

**RE SERIES  
LP-GAS TANK HEATER  
OPERATION MANUAL**

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Figure 1-1 - RE Series Tank Heater

## 1. GENERAL

**1.01** This manual provides a physical and functional description and operating theory necessary for effective use of the Ransome RE Series Tank Heater.

**1.02** Ransome RE Series Tank Heaters provide an economical and dependable source of LP-Gas vapor for a wide range of applications up to 400 gallons per hour. All units require electrical connections, which must only be connected by experienced and qualified personnel. Each unit is individually factory tested on LP-Gas and shipped ready for use. The LP-Gas inlet and vapor outlet are connected to the user's system, heaters are activated, and the Ransome RE series vaporizer goes to work quietly, safely, 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 amount:

Latent Heat of Vaporization (1 atm.) LP-Gas: 182.7 BTU/LB  
Specific Volume of LP-Gas at 60° F and 1 atm.: 8.5 CF/LB.

**1.04** Ransome RE Series Tank Heaters develop the heat required for vaporization through the use of an electrical immersion heater which functions as needed to create enough vapor to replace that being used.

**1.05** Features of the RE Series Tank Heaters include the following:

- (a) Precision high temperature switch, factory set and sealed against tampering, incorporates precious metal contacts for extended service life.
- (b) ASME code pressure vessel. Optional fully insulated shell to prevent unwanted heat loss.
- (c) Models are available in a complete range of capacities, vaporizing 25 to 400 gallons per hour of LP-Gas thus allowing purchase of the precise capacity required.
- (d) All sizes are capable of automatic-infinite turn-down and will maintain ready supply of vapor from no-load to full load capacity. At no-load, only enough heat will be generated to maintain pressure in storage tank.
- (e) Standard units are furnished with a weather-tight (NEMA 4) control panel. (NEMA 7 available)
- (f) Standard electrical configuration is 480 volt, 3 PH, 60 Hz. Electrical wiring may be arranged for most voltages. (see Table 4-2)

## How to Select an Electric Vaporizer

**1.06** How To Select an Electrically Heated Tank Heater.

- (a) Determine the total amount of LP-Gas vaporized in gallons per hour.
- (b) Select a vaporizer from Table 4-1 with at least as much capacity as determined in 1.06.

## How They Work

**1.07** The RE Series Tank Heater uses pressure actuated ON/OFF control to maintain a desired pressure in the LP-Gas storage vessel. An operating pressure switch cycles an immersion heater full ON or OFF. Pressure sensitivity (hysteresis) is designed into the control action between ON and OFF. This sensitivity is designed to prevent the switching of the immersion heater ON and OFF within a pressure span that is too narrow. Pressure is always maintained "about the set point." This is dictated by the switching sensitivity of the ON/OFF control. The control action further dictates that there will be a certain amount of pressure overshoot and undershoot. The degree of overshoot and undershoot will be dependent on the characteristics of the entire thermal system.

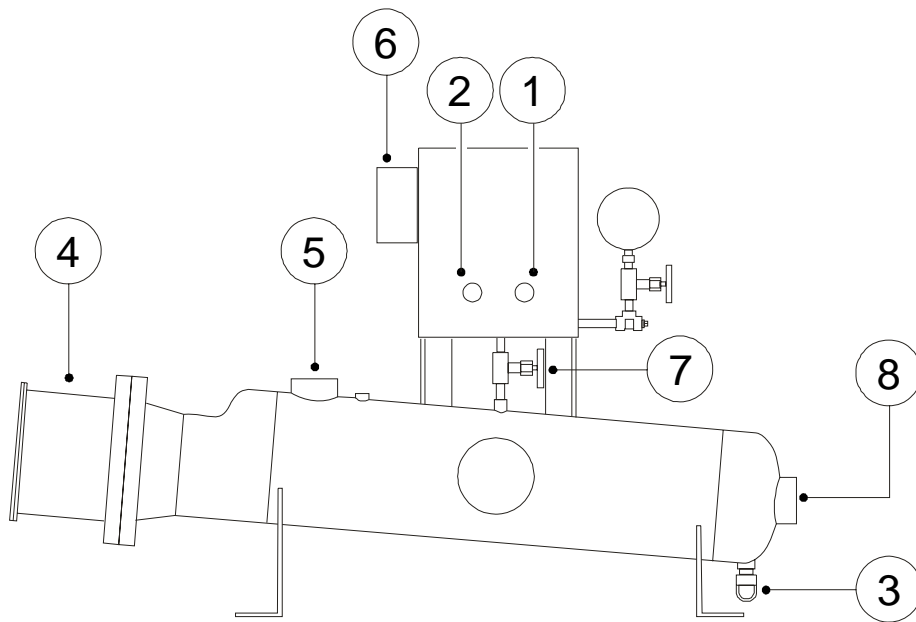
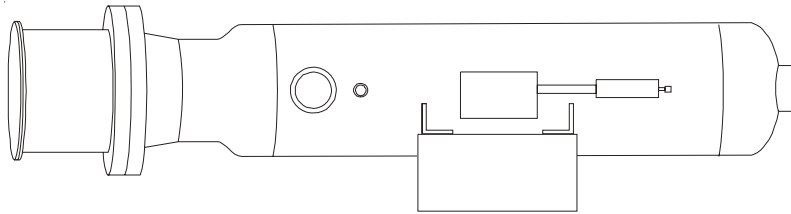


Figure2-1

Figure 2-1 (Continued)

Key	Element	Function
1	Vaporizer OFF/STOP Switch	Turns Vaporizer Module OFF
2	Vaporizer ON/START Switch	Turns Vaporizer Module ON
3	LP Liquid Drain Valve	Allows for evacuation of unit.
4	Flanged Immersion Heater	Provides heat necessary for vaporization.
5	LP Vapor Outlet	Connection point to LP-Gas vapor line.
6	Explosion Proof Pressure Control	Cycles immersion heater ON-OFF to maintain desired system pressure.
7	Instrument Isolation Valve	Shuts off pressure supply to pressure switch.
8	LP Liquid Inlet	Connection point to LP-Gas liquid line.

## 2. PHYSICAL DESCRIPTION

**2.01** The Ransome RE Series Tank Heaters are all similar in design and construction. Designed for mounting on a concrete slab, outdoors, in varied weather conditions.

**2.02** The principal difference between each model is capacity, ranging from 25 to 400 gallons per hour. Most of the system components are similar between models. Capacity is increased by the vaporizer tube size and heating capacity of immersion heater.

### Features and Benefits

**2.03** ASME Code Pressure Vessel. Each vessel is constructed of high strength carbon steel as per Section VII, Div. I of the ASME Code.

**2.04** Precision operating and safety limit switches. All parts are steel, stainless steel or brass. All wetted parts are of stainless steel construction.

**2.05** Top quality flanged immersion heater. Steel elements are standard. Stainless steel available. Heaters are sized for the exact heat required.

**2.06** ASME stamped relief valve. ASME pressure vessel is adequately protected by an external safety relief valve.

**2.07** All controls (contactors, relays, etc.) are located inside a NEMA 4 control panel for dependable performance even in extreme weather conditions.

**2.08** All sizes are capable of infinite turndown and will maintain heat supply and resultant pressure in LP-Gas storage vessel from zero load to full capacity. At no load, only enough heat will be generated to maintain set point pressure.

**2.09** Standard electrical configuration Class I, Div. II. (Class I, Div. I also available)

## 3. HEATING SYSTEM

**3.01** The heating process is achieved by using an electrical immersion heater. The Operating LP-Gas Pressure Switch monitors the vapor pressure and maintains it at approximately 100 psig by cycling on the electric immersion heater when the pressure falls below 100 psig.

Temperature F	Approximate Pressure (psig) LP-Gas
110	204
100	177
90	150
80	128
70	110
60	93
50	78
40	65
30	53
20	42
10	34
0	24.5
-10	17.5
-20	11.5

**Table 3-1 - LP-Gas Vapor Pressure**

#### 4. SPECIFICATIONS

##### Performance

Rated capacity in Gallons per hour @ 60 degrees F 100 psig.

GAL/HR	CF/HR	Model
25	911	RE25
50	1822	RE50
80	2916	RE80
160	5832	RE160
240	8748	RE240
320	11664	RE320
400	14580	RE400

**Table 4-1**

Operating pressure switch setting: 100 psig

High pressure switch setting: 240 psig

High temperature switch setting: 120 F

Relief valve pressure setting: 250 psig

ASME pressure vessel design pressure: 250 psig

Design temperature: 120 F

##### Connections

<b>Inlet:</b>	RE 25 - RE240	2" FNPT
	RE320 - RE400	3" FNPT
<b>Outlet:</b>	RE 25 - RE 80	2" FNPT
	RE160 - RE400	3" MNPT

##### Construction

**Tank Heater Vessel Shell:** SA106 Grade B Carbon Steel.

**Connections:** SA105 Carbon Steel.

#### IMPORTANT INSTALLATION NOTE:

Use the shortest possible HORIZONTAL piping at the vapor outlet. (Not more than 1 foot from the tank heater). After this short horizontal run, the piping must be vertical to above storage tank's 86.5% fill line. From there it can piped horizontally. Too long of horizontal piping in the liquid region may cause the tank heater to overheat.

**Table 4-2 - Electrical and Physical Specifications**

KW	Amps/Line 480V - 3 Ph 50/60 Hz	Conduit size Heater Circuit	Number of Lines	Shell O.D.	LP-Gas Inlet	LP-Gas Outlet	Approx. Overall Length	Approx. Overall Height	Ransome Model
8	10A	3/4"	3	4-1/2"	2" NPT	2" NPT	56"	24"	RE 25
16	19A	3/4"	3	8-5/8"	2" NPT	2" NPT	36"	30"	RE 50
25	31A	3/4"	3	8-5/8"	2" NPT	2" NPT	45"	30"	RE 80
50	30A	1"	6	10-3/4"	2" NPT	3" 300 CL	64"	32"	RE 160
75	45A	1"	6	10-3/4"	2" NPT	3" 300 CL	82"	32"	RE 240
100	40A	1-1/4"	9	12-3/4"	3" 300 CL	3" 300 CL	74"	36"	RE 320
125	50A	1-1/4"	9	12-3/4"	3" 300 CL	3" 300 CL	92"	36"	RE 400

**NOTE:** All control circuits 120V AC, 50/60 Hz, 10A

## 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 RE Series Tank Heaters. 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 tank heater location.

**5.03** When the Ransome Equipment arrives, examine the shipping container for obvious damage. Carefully unpack the unit and examine the exterior for any obvious shipping damage. All claims of shipping damage should be made to the shipping company, not to Ransome or your distributor. Obvious workmanship problems or incomplete shipments should be immediately referred to Ransome (or distributor) following the warranty service procedures described in Part 6.

### Start Up and Operating Procedure

**5.04** The RE Series Tank Heater is installed as close to and as far below the LP-Gas storage tank as practical. This is very important since the tank heater is dependent on gravity for the flow of LP-Gas liquid into it. The shortest possible run of adequately sized supply piping minimizes pressure drop and maximizes the value of liquid head pressure to the tank heater. As liquid flows into the tank heater, it is immediately vaporized by the warm immersion heater. The resultant warm vapor is naturally re-circulated back into the LP-Gas storage vessel. This addition of heat raises the temperature and consequently raises the pressure in the system. As system pressure varies due to rise and fall of ambient temperature or vapor withdrawal from tank, the tank heater will circulate sufficient LP-Gas to maintain desired set point pressure as long as heat losses do not exceed capacity of tank heater input.

**5.05** All RE Series Tank Heaters are factory tested using commercial LP-Gas. Ransome tank heaters 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 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 equiva-

lent leak detector must be conducted after installation and any leaks must be repaired prior to operation of the vaporizer.

**5.06** This startup procedure assumes a complete and proper installation of the entire gas system including storage tank(s), valves, piping, fittings, etc. and including any required electrical power. All installations must be in accordance with State, provincial or local regulations, codes, and laws. The procedure assumes use of clean, contamination free LP-Gas. Close all valves in the system prior to start-up. Then, proceed as follow:

**Step 1** - Allow a qualified electrician to complete all electrical connections between the control panel of the RE Tank Heater and incoming power. Be sure to conform to all applicable installation codes.

**Step 2** - Prime the system by slowly opening valves in the LP-Gas liquid line one at a time between the storage tank and the RE Tank Heater inlet valve, starting at the storage tank.

**Step 3** - Slowly open RE Tank Heater inlet valve, admitting LP-Gas liquid to the vaporizer. Be sure that all valves downstream of the RE tank Heater, are closed.

**Step 4** - Open all the valves on the outlet of the Tank Heater, starting at the vaporizer toward the tank.

**Step 5** - With service power connected, push the tank heater "START" button. If the vapor pressure within the tank/heater system is below 100 psig (i.e. ambient temperature below 65 degrees F), the immersion heater will be energized to operate until the system's Operating Pressure Switch interrupts the heater control circuit.

**Step 6** - When the main heaters automatically shut off, the LP-Gas vapor in the tank is at the proper pressure for continuous operation. The system is now ready to be put on line.

**Step 7** - For tank heater shutdown, push the "STOP" button on the control panel.



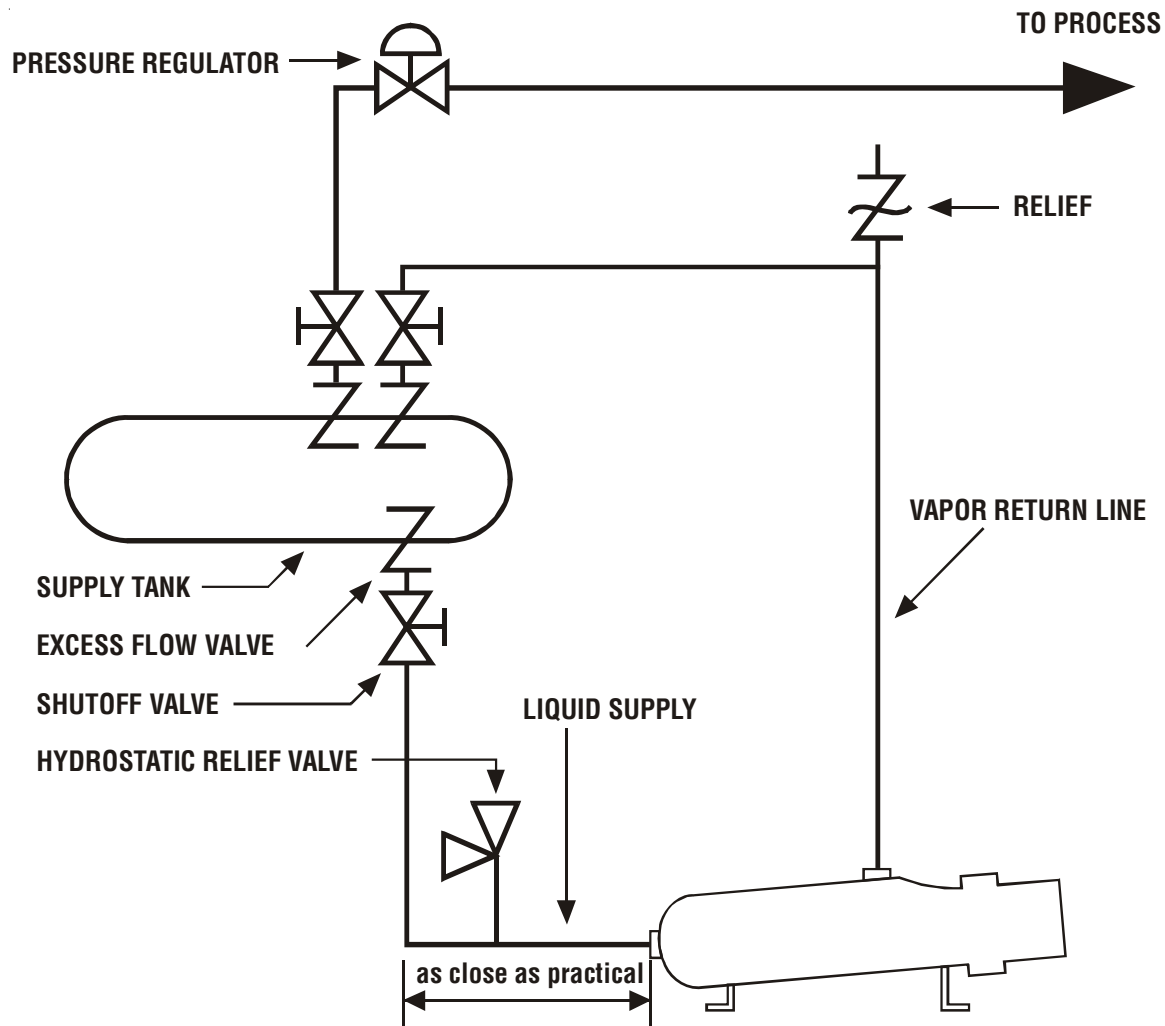


Figure 5-1 - Typical RE Series Tank Heater Installation

## 6. MAINTENANCE

**6.01** Make sure the system components are compatible with LP-Gas and suitable for pressure and temperature of LP-Gas.

**6.02** Maintenance procedures in Part 6 should be performed in accordance with state and local regulations.

### Safety Precautions

**6.03** A supply of LP-Gas liquid must be available at all times. The liquid supply valve and excess flow valve in the storage tank must remain open.

**6.04** The RE Series Tank Heaters contain gas under pressure while in normal operation. Any gas leaks within the heater/tank system or in any part of the installation are potentially dangerous and must be eliminated immediately or accident or injury may occur. Any odor, gas or dark oily stains on joints or fittings indicate a possible gas leak.

**6.05** 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 and “O” rings, they are subjected to vibration and thermal stresses. The possibility of leaks developing over a period of time is always present.

### Emergency Instructions

**6.06** If a large leak is discovered, do not attempt to 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. The leak will stop when all gas downstream of the Gas Supply Valve(s) has been exhausted.

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

### Routine Inspection

**6.07** 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.

**6.08** SAFETY RELIEF VALVES should be replaced at any time lack of safety or 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 the release of excessive pressure in an emergency.

**6.09** Electrical connections must be tight and corrosion free. In order for all controls and heaters to work properly, check all electrical fittings and conduit for weather related cracks or leaks. Repair as necessary.

### Purging Gas From The System

**6.10** If service requires removal of gas from the system, DO NOT merely vent gas to atmosphere. This could result in the possibility of injury or damage. Follow accepted practices using LP-Gas drain valve to remove LP-Gas from the system. Make sure all vapor is actually removed from the equipment before any connections are loosened.

**6.11** 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 frost is no longer present.**

**6.12** 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 Operations Manual.

(b) Contact the Gas System Installer.

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

### Gas System Trouble Shooting

**6.13** 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. 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 Description of the Ransome system, described in Parts 2 and 3 of this manual.

## **Gas System Trouble Shooting** (continued)

**6.14** Before beginning any trouble-shooting, make certain the Ransome tank heater has been properly installed. All system components including storage tank(s), valves, piping, pumps and fittings must conform to all state, provincial or local regulations, codes and laws.

### **Warranty Service**

**6.15** 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**  
**3495 South Maple Avenue**  
**Fresno, California 93725**  
**U.S.A.**

Phone (559) 485-0979 / Fax (559) 485-8869

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

- (a) Complete Material Return Authorization (MRA) form. These can be obtained from Ransome Customer Service upon request.
- (b) The name and area code - telephone 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 (if known).
- (f) The Model and Serial Number of the Ransome equipment.