

**RW SERIES
WATER-BATH LP-GAS VAPORIZERS
OPERATION MANUAL**

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Figure1-1 -- RW Series Vaporizers

1. GENERAL

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

1.02 Ransome RW Series water bath Vaporizers provide an economical, dependable source of Liquefied Petroleum (LP) gas vapor for a wide range of applications up to 900 gallons per hour. Standard units are completely self-contained, requiring electric power only for liquid level control and electronic intermittent pilot. They are individually factory-tested on Propane and shipped ready for use. The LP-Gas Inlet and Vapor Outlet are connected to the user's system. The Water Bath is filled with a 50/50 glycol-water mix, the Burner is activated, and the Ransome RW 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 into a vapor, heat must be added at the rate of:

- (a) From 785 BTU for each gallon of Propane at -44° F to 441 BTU @ 132° F.
- (b) From 808 BTU for each gallon of Butane at -32°F to 634 BTU @ 130°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 RW 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 maintain proper Water Bath temperature.

1.05 Features of the RW Series Vaporizers include the following:

- Unique liquid level control with only two moving parts is used in all RW 100 units, allowing quick filling of the vaporizing tube while preventing liquid carryover. Larger sizes use reliable float switch and electric valve.
- Gas control system with Intermittent Pilot Module to maintain proper Water Bath Temperature under changing load conditions.
- Individual controls for each tube accurately maintain temperature of the liquid bath.

- Two-stage pressure regulation, used on all units in this series, provides proper burner pressure operation regardless of pressure changes within storage tanks.
- Jacketed vaporizer tubes conform to ASME Code; have water tubes located internally to increase circulation and capacity.
- All controls are located inside modular cabinets in a warm area for dependable performance even in extreme weather conditions.
- Modular design provides maximum capacity in a compact, rectangular unit. Even the 900 gallon per hour size occupies less than 10.5ft.²
- All sizes can be easily adapted to use tank vapor to supply the Burner Train in heavy-duty applications where a substantial amount of contamination of heavy ends may be present in the LP-Gas supply.
- New Burner design provides more efficient combustion, better ignition and greater resistance to the effects of high winds, storms and locally turbulent airflows.
- Models are available in a complete range of sizes from 100 gph to 900 gph Propane capacity, allowing the user to specify 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 will be generated to maintain temperature and to prevent condensation. Warm liquid bath provides continuous heat source, eliminates starting lag when accommodating widely fluctuating loads.



Figure2-1 -- Typical RW Series Vaporizer (RW180)

How To Select A Water Bath Vaporizer

1.06 Determine the total amount of LP-Gas Vapor required. Add up the maximum in puts 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 the manufacturers of the equipment.

(a) Calculate required capacity as follows:

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

Where: Q = Required Capacity Propane in Gal/Hr.
 Ht = Total Input Required, BTU/Hour
 Fd = Load Variation Factor: 1.0 for Gradual Load Changes, or 1.1 for rapidly Fluctuating Load, 1.2 for Temperatures below -30° F.

Table 2-1 – RW Series Vaporizer

Key	Element	Function
1	Vaporizer Tube	Provides a Vessel for heating LP-Gas into Vapor.
2	Hot Water Circulation Pump	Circulates hot water for efficient heat transfer and temperature control.
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	Vaporizer Drain Plug	Provides a means of cleaning out heavy ends accumulation in Vaporizer Tube.
5	Low Water Cutoff Flow Switch	Senses the Water-Bath Flow. Interrupts the millivolt circuit to Burner Gas Control Valve when the water level drops below a predetermined level.
6	Water Bath Temperature Switch	Senses water bath temperature and provides electrical control of Burner Gas Control Valve. Set to 175°F when Vaporizer is idling.
7	Glycol Water Fill	Provides the means for filling Water-Bath jacket.
8	Expansion Tank	Keeps heat exchanger full while preventing overflow.
9	Vent Stack	Provides an outlet for the product combustion.
10	Safety Relief Valve	Relieves vapor outlet pressure when pressure exceeds 250 lbs.
11	LP-Gas Vapor Outlet	Connection point to LP-Gas vapor line.
12	Power Connection	Provides a 117V AC conduit connection.
13	LP-Gas Inlet Assembly	Connection point LP-Gas liquid line.
14	Water Sight Glass	Provides a visual indication of Water-Bath level.
15	Glycol Water Drain	Provides the means for removing Water-Bath, i.e., to sample Glycol-Water ratio.
16	Burner Shut-Off Valve	Provides manual shut-off of gas vapor to Burner Train.
17	Burner Gas Regulator	Provides two stages of vapor pressure regulation to Main Burner. Set to 11 inch W.C. with one Burner on.
18	Drip Leg Valve	Provides: (a) For removing heavy ends accumulated from Burner Gas Train. (b) For purging air from the Burner Gas Train.

2. PHYSICAL DESCRIPTION

2.01 The Ransome RW Series Vaporizers are all similar in design and construction. They are designed for mounting on a concrete slab, outdoors, in varied weather conditions. The heat exchanger is mounted inside a 14-gauge, hot-rolled steel cabinet.

2.02 The principle difference between models is the capacity, ranging from 100 to 900 gph. The model RW 100 utilizes an internal Ball Float Valve to control LP-Gas level in the Vaporizer. The remainder of the series

uses an external Float Switch and Electric Inlet Valve.

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 Figure 2-1 illustrates a typical Vaporizer system (RW 180) and is 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.

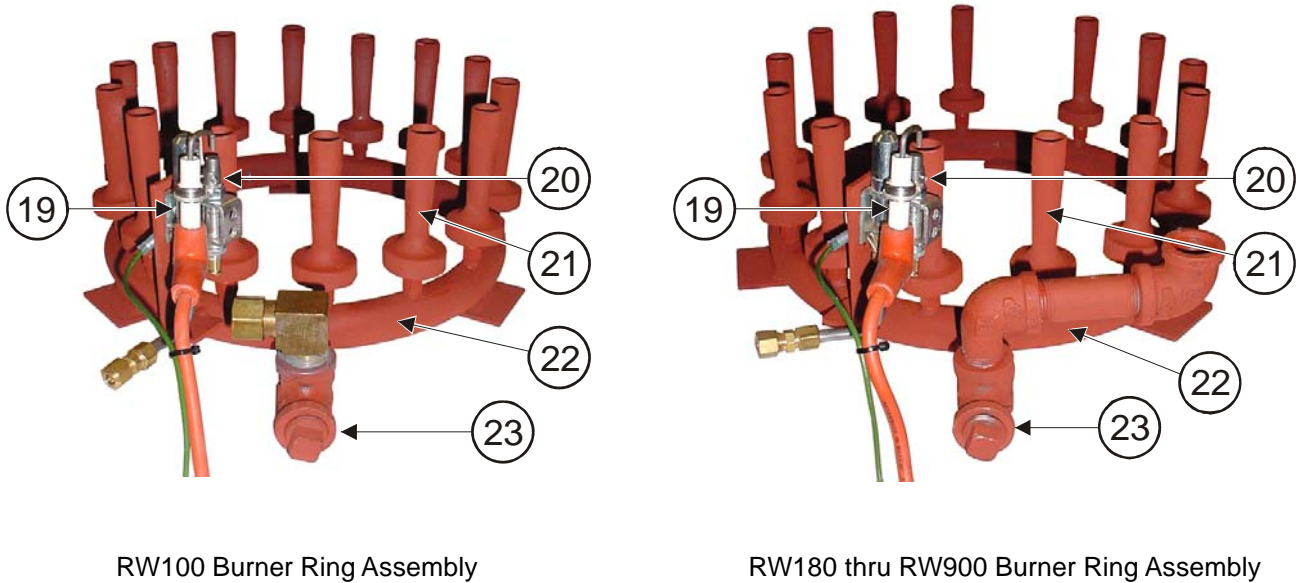


Figure 2-2 -- Detail of RW Series Burner Ring Assembly and Components

Table 2-1 – RW Series Vaporizer (continued)

Key	Element	Function
19	Igniter Sensor Assembly	Senses flame current to shut off spark generator and energize Main Gas Valve.
20	Pilot Assembly	Provides intermittent gas flame to light Main Burner.
21	Venturi Burner	Burner with orifice to provide heat for vaporization.
22	Burner Ring Assembly	Provides a uniform flame for heating Vaporizer Tube.
23	Burner Pressure Tap	Connection point for an external pressure gauge.

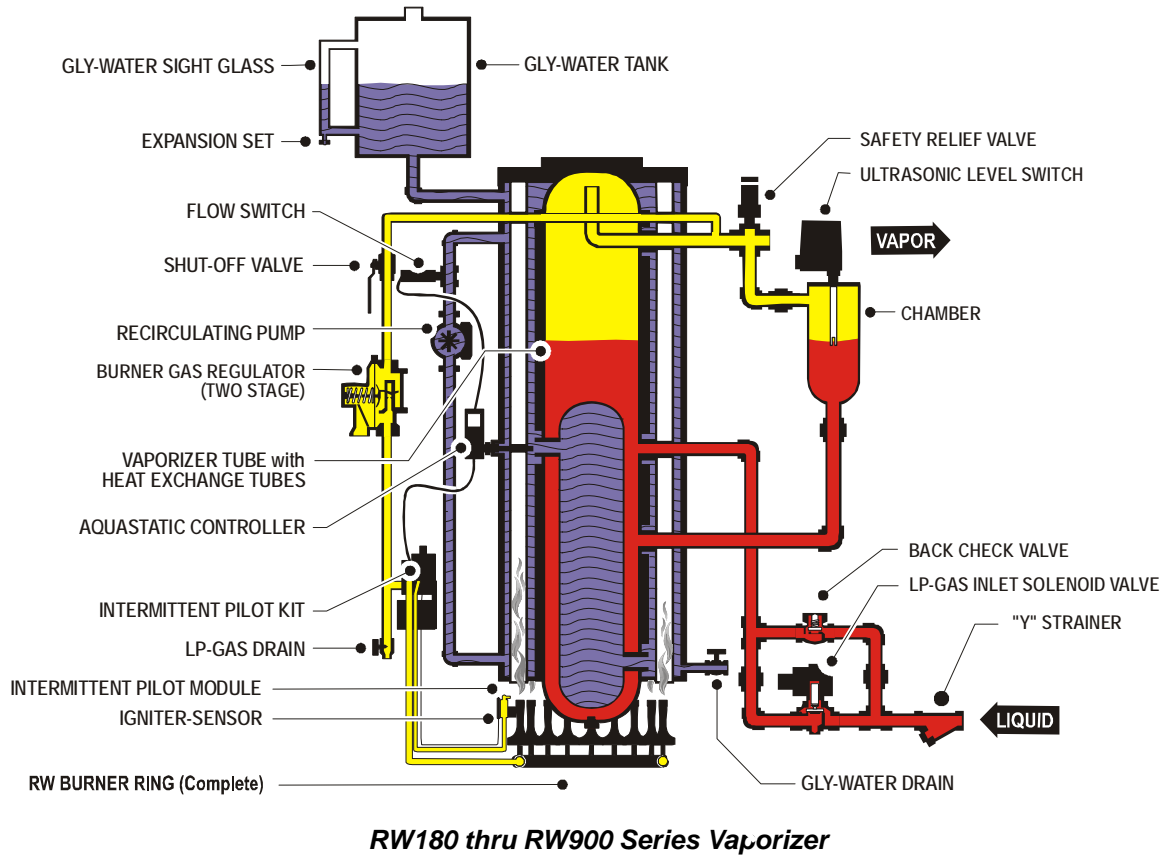
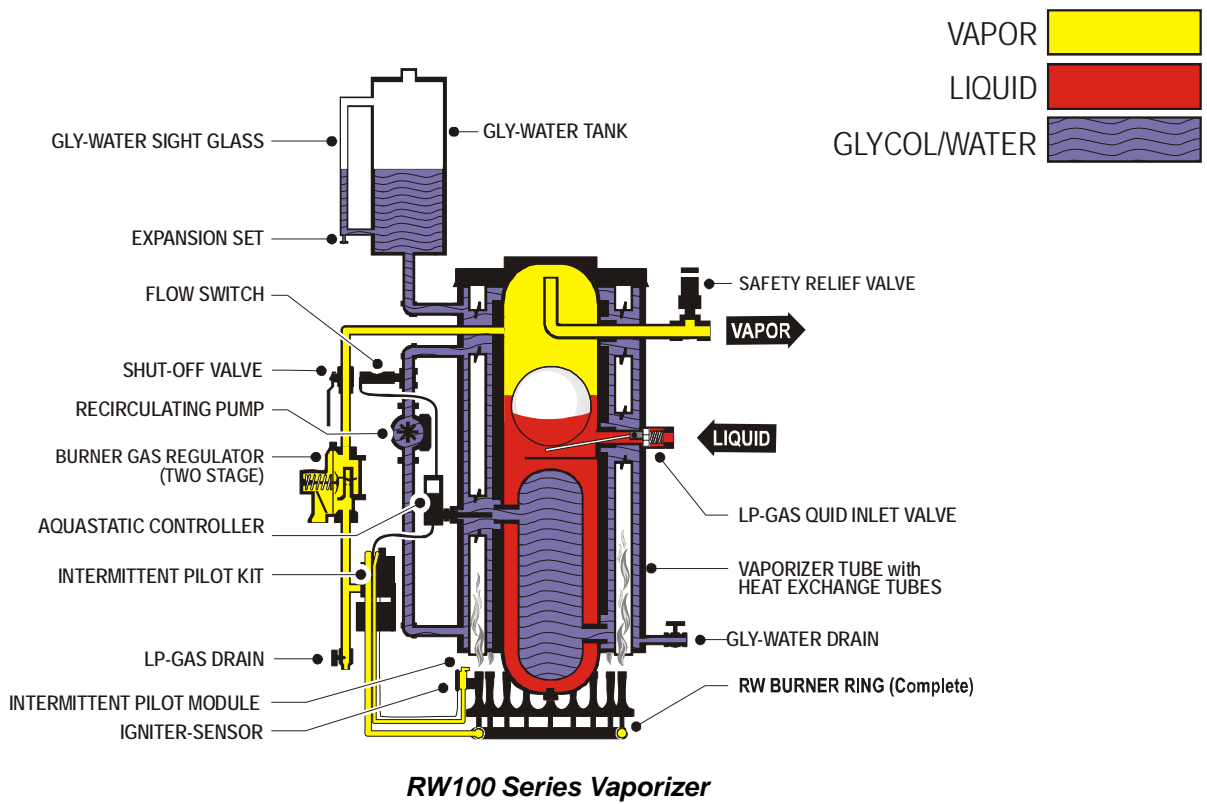


Figure 3-1 -- General Schematic for RW Series Vaporizers

3. FUNCTIONAL DESCRIPTION

3.01 Figure 3-1 illustrates the general Schematic for RW Vaporizers and is functionally equivalent for all RW Series Vaporizers.

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

- (a) RW 100 uses an internal ball float valve to limit liquid level and prevent flooding.
- (b) RW 180 through 900 use an external float switch and electric inlet valve.

Burner Train

3.03 A small portion of the vapor supplied to the load is used to supply the Burner Train. The Water Bath Temperature Switch monitors the Water Bath

temperature and maintains it at 175°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 inches W.C. (Water Column). The Vapor Pressure Gauge (Optional) monitors the vapor pressure supplied to both the load and Burner Train. Vapor is supplied to the Burner Ring Assembly on demand by the Burner Gas Control Valve.

3.04 The Burner Gas Control Valve furnishes vapor to supply the Intermittent Pilot and Main Burner. Following the call for heat, the Intermittent Pilot Module energizes the first main valve operator. The first main valve opens, which allows gas to flow to the pilot burner. At the same time, the electronic spark generator in the module produces a high voltage spark pulse output. The voltage generates a spark at the igniter-sensor that lights the pilot.

If the pilot does not light, or the pilot flame current is not at least 1.0 uA and steady, the module can not energize the second (main) valve and the main burner cannot light. After 90 seconds maximum, the system shuts off and the pilot valve closes; trial for ignition restarts after a minimum of five minutes (six minutes nominal). Ignition, shutoff, and wait sequence repeats until pilot lights or call for heat ends.

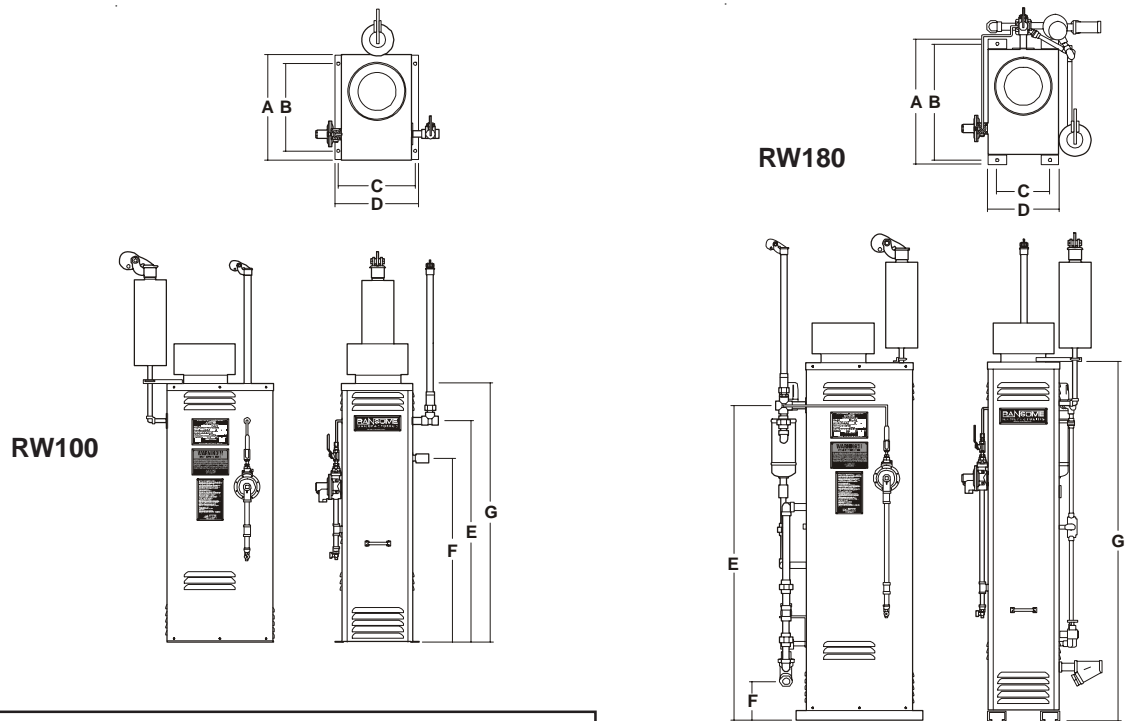
When the pilot flame is established, a flame rectification circuit is completed between the sensor and burner ground. The flame sensing circuit in the module detects the flame current, shuts off the spark generator and energizes the second main valve operator. The second main valve opens and gas flows to the main burner, where it is ignited by the pilot burner. When the call for heat ends, both valve operators are de-energized, and both valves in the gas control close.

3.05 The principle purpose of the Burner GasControl Valve is to supply vapor to the Burner Ring on demand. When the Water Bath temperature drops to less than 175°F, the Water Bath Temperature Switch closes, energizes the Intermittent Pilot Module. The Intermittent Pilot lights this vapor as it reaches the Burner Ring Assembly. The Water Bath temperature increases. Subsequently, it reaches 175°F causing the Water Bath Temperature Switch to shut off the vapor to the burner.

3.06 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.

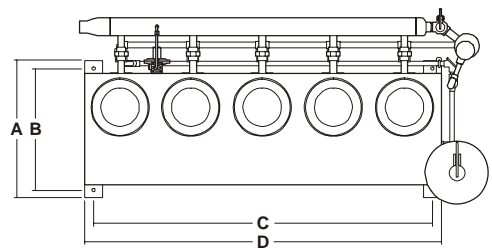
**Table 3-1
Storage Tank Pressure
vs.
Ambient Temperature Chart**

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	
-20	13.5	
-30	8.0	
-40	3.6	



Model No.	Dimensions, Inches						
	A	B	C	D	E	F	G
RW100	20.375	17	15.25	16.5	42.375	34.5	48.5
RW180	26.25	23.25	12.625	16.125	63.5	8	70.625
RW360	26.25	23.25	28.5	32	63.5	7	70.625
RW540	26.25	23.25	44.5	48	63.5	7	70.625
RW720	26.25	23.25	60.5	64	63.5	7	70.625
RW900	26.25	23.25	76.5	80	63.5	7	70.625

Model No.	Inlet Connection (NPT)	Outlet Connection (NPT)	Approx. Shipping Weight
RW100	3/4 in.	1 in.	450 lbs.
RW180	1 in.	1 in.	750 lbs.
RW360	1 in.	2 in.	1,390 lbs.
RW540	1 in.	2 in.	1,950 lbs.
RW720	1 in.	2 in.	2,510 lbs.
RW900	1 in.	2 in.	3,070 lbs.



RW360, RW540, RW720 & RW900

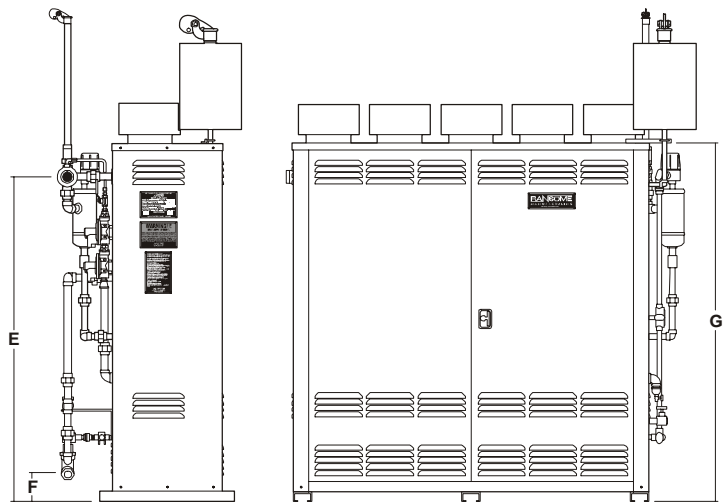
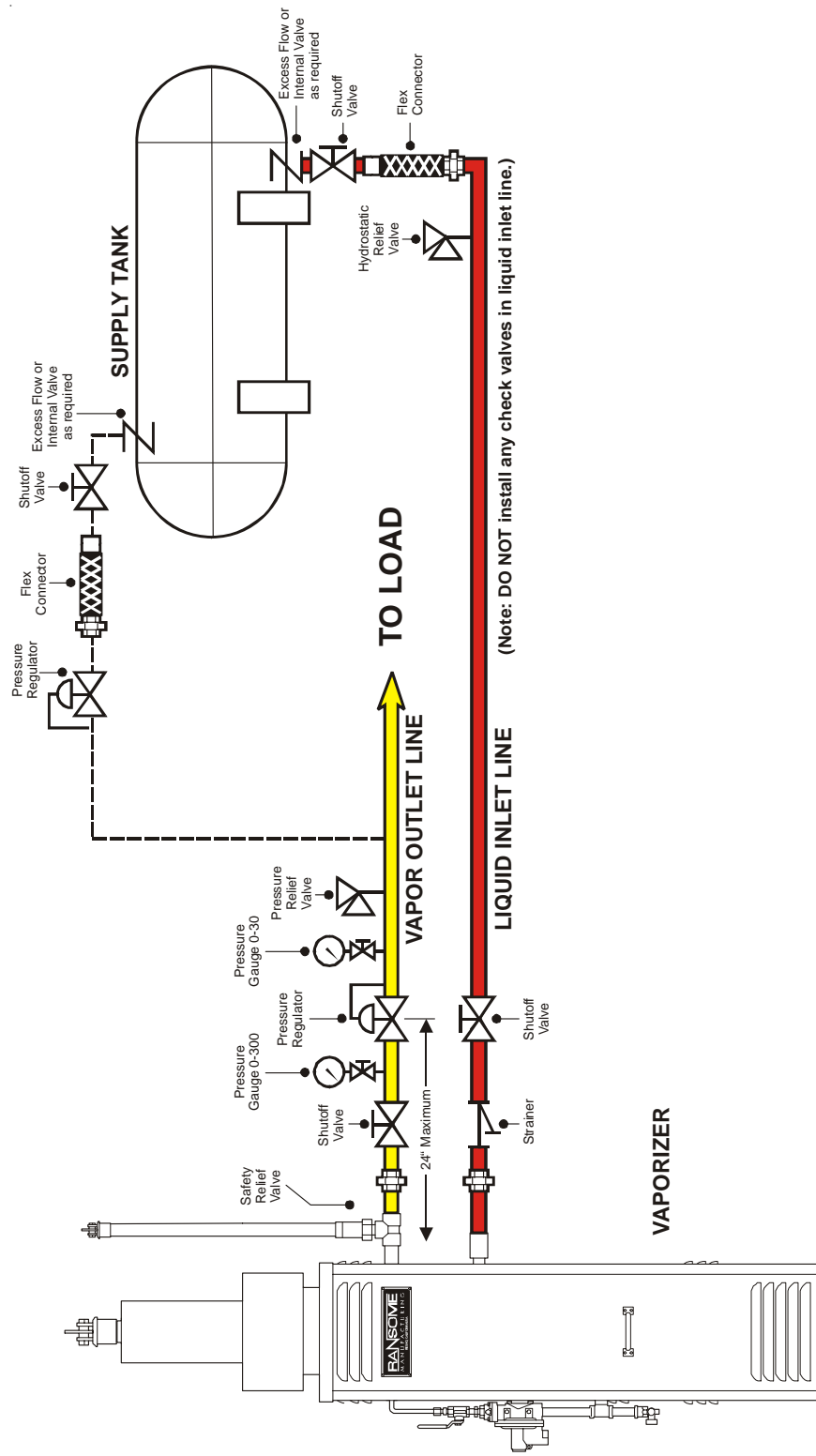


Figure4-1 -- RW Series Physical Specifications



NOTES:

1. Equipment, piping and installation must be in accordance with provisions of NFPA58, 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 separator, 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.

Figure 5-1 -- Typical RW Series Installation

Table 4-1 -- RW Series Functional Specifications

Model	GPH Propane	Millions of BTU/Hour	CF/HR	KG/HR
RW 100	100	9.16	3,645	192
RW 180	180	16.49	6,561	345
RW 360	360	32.98	13,122	690
RW 540	540	49.46	19,683	1,035
RW 720	720	65.95	26,244	1,380
RW 900	900	82.44	32,805	1,725

NOTES:

1. For Propane LP Gas.
2. See Paragraph 1.06 for sizing information.
3. Units may be paralleled to achieve greater capacities.

4. SPECIFICATIONS

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

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

5. OPERATION

5.01 The intent of Part 5 is to give the LP-Gas user general information on installation and turn-on procedure for the Ransome RW 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 shipping damage. All claims for shipping damage should be made to the shipper, not to Ransome Manufacturing or the Distributor. Obvious workmanship problems or incomplete shipments should be immediately referred to Ransome Manufacturing (or Distributor) following the warranty service procedures described in Part 6.

Start Up and Operating Procedure

5.04 All RW 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, provincial or 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
	<div data-bbox="381 562 1235 762" style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Note</p> <p>Before filling the Water Bath, remove the 1/4 inch vent plug located on the top side of the Water Bath Shell. Replace this plug after filling.</p> </div> <p>1 Fill Vaporizer Water Bath with a proper mixture of Dow Ambitrol CN solution or an equivalent to prevent freezing up and corrosion. An equivalent solution is 50/50 mixture – 3 gallons of water and 3 gallons of antifreeze. The water and antifreeze must be thoroughly premixed prior to loading in the Water Bath. The Water Bath level can be visually monitored in the Water Sight Glass mounted on the front of the Vaporizer or the Expansion Tank. On Units without an Expansion Tank, fill up to approximately 2 inches of the top of the Water Sight Glass. On units with an Expansion Tank, fill up to 1/3 of the Water Sight Glass. After the Vaporizer has preheated, top off within ½ inch of the top of the Water Sight Glass.</p> <p>2 Prime the system by slowly opening valves in the LP-Gas line one at a time between the Storage Tank and the RW 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.</p> <p>3 Slowly open RW Vaporizer Inlet Valve, admitting LP-Gas to Vaporizer Tube.</p> <p>4 Slowly open Burner Train Shutoff Valve. The Pressure Gauge reading will rise until it becomes approximately equal to the pressure in the Storage Tank.</p> <p>5 A considerable amount of air will be trapped in the Burner Train, which must be purged before the Pilot will light properly.</p> <ul style="list-style-type: none"> (a) This can be done effectively through the 1/8 inch Drip-Let 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 lit portable LP-Gas torch over this small burner and open the Drip-Let 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 and extension. <p>6 Turn on Vaporizer ON/OFF switch to operate the Vaporizer. If there is a call for heat the Vaporizer will automatically light. (See 3.04 for lighting sequence and Main Burner operation).</p>

STEP	PROCEDURE						
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 the valve at the Vaporizer Inlet and leaving the Outlet open with Gas Control ON until all residual gases are consumed. Turn the ON/OFF switch to the OFF position.						
<div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: 80%;"> <p>Note</p> <p>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.</p> </div>							
<p>Pressure drop from inlet to outlet is as follows:</p>							
<table style="width: 100%; border: none;"> <tr> <td style="padding: 5px;">RW100 (4 psi)</td> <td style="padding: 5px;">RW540 (2 psi)</td> </tr> <tr> <td style="padding: 5px;">RW180 (1 psi)</td> <td style="padding: 5px;">RW720 (3 psi)</td> </tr> <tr> <td style="padding: 5px;">RW360 (1 psi)</td> <td style="padding: 5px;">RW900 (4 psi)</td> </tr> </table>		RW100 (4 psi)	RW540 (2 psi)	RW180 (1 psi)	RW720 (3 psi)	RW360 (1 psi)	RW900 (4 psi)
RW100 (4 psi)	RW540 (2 psi)						
RW180 (1 psi)	RW720 (3 psi)						
RW360 (1 psi)	RW900 (4 psi)						
<p>Control settings:</p>							
<ul style="list-style-type: none"> (a) Burner pressure -- 11 inches WC, with burners ON. (b) Low Water Cut-Off -- 12 inches WC (c) Operating temperature Switch -- 175 °F. 							
<p>Water-Bath Capacity:</p>							
<table style="width: 100%; border: none;"> <tr> <td style="padding: 5px;">RW100 (7.4 gallons)</td> <td style="padding: 5px;">RW540 (49.5 gallons)</td> </tr> <tr> <td style="padding: 5px;">RW180 (16.5 gallons)</td> <td style="padding: 5px;">RW720 (66.0 gallons)</td> </tr> <tr> <td style="padding: 5px;">RW360 (33.0 gallons)</td> <td style="padding: 5px;">RW900 (82.5 gallons)</td> </tr> </table>		RW100 (7.4 gallons)	RW540 (49.5 gallons)	RW180 (16.5 gallons)	RW720 (66.0 gallons)	RW360 (33.0 gallons)	RW900 (82.5 gallons)
RW100 (7.4 gallons)	RW540 (49.5 gallons)						
RW180 (16.5 gallons)	RW720 (66.0 gallons)						
RW360 (33.0 gallons)	RW900 (82.5 gallons)						

6. MAINTENANCE

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

Safety Precautions

6.02 The RW 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 source 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 on any other components in the installation uses threaded joints, gaskets and “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 safely dispersed before attempting repairs.

Routine Inspection

6.05 LP-Gas Inlet Valve(s) to vaporizer should be disassembled and inspected at least once a year and more often if the equipment is in heavy use and also at any time an abnormality is detected. Any parts that are worn or show deterioration should be repaired.

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 kept clear or erratic operation, stability or loss of control 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 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 or other damage 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.

6.11 Glycol-Water Mixture in the Vaporizer Water Bath must be kept at the proper operating level. This can be routinely checked through the Sight Glass. Continuous loss of liquid indicates a leak or could be due to excessive Water Bath temperature. The Honeywell Temperature Switch may require replacement or readjustment to 175°F. When Vaporizer is handling a load, Water Bath temperature will increase to as high as 185°F. This is a normal occurrence.

CAUTION

NEVER operate an RW Water Bath Vaporizer on anything but a 50/50 mixture of a good quality ethylene glycol base antifreeze and water. Use of straight antifreeze will severely reduce vaporizing capacity and straight water will boil away as well as cause severe corrosion.

6.12 Water Bath Mixture tests should be made periodically for antifreeze protection as well as condition of the rust inhibitors. Replace mixture or supplement glycol or rust inhibitors as indicated.

6.13 Exterior Paint – Keep all external surfaces well painted to prevent deterioration and rust.

Purging Gas from the System

6.14 If service requires removal of gas from the system, do not merely vent gas to the 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.

6.15 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. 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. The use of a heat source, such as a forced air heater, may expedite this process in cold weather.

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

- (a) Consult the Operation Manual
- (b) Contact the gas system installer.
- (d) Contact Ransome Manufacturing, following the instructions under warranty service in this manual.

Gas System Trouble Shooting

6.17 The trouble-shooting procedures described in Table 6-1 are intended to help a service person isolate the cause of trouble encountered during routine operation to a replaceable part listed in Table 6-2 and Table 6-3. Only the kinds of trouble more 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 the best use of these trouble-shooting procedures, the service person should be thoroughly familiar with the Physical

and Functional Descriptions of the Ransome system described in Parts 2 and 3 of this manual.

6.18 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.

6.19 Faulty system components should be returned to Ransome Manufacturing, 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

Table 6-1 — Trouble Shooting

SYMPTOM	PROBABLE CAUSE	REMEDY
Pilot Outage	<ol style="list-style-type: none"> 1. Extreme wind currents. 2. Pilot orifice plugged. 3. Improper burner pressure. 4. Loose wiring. 5. Delayed ignition —See below. 6. Tank empty. 7. Insufficient millivoltage from Thermal Generator. 8. Low water level in Water Bath 	<p>Build suitable wind screen.</p> <p>Clean or replace.</p> <p>Adjust regulator to 11" W.C.with Main Burner on.</p> <p>Repair. Clean contacts.</p> <p>Add fuel.</p> <p>Reposition or replace.</p> <p>Check Sight Glass. Replenish Water Bath mixture and reset low liquid level switch.</p>
Delayed Ignition or Flashback	<ol style="list-style-type: none"> 1. Pilot orifices partially plugged. 2. Improper position of Pilot. 3. Improper Burner pressure. 4. Faulty or dirty Burner Gas Control Valve. 	<p>Clean or replace.</p> <p>Adjust</p> <p>Adjust to 11" W.C. with Main Burner on.</p> <p>Clean or replace.</p>
Main Burner Will Not Come On	<ol style="list-style-type: none"> 1. Vapor Temperature Switch. 2. Loose wiring. 3. Faulty or dirty Burner Gas Control Valve. 4. Tank empty. 6. Low water level in Water Bath 	<p>Adjust or replace.</p> <p>Repair -- Clean contacts.</p> <p>Clean or replace.</p> <p>Add fuel.</p> <p>Check Sight Glass. Replenish Water Bath mixture.</p>

Table 6-1 — Trouble Shooting (Continued)

SYMPTOM	PROBABLE CAUSE	REMEDY
Sooty or Smelly Combustion	<ol style="list-style-type: none"> 1. High burner pressure: 2. Air inlet restricted. 3. Burner Ring improperly positioned. 4. Vent stack plugged, damaged or incorrect. 	<p>Adjust Burner Gas Regulator to 11" W.C. with Main Burner on.</p> <p>Correct the restriction.</p> <p>Adjust.</p> <p>Repair or replace.</p>
Liquid at LP-Gas Outlet	<ol style="list-style-type: none"> 1. LP-Gas Inlet damaged or blocked open. 2. No Regulator at Vaporizer Outlet 	<p>Inspect valve assembly. Clean, repair or replace.</p> <p>Correct installation. See Figure 5-1.</p>
Insufficient Capacity	<ol style="list-style-type: none"> 1. Overload. 2. Low Burner pressure. 3. Burner orifice(s) plugged. 4. Storage Tank pressure too low. 5. Valve or pipe sizing too small. 6. Inlet Strainer clogged. 7. Valve(s) not completely open. 8. Vaporizer Temperature Switch set too low. 9. Storage tank level too low. 10. Percentage of Glycol too high. 	<p>Reduce load or use larger Vaporizer.</p> <p>Adjust.</p> <p>Clean.</p> <p>Use priming pump.</p> <p>Use Correct size. (See Ransome pipe sizing charts.)</p> <p>Clean.</p> <p>Open as required.</p> <p>Readjust or replace switch, if necessary.</p> <p>Add fuel.</p> <p>Test a sample. Correct mixture ratio or replace.</p>
Intermittent Pilot Not Working.	<ol style="list-style-type: none"> 1. No electrical power. 2. Improper electrode gap. 3. Loose wire. 4. Faulty or damaged control. 	<p>Supply power.</p> <p>Adjust to 1/8 inch ± 1/32.</p> <p>Inspect and repair.</p> <p>Replace.</p>

Table 6-2 -- RW100 Replacement Parts

PART NUMBER	DESCRIPTION
RC225	Gly-Water Tank Cap #5
36W10	Gly-Water Tank
EX906C	Gly-Water Sight Glass
EX34019	Expansion Set Valve
* DI-119	Flow Switch
80	Shut-Off Valve 1/4"
PC07	Recirculating Pump
R632HCF	Regulator
HW-L4006A	Water Temperature Switch (Aquastat Controller)
HW-Y8610	Intermittent Pilot Kit - Kit Includes: 392431, S8610U and VR8304U
1370	LP-Gas Drain
S8610U	Intermittent Pilot Module
392431	Ignitor-Sensor
RC125	Rain Cap #1
PAH185	Pipeaway Adaptor
36H20	Vent Cap (8")
H185250	Safety Relief Valve
13H00	LP-Gas Liquid Inlet Valve
10W10	Vaporizer Tube with Heat Exchange
GJ05	Gly-Water Drain 1/2"
12W12	RW Burner Ring Complete (RW100)

* "Flow Switch" replaces "Low Water Cutoff" on models after 1998.

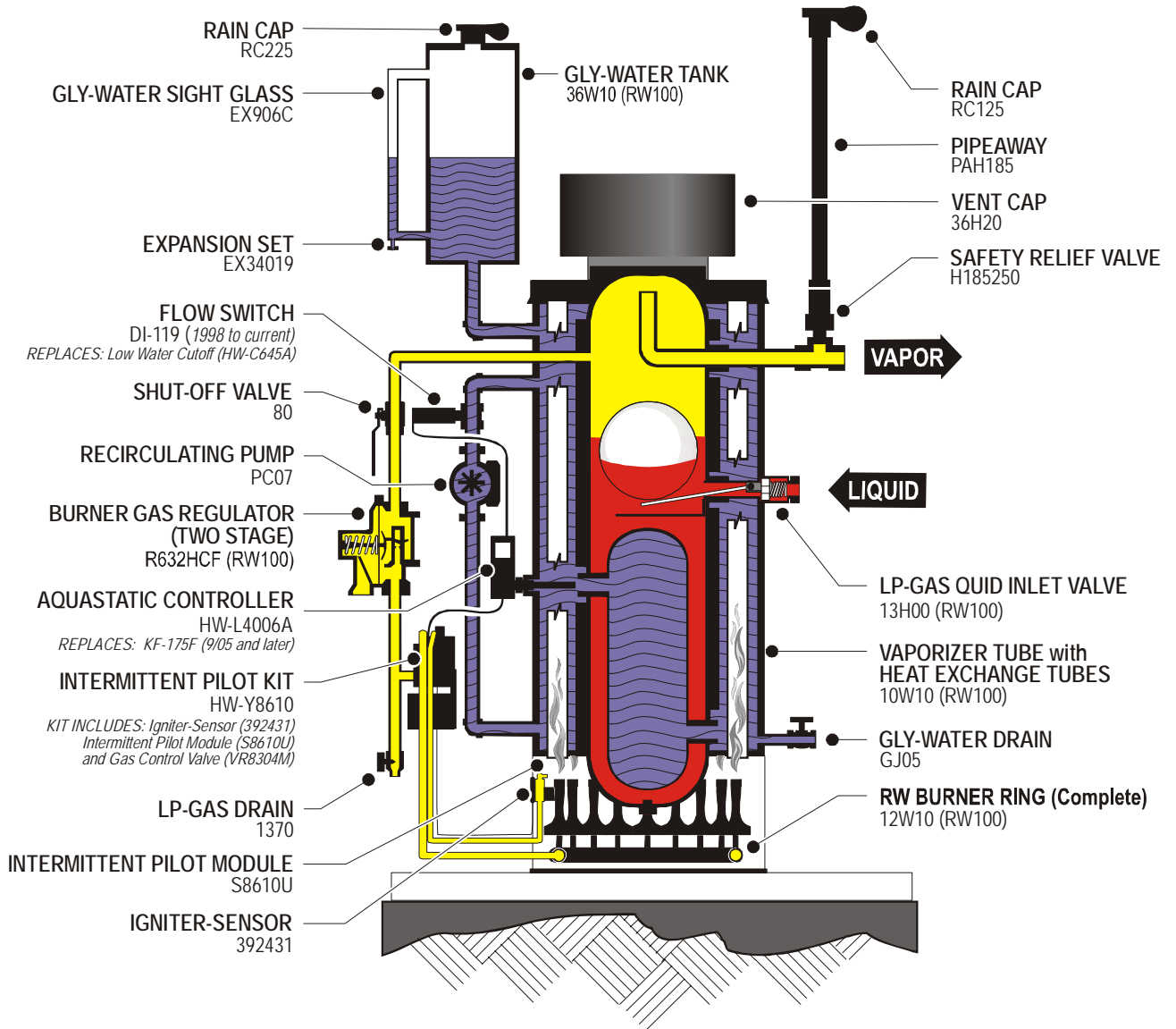
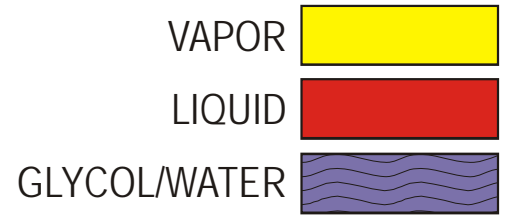


Figure 6-2 -- RW100 Cutaway Drawing

Table 6-3 -- RW180 thru RW900 Replacement Parts

PART NUMBER	DESCRIPTION
36H20	Vent Cap (8")
RC225	Gly-Water Tank Cap #5
36W10	Gly-Water Tank (RW180)
36W36	Gly-Water Tank (RW360 thru RW900)
EX906C	Gly-Water Sight Glass
EX34019	Expansion Set Valve
* DI-119	Low Water Cutoff
80	Shut-Off Valve 1/4"
PC07	Recirculating Pump
R632HCF	Regulator RW180
R632JFF	Regulator RW360
R622HHGJ	1st Stage Regulator RW540 and RW720
R622CFFXA	2nd Stage Regulator RW540 and RW720
R622HJGJ	1st Stage Regulator RW900
HSRLBFC	2nd Stage Regulator RW900
10W18	Vaporizer Tube with Heat Exchange
HW-L4006A	Water Temperature Switch (Aquastatic Controller)
HW-Y8610	Intermittent Pilot Kit - Kit Includes: 392431, S8610U and VR8304U
1370	LP-Gas Drain
S8610U	Intermittent Pilot Module
392431	Ignitor-Sensor
RC125	Rain Cap #1
PAH185	Pipeaway Adaptor
H185250	Safety Relief Valve
SOR1	Ultrasonic Level Switch (Replaces: JO-BELL Liquid Level Control)
I5H10	Chamber f/ Ultrasonic Level Switch (Replaces: JO-BELL Liquid Level Control)
BCU10	Backcheck Valve
RX8210B027	LP-Gas Inlet Solenoid Valve
774	"Y" Type Strainer
GJ05	Gly-Water Drain 1/2"
12W18	RW Burner Ring Complete (RW180 thru RW900)

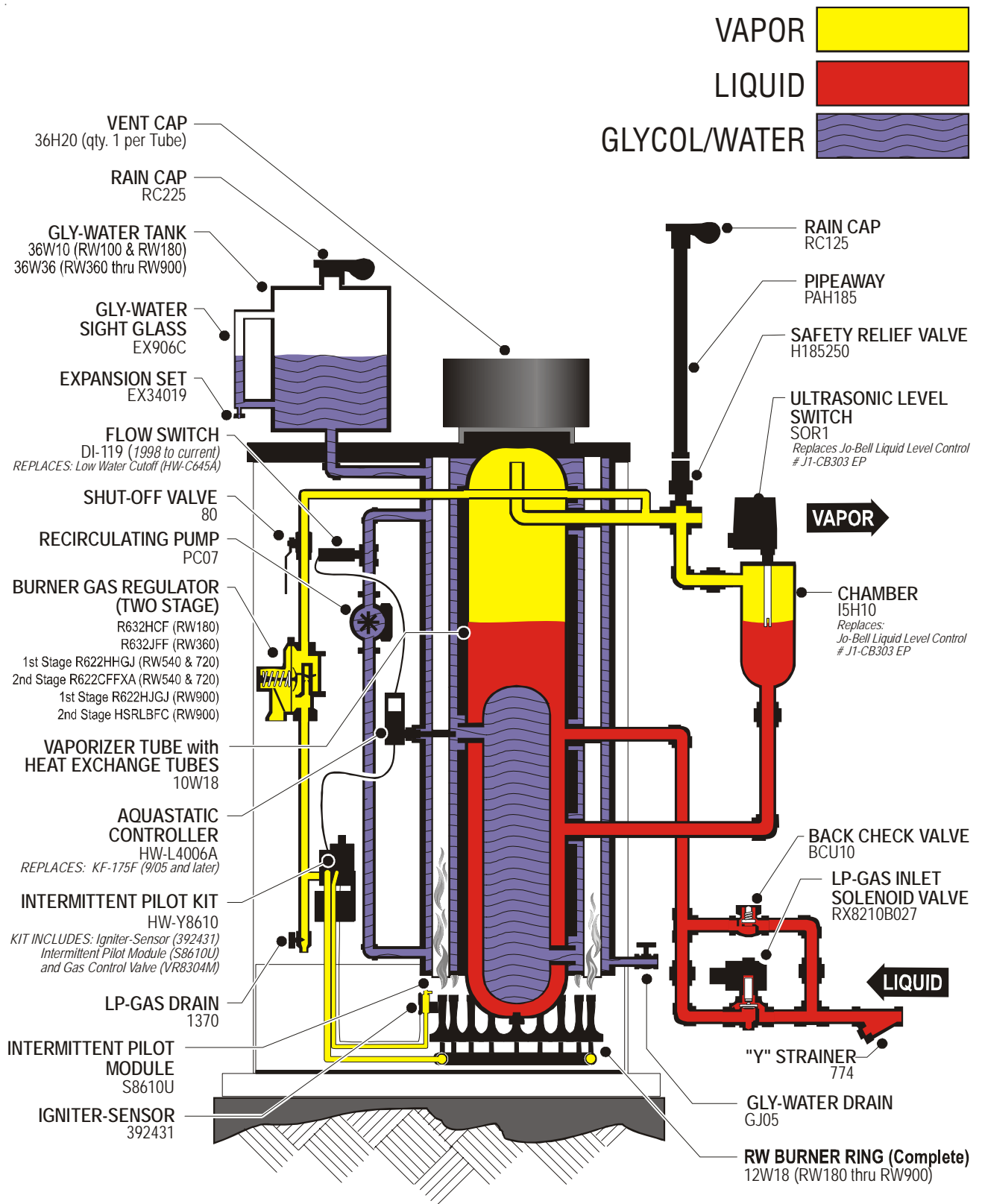


Figure 6-3 -- RW180 thru RW900 Cutaway Drawing

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
