the valve should the above occure.

6.06 **Operating Switches and Controls** should be checked for correct performance at frequent intervals. Repair or replacement should be accomplished at the first indication of sticking, erratic performance or any abnormal condition.

6.07 **Safety Relief Valves** should be replaced at no more than five year intervals or any time possible damage is suspected. Vent piping connected to safety relief valves must be kept open, free from condensation, ice or other foreign material that might restrict release of excessive pressure in an emergency.

6.08 **Pressure Regulator Vents** must be clear, or erratic operation may result.

6.09 **Burner Train:** Burners, pilots, controls and all related components must be kept free of insects, cobwebs, debris and/or other foreign materials that might impair operation. Particular attention should be paid to the possibility of tar or other sticky or oily deposits accumulating in the gas controls. These deposits must be removed to prevent faulty operation. If these heavy ends are continually found in the fuel, the burner gas for the Vaporizer may be withdrawn directly from the Storage Tank(s). If this is to be done, a suitable regulator should be installed at the Storage Tank to avoid recondensation.

6.10 Vaporizer Tubes should be inspected for corrosion and soot accumulation at regular intervals. Soot should be removed to obtain original efficiency. If signs of corrosion are found, the Vaporizer Tube should be reinspected, tested and approved by a Certified A.S.M.E. Code Inspector. Any rejected Vaporizer Tube must be replaced.

Purging Gas From System

6.11 If service requires removal of gas from the system, do not merely vent gas to atmosphere. This could result in fire with the possibility of injury or damage.

(a) A Flare Burner should be installed at a safe distance from any gas leakage.

(b) Dispose of gas by burning.

(c) Make sure all gas is actually removed from the equipment before any connections are loosened.

6.12 If LP-Gas liquid is present in the Ransome equipment, it will chill as the pressure is relieved slowing the rate at which it will boil and discharge as vapor through the Flare Burner, BE CERTAIN all liquid is actually vaporized before loosening any connections.

6.12 (Continued) **The presence of frost on the outside of a component part is an indication of the presence of LP-Gas liquid and no connections should be loosened until it melts.**

6.13 All servicing must be done in a safe, thorough, step-by-step manner. If in doubt about what to do, the serviceman should:

(a) Consult the Operation Manual.

(b) Contact the gas system installer.

(c) Contact Ransome, following the instructions under Warranty Service in this manual.

Gas System Trouble Shooting

6.14 The trouble shooting procedures described in Table 6-1 are intended to help a serviceman isolate the cause or trouble encountered during routine operation to a replaceable part listed in Table 6-2 and Table 6-3. Only the kinds of trouble most likely to be encountered in service are listed; the list is by no means comprehensive. The Probable Cause column of Table 6-1 lists in order of most likely occurrence. To make best use of these trouble shooting procedures, the serviceman should be thoroughly familiar in the Physical and Functional Descriptions of the Ransome system, described in Parts 2 and 3 of this manual.

6.15 Before beginning any trouble shooting, make certain the Ransome Vaporizer has been properly installed. All system components including storage tanks, valves, piping, pumps and bypass valves must conform to NFPA No. 58 Standards and all state, provincial or local regulations, codes and laws.

Warranty Service

6.16 Faulty system components should be returned to Ransome, following the conditions set out in the Warranty. Defective material or technical questions should be referred to:

Ransome Manufacturing Customer Service
3495 5. Maple Avenue
Fresno, California 93725-2494
Phone: (559) 485-0979
email: office@meeder.com
www.ransomemfg.com

When the material is returned to Ransome, the following information will expedite repair or replacement and return if it is included:

(a) Completed Material Return Authorization (MRA) form. These can be obtained from Ransome Customer Service upon request.

(b) The name and area code-phone number of the individual most familiar with the failure.

(c) A brief statement of the problem with the unit.

(d) Make(s) of other gas equipment in the user's system.

(e) The approximate date and Purchase Order number for the Ransome equipment.

(f) The Model and Serial Number of the Ransome equipment.

Table 6-1 — Trouble Shooting

SYMPTOM	PROBABLE CAUSE	REMEDY
Pilot Outage	1. Extreme wind currents	Install Electric Pilot Relighter. See Replaceable Parts List or build suitable wind screen.
	2. Pilot orifice plugged.	Clean or replace.
	3. Improper burner pressure.	Adjust regulator to 11” W.C.with Main Burner on.
	4. Delayed ignition —See below.	
	5. Tank empty.	Add fuel.
	6. Insufficient millivoltage from Thermal Generator.	Reposition or replace.
Delayed Ignition or Flashback	1. Pilot orifices partially plugged	Clean or replace.
	2. Improper position of Pilot.	Adjust
	3. Improper Burner pressure.	Adjust to 11” W.C. with Main Burner on.
	4. Faulty or dirty Burner Gas Control Valve.	Clean or replace.
	5. Insufficient millivoltage from Thermal Generator.	Reposition or replace.
Main Burner Will Not Come On	1. Vapor Temperature Switch.	Adjust or replace.
	2. Loose wiring.	Repair -- Clean contacts.
	3. Faulty or dirty Burner Gas Control Valve.	Clean or replace.
	4. Insufficient millivoltage from Thermal Generator.	Reposition or replace.
	5. Tank empty.	Add fuel.
Sooty or Smelly Combustion	1. High burner pressure:	Adjust Burner Gas Regulator to 11” W.C. with Main Burner on.
	2. Air inlet restricted.	Correct the restriction.

Table 6-1 — Trouble Shooting (Continued)

SYMPTOM	PROBABLE CAUSE	REMEDY
Sooty or Smelly Combustion (Continued)	3. Burner Ring improperly positioned.	Adjust.
	4. Vent stack plugged, damaged or incorrect.	Repair or replace.
Liquid at LP-Gas Outlet	1. LP-Gas Inlet damaged or blocked open.	Inspect valve assembly. Clean, repair or replace.
	2. No Regulator at Vaporizer Outlet	Correct installation. See Figure 5-1.
Insufficient Capacity	1. Overload.	Reduce load or use larger Vaporizer.
	2. Low Burner pressure.	Adjust.
	3. Burner orifice(s) plugged.	Clean.
	4. Storage Tank pressure to low.	Use priming pump.
	5. Valve or pipe sizing too small.	Use Correct size. (See Ransome pipe sizing charts.)
	6. Inlet Strainer clogged.	Clean.
	7. Valve(s) not completely open.	Open as required.
	8. Vaporizer Temperature Switch set too low.	Readjust or replace switch, if necessary.
	9. Storage tank level too low.	Add fuel.
Pilot Relighter Not Working.	1. No electrical power.	Supply power.
	2. Improper electrode gap.	Adjust to 1/8 inch ± 1/32.
	3. Loose wire.	Inspect and repair.
	4. Faulty or damaged control.	Replace.

Table 6-2 -- RH50, RH80, RH120 & RH240 Replacement Parts

PART NUMBER	DESCRIPTION
HW-Q313A	Thermal Generator
JC-Y90AA	Pilot Orifice
JC-KIT	Pilot Assembly Complete
KRS	Kaowool Sleeve (Qty. 1, 8"x10" Piece)
KMB	Doughnut Gasket
KF-120F	Vapor Temperature Switch
*CP-PR120V	Pilot Relighter * (For Units Equipped with an “E” Option Only)
*KF-PRLW	Lead Wire for Relighter * (For Units Equipped with an “E” Option Only)
ME318	POL Adaptor
R632HCF	Regulator for RH50, RH80, RH120 & RH240
H185250	Safety Relief Valve
80	Shut-Off Valve 1/4"
1370	LP-Gas Drain
HW-VS820A	Burner Gas Control Valve
PAH185	Pipeaway Adaptor
13H00	LP-Gas Liquid Inlet Valve
10H05	Vaporizer Tube (RH50)
10H08	Vaporizer Tube (RH80)
10H12	Vaporizer Tube (RH120 & RH240)
12H20-63	RH Burner Ring Complete (RH50)
12H20-65	RH Burner Ring Complete (RH80)
12H20-69	RH Burner Ring Complete (RH120 & RH240)
PO508T69	#69 Orifice, Main Burner (RH50) Qty. 15
PO508T65	#65 Orifice, Main Burner (RH80) Qty. 15
PO508T63	#63 Orifice, Main Burner (RH120 & RH240) Qty. 15
PO508T79	#79 Orifice, Main Burner (RH50, RH80, RH120 & RH240) Qty. 1
RC125	Rain Cap
36H05	Vent Cap for RH50 and RH80
36H20	Vent Cap for RH120 & RH240

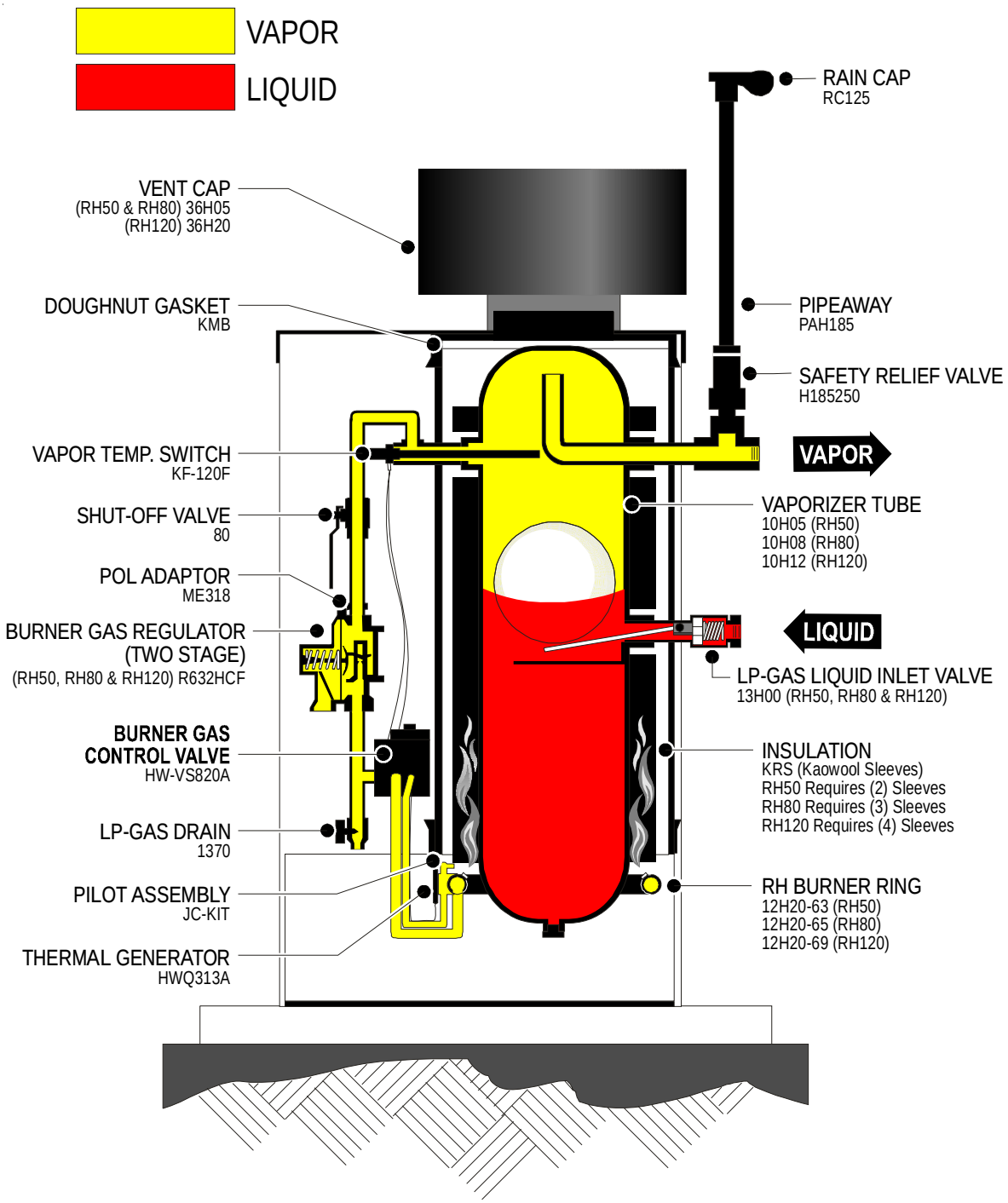


Figure 6-2 -- RH50, RH80 & RH 120 Cutaway Drawing

Table 6-3 -- RH200 thru RH1000 Replacement Parts

PART NUMBER	DESCRIPTION
HW-Q313A	Thermal Generator
JC-Y90AA	Pilot Orifice
JC-KIT	Pilot Assembly Complete
KRS	Kaowool Sleeve (Qty. 1, 8"x10" Piece)
KMB	Doughnut Gasket
KF-120F	Vapor Temperature Switch
CP-PR120V	Pilot Relighter (Replaces KF-PR120V since 2008)
KF-PRLW	Lead Wire for Relighter
R532HCF	Regulator for RH200
R532JFF	Regulator for RH400
R522HHGJ	1st Stage Regulator for RH600 and RH800
R522CFFXA	2nd Stage Regulator for RH600 and RH800
R522HJGJ	1st Stage Regulator for RH1000
R422DDFXA	2nd Stage Regulator for RH1000
H185250	Safety Relief Valve
80	Shut-Off Valve 1/4"
RX8210G027	LP-Gas Liquid Inlet Solenoid Valve
PAH185	Pipaway Adaptor
1370	LP-Gas Drain
HW-VS820A	Burner Gas Control Valve
BCU10	Backcheck Valve
774	"Y" Type Strainer
SOR1	Ultrasonic Level Switch (Replaces: JO-BELL Liquid Level Control)
I5H10	Chamber f/ Ultrasonic Level Switch (Replaces: JO-BELL Liquid Level Control)
10H20	Vaporizer Tube (RH200 thru RH1000)
12H20	RH Burner Ring Complete (RH200 thru RH1000)
PO508T57	#57 Orifice, Main Burner (RH200 thru RH1000) Qty. 15
PO508T79	#79 Orifice, Main Burner (RH200 thru RH1000) Qty. 1
RC125	Rain Cap
36H20	Vent Cap (8")

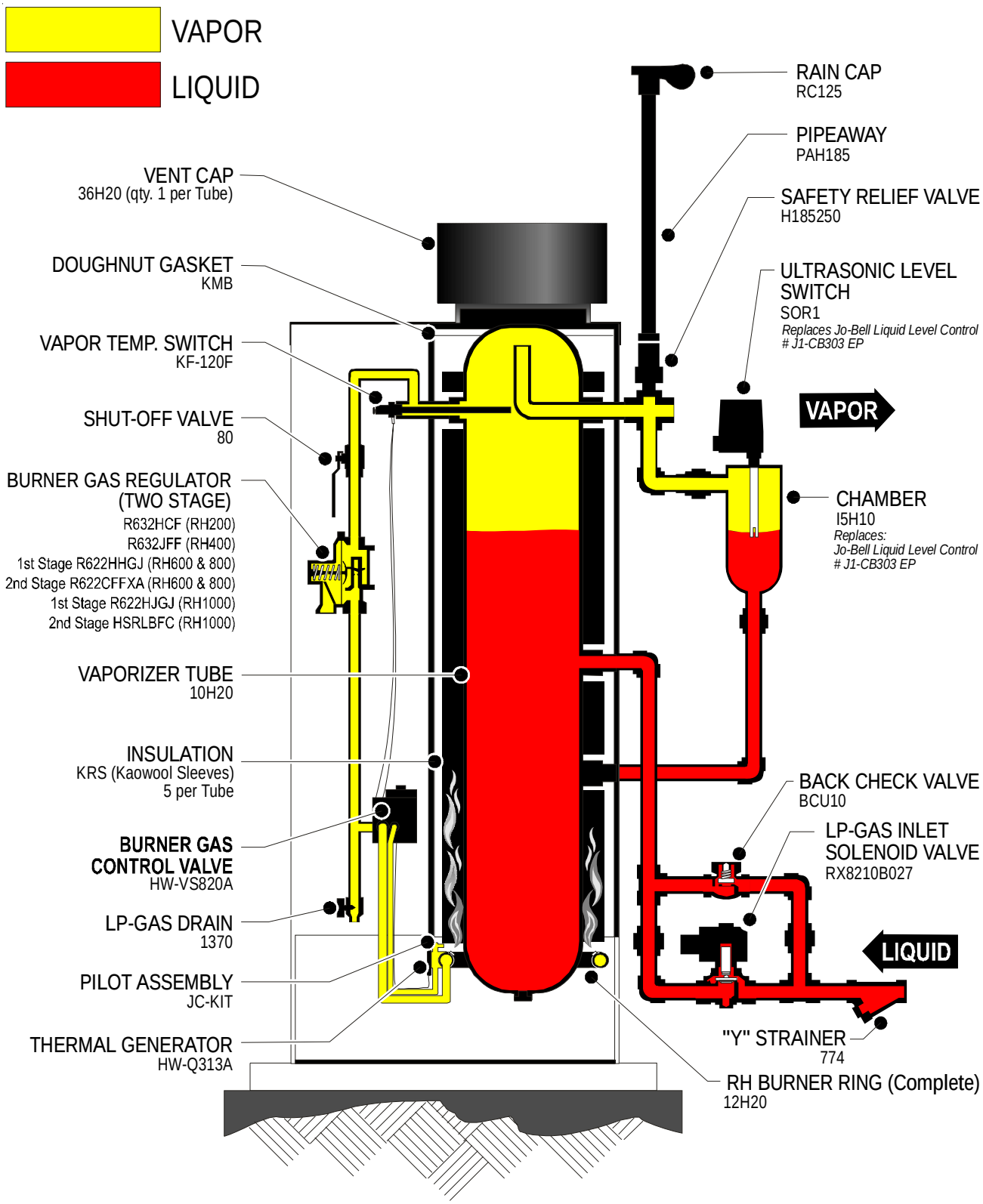


Figure 6-3 -- R200 thru RH 1000 Cutaway Drawing

Ransome Model No. _____ Serial No. R_____ Date Purchased: _____

Purchased From (Name of Supplier) _____

Owner (Name of Company) _____

Where Installed (If Different) _____ City _____ State_____

Date Installed and First Operated _____

Notes