



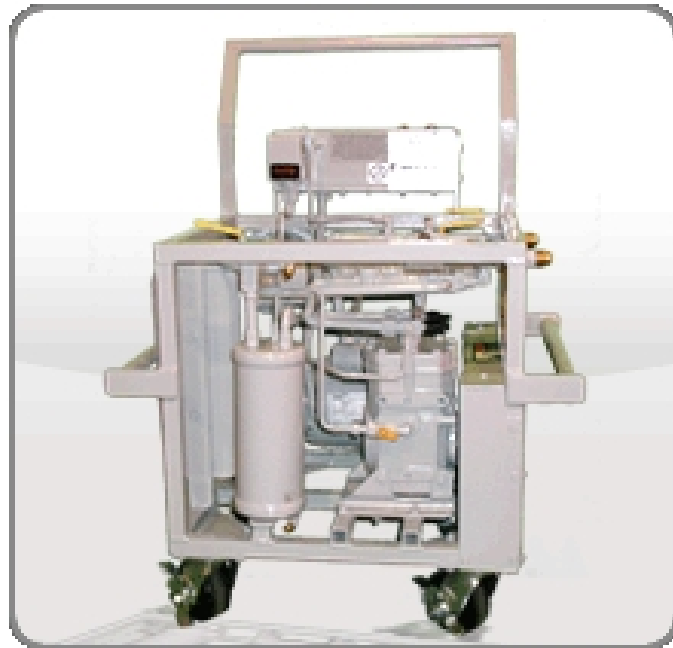
# RefTec

INTERNATIONAL SYSTEMS LLC

## Lovac™

### R11, R113 & R123

### Refrigerant Recovery System



### OPERATION MANUAL

Version 4 (rev date 10/8/18) For  
Lovac Models: CRL-115-E & CRL-240-E  
For units with serial numbers starting: 40000

**\*\*\*\*ATTENTION\*\*\*\***

**\*\*\*WARNING\*\*\***

**IF OIL LEVEL IS SEEN  
IN SIGHT GLASS  
OF DORIN  
COMPRESSOR – OIL  
LEVEL IS LOW –PLEASE  
ADD OIL !!!!!!!!**

**THANK YOU  
REFTEC**



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## SPECIFICATIONS

Electrical power requirements	CRL-115 Model: 115VAC, 50/60 Hz, 1-phase, 20-Amperes, 2.0-Hp CRL-240 Model: 230VAC, 50/60 Hz, 1-phase, 20-Amperes, 2.0-Hp
Dimensions (lxwxh)	23-in x 27-in x 34-in
Weight	160-lbs/73-kg (shipping 400-lbs/181-kg)
Recovery Rates	Vapor = 0.66-lb/min Push/Pull = 100-lb/min
Safety limit switches	High pressure = 20-psi Low pressure = 29-in Hg
Condenser	Water cooled plate exchanger

## ORDER NUMBERS

CRL-115-E	115/60/1, 110/50/1, 2.0HP, 20A
CRL-240-E	230/60/1, 220/50/1, 2.0HP, 20A

## INCLUDED ITEMS

- 48-cubic inch filter drier
- 12-ft, 3 pin tank float cable
- 50-ft power cord
- Two 10-ft x 3/4-in hoses (3/4-in flare fittings w/ball valves)
- One 20-ft x 3/4-in hoses (3/4-in flare fittings w/ball valves)
- 3/4-5/8 inch & 5/8-1/2 inch fittings

## ACCESSORIES

KIT-001	Quick connect kit for Lovac unit and hoses (install to 3/4-in flare fittings)
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### Notice

*RefTec International, Inc. urges that all HVAC technicians utilizing RefTec or any manufacturer's product make every effort to eliminate or vigorously reduce the emission of CFC, HCFC and HFC refrigerants to the atmosphere during installation, operation or maintenance of cooling equipment. Always act in a responsible manner to conserve refrigerants for continued use even when acceptable alternatives are available. Conservation and emission reduction can be accomplished by following recommended service and safety procedures.*

### Warning

*To avoid injury or death due to inhalation of, or skin exposure to, refrigerant closely follow all safety procedures described in the Material safety Data Sheet for the refrigerant and to all labels on refrigerant containers. Certain procedures common to refrigeration system service may expose personnel to liquid or vaporous refrigerant.*

## PRODUCT DESCRIPTION

RefTec's Lovac system provides efficient and safe recovery of low-pressure refrigerants R11, R113 and R123.

The unit consists of the following components:

- 2.0-hp open drive compressor
- Water cooled plate exchanger
- Tank & system pressure gauges
- Valve system: 3-way valve, oil return valve, 2-way evacuation valve
- Male 3/4-in flare inlet and outlet ports with isolation ball valves

To perform a complete recovery procedure:

- Connect hoses to perform push/pull recovery. Performs a self-evacuation procedure
- Open ports on chiller and recovery tank – liquid refrigerant will migrate to the evacuated recovery tank from the chiller evaporator
- Turn Lovac system ON – After a 2 minute time delay Lovac begins drawing vapor out of the tank and injecting hot compressed vapor back into the chiller condenser. This vapor injection creates a pressure differential, which forces remaining liquid refrigerant into the recovery tank. Two onboard gauges display chiller pressure and recovery tank pressure during operation.
- When liquid transfer is complete, as indicated by viewing an in-line sight glass, user reconfigures the hoses extract refrigerant vapor from the chiller.
- Lovac draws vapor through a 48-cubic inch filter drier. Discharged hot compressed refrigerant vapor passes through an oil separator, which returns oil to the compressor.
- Refrigerant vapor is condensed in the water-cooled plate exchanger and sent on to the recovery tank.
- Recovery stops when an internal pressure switch indicates that the chiller reaches a 29-inch Hg vacuum. If pressure should again rise above 27-inches Hg, Lovac restarts to again achieve a 29-inch Hg vacuum in the chiller.

## SAFE OPERATIONS & TIPS

To ensure your safety as well as that of others, proper preparation must take place.

Make sure you have a recovery tank with a minimum 3/4-inch male flare vapor port, liquid port and dip tube. The tank must be able to hold the entire refrigerant charge at 80% capacity and must be pressure rated for the refrigerant type being recovered. A suitable scale should be used to weigh the refrigerant charge to prevent overfilling tanks. Calculate the tank's refrigerant capacity by using the formula:

**Max allowable gross weight = 80% tank water capacity + tank tare weight.**

If a scale is not available, use a tank with a 3-pin mechanical float switch. Lovac is supplied with a 12-ft tank float cable. 3-pin mechanical float switches to install in most types of recovery tanks are available from RefTec. The float system deactivates Lovac's control circuit when the tank is at 80% of its full capacity.

Recovery tanks must be evacuated to 29-inch Hg vacuum prior to commencing recovery.

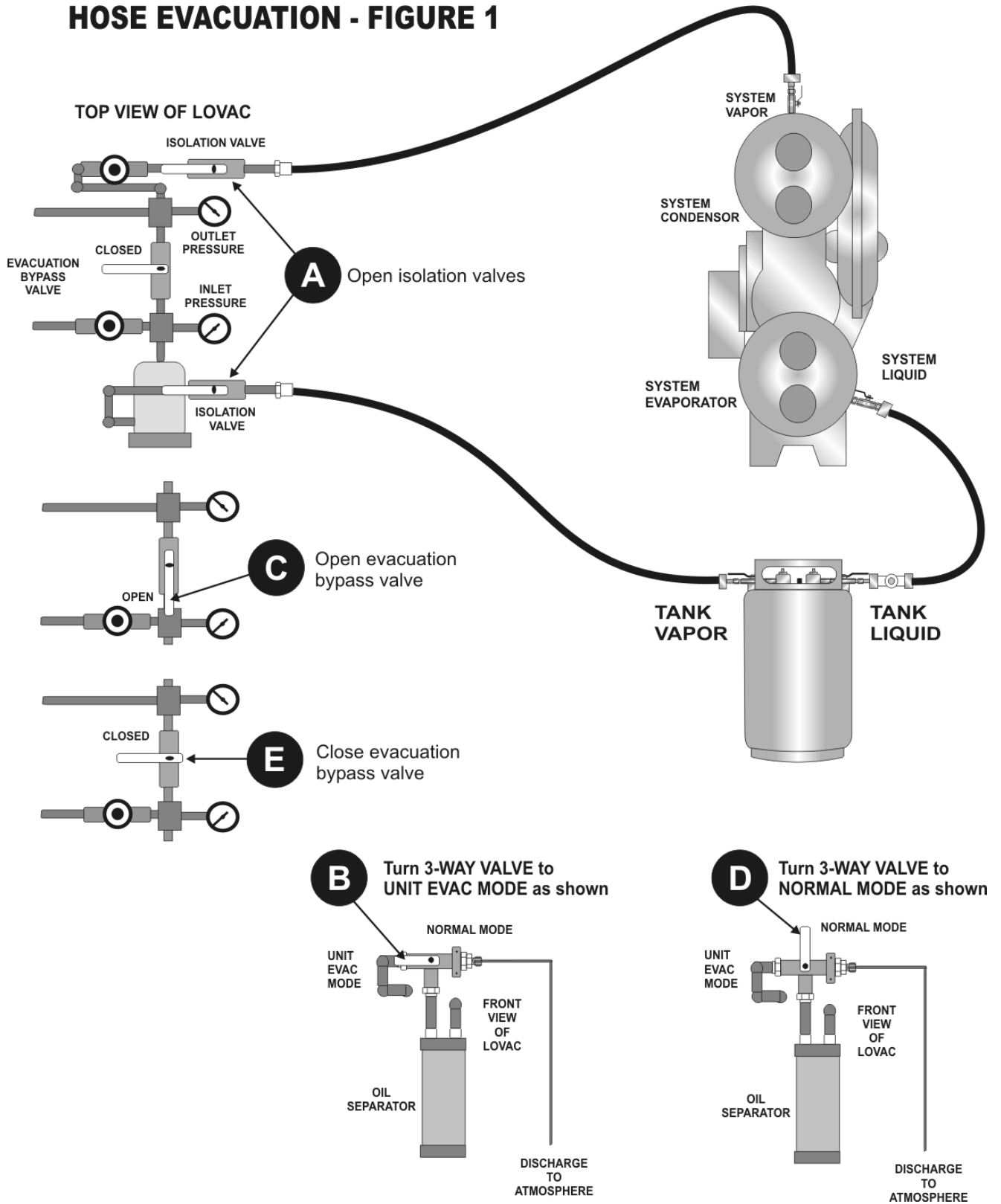
### PEAK PERFORMANCE

Connect to 3/4-inch chiller evaporator and condenser ports when possible.

## EVACUATING HOSES & LOVAC

1. Close oil return valve between the oil separator and compressor
2. Turn off the chiller and make sure it cannot restart
3. Connect the supplied 50-ft power cord from Lovac's control box to a minimum 20-amp maximum 25-amp outlet with a breaker or fused disconnect
4. Connect the three supplied hoses as shown in Fig. 1 to the Lovac unit, chiller and tanks.  
Customer is urged to place an in-line sight glass on the tank liquid port to monitor liquid flow.
5. Connect supplied 12-ft safety float cable from Lovac to the recovery tank. If a scale is used instead of a float cable, set the 80% full bypass switch to the **ON** position.
6. **OPEN** inlet and outlet isolation valves on top of the Lovac (See **Fig. 1-A**)
7. Turn 3-way valve on front of Lovac to **UNIT EVAC MODE** (See **Fig. 1-B**)
8. Turn 2-way evacuation bypass valve on top of the Lovac to OPEN (See Fig. 1-C).
9. Turn Lovac power switch ON. After a 2-minute delay, it evacuates the hoses to the recovery tank and chiller vapor
10. Return 3-way valve on front of Lovac to **NORMAL OPERATION** position (See Fig. 1-D)
11. Turn 2-way evacuation bypass valve to **CLOSED** position (See Fig. 1-E)
12. Open oil return valve between oil separator and compressor.
13. Proceed to Liquid Push/Pull Recovery

# HOSE EVACUATION - FIGURE 1

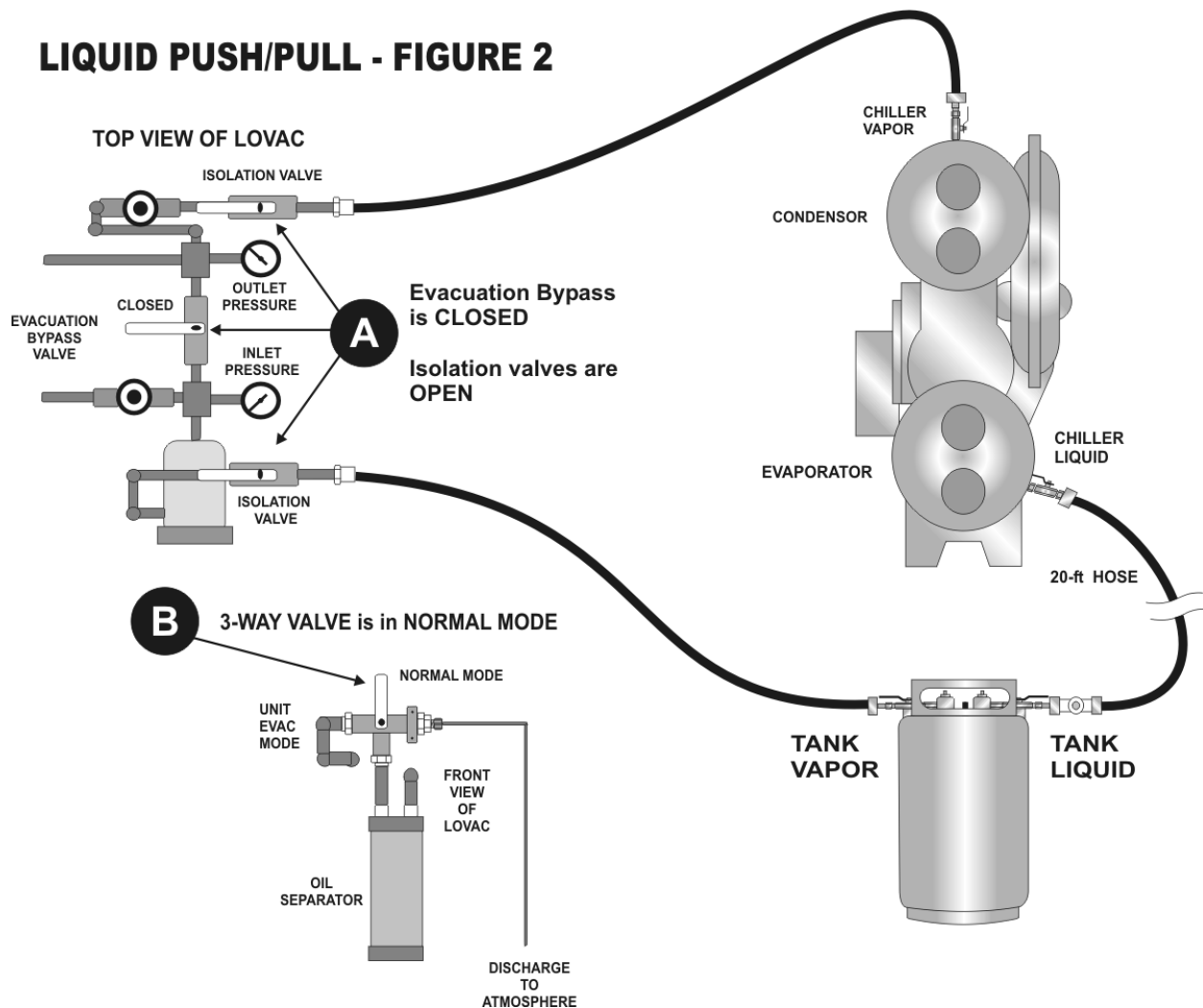


## LIQUID PUSH/PULL PROCEDURE

*Operation ensues after Step 12 on page 4. Make sure each previous EVACUATION PROCESS step on page 4 has been properly executed before proceeding.*

1. Open Liquid and Vapor access valves on the chiller being recovered
2. Open Liquid and Vapor isolation valves on the recovery tank
3. Turn Lovac power switch **ON**. After 2-minute delay Lovac draws vapor off the recovery tank and injects it into the chiller condenser to begin the push/pull process.
4. Monitor liquid flow through the sight glass on hose between the chiller evaporator and recovery tank.
5. When liquid flow stops, close isolation valves on the recovery tank. Lovac will automatically shut off when suction reaches a 29-inch Hg vacuum.
6. Close access valves on the chiller and ball valves on the ends of the Lovac hoses at the tank vapor and chiller vapor connections. Proceed to vapor recovery.

### LIQUID PUSH/PULL - FIGURE 2



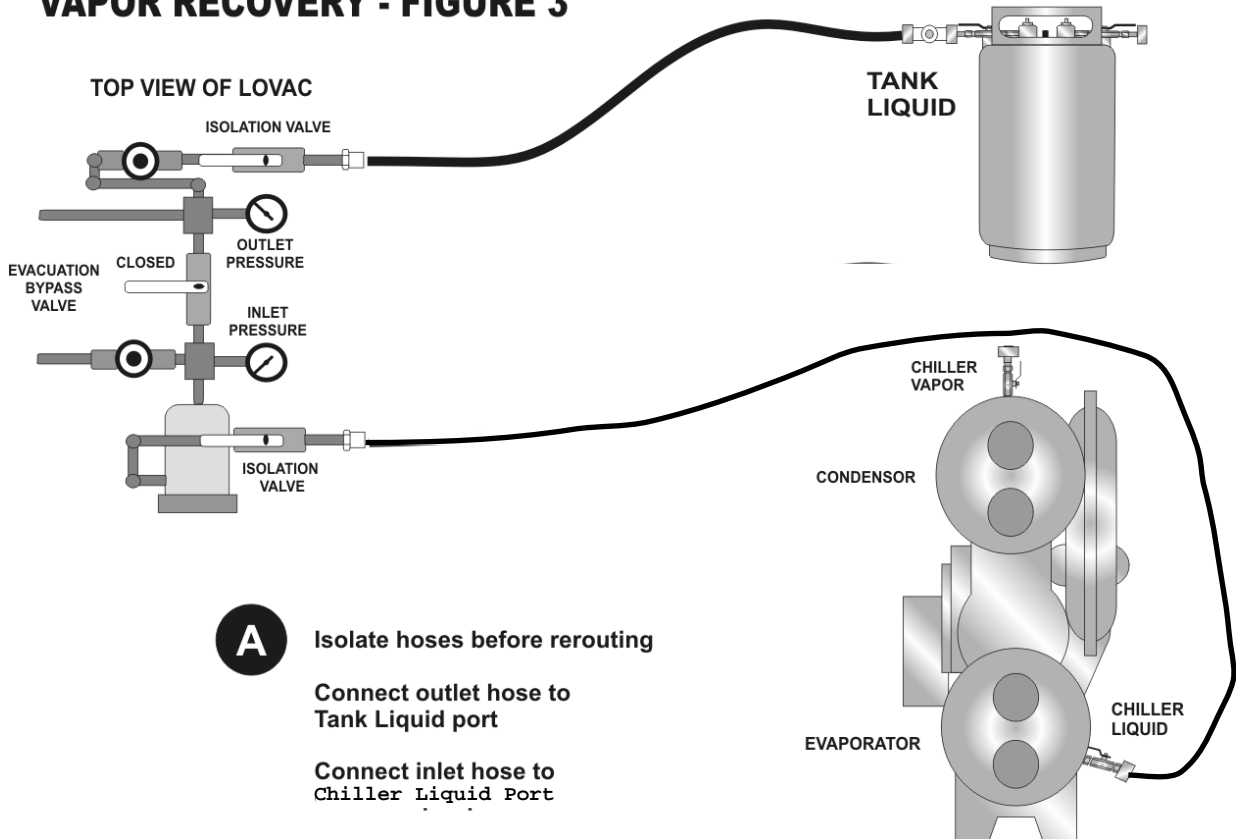


# VAPOR RECOVERY PROCEDURE

**Operation ensues after Step 5 on page 6. Make sure each previous LIQUID PUSH/PULL step on page 6 has been properly executed before proceeding.**

- Confirm that all isolation valves on the chiller and recovery tank are CLOSED.
  - Confirm the isolation valves on Lovac hoses connected at chiller and tank vapor ports are CLOSED.
1. Reroute hoses per Fig 3. Connect outlet hose to tank liquid and inlet hose to chiller vapor. (**Fig 3-A**)
  2. **OPEN** isolation ball valves on the hoses, chiller condenser valve and tank liquid valve.
  3. Connect condensing water supply hose from water source to Lovac's water-cooled plate exchanger. Connect water discharge hose to a drain. Start water flow.
  4. Turn Lovac **ON**. After a 2-minute delay, Lovac begins recovering vapor.
1. **TIP:** If vapor recovery seems slow after the inlet pressure system gauge dips below 5-in. vacuum and if the compressor has adequate oil, the user may close the oil return valve to speed up recovery. Toggle the oil return valve ON and OFF to maintain proper compressor oil level.
  5. When the chiller is recovered to a 29-in. Hg vacuum, Lovac shuts off and illuminates a "Recovery Complete" light. Lovac restarts if chiller vacuum drops to 27-in. Hg vacuum.
  6. When finished, turn off condensing water flow. Close isolation valves on the chiller, tank, Lovac unit and hoses before disconnecting components.

## VAPOR RECOVERY - FIGURE 3



## SWITCHING BETWEEN REFRIGERANT TYPES

1. After vapor recovery is complete, there may be residual refrigerant in the Lovac unit, which must be removed if you plan to recover a different refrigerant type. Connect ¼-inch hoses from an evacuated 30-lb recovery tank to both the suction and discharge service valves on the compressor. Allow refrigerant to be drawn into the tank.
2. Replace the 48-cubic inch filter drier per the below procedure
3. Change compressor and oil separator fluid per the below procedure

## REPLACING FILTER CORE

The filter core should be replaced after every recovery job to protect the compressor. Access the core by remove filter housing cover bolts. Remove the used core and install a fresh 48-cubic inch core. Replace the gasket and torque the bolts to 14 to 16 ft-lbs.

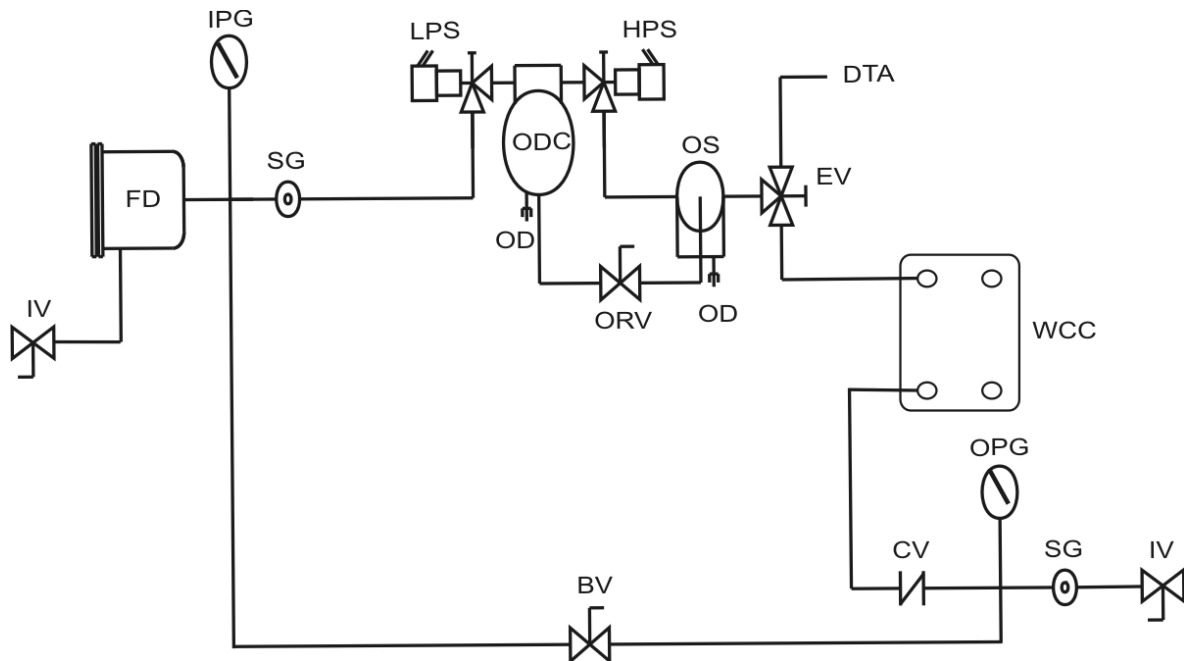
## CHANGING COMPRESSOR OIL

***Compressor oil should be changed...***  
***... after 10-hours of run time***  
***... when recovering a different type of refrigerant***  
***... after recovering a system with a burned out compressor***

**Charge the compressor with the same type of oil used with the refrigerant being recovered.**

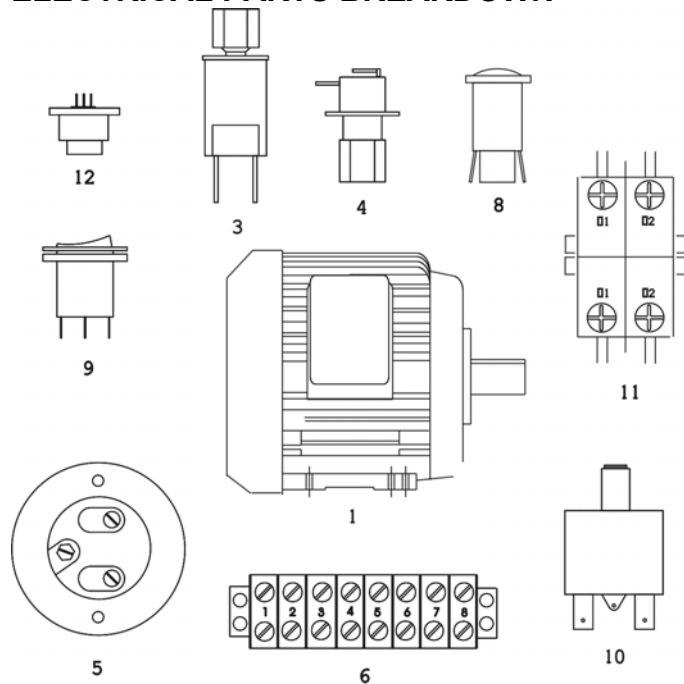
1. Ensure that residual refrigerant has been removed from Lovac
2. Connect a manifold set to dry nitrogen and to the suction and discharge access valves on the compressor
3. Connect a ¼" hose from the access fitting on the bottom of the oil separator to a suitable disposal container
4. Gradually feed nitrogen into the discharge port of the compressor until all oil is forced out of the oil separator and compressor (10-15 psi should be adequate)
5. Connect a vacuum pump to the ¼" suction port of the compressor and pull a 29-inch vacuum
6. Connect a ¼" hose from the compressor's bottom access port to a fresh container of oil. Fill compressor with exactly 17-oz of oil and bottom of access port of oil separator with 16oz
7. Remove hoses and pull entire Lovac unit under a 29-inch vacuum. Dispose of used oil appropriately.

## PROCESS AND IDENTIFICATION SCHEMATIC



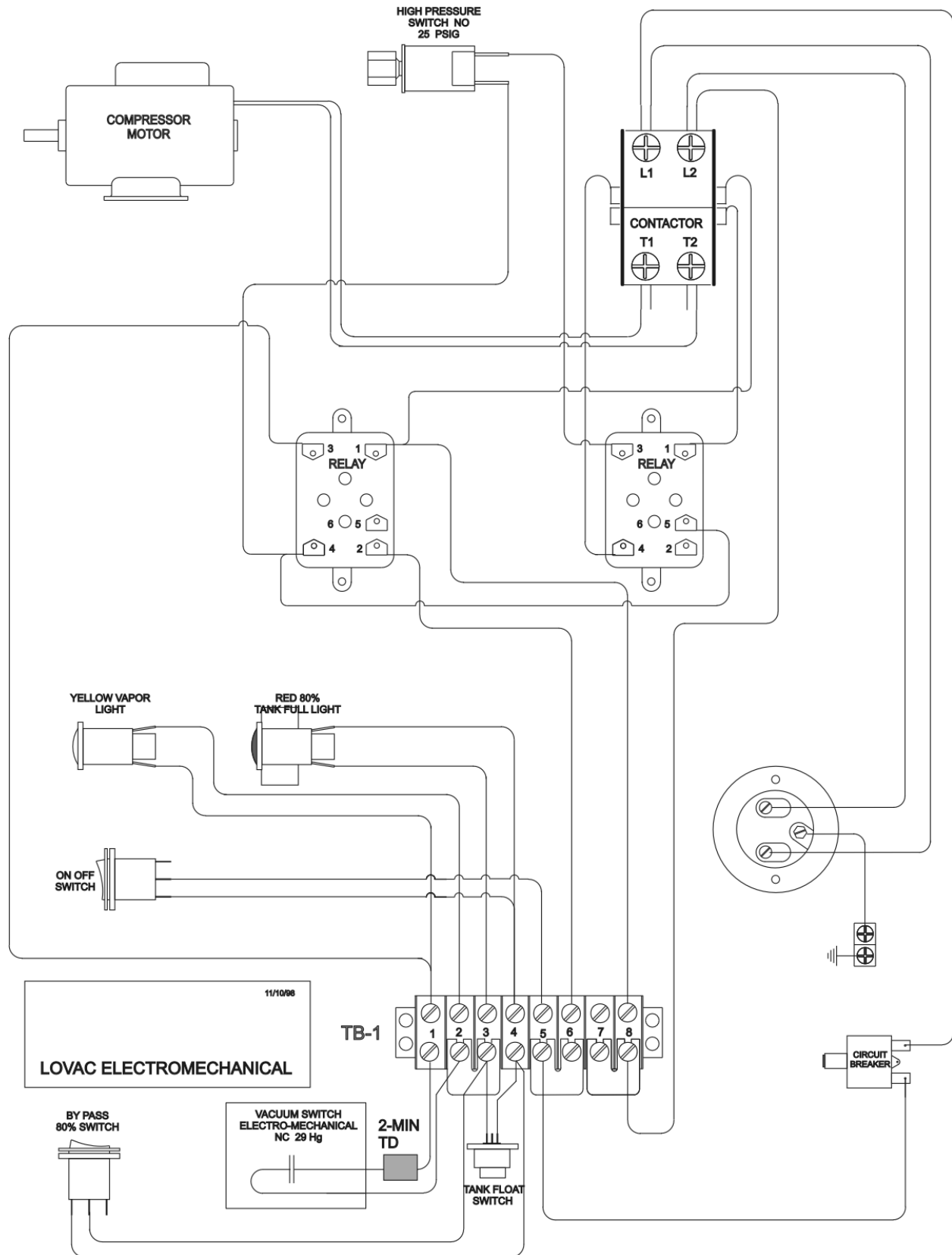
Item	Description	Item	Description
OPG	OUTLET PRESSURE GAUGE	IV	ISOLATION VALVE
IPG	INLET PRESSURE GAUGE	LPS	LOW PRESSURE SWITCH
BV	EVACUATION BYPASS VALVE	HPS	HIGH PRESSURE SWITCH
ORV	OIL RETURN VALVE	DTA	DISCHARGE TO ATMOSPHERE
ODC	OPEN DRIVE COMPRESSOR	OD	OIL DRAIN
OS	OIL SEPARATOR	FD	FILTER DRIER
EV	EVACUATION VALVE	SG	SIGHT GLASS
WCC	WATER COOLED CONDENSER	CV	CHECK VALVE

## ELECTRICAL PARTS BREAKDOWN



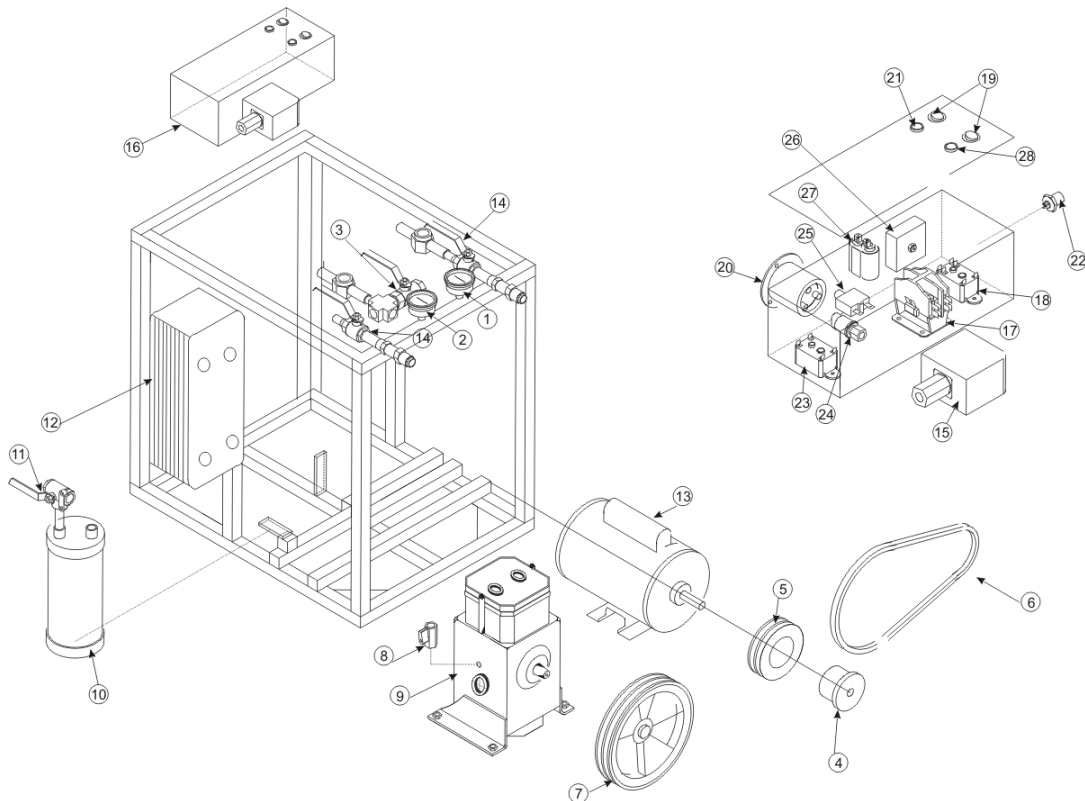
1. Compressor motor 2Hp  
120/240VAC, 50/60Hz, 1Ph 3450rpm
2. no item
3. High pressure switch 20 psig
4. Low pressure switch 29-in. Hg
5. Male inlet 20A, 250V, 2 P, 3W GRD
6. Terminal block
7. no item
8. Red indicating lamp 120 VAC or 230 VAC  
( Yellow Lamp : on 115v only)
9. (2) Switches 250 VAC
10. Circuit breakers – 20 AMP, 250 VAC, 28 VDC
11. Contactor – 120 VAC coil, 50/60 Hz, 30A, FL 600 VAC or 230 VAC

### ELECTRICAL BLOCK WIRING DIAGRAM



## REPLACEMENT PARTS LIST

REF NR.	CRL-115-E 115V P/N	CRL-240-E 230V P/N	DESCRIPTION
1	RGA300	RGA300	OUTLET PRESSURE GAUGE
2	RGA300	RGA300	INLET PRESSURE GAUGE
3	RV-004	RV-004	EVACUATION BYPASS VALVE
4	HBU238	HBU238	MOTOR DRIVE PULLEY BUSHING
5	HBU242	HBU242	MOTOR DRIVE PULLEY
6	HBT135	HBT135	MOTOR DRIVE BELTS
7	HPY085a	HPY085a	COMPRESSOR PULLEY
8	RVM012	RVM012	OIL BYPASS VALVE
9	RCP999A	RCP999A	VAPOR RECOVERY COMPRESSOR
10	ROS005	ROS005	VAPOR COMPRESSOR OIL SEPARATOR
11	RVA050	RVA050	DISCHARGE EVACUATION VALVE
12	RHX200	RHX200	WATER COOLED CONDENSER
13	EMO315	EMO315	COMPRESSOR DRIVE MOTOR
14	RV-004	RV-004	HAND BALL VALVES
15	XSW030	XSW030	LOW PRESSURE SWITCH
16	MBX001	MBX001	ELECTRICAL CONTROL BOX
17	ECP030	EMS003	TWO POLE CONTACTOR
18	ERY004	ERY005	SWITCHING RELAY SPDT
19	ESW002	ESW002	POWER SWITCH
20	EMI451	EMI260	INLET POWER LOCKING CONNECTOR
21	ELT001	ELT003	RED INDICATING LAMPS
22	ETC005	ETC005	FLOAT INTERFACE CONNECTOR
23	ERY004	ERY005	SWITCHING RELAY SPST
24	XSW020	XSW020	HIGH PRESSURE SWITCH
25	EBR120	EBR120	BREAKER
26	ECP392	ECP392	SOLID STATE RELAY
28	ELT002	N/A	YELLOW INDICATING LAMP



## TROUBLESHOOTING GUIDE

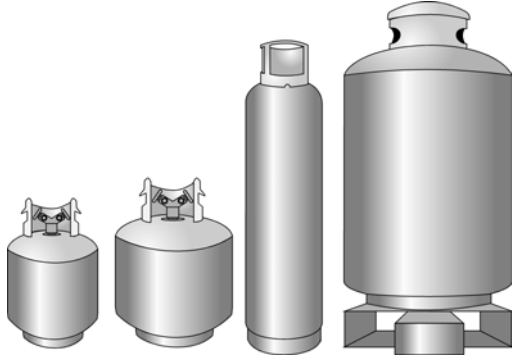
### WARNING!!

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SYMPTOM	CAUSE	SOLUTION
Pressure differential between system and recovery tank becomes too high – greater than 15-psig	Restrictions in recovery line	Remove restriction in recovery lines or tank. Use hoses and tank with full 3/4" service ports and dip tubes.
Slow liquid transfer	Restriction in flow	Remove restriction in recovery lines or tank. Use hoses and tank with full 3/4" service ports and dip tubes.
Head pressure to recovery tank is high	Hose to tank is restricted	Install appropriately sized fittings on tank. Run water over the tank.
	Capacity of recovery tank is too low or tank is overfilled	Use larger tanks that can easily accept the complete charge at 80% of their capacity
	Noncondensable gases are present	Purge noncondensibles using legal and environmentally sound means such as RefTec's Minipurge unit
	Condensing water flow restricted to too low	Remove restriction in water line or change source
Lovac compressor will not restart	Compressor motor thermal overload is open	Let unit cool down before attempting to restart
Lovac slugging with liquid during push/pull procedure	Recovery hose incorrectly installed – liquid is being routed to the Lovac unit instead of the recovery tank	See hose connection diagram on page 6 and verify connections
	Lovac is drawing off recovery tank liquid valve instead of the vapor valve	See hose connection diagram on page 6 and verify connections

**For Technical Service from 8:00 AM – 5:00 PM (EST)  
please dial 800-214-4883**

## DOT REFRIGERANT RECOVERY TANKS



- Typical recovery tanks have small diameter ports that restrict refrigerant flow and decrease recovery rates. RefTec 250 & 1000-lb D.O.T. tanks have been fitted with full 3/4" service valves and copper dip tubes to eliminate restrictions and allow faster refrigerant transfer.
- For R11, R12, R22, R113, R114, R123, R134a, and additional high-pressure refrigerants and blends. 30 & 50-lb tanks only service R410a.
- Quick connects are available for tanks servicing low-pressure refrigerants.

Part number	Capacity / Port Size	Connections	80% Full Limit Switch
<b>CYL-1000</b>	1,000-lb capacity, 3/4" ports	3/4" Flare with Ball Valves	
<b>CYL-1000-LS</b>	1,000-lb capacity, 3/4" ports	3/4" Flare with Ball Valves	Yes
<b>CYL-1000-QC</b>	1,000-lb capacity, 3/4" ports	Quick Connects	
<b>CYL-1000-LS-QC</b>	1,000-lb capacity, 3/4" ports	Quick Connects	Yes
<b>CYL-250</b>	250-lb capacity, 3/4" ports	3/4" Flare with Ball Valves	
<b>CYL-250-LS</b>	250-lb capacity, 3/4" ports	3/4" Flare with Ball Valves	Yes
<b>CYL-250-QC</b>	250-lb capacity, 3/4" ports	Quick Connects	
<b>CYL-250-LS-QC</b>	250-lb capacity, 3/4" ports	Quick Connects	Yes
<b>CYL-050</b>	50-lb capacity, 1/4" ports	1/4" flare	
<b>CYL-050-LS</b>	50-lb capacity, 1/4" ports	1/4" flare	Yes
<b>CYL-030</b>	30-lb capacity, 1/4" ports	1/4" flare	
<b>CYL-030-LS</b>	30-lb capacity, 1/4" ports	1/4" flare	Yes



## ASME REFRIGERANT TANKS

- Mounted on casters
- High pressure (-HP) tanks: Dual 250-psi relief valves on diverting valve.
- Low pressure (-LP) tanks: 250-psi rupture disc & 250-psi relief (meets ASME section VIII div 1 and ANSI specifications)
- Pressure gauge
- (3) Sight glass windows
- 80% tank full float switch
- Bottom drain connection
- Liquid & Vapor ports: Threaded connections with isolation ball valves are supplied standard. Ball valves may be substituted with quick connect fittings on LP tanks only.

Part number	Capacity	Connections	Refrigerant Service
<b>ASME-250-075-HP</b>	250-Gallon	3/4" Flare with Ball Valves	High Pressure
<b>ASME-250-075-LP</b>	250-Gallon	3/4" Flare with Ball Valves	Low Pressure
<b>ASME-250-075-LP-QC</b>	250-Gallon	3/4" Ports with Quick Connects	Low Pressure
<b>ASME-500-075-HP</b>	500-Gallon	3/4" Flare with Ball Valves	High Pressure
<b>ASME-500-075-LP</b>	500-Gallon	3/4" Flare with Ball Valves	Low Pressure
<b>ASME-500-075-LP-QC</b>	500-Gallon	3/4" Ports with Quick Connects	Low Pressure

Tank model	Gallons	Dry wgt	Refrigerant Capacity at 80% Full (lbs)						
			R12	R22	R500	R502	R134a	R11	R123
ASME-250	250	650 lb	2195	2000	2034	2039	2015	2459	2440
ASME-500	500	1000 lb	4390	4000	4068	4078	4030	4918	4880