



# RS Series

OIL-INJECTED ROTARY SCREW COMPRESSORS

## OPERATOR MANUAL

RSB-15 RSB-20 RSB-25  
RSB-30 RSB-40 RSB-50



### **WARNING**

Personal injury and/or equipment damage will result by failing to pay attention to the vital safety information and instructions in this manual. Carefully read, understand, and retain all safety information and instructions before operating this compressor.

# SECTION 1

## GENERAL SAFETY

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As with any piece of rotating equipment common sense and safety precautions should be used in the operation of this rotary screw air compressor. Carelessness can be very hazardous to personnel.

In addition to the obvious safety rules, we recommend additional safety precautions as listed below. Please read and follow these precautions for the safe day-to-day operation of your compressor.

1. Read and understand all the instructions found in this manual before operating your compressor.
2. Disconnect the main power source before working on or performing any maintenance procedures on this unit. Use a lock out and tag out process.
3. Do not attempt to remove any parts, break any connection, loosen oil fill plug or drain plug until the unit has been shut down and air pressure has been relieved.
4. Do not operate the compressor in excess of its rated pressures and speeds indicated on the compressor nameplate.
5. Do not remove guards, shields, or screens while the compressor is in operation. If removed for maintenance replace before resuming operation.
6. Observe the delivery pressure gauge daily to be sure the automatic control system is operating within proper limits.
7. Periodically check all safety and relief devices for proper operation.
8. Use compressed air properly. Pressurized air can cause serious injury to personnel.
9. Be sure that no tools, rags or loose parts are left in or on the compressor or drive parts.
10. Do not use flammable solvents for cleaning parts.
11. Exercise cleanliness during maintenance and when making repairs. Keep dirt away from parts and exposed openings by covering with clean cloth or Kraft paper.
12. Do not install a shut-off valve in the discharge line without installing a pressure relief valve between the shut-off and the compressor package.
13. Do not operate the compressor in areas where there is a possibility of flammable or toxic substances entering the system.
14. Never disconnect (or jump) the air discharge temperature switch or any other safety device and attempt to operate the compressor.
15. Know what mode of operation the compressor is in before working around the unit. The power may be on but the machine not running if it is in the auto restart mode. Adhere to note #2 above..

Make sure to follow the local code requirements in your area to ensure compliance prior to installing the compressor.

**The owner, lessor or operator of this compressor is hereby notified and forewarned that failure to observe these safety precautions may result in injury and/or property damage.**

Curtis-Toledo does not mean to imply that

the preceding list of safety precautions is all-inclusive or that the observance of this list will prevent all injury or property damage.

Curtis-Toledo expressly disclaims responsibility or liability for any injury or property damage caused by failure to follow these specified precautions or by failure to exercise ordinary caution and due care required in operating or handling this equipment even though not expressly specified.

### SAFETY DECALS

Your compressor is posted with several safety decals to inform the user of hazards associated with its operation. These decals are positioned

where the hazard is most prevalent on the compressor. Refer to the figures below for the decals used and their location on the compressor.

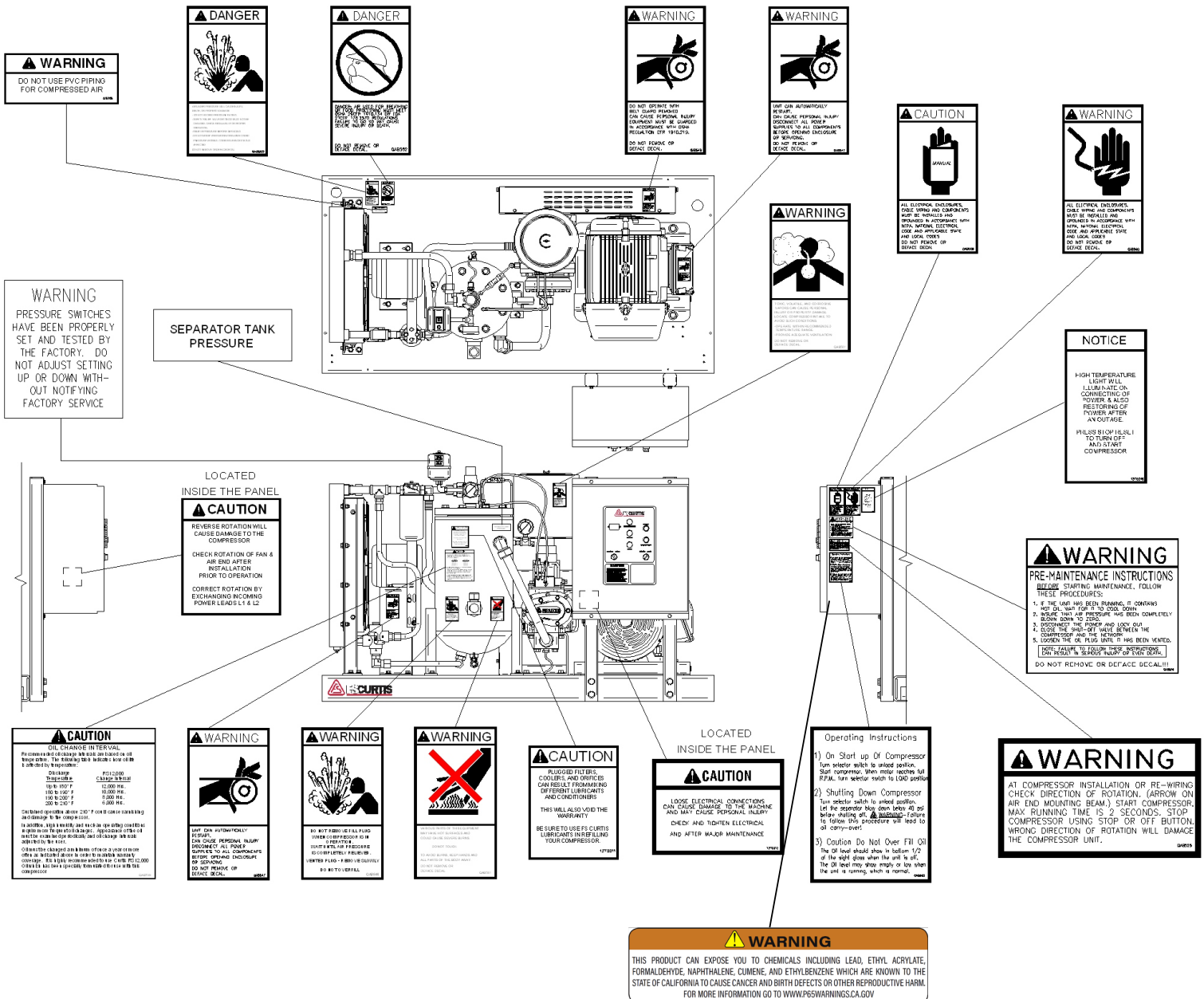


Figure 1-1  
Safety Decal Locations  
(Open units)

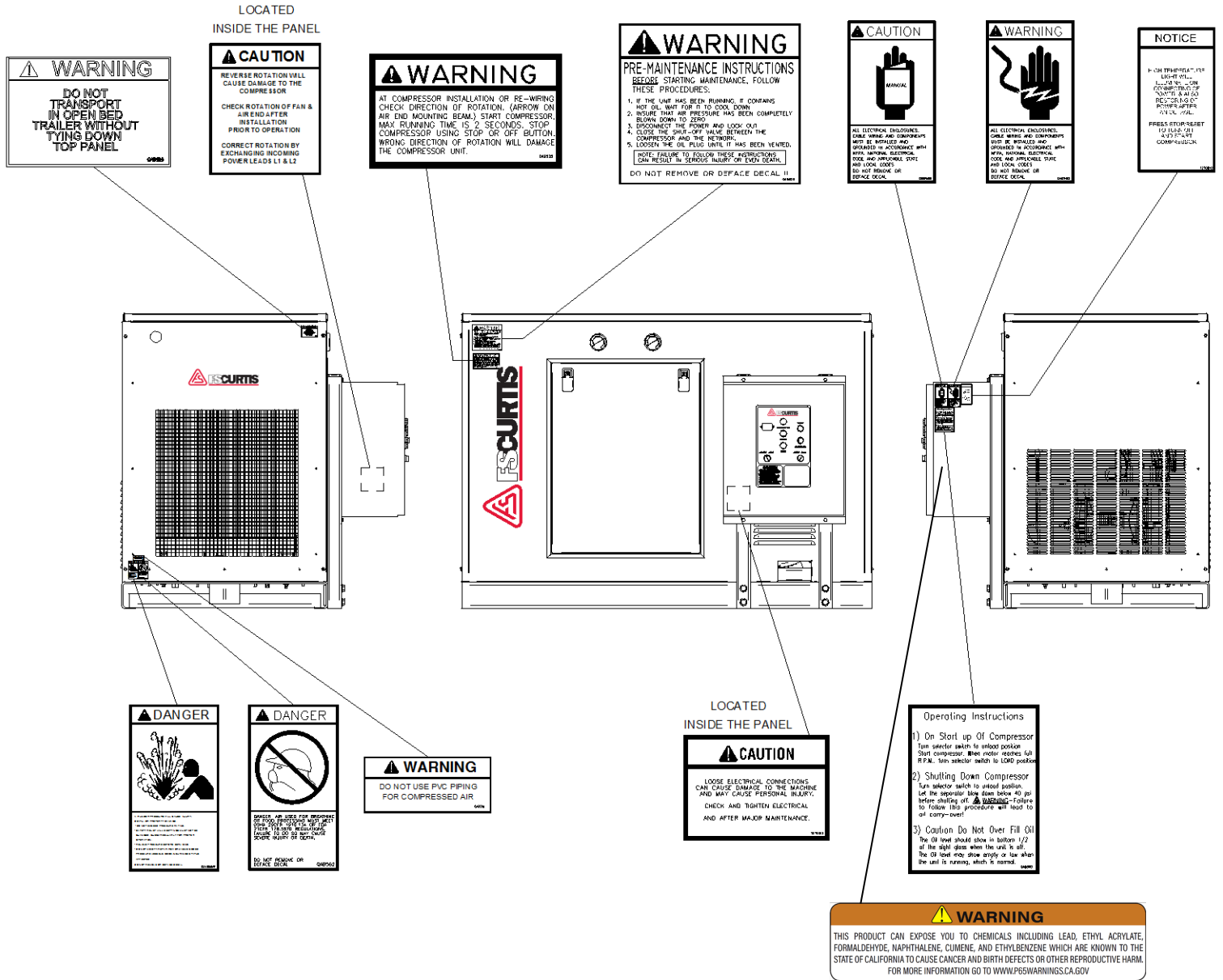


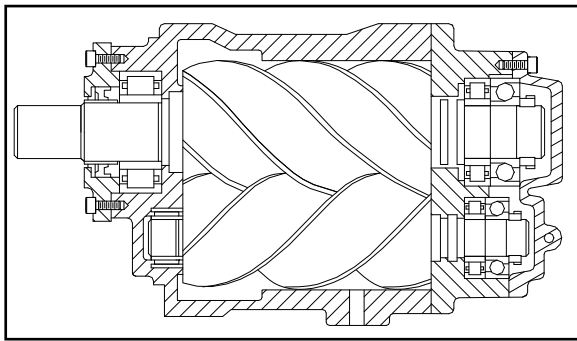
Figure 1-2  
Safety Decal Locations  
(Enclosed units)

## SECTION 2

### GENERAL DESCRIPTION

#### COMPRESSOR

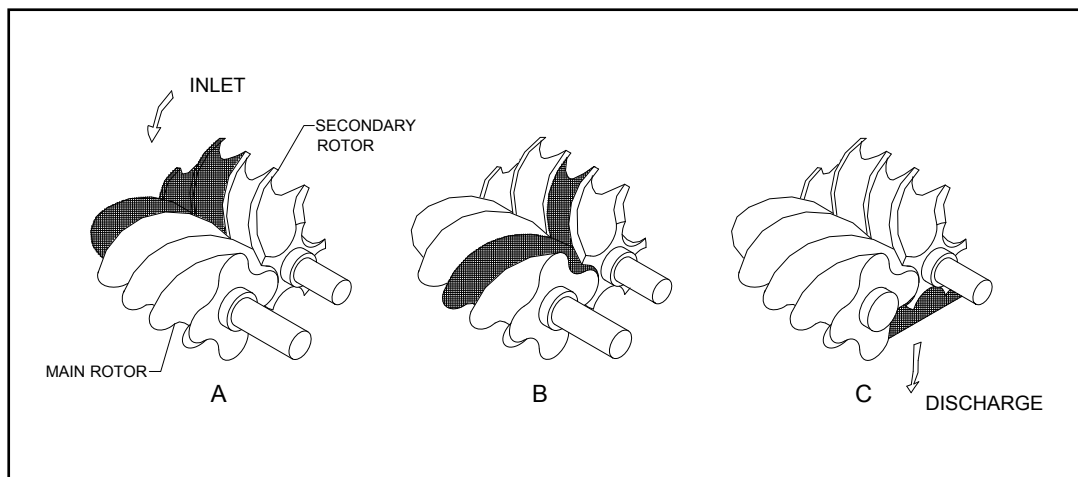
The compressor assembly is an oil flooded positive displacement, single stage, helical screw type unit consisting of two rotors or screws supported axially by roller bearings and enclosed in a housing or stator as depicted in the sectional view Figure 2-1.



**Figure 2-1**  
**Compressor Assembly**

In operation as depicted below in the compression cycle (Ref. Figure 2-2), air entering the compressor through the inlet port becomes trapped between the helical lobes of the main rotor and the matching grooves of the secondary rotor (A). As the rotors turn air is trapped in the cavity created by the meshing lobe and groove and reduced in volume or “compressed”. It is then pushed through the successive cavities (B) until it reaches the discharge end of the compressor (C) and is sent to the oil separator.

During the compressor cycle, oil is injected into the compressor for the purpose of dissipating the heat of compression and to seal the internal clearances. The compressed air laden with oil leaves the compressor through the discharge port and enters a reservoir where the oil and air are separated. This process delivers a smooth flow of compressed air at the desired pressure.



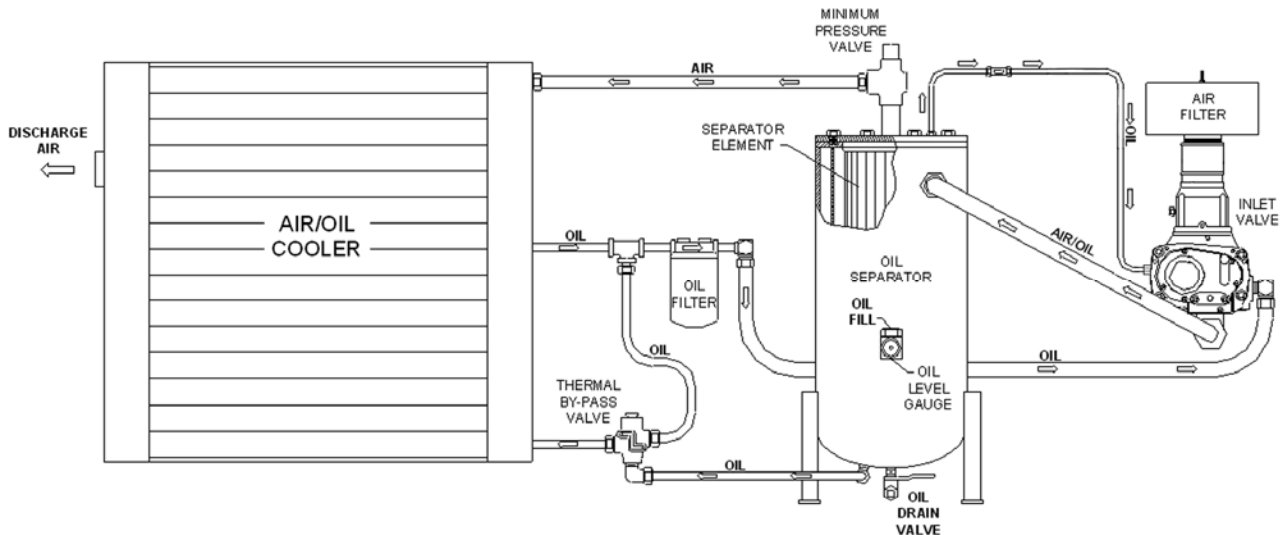
**Figure 2-2**  
**Compression Cycle**

## AIR/OIL FLOW

Air enters the compressor through the air filter and air inlet valve and into the air end where it is mixed with oil. After compression the air/oil mixture is discharged into the oil separator where its velocity is reduced causing most of the oil to drop to the bottom. The remaining oil is removed as the air passes through the separator element. Oil collected at the bottom of the separator element is returned to the inlet of the compressor through the scavenger line that is equipped with a sight glass for monitoring the flow of oil to determine when separator replacement is necessary. The coalesced air then passes through the minimum pressure valve set to maintain a minimum of 65-70 PSI in the oil separator to ensure a sufficient flow of oil to the compressor. The compressed air then enters the aftercooler where it is cooled and discharged into the compressed air system.

A sufficient amount of oil is stored in the oil separator tank and is forced by the pressure of compression from the separator to the thermal by-pass valve, which regulates its flow into the oil cooler depending on the temperature of the oil. The thermal by-pass valve will open when the oil reaches a predetermined temperature allowing the hot oil to enter the cooler. Oil, which has not reached this temperature setting, will by-pass the cooler.

The oil is then filtered and sent to the compressor to initiate the compression cycle. The oil also serves as lubrication for the compressor bearings.



**Figure 2-3**  
**Air/Oil Flow**

## SECTION 3

### INSTALLATION

#### GENERAL

Upon receipt of your compressor, inspect for freight damage. Report any damage as soon as possible. See “FREIGHT DAMAGE PROCEDURES” at the end of this section.

We recommend that the compressor remain on its shipping skid until it reaches the final installation site.

The base of the compressor is equipped with lifting notches for forklift removal from the shipping skid. If a crane is used to lift the compressor we recommend the use of a spreader bar and chains

#### CAUTION

**Lift the compressor unit by the base plate only. Do not attempt to lift the unit using such places as the motor, compressor or discharge piping as lifting points.**

Allow at least three (3) feet clearance on all sides of the compressor to facilitate maintenance and allow for free circulation of air. The unit should be located in a clean, well-lighted area that will not be exposed to ambient temperatures exceeding 105°F.

#### DANGER

**The eyebolts provided on the motor are for lifting the motor only and should not be used to lift any additional weight. All eyebolts must be securely tightened. When lifting the motor the lifting angle must not exceed 15°. Failure to observe this warning may result in damage to the equipment and/or personal injury.**

#### LOCATION

Your Curtis Rotary Screw compressor unit does not require a special foundation to operate. However, it is necessary that the floor be level and that the base of the unit be adequately supported. Consult the “SPECIFICATIONS” section of this manual for the weight and dimensions of your model. We also recommend the compressor be bolted to the floor.

**OUTDOOR INSTALLATION** – The standard R/S Series was designed for indoor applications only. Installation in an outdoor, unsheltered area should be avoided. The unit must be protected against rain, snow and freezing temperatures. If outdoor installation is unavoidable contact the factory for modifications. Failure to obtain factory approval will void the warranty.

Any unsheltered installation must have at least the following modifications:

- NEMA 4 controls
- TEFC motors
- Weather resistant cabinet
- Freeze protection (If applicable, see “COLD WEATHER OPERATION”)

**COLD WEATHER OPERATION** – The unit should be installed inside a shelter heated to temperatures above freezing (32° F). If installation must be in an unheated area the following conditions must be met to keep the compressor warranty intact:

1. All control lines and drain lines must be heated to avoid freezing.
2. The oil separator must be heated to maintain viscosity during idle periods.
3. FS CURTIS MaxFluid FSC-8000 synthetic oil must be used.

Low temperature kits are available through the factory. Contact your local FS Curtis compressor distributor for details.

## INLET AIR

A clean air supply is required for the satisfactory operation of your compressor.

### **⚠ DANGER**

**Inlet air must not contain any flammable or toxic gases. These gases will be concentrated by the compressor and could result in property damage, personal injury or death.**

The inlet air filter supplied with the compressor is of sufficient size and design to meet all normal operating conditions

### **⚠ WARNING**

**Inlet air containing reactive gases will cause failure of the lubricant and compressor. Insure an air supply that is well clear of any reactive gases.**

If it is necessary for inlet air to be taken from an outside source, the piping should be at least the diameter of the air filter inlet. If the distance is over twenty (20) feet the diameter needs to be enlarged to reduce restriction. The piping must be corrosion resistant and cleaned thoroughly after fabrication. The inlet must be protected to prevent rainwater and small animals from entering the inlet piping.

## AIR DISCHARGE

Your compressor is equipped with an oil/air cooler. On air-cooled units the cooling fan is of sufficient size to provide adequate cooling of the compressed air and the compression oil passing through this cooler. We recommend a thorough cleaning of the cooler fins periodically by vacuum or compressed air to insure a restriction free flow of air from the cooling fan through the oil/air cooler.

### **⚠ CAUTION**

**Inadequate airflow will cause the compressor to run hot which can cause damage to the compressor and increase oil carryover.**

## WATER-COOLED UNITS

The cooling water supply should be checked to make sure the flow is sufficient. The chart shown in Figure 3-1 lists approximate minimum water flow rates in U.S. gallons per minute at various temperatures into the heat exchanger(s). The water flow rate shown will cool the compressor oil to approximately 140° F. The compressor discharge temperature should be maintained at 160° F to 180° F under most conditions. The water outlet temperature from the heat exchanger will be approximately 110° F, which is the maximum recommended to prevent heat exchanger tube fouling and corrosion. Higher than listed water flow rates will decrease the water outlet temperature.

HP	Inlet Water Temperature			
	60°F	70°F	80°F	90°F
15	1.6	2.0	2.8	4.0
20	2.2	2.8	3.7	5.5
25	2.8	3.3	4.3	6.5
30	3.1	4.0	5.5	8.0
40	4.4	5.5	7.3	1.0
50	5.5	6.5	8.5	13.0

**Figure 3-1  
Water Flow Rates (U.S. gal/min)**

The size of the incoming water supply piping should be at least equal to the connections provided with the compressor.

### **⚠ WARNING**

**Water-cooled units must not be exposed to low temperatures below 40°F, 4.4°C.**

## ELECTRICAL CONNECTIONS

All internal wiring has been done at the factory. Wiring of the power supply to the compressor should be done by a qualified electrician to comply with the National Electric Code, state code and any local codes in accordance with the wiring diagram specific to your compressor model shown in the "SPECIFICATIONS" section of this manual.



**⚠ DANGER**

**Electrical shock can cause severe injury or death. Disconnect all power supplies, lockout and tag before working on unit.**

The power supply should be adequate and free of parasitic loads that will cause an under voltage condition during compressor operation.

The power source should be connected through a fusible disconnect and properly grounded in accordance with the National Electric Code and any other applicable codes.

**⚠ WARNING**

**Failure to properly ground the compressor package could result in controller malfunction.**

We recommend the use of time delay fuses in the fusible disconnect for isolating the unit. Per the National Electric Code the fuse should be sized at 175% of the full load amp draw. Consult the Code if using another style of branch circuit protection.

**COMPRESSOR ROTATION**

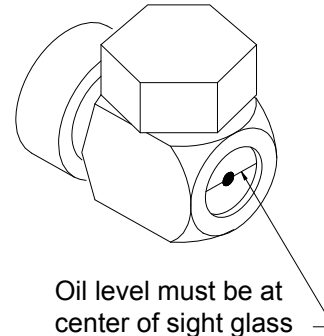
After the electrical wiring has been properly connected check for proper rotation by momentarily starting and stopping the motor. A directional arrow is affixed to the compressor drive end.

**⚠ WARNING**

**Reverse rotation will cause air end damage. Never allow the compressor to run in reverse rotation as property damage or personal injury may occur.**

**OIL LEVEL CHECK**

Your compressor was shipped from the factory charged with the correct amount of compressor oil. However, the oil level must be checked at installation and again prior to start-up. The combination oil fill and sight glass is located on the side of the separator tank. The oil level should be at the center of the mark when the unit is off (Figure 3-2).



**Figure 3-2  
Oil Fill – Sight Glass**

**STORAGE**

In some cases it may be necessary to store the compressor for extended periods of several months before putting it into service. When this is required observe the following recommendations.

1. Cover and seal all machine openings to prevent the entrance of water and dirt.
2. Cover all openings in open drip proof motors.
3. If the storage conditions are below freezing, drain the aftercooler, traps, water-cooled heat exchangers and associated piping. We do not recommend outside storage.
4. Cover with a waterproof tarpaulin that can easily be removed for in storage inspection and maintenance.
5. While in storage, rotate the compressor and motor by hand every thirty to sixty days to prevent flat spots on the bearings that can lead to premature failure.

At the end of the storage period follow the uncrating and start-up procedures. If the unit has been stored for more than eighteen months contact the factory before starting the compressor

## FREIGHT DAMAGE PROCEDURES

1. The customer or his agent **MUST** inspect each shipment for damage at the receiving point.
2. If the shipment is damaged, the customer should so note the damage on the freight bill.
3. The customer should request an inspector from the freight carrier to inspect the equipment immediately. It is best to send a confirming letter with the following information.
  - a. Freight bill number.
  - b. Date delivered.
  - c. Shippers name and address.
  - d. Description of damage (a photograph if possible).
  - e. A copy of your invoice for the equipment
4. After inspection (before the inspector leaves).
  - a. Get a copy of the inspection report.
  - b. Request the unit be shipped back to the factory at the freight carrier's expense.
  - c. Request a credit for the original freight bill.
5. Call the factory and:
  - a. Get a Return Material Authorization (RMA) number.
  - b. Give a purchase order for repair. The P.O. should refer to the item and trucker claim.
6. Curtis-Toledo will accept the shipment back, repair the damage (under normal conditions) and return the unit within (7) working days.
7. We will invoice the customer for the repair, which will then become part of your claim. The invoice must be presented to the freight carrier's claim department along with their completed claim form.

If the damage can be repaired at the receiving point, follow procedure steps 1 through 4a. Repair the unit and present a detailed invoice to the freight carrier showing labor hours, labor rate, materials used and cost of the materials.

## OPERATION

### GENERAL

Every Curtis Rotary Screw compressor has been pre-wired for the voltage specified at the time the order was placed.

The unit has been thoroughly tested at the factory to assure it will operate at its rated capacity and is in good working order. The user needs only to connect the unit to the correct power supply and to the compressed air system (and to the appropriate water supply on water cooled units, refer to SECTION 3 "INSTALLATION").

The purpose of this section is to familiarize the user with the controls, their function and how they operate. We strongly suggest that you read and understand this section before starting your compressor.

### OPERATING MODES

The RS Series compressors are equipped with an automatic dual control operating system consisting of a load/unload control (constant) and a start-stop control with delay off timer (automatic). These control methods are achieved through the use of a pressure switch, a two-position selector switch, a three way normally open solenoid valve and a two way air operated blow down valve shown schematically in Figure 4-9 "Load/ Unload Control".

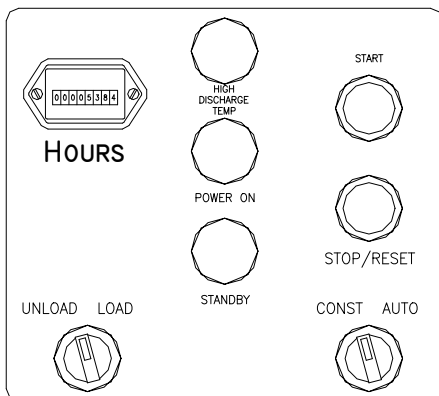
The mode of operation is selected using the switch marked CONST/AUTO located on the compressor control panel (Figure 4-1).

### LOAD/ UNLOAD CONTROL

Selecting the CONST position puts the unit into the load/ unload control mode which allows the motor to run continuously while the compressor loads and unloads as determined by the high and low settings of the pressure switch. This mode of operation is best used in high air demand systems to reduce energy consumption.

### START - STOP CONTROL

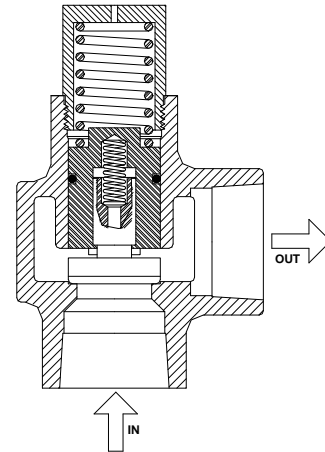
With the selector switch in the AUTO position the motor is allowed to start and stop as dictated by the pressure switch. When system pressure reaches the high setting of the pressure switch a timer is energized which will shut down the unit after a selected time period (factory set at 10 minutes) if system pressure does not fall to the low setting of the pressure switch. If the system is allowed to shut down the amber standby light on the control panel will illuminate to alert personnel that the unit may restart at any time. When the system pressure does fall to the low setting the unit will restart turning off the standby light.



**Figure 4-1  
Control Panel**

**MINIMUM PRESSURE VALVE**

An internally loaded check valve that prevents the back flow of air from system pressure when the unit stops, unloads or is shut down. This valve also maintains approximately 65 PSI in the oil reservoir (Figure 4-2).



**Figure 4-2**  
**Minimum Pressure Valve**

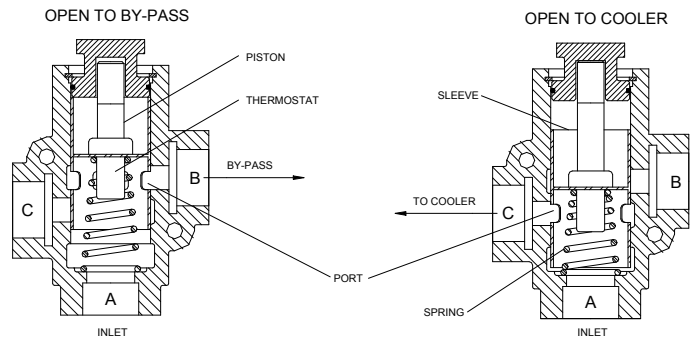
**THERMOSTATIC CONTROL VALVE**

This valve, located in the oil return line (Figure 2-3), incorporates a thermostat to control the temperature of the compressor lubricant.

When the compressor is started and the unit is cold the valve is open to the by-pass at port B allowing the oil entering at port A to flow directly from the oil separator tank through the oil filter to the compressor.

As the oil heats up the thermostat senses the temperature and gradually closes the valve to port B and opens it to port C through which the heated oil will flow to the oil cooler before entering the oil filter and compressor. The thermostat is fully opened at 170° F to prevent moisture contamination in the oil system (Figure 4-3).

**Figure 4-3**



**Thermostatic Control Valve**

## INITIAL START-UP

After completing the initial start-up checks, as noted in SECTION 3 "INSTALLATION", the machine is ready to start. Turn the switch marked UNLOAD /LOAD to the unload position then press the START button. When the unit reaches full speed and separator pressure reaches 25-30 PSI, turn the UNLOAD/LOAD switch to the load position (Figure 4-1). The minimum pressure valve will allow 65 PSI to build in the oil separator tank before permitting air to flow downstream.

Watch the following measurements carefully at the instrument panel while the compressor is running:

1. Compressor discharge temperature should range between 160° to 180° F when running at full speed.
2. Oil separator tank pressure should be approximately 1-2 PSI higher than system gauge pressure.
3. Receiver pressure should register actual system pressure – approximately 1-2 PSI lower than separator tank pressure.

## SHUTTING DOWN THE COMPRESSOR

Before shutting down the compressor, turn the UNLOAD/LOAD switch to unload and allow the separator tank time to blow down i.e. 45 to 60 seconds. When the separator tank pressure gauge reads 30-40 PSIG press the Stop button to turn off the compressor.

 <b>WARNING</b>
<b>Failure to follow this procedure when shutting down the compressor will lead to oil carry over.</b>

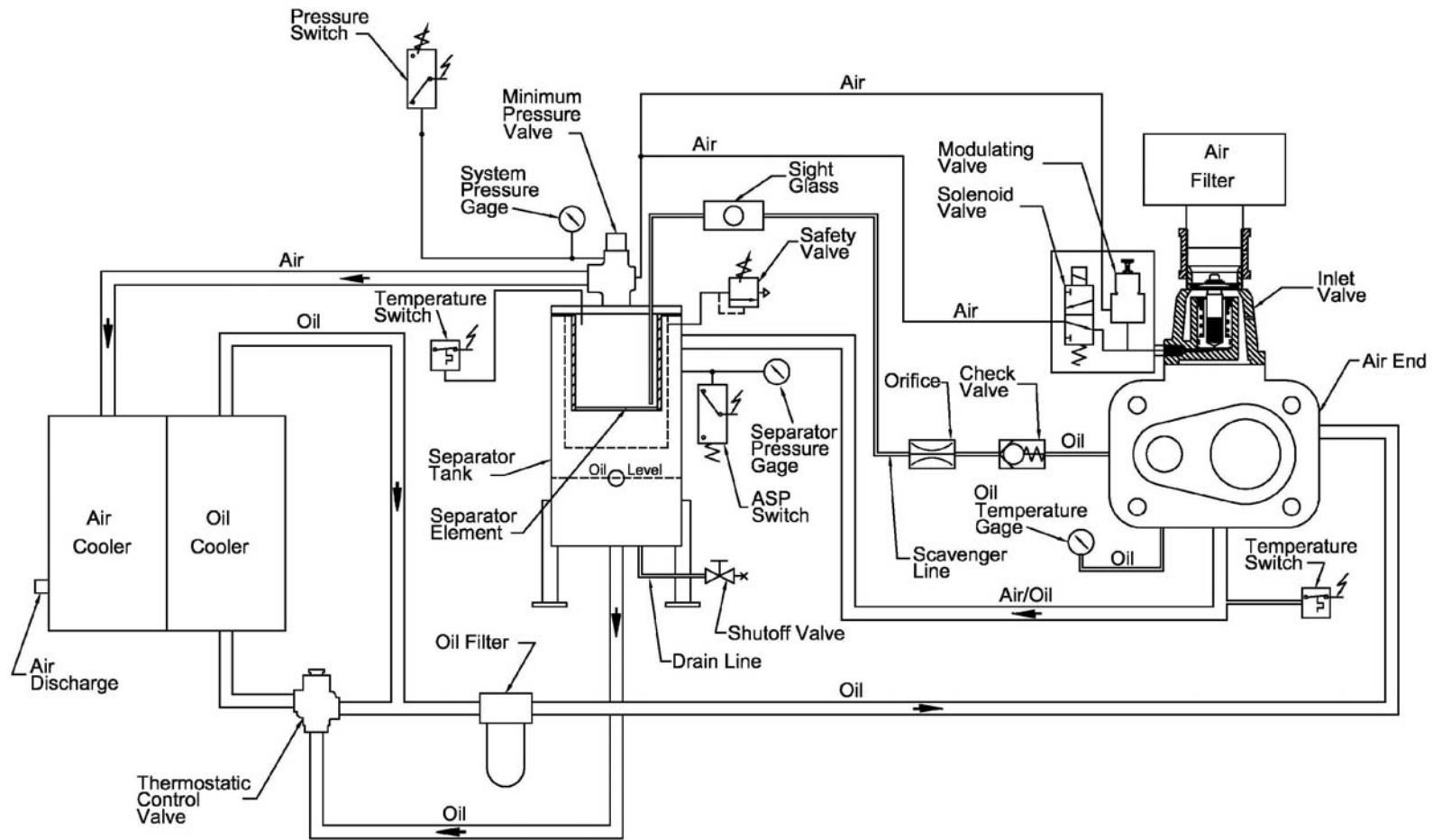


Figure 4-4  
Flow Diagram  
Load/Unload Control

## SECTION 5

### MAINTENANCE

#### GENERAL

Your Curtis Rotary Screw Compressor has been designed to require a minimum amount of maintenance. However, as with any piece of mechanical equipment, the implementation of a good maintenance program is recommended for smooth day-to-day operation of your compressor and for the longevity of your compressed air system.

This section will provide the user with instructions for maintenance and/or replacement of the serviceable components.

NOTE: Some components of your unit may be equipped with service indicators that alert the user when service on these items is required

#### **⚠ DANGER**

**Before performing any maintenance be sure the electrical supply has been disconnected, locked and tagged and that all pressure has been relieved from the compressed air system.**

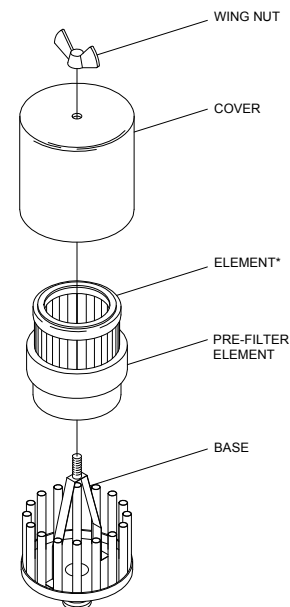
#### AIR FILTER

Frequency of servicing the air filter will depend on the environmental conditions under which the compressor is operating. Service the air filter element under any of the following conditions, whichever comes first.

- Check the air filter element weekly and change if outside surface of the element appears to be coated with dust.
- Change every two thousand (2000) hours of operation or every six (6) months.
- Under unusually dirty ambient conditions change the element as required.
- When differential pressure gauge reads 25" H<sub>2</sub>O vacuum, service is required.

#### Standard air filter replacement (Figure 5-1)

1. Clean the exterior surfaces of the filter canister.
2. Loosen the wing nut and remove the air filter cover.
3. Remove the element and clean the interior surfaces.
4. Inspect and/or replace the element.
5. Replace the cover and retighten the wing nut.



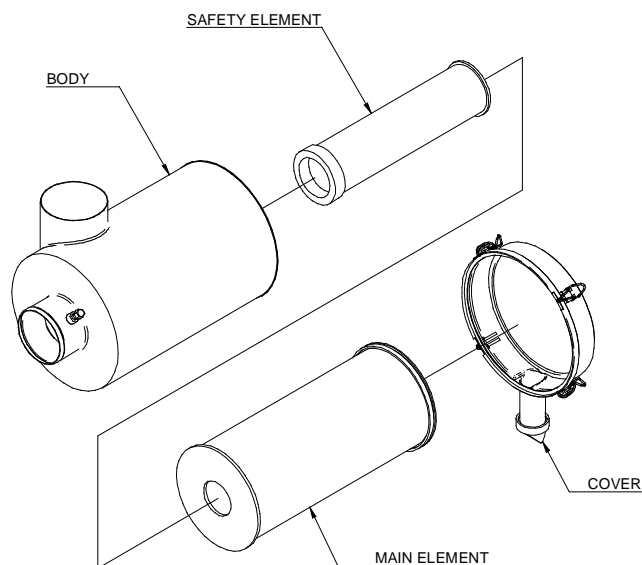
**\*Consult the appropriate parts list for element part number**

**Figure 5-1**

#### Heavy-Duty air filter replacement (Figure 5-2)

1. Clean the exterior surfaces of the filter canister.

2. Remove the filter cover.
3. The heavy-duty filter consists of two elements, a main element with a safety element inside. Remove the element then the main element from the filter body.
4. Using a damp cloth clean the interior surfaces of the filter body and cover. Do not attempt to blow dirt out with compressed air.
5. Inspect and/or replace the elements.
6. Replace the cover and tighten the wing nut.
7. Reset the maintenance indicator if applicable.



**\*Consult the appropriate parts list for element part numbers**

**Figure 5-2**

### Air filter inspection and cleaning

It is recommended that the air filter element(s) be changed every six (6) months or 2000 hours. However the filter element(s) should be inspected and cleaned if necessary on a weekly basis in conjunction with your maintenance program. Instructions for inspecting the element(s) are as follows:

1. Shine a bright light through the element from the inside to inspect for damage. If cracks or pinholes are detected, discard the element.
2. If element(s) appear in good condition return them to the filter housing per previous filter replacement instructions.

## LUBRICANT

Your compressor has been tested and shipped with a full charge of **FS CURTIS LUBEPLUS FSC-8000** synthetic oil. This lubricant has been specially formulated to extend the service life of your compressor and is formulated for high temperature operation, easy start-up when cold, reduced sludge and lacquer buildup and is completely compatible with all seals, gaskets and other compressor materials.

Change the lubricant as noted in the "Maintenance Schedule" located on page 26 of this manual. Between changes check the oil level daily and add as necessary.

When operating in severe conditions it will be necessary to change the lubricant more frequently. Temperature of operation has the most significant effect on the life of the lubricant. The following chart shows the decrease in interval based on temperature.

Discharge Temperature	FSC-8000
Up to 180° F	8000 Hrs.
180° to 190° F	6000 Hrs.
190° to 200° F	4000 Hrs.
200° to 210° F	2000 Hrs.

### **⚠ DANGER**

**Hot oil under pressure can cause severe injury, death and/or property damage. Be sure the compressor is shutdown and the pressure is relieved before attempting to change or add lubricant.**

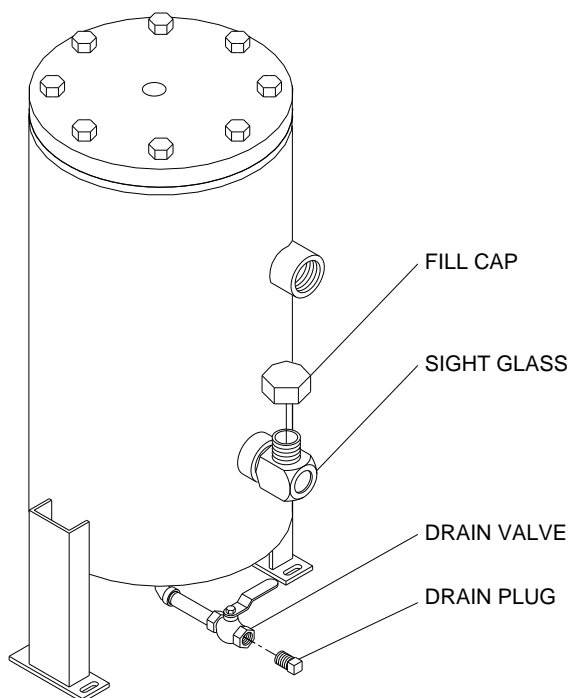
### Checking level and adding compressor oil. (Ref. Figure 5-3)

1. Shut down the unit.
2. Wait one (1) minute after the compressor stops to allow the pressure to be relieved and the lubricant to settle.
3. Observe the lubricant level. It should be at the center of the sight glass.
4. To add lubricant, disconnect the power, lockout and tag to prevent accidental restarting.
5. Clean dirt from around the fill cap.



6. Loosen the cap and make sure any additional pressure is relieved through the vent holes, then remove.
7. Add lubricant to the proper level.
8. Replace cap and tighten securely.

<b>⚠ WARNING</b>
<b>Do not attempt to remove the fill cap, drain plug or any other components while the compressor is running or pressurized.</b>



**Figure 5-3**

#### Changing lubricant (Ref. Figure 5-3)

1. Shut down the unit, disconnect the power, lockout and tag to prevent accidental restarting.
2. Wait one (1) minute after the compressor stops to allow the pressure to be relieved.
3. Clean the dirt from around the fill plug.
4. Loosen the fill plug and make sure any additional pressure is relieved through the vent hole, then remove.
5. Remove the drain plug from the end of the drain line at the bottom of the separator tank.
6. Open the ball valve and allow the oil to drain.
7. When the oil has completely drained close the ball valve and replace the drain plug.

8. Refill with **FS CURTIS LUBERPLUS FSC-8000** Compressor lubricant. (Consult the specifications section for the proper amount of lubricant for your model).
9. Replace the fill cap and tighten securely.
10. Restart the unit and allow the lubricant to circulate through the system.
11. Shutdown the unit and follow the steps for checking the lubricant level.

<b>⚠ CAUTION</b>
<b>Over filling the oil reservoir can cause oil carryover and damage the compressor. Do not fill above the full mark in the sight glass.</b>

<b>⚠ CAUTION</b>
<b>Mixing lubricants can damage the compressor and will void the warranty. Use only FS CURTIS lubricants.</b>

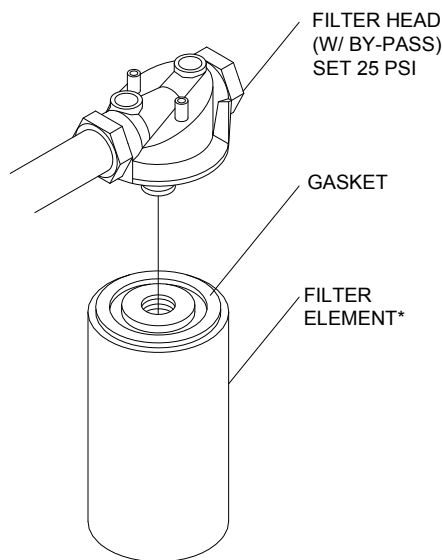
#### Oil filter replacement

Change the oil filter element after the first five hundred (500) hours of operation. Then under any of the following conditions:

- Every six (6) months or two thousand (2000) hours whichever occurs first
- Every lubricant change
- When differential pressure gauge reads 15 PSID.

#### Change as follows: (Ref. Figure 5-4)

1. Shut down the unit, disconnect the power, lockout and tag to prevent accidental restarting.
2. Wait one (1) minute after the compressor stops to allow for the pressure to be relieved.
3. Using a strap wrench remove the old filter from the filter head.
4. Clean the gasket contact surface on the inside of the filter head.
5. Apply a light film of the compressor oil to the gasket surface on the new element.
6. Hand tighten the new element until the gasket is seated in the gasket groove.
7. Continue tightening the element by hand an additional  $\frac{1}{2}$  to  $\frac{3}{4}$  turn.
8. Restart the unit and check for leaks.



**\*Consult appropriate parts list for correct element part number.**

**Figure 5-4**

### SEPARATOR ELEMENT

The air/oil separator element never “wears out” but it does lose its effectiveness due to being plugged with dirt. To obtain long separator life, it is important to change the air inlet filter and the lubricant filter as suggested in the maintenance schedule.

Change the separator element under any of the following conditions, whichever comes first:

- Whenever pressure drop between system and separator exceeds 10 PSI.
- Once a year.
- Every four thousand (4000) hours.
- When excessive oil appears in the air discharge line.
- When differential pressure gauge reads 10 PSID.

### Separator element replacement (Ref. Figure 5-5)

1. Shut down the unit; disconnect the power, lockout and tag to prevent accidental restart.

2. Allow one (1) minute after the compressor stops to allow the pressure to be relieved and the oil in the sump to settle.”
3. Disconnect the main air line and the scavenger tube from the separator cover.
4. Disconnect the control air lines after noting their connection points. Tag the lines if necessary.
5. Use a suitable wrench and remove the bolts that hold the separator cover and lift the cover from the separator tank.
6. Lift the element up and out of the separator tank and discard.
7. Carefully lower the new element into the separator tank and center.
8. Clean and replace the cover, align the holes and install the bolts. Tighten the bolts in a cross pattern to prevent over tightening one side of the cover (See bolt torque specifications).
9. Install the main air line and the control air lines.
10. Install the scavenger tube making sure the end is touching the bottom of the separator element.
11. Clean the orifice located at the end of the scavenger tube where it enters the inlet valve or air end.
12. Reconnect the power, restart the unit and check for leaks.

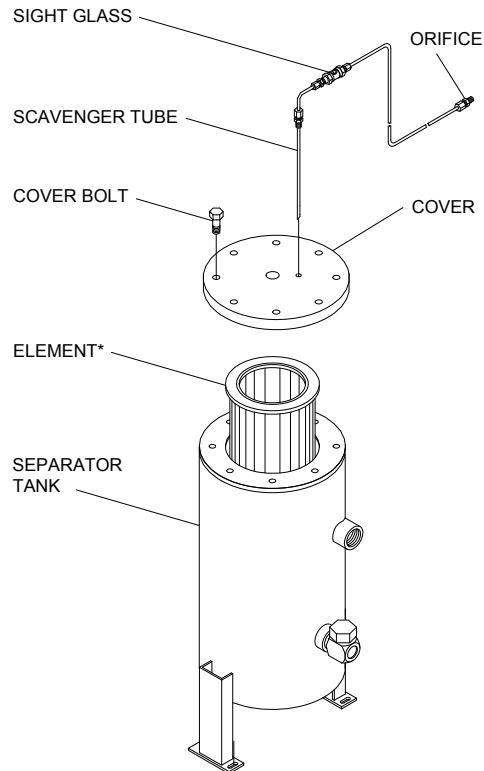
### **▲ DANGER**

**Separator, piping and control lines may be very hot immediately after shut down. Allow the unit to cool before attempting service.**

### SCAVENGER LINE OIL SIGHT GLASS

During loaded operation there should be a visible mist of lubricant in the sight glass. If no flow is visible then the orifice is blocked or restricted. The orifice is located in the scavenger line where it enters the inlet valve or air end. (Ref. Figure 5-5)

NOTE: After installation of a new separator element, lubricant will not necessarily appear in the sight glass for the first several hours of operation. If clogging is suspected remove the orifice and clean in a suitable solvent.



**\*Consult appropriate parts list for element part number**

**Figure 5-5**

### THERMOSTATIC CONTROL VALVE

In normal operation the thermostatic valve controls the oil temperature and prevents moisture contamination of the oil. Malfunction of this valve may result in moisture in the oil system that can damage the compressor and cause oil carry-over. A failure of the element in the closed position will divert the lubricant from the oil cooler and result in the unit shutting down due to high temperature.

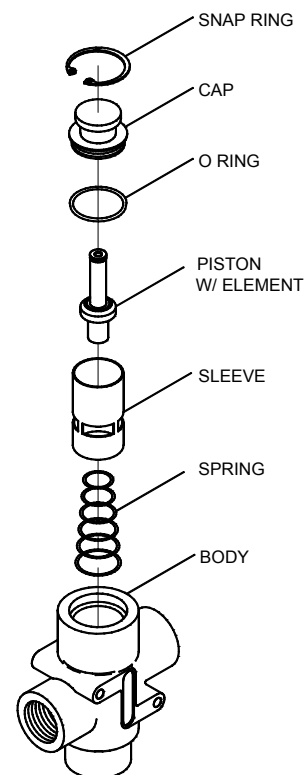
A repair kit is available for this valve to replace the wearable components. Consult the parts list for your compressor to obtain the part number for this repair kit.

### **⚠ DANGER**

**Before performing any maintenance be sure the electrical supply has been cut off, locked and tagged and that all pressure has been relieved from the compressor system.**

### Thermostatic Control Valve Repair (Figure 5-6)

1. Place a spill pan under the valve.
2. Remove the snap ring from the top of the valve body. The valve is spring loaded and the cap may pop up when the ring is removed.
3. Remove the cap and internal parts taking care to note the orientation of the spring, piston and element.
4. Reassemble with the renewal parts. Take care when replacing the cap not to cut the "O" ring or put undue stress on the attached piping.
5. Replace any lost lubricant.
6. Return the unit to service.



**Figure 5-6**

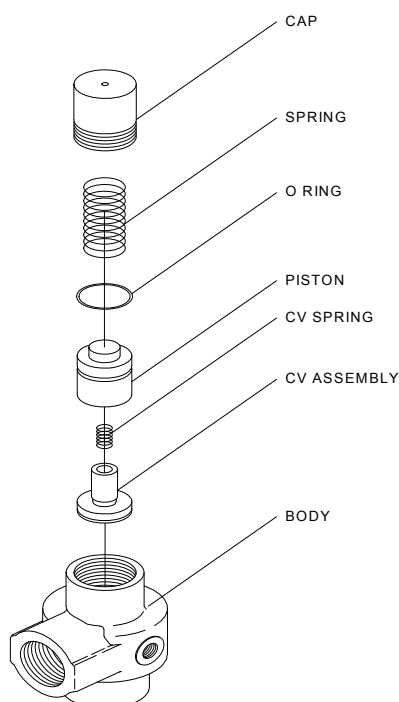
### MINIMUM PRESSURE VALVE

The minimum pressure valve is a non-adjustable spring loaded check valve designed to maintain a minimum of 65 PSI in the separator tank.

Air exiting the vent hole in the cap indicates “O” ring failure, allowing air to leak into the spring cavity inside the cap, which will effect the operation of the valve.

Consult the appropriate parts list for part number of the kit available to repair this valve, depicted in Figure 5-7, as follows.

1. Carefully unscrew the spring loaded valve cap.
2. Remove the piston and seat assembly.
3. Inspect the valve body for scratches and deterioration of the seating surfaces.
4. Replace the “O” ring on the piston taking care not to damage it.
5. Reassemble the piston with the new seat assembly and spring and replace in the valve body.
6. Replace the spring and tighten the cap.
7. Return the unit to service



**Figure 5-7**

## INLET VALVE

See CAP303-1 Manual Supplement.

## DRIVE SYSTEM

Routine examination of the drive system is recommended to insure maximum compressor life. Check the belts weekly for condition and tightness. The slack created by initial operation should be taken up after the first one hundred (100) hours.

### **⚠ DANGER**

**Do not operate the compressor with the fan or belt guard removed. Exposed fan and belts can cause injury to personnel.**

### **Check and tighten the belts as follows: (Ref. Figure 5-8)**

1. Disconnect the power, lock out and tag out, and allow all pressure to be relieved.
2. Remove the belt guard.
3. Inspect for any fraying or cracking. If found replace the belts. (See “Belt Replacement”)
4. Check the tension. The deflection should be about 1/64” per inch of span between the sheaves with about 4-6 pounds of downward force.
5. To adjust the tension, loosen the bolts holding the motor to the slide base and using the take-up bolts move the motor until the belts are tight per number 4 above, then retighten the motor bolts.
6. Replace the belt guard and return the compressor to service.

### **⚠ DANGER**

**Before performing any maintenance be sure the electrical supply has been cut off, locked and tagged and that all pressure has been relieved from the compressed air system.**

### **Changing the belts: ( Ref. Figure 5-8)**

1. Disconnect the power and relieve all pressure to the system.
2. Remove the belt guard.
3. Loosen the bolts holding the motor to the slide base.
4. Using the take-up bolts move the motor toward the air end to relieve the tension.
5. Remove the belts.

6. Replace with new belts. (Consult the appropriate parts list for your model to obtain the correct belt part number.)
7. Set tension by sliding the motor back to its original position using the take-up bolts and tighten the motor hold down bolts. The deflection should be about 1/64" per inch of span between the sheaves with about 4-6 pounds of download force.
8. Replace the belt guard and return the compressor to service.

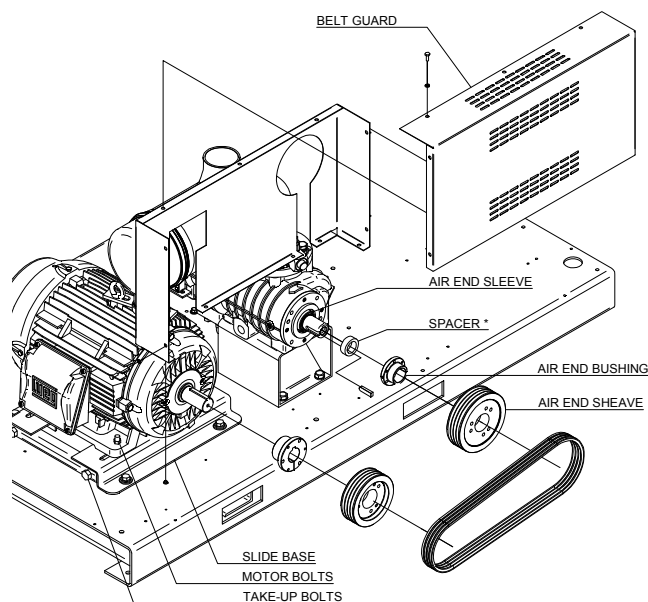


Figure 5-8

**NOTICE**

Slide and firmly press block ring (spacer) against air end sleeve.  
Slide air end sleeve and bushing against block ring (spacer) and hold in place while tightening bushing setscrew.

**IMPORTANT**

It is critical to have no gap between air end sleeve, block ring, and bushing!

**NOTICE**

To avoid potential damage to the belts, never force them over the sheaves. Move the drive motor instead.

**Sheave alignment**

Any degree of sheave misalignment will result in a reduction of belt life. Misalignment whether parallel or angular should not exceed 1/16".

Parallel misalignment occurs when the shafts are parallel but the face of the sheaves is not in alignment. Angular misalignment occurs when the shafts are not parallel.

An easy and effective method for checking the alignment in both directions is to use an accurate straight edge as follows:

1. Switch off the unit; disconnect the power and lockout and tag to prevent accidental restarting.
2. Allow one (1) minute after the compressor stops for the pressure to be relieved.
3. Remove the belt guard.
4. Lay the straight edge across the face of the motor sheave and check the alignment with the face of the air end sheave.
5. Then lay the straight edge across the face of the air end sheave and check the alignment with the face of the motor sheave.
6. If the alignment is greater than 1/16" in either direction, as shown in Figure 5-9, loosen the belts as outlined in "Changing the belts" section and align the sheaves.
7. Reset the tension on the belts.
8. Reinstall the belt guard.
9. Return the unit to service.

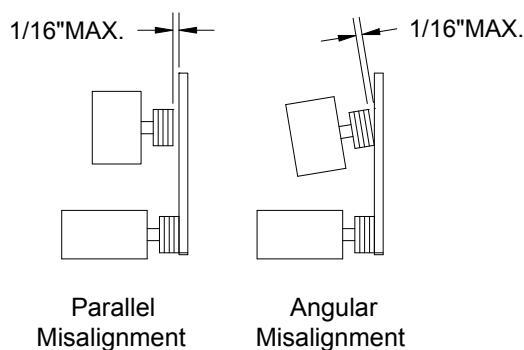


Figure 5-9

**⚠ DANGER**

Do not operate the compressor with the fan or belt guard removed. Exposed fan and belts can cause injury to personnel.

**Fan**

Check the fan for cracking, loose screws and loose blades. Make sure that it is securely mounted to the shaft. Tighten the mounting screws if loose. Replace a damaged fan immediately.

# RSB Series (15 hp – 50 hp) MAINTENANCE SCHEDULE\*

DESCRIPTION	PART #	QTY	DAILY	WEEKLY	YEARLY	SERVICE INTERVALS (HOURS)													
						500	2 000	4 000	6 000	8 000	10 000	12 000	14 000	16 000	18 000	20 000	22 000	24 000	
Check sump oil level (fill if necessary)			•																
Check oil scavenger line for oil flow			•																
Check pressure operating point and controls			•																
Inspect/clean oil scavenger line orifice								•		•		•		•		•		•	
Drain condensate from air receiver			•																
Check pressure relief valve for operation <sup>3</sup>				•															
Drain condensate from sump				•															
Check load/unload cycle; Check all electrical connections				•															
Inspect/clean finned surface of radiator(s)				•															
Check for loose fittings and fasteners						•													
Inspect hoses for signs of wear <sup>4</sup>				•															
Change oil filter						•													
Oil sample	Oil Analysis Kit FVO701-POL					•		•		•		•		•		•		•	
Motor bearing lubrication							•	•	•	•	•	•	•	•	•	•	•	•	•
Inspect anti-vibration pads (units with tank only)								•		•		•		•		•		•	
Inspect belts (tension/alignment)				•		•													
QUARTERLY SERVICE KIT	FSK-RS1525, FSK-RS30, FSK-RS4050						•	•	•		•	•	•		•	•	•		
YEARLY SERVICE KIT	FSK-RS1525, FSK-RS30, FSK-RS4050									•				•					•
TUNE UP KIT (3)	FSK-RS1525, FSK-RS30, FSK-RS4050																		

Notes:

- 1) Initial 500 h only. Follow regular intervals thereafter.
  - 2) Change oil yearly if operating under 8000 h. Lubricant may require more frequent changes depending on operating environment and running conditions. For oil life versus operating temperature see chart on page 47.
  - 3) Replace as necessary or every 5 years.
- \* The maintenance intervals described herein are for normal operating condition in clean and well ventilated environments. Frequency of intervals will increase for non-standard environments. Please contact your authorized FSCURTIS distributor for more information and recommendations.

Service Kits:

QUARTERLY SERVICE KITS = oil filter + oil analysis  
 YEARLY SERVICE KITS = Inlet air filter + oil-filter + air/oil separator + ventilation filter material + oil analysis + gaskets  
 TUNE UP KITS = Consult Factory

## TROUBLESHOOTING

Symptom	Probable Cause	Remedy
<b>Failure to start</b>	Power not turned on	Turn power on by connecting main disconnect switch or circuit breaker
	Blown main circuit fuse	Replace fuse
	Blown control circuit fuse	Replace fuse
	Safety circuit shutdown-high discharge temperature	Correct situation per remedy described under “High Discharge Air Temperature” symptom of this troubleshooting guide, then press the manual reset button on the high discharge temperature switch, restart compressor
	Overloaded motor, thermal overload, relay tripping	Press reset button on motor starter
<b>Unscheduled shut down</b>	High discharge temperature	Correct situation per remedy described under “High Discharge Air Temperature” symptom of this troubleshooting guide, then press the manual reset button on the high discharge temperature switch, restart compressor
	Overloaded motor, thermal overload relay tripping	Press reset button on motor starter
<b>Low receiver pressure</b>	Excessive air demand	Re-evaluate air demand
	Excessive leaks in service lines	Repair service lines
	Inlet valve not fully open	Correct situation as per remedy described in “Malfunctions in the capacity system” (A) “Inlet valve not opening or closing in relation to air demand” section of this troubleshooting guide
	Dirty inlet air filter.	Clean air filter element or replace with a new element
	Air pressure switch not set correctly	Readjust air pressure switch to desired cut-in and cut-out pressure
	Faulty receiver pressure gauge	Check and replace if found faulty

**TROUBLESHOOTING (CON'T.)**

<b>Symptom</b>	<b>Probable Cause</b>	<b>Remedy</b>
<b>High discharge air temperature</b>	<p>Not enough cooling water flowing through the cooler (water cooled models)</p> <p>Inadequate circulation of cooling air at cooler (air cooled models)</p> <p>Low oil level in separator</p> <p>Dirty oil filter</p>	<p>Check water system for possible restriction, including water regulator valve</p> <p>Check location of cooler to make sure there is no restriction to free circulation of cooling air. Also check the fins of the cooler and if found dust laden, clean with compressed air while the machine is not running</p> <p>Add oil and bring to recommended level Also check oil system for possible leaks</p> <p>Replace oil filter element</p>
<b>Low air delivery</b>	<p>Dirty air filter</p> <p>Excessive leaks in service line</p> <p>Inlet valve not opening completely</p>	<p>Clean air filter element(s) or replace with new element(s)</p> <p>Repair service lines</p> <p>Correct situation per remedy described under "Malfunctions in the capacity control system" – (A) "Inlet valve not opening or closing in relation to air demand" section of this trouble shooting guide</p>
<b>Safety valve blows</b>	<p>Air pressure switch not set correctly</p> <p>Inlet valve not closing properly in relation to air demand</p> <p>Dirty separator</p> <p>Faulty receiver pressure gauge</p> <p>Faulty safety valve.</p>	<p>Readjust pressure switch so that the compressor unloads at the desired pressure</p> <p>Correct situation per remedy described under "Malfunctions in the capacity control system" – (A) " Inlet valve not opening or closing in relation to air demand" section of this trouble-shooting guide</p> <p>Replace with new air/oil separator element</p> <p>Check gauge for accuracy</p> <p>Check safety valve for correct pressure setting. Replace valve if leaking</p>
<b>Excessive oil consumption</b>	<p>Separator tank overfilled</p> <p>Blocked scavenger line</p> <p>Faulty oil filter</p>	<p>Drain oil in separator to full mark on oil level gauge</p> <p>Clean scavenger line and orifice</p> <p>Replace oil filter element</p>



**TROUBLESHOOTING (CON'T.)**

<b>Symptom</b>	<b>Probable Cause</b>	<b>Remedy</b>
	<p>Oil breakdown.</p> <p>Wrong oil being used</p> <p>Rapid start/stop or load/unload cycle</p> <p>Excessive oil foaming</p> <p>Scavenger line does not extend to bottom of separator</p> <p>Operating pressure to low</p> <p>Faulty or damaged separator element</p> <p>Leak in oil line</p> <p>Shaft seal failure</p> <p>Rapid pressure loss in system</p> <p>Starting the unit before the separator has been blown down</p>	<p>Correct situation per remedy described in "Oil breakdown" section of this troubleshooting guide</p> <p>Refer to SPECIFICATIONS section of this manual for correct oil</p> <p>Correct situation per remedy described in "Malfunctions in the capacity control system" - (C) "Rapid cycling" section of this troubleshooting guide</p> <p>Same as above</p> <p>Check scavenger line connections on separator tank</p> <p>Receiver pressure should not drop below 100 PSIG when running loaded. Leakage in system or air consumption is too great</p> <p>Change air/oil separator</p> <p>Check for leaks and correct</p> <p>Replace necessary components of the seal or complete seal if necessary</p> <p>Look for applications using large amounts of air very quickly. An air receiver should be installed in the system.</p> <p>Change procedure and instruct operators on proper use</p>
<b>Frequent air filter clogging</b>	Faulty air filter or inadequate filter for the environment	Replace faulty air filter element. If air filter is inadequate replace it with a heavy-duty air filter
<b>Oil breakdown</b>	<p>Extreme operating conditions such as high oil injection and compressor discharge temperatures, high ambient temperature with high humidity and high receiver pressure</p> <p>Contaminated oil</p>	<p>Operate compressor at recommended receiver pressure and oil injection temperature</p> <p>Service air filter element and oil filter element in accordance with maintenance schedule</p>

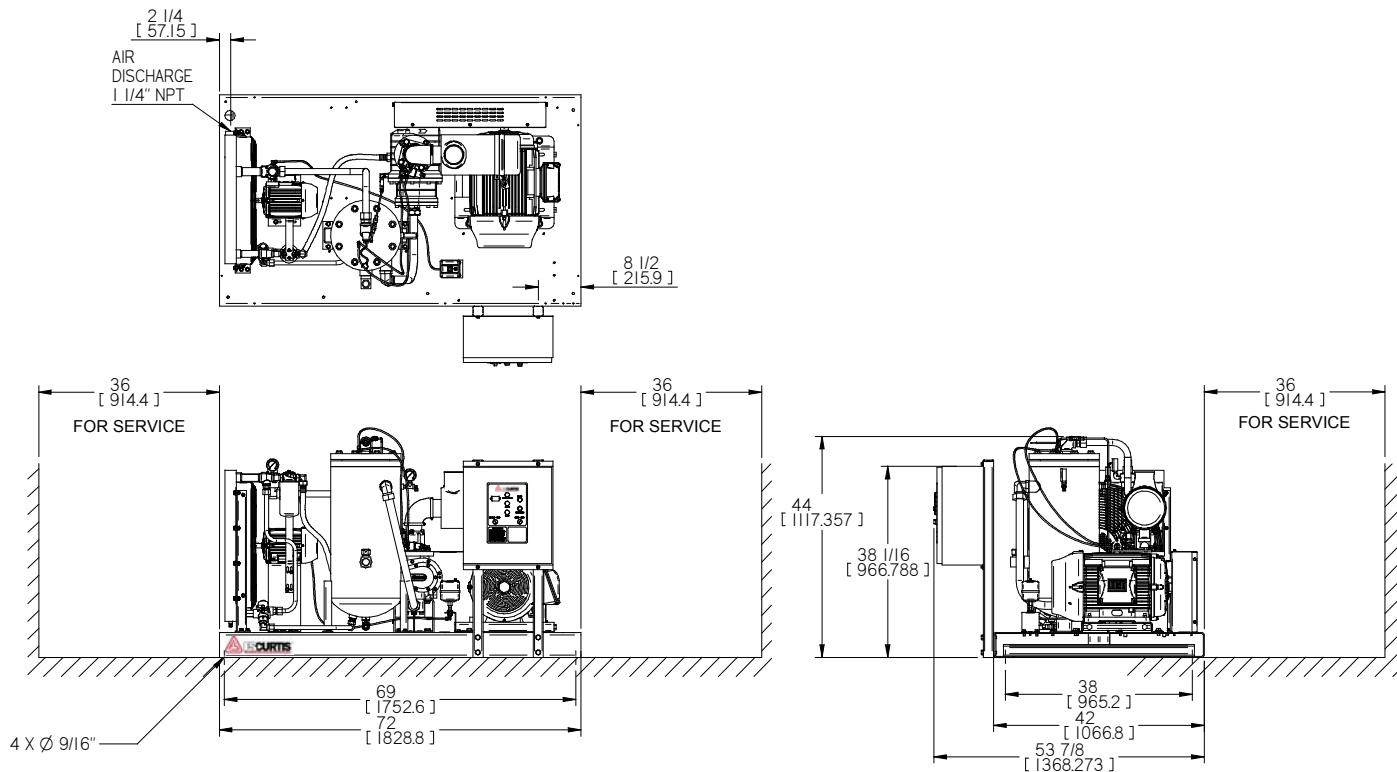
**TROUBLESHOOTING (CON'T.)**

<b>Symptom</b>	<b>Probable Cause</b>	<b>Remedy</b>
	<p>Failure to drain condensate from the separator</p> <p>Mixing of different brands of oil</p> <p>Wrong type of oil being used</p>	<p>Drain condensate from the separator periodically. More frequent draining might be necessary when operating at high ambient temperature and high humidity environment.</p> <p>DO NOT MIX DIFFERENT BRANDS OF OIL</p> <p>Refer to SPECIFICATIONS section of this manual for correct oil</p>
<p><b>Malfunctions in the capacity control system</b></p> <p><b>(A) Inlet valve not opening or closing in relation to air demand.</b></p> <p><b>(B) Compressor does not unload when there is no air demand.</b></p> <p><b>(C) Rapid cycling between Load and Unload</b></p> <p><b>Oil coming out through air filter at shutdown</b></p> <p><b>Oil coming out through blow down valve</b></p>	<p>Improper setting of the air pressure switch or faulty switch</p> <p>Faulty unloader solenoid valve</p> <p>Inoperable inlet valve</p> <p>Pressure regulator set to low</p> <p>Air pressure switch not set correctly</p> <p>Faulty solenoid valve</p> <p>Faulty air pressure switch</p> <p>Leaks in service lines</p> <p>Too small volume of air in service line.</p> <p>Air consumption exceeds compressor supply capability</p> <p>Cut-in cut-out pressure set too close in pressure switch</p> <p>Faulty inlet valve</p> <p>Oil level too high in separator</p> <p>Cycling too often between load and unload.</p>	<p>Readjust air pressure switch to proper setting. Replace if faulty.</p> <p>Replace solenoid valve</p> <p>Check inlet valve assembly</p> <p>Adjust pressure regulator to 100 PSI minimum (175 PSI units)</p> <p>Readjust air pressure switch setting</p> <p>Check wiring and solenoid valve</p> <p>Replace air pressure switch</p> <p>Repair leaks</p> <p>Provide sufficient volume by adding air receiver.</p> <p>Add larger compressor, check system for air leaks</p> <p>Readjust cut-in and cut-out pressure settings</p> <p>Inspect valve. If necessary, replace.</p> <p>Bring the oil to recommended level by draining the separator. Use the oil level gauge as a guide.</p> <p>Correct situation as per solutions described under "MALFUNCTIONS IN THE CAPACITY CONTROL SYSTEM" – "(C) Too rapid cycling between load and unload" section of this guide.</p>

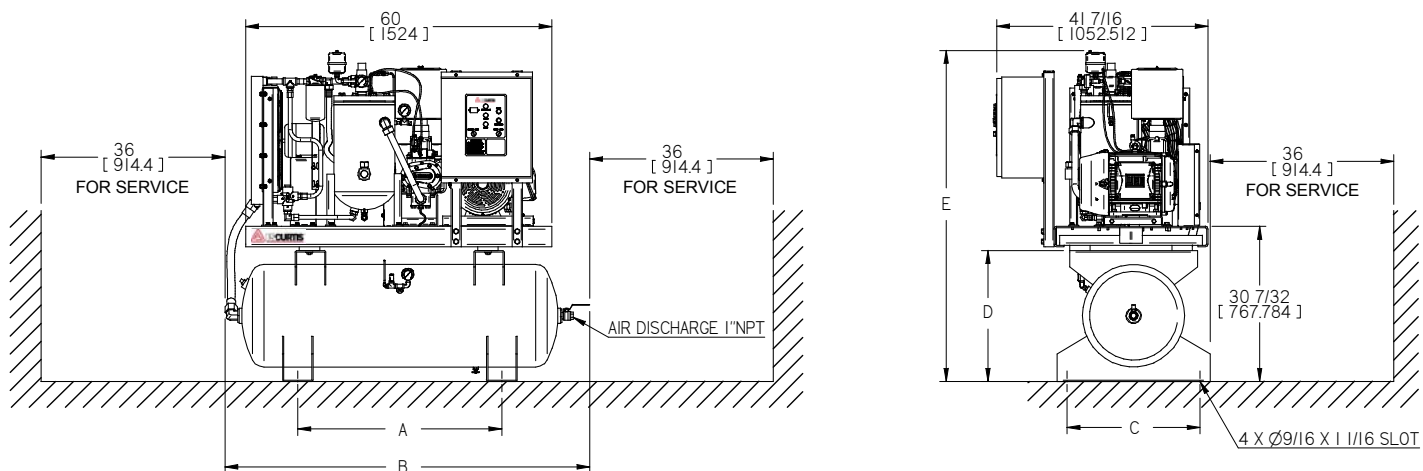
## V-BELT TROUBLESHOOTING CHECK LIST

Symptom	Cause	Remedy
<b>Too frequent air filter clogging</b>	Compressor operating in highly contaminated area	Use remote air intake mounting
	Air filter not adequate for operating conditions	Use heavy duty air filter
<b>Belts slip, shiny or glazed sheave sidewalls</b>	Not enough tension	Replace V-belt and apply proper tension
<b>Belts squeal</b>	High starting load.	Apply proper tension.
	Belts are worn out	Replace belts
<b>Belts turn over</b>	Broken cord caused by improper installation.	Replace belts and install correctly
	Incorrect belt tension	Tension properly.
	Drive misalignment.	Realign sheaves.
	Worn sheaves.	Replace sheaves.
	Excessive belt vibration.	Check equipment for solid mounting.
<b>Mismatched belts</b>	New belts mixed with old belts	Replace entire set of belts
	Sheave grooves worn unevenly.	Replace sheaves
	Sheave shafts not parallel	Realign drive correctly
<b>Belts break frequently</b>	Inadequate belt tension	Increase tension (Ref. "DRIVE SYSTEM" page 22)
	Belts forced over sheaves by prying.	Replace belt correctly by moving drive (Ref. "DRIVE SYSTEM" page 22).
<b>Belts wear rapidly</b>	Sheave grooves worn	Replace sheaves
	Mismatched belts	Always replace entire belt set. Do not mix old and new belts or different types of belts
	Misalignment	Realign drive
	Belts slip	Tension properly
	Abrasive conditions	Protect drive from dirt
<b>Sheave has nicks or burrs</b>	Foreign object in drive	Re-install belt guard Replace belts and sheaves
<b>Metal flanges between sheaves have knife edges</b>	Belt slip and/or abrasive atmosphere	Replace sheave Protect against abrasives
<b>Groove sidewalls have lip, ridge or are dished out.</b>	Belt slip and/or abrasive atmosphere.	Replace sheave Protect against abrasives



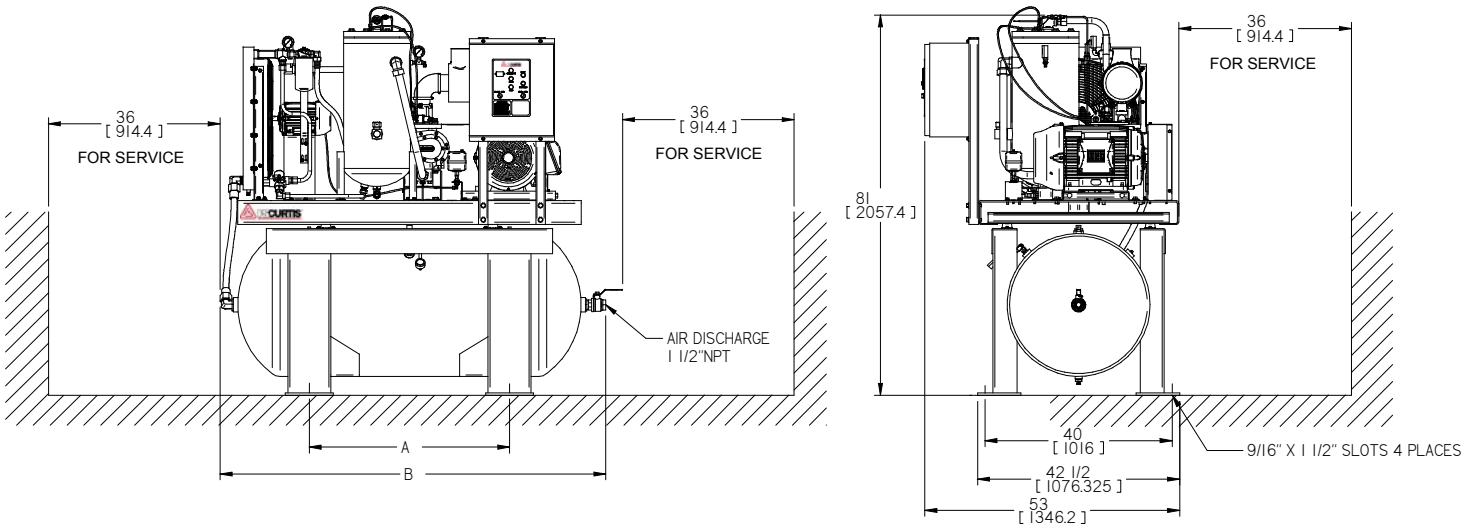


**Figure 6-2  
Installation Drawing RSB 40 & 50 (Open Unit)**



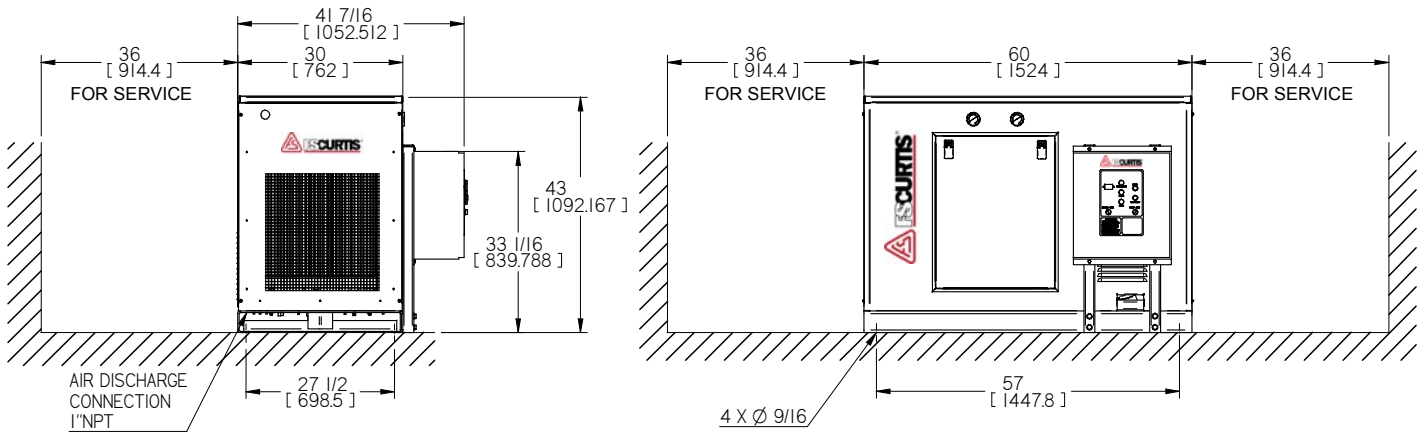
	TANK SIZE	A	B	C	D	E
RSB 15	80 GAL	40	73	28	25	65
RSB 20,25	120 GAL	40	77	28	30	69
RSB30	120 GAL	40	77	28	30	69

**Figure 6-3  
Installation Drawing RSB 15T - 30T (Open Unit)**

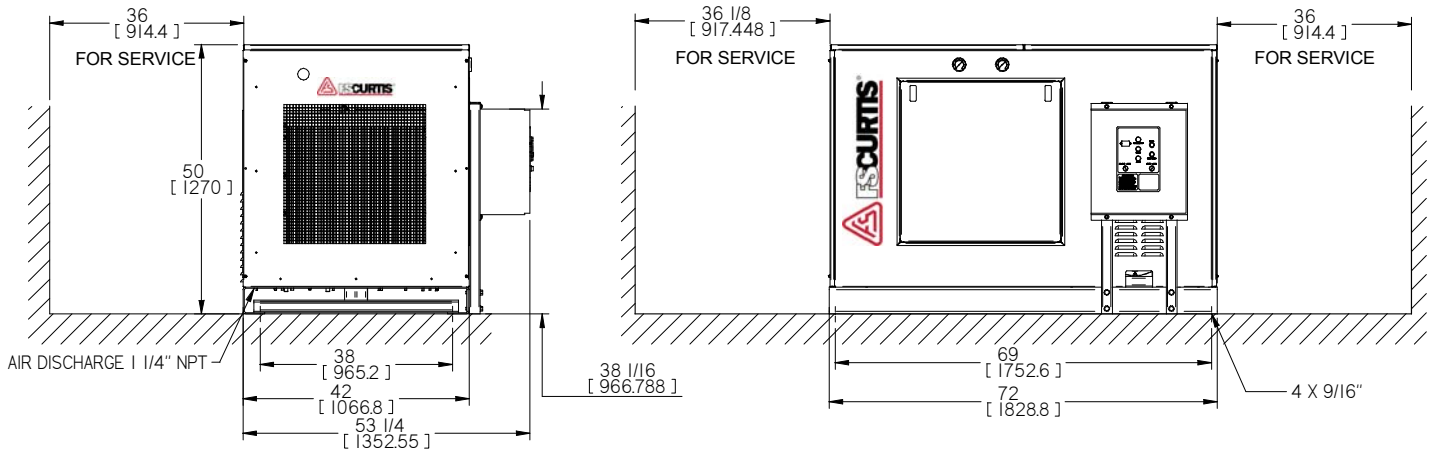


	TANK SIZE	A	B
RSB 40	200 GAL	42	80
	240 GAL	54	92
RSB 50	200 GAL	42	80
	240 GAL	54	92

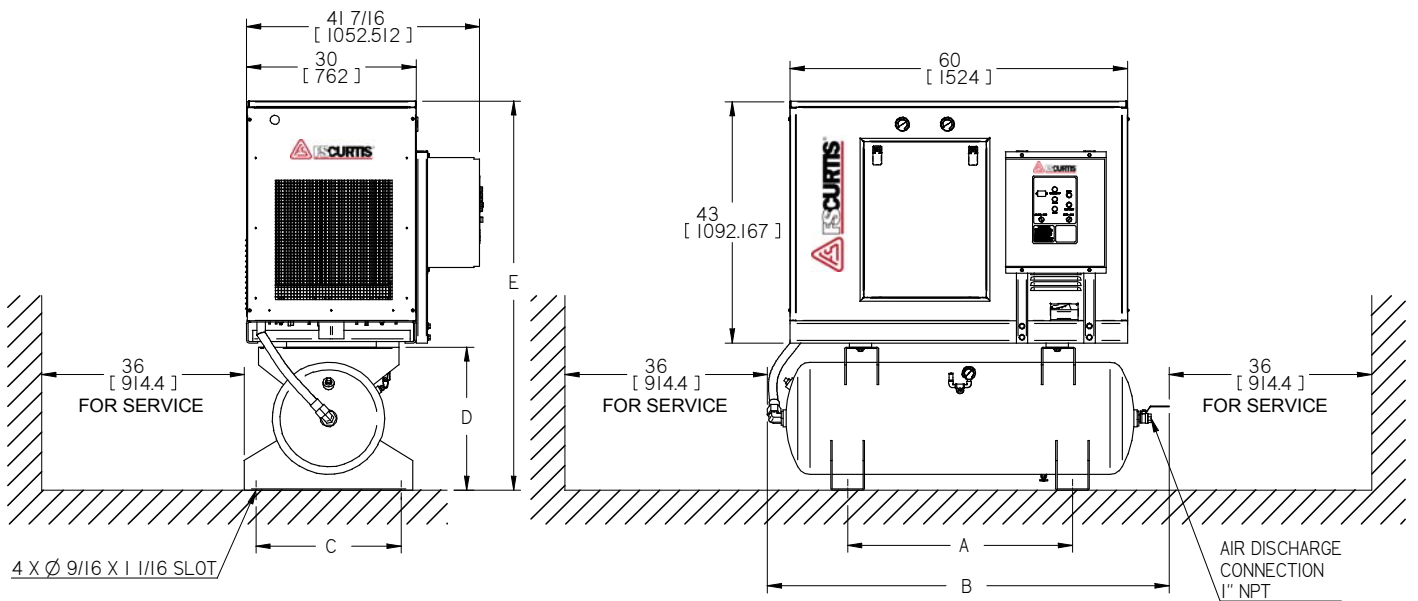
**Figure 6-4**  
Installation Drawing RSB 40T & 50T (Open Unit)



**Figure 6-5**  
Installation Drawing RSB 15 – 30 (Enclosed Unit)

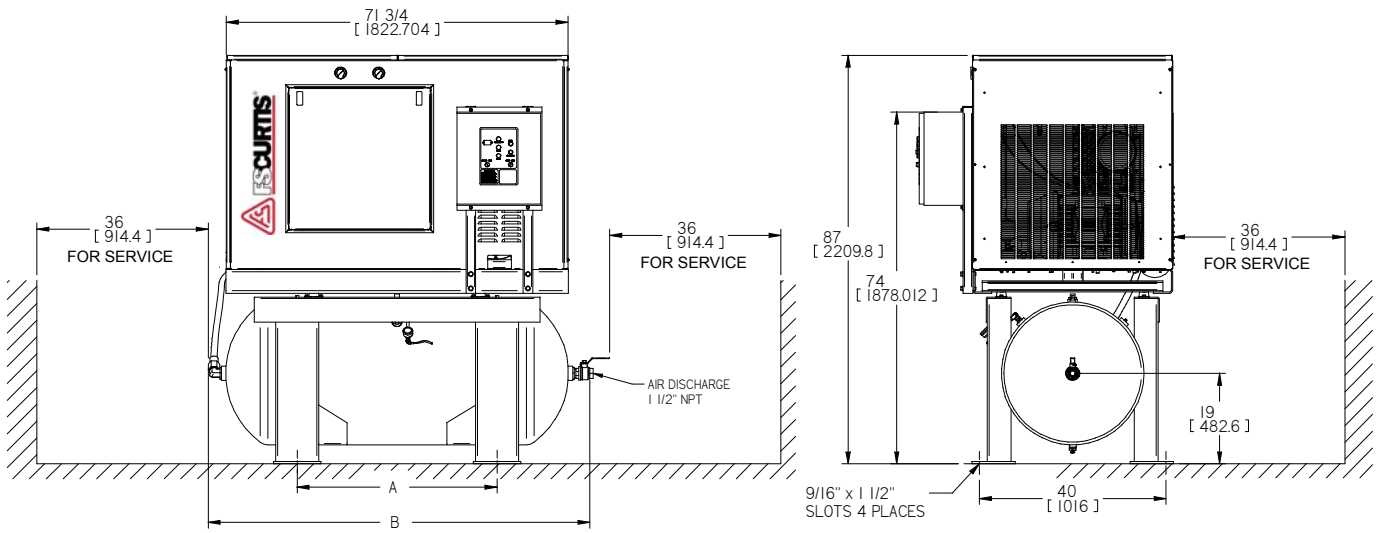


**Figure 6-6**  
**Installation Drawing RSB 40 & 50 (Enclosed Unit)**



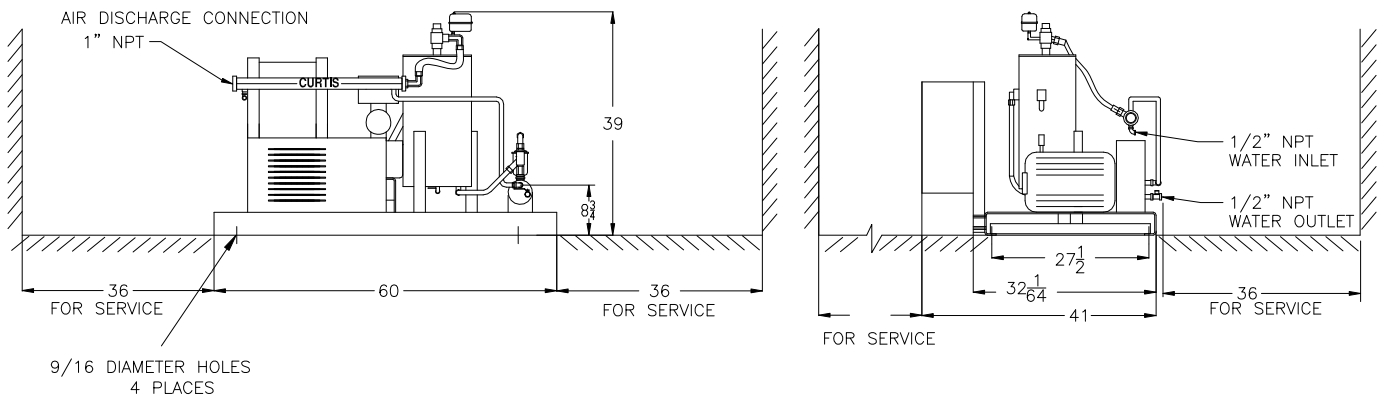
	TANK SIZE	A	B	C	D	E
RSB 15	80 GAL	40	73	28	25	65
RSB 20,25	120 GAL	40	77	28	30	69
RSB30	120 GAL	40	77	28	30	69

**Figure 6-7**  
**Installation Drawing RSB 15T - 30T (Enclosed Unit)**



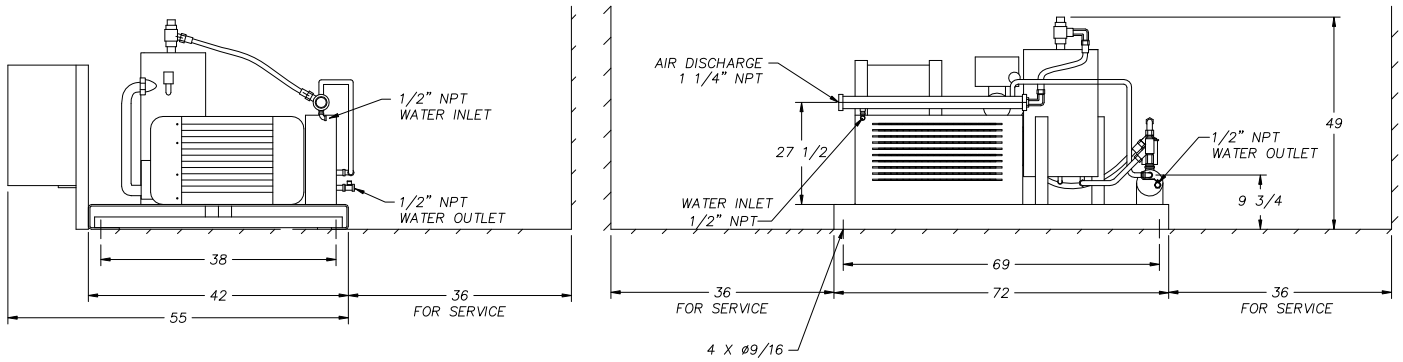
	TANK SIZE	A	B
RSB 40	200 GAL	42	80
	240 GAL	54	92
RSB 50	200 GAL	42	80
	240 GAL	54	92

**Figure 6-8**  
**Installation Drawing RSB 40T & 50T (Enclosed Unit)**

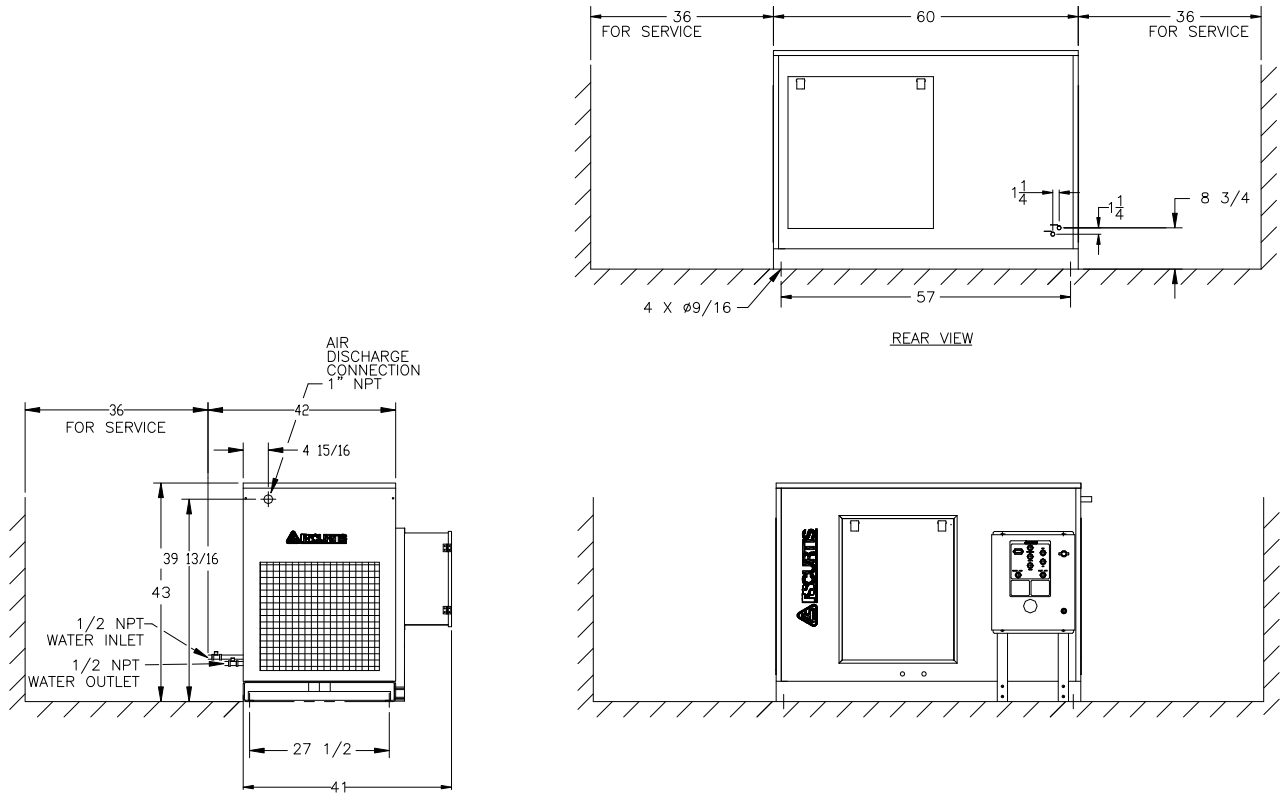


**Figure 6-9**  
**Installation Drawing RSB 15 – 30 (Open Unit)**  
**Water Cooled**

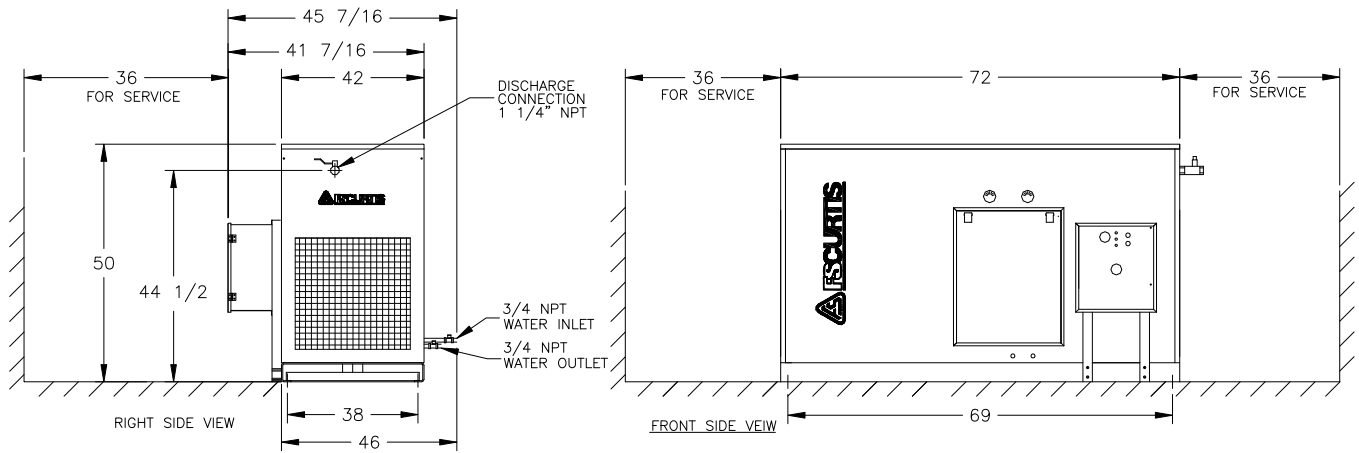




**Figure 6-10**  
**Installation Drawing RSB 40 & 50 (Open Unit)**  
**Water Cooled**



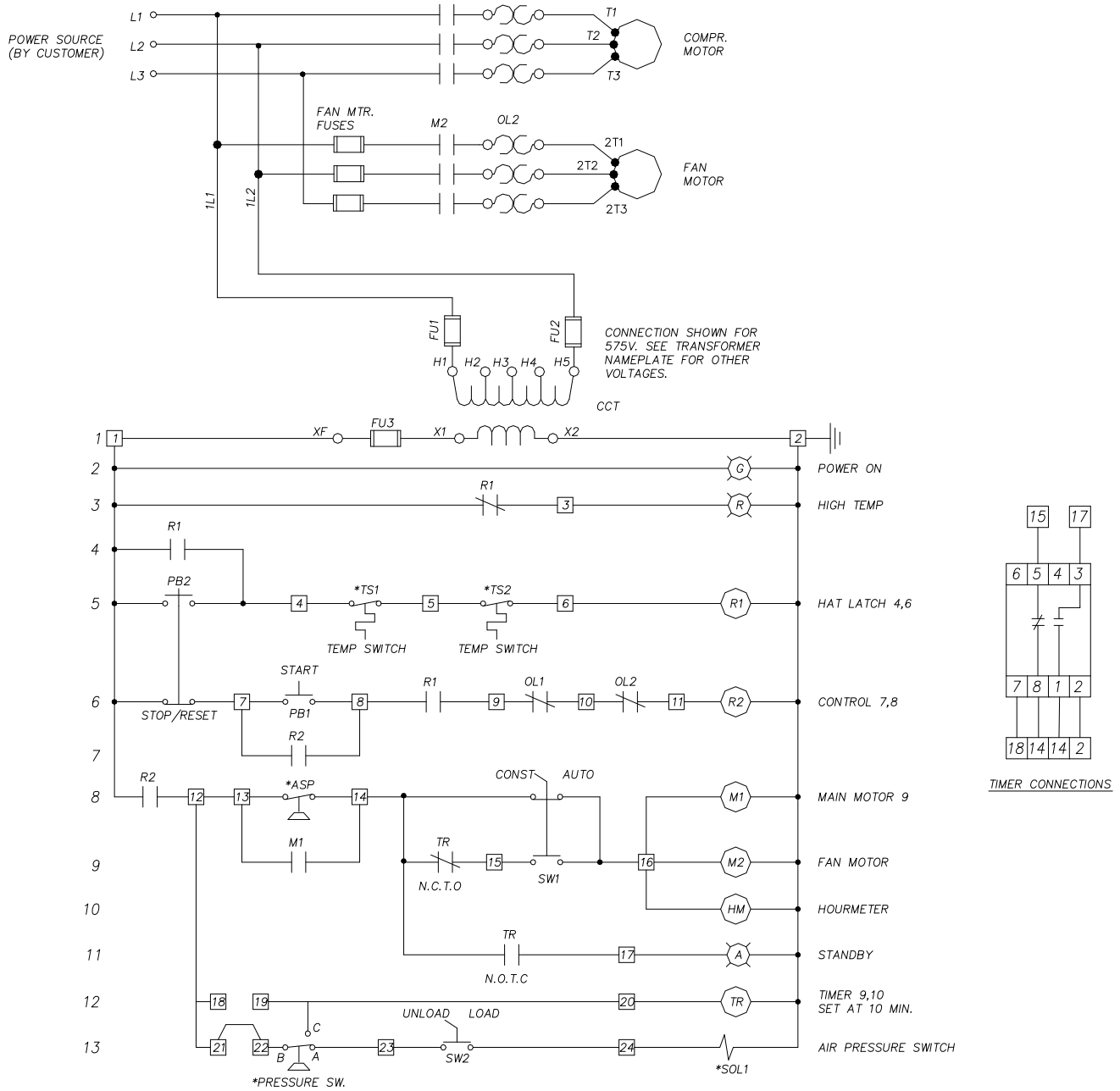
**Figure 6-11**  
**Installation Drawing RSB 15 - 30 (Enclosed Unit)**  
**Water Cooled**



**Figure 6-12**  
**Installation Drawing RSB 40 & 50 (Enclosed Unit)**  
**Water Cooled**

# WIRING DIAGRAM FOR FULL VOLTAGE START RSB MODELS

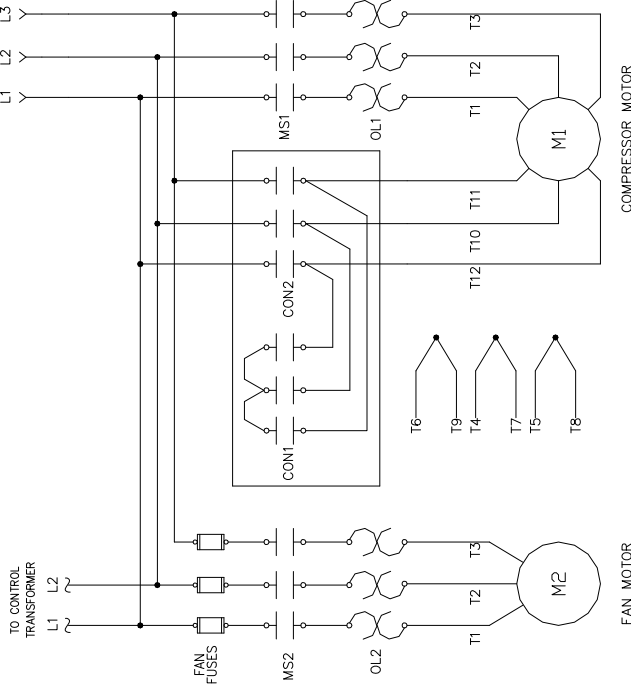
CUSTOMER TO SUPPLY PROPERLY PROTECTED  
POWER SOURCE AS PER LOCAL CODES  
(USE 60 C OR 75 C COPPER WIRE ONLY)



# WIRING DIAGRAM FOR WYE/DELTA START

CUSTOMER TO SUPPLY PROPERLY PROTECTED POWER SOURCE AS PER LOCAL CODES (USE 60 C OR 75 C COPPER WIRE ONLY)

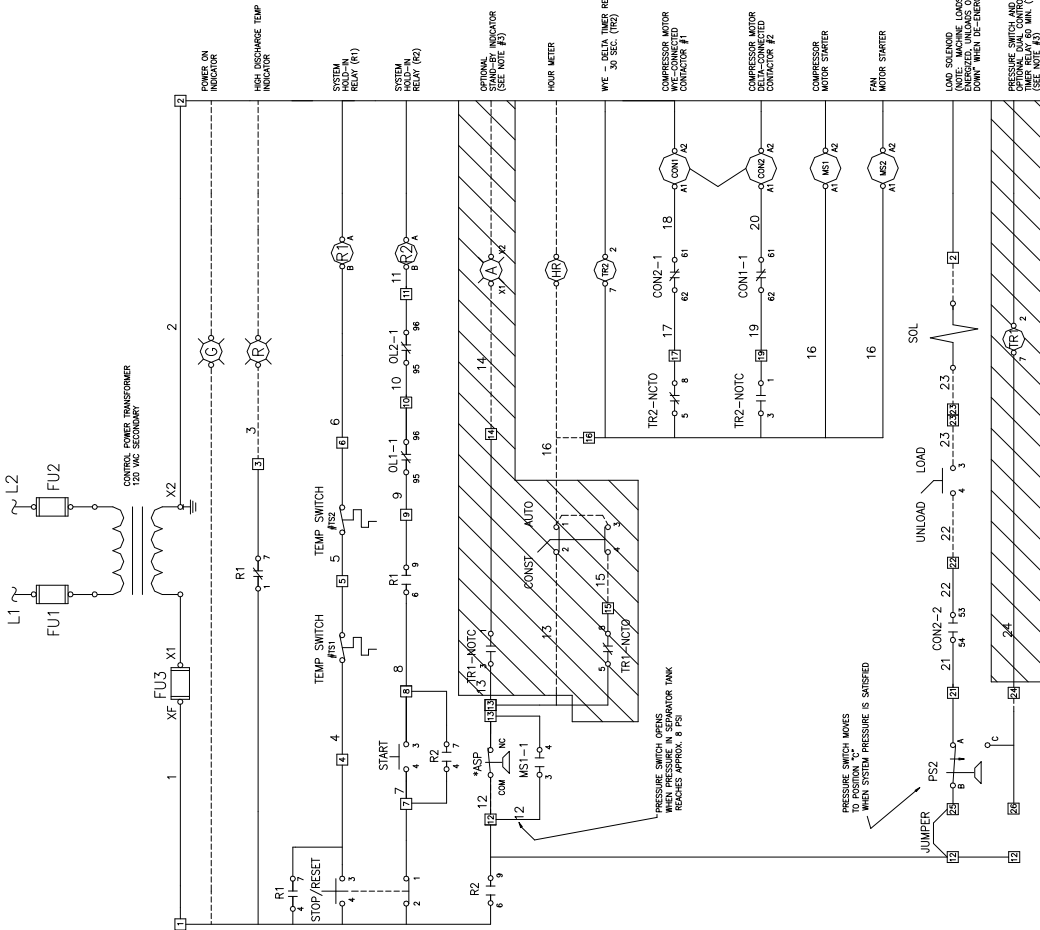
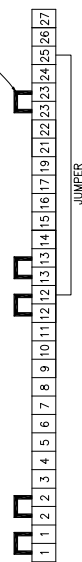
POWER SOURCE (BY CUSTOMER)



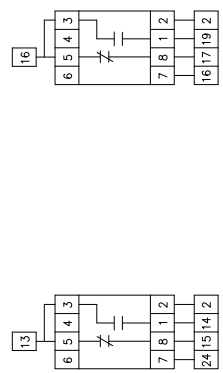
NOTE 1: DASHED LINES INDICATE PANEL-DOOR WIRING OR FIELD WIRING

NOTE 2: TERMINAL STRIP WILL BE SET UP AS SHOWN BELOW:

NOTE 3: OPTIONAL (DIRECT DRIVE) TIMED DUAL CONTROL WIRING & COMPONENTS SHOWN IN SHADED BOX



LOAD SOLENOID LOADS WHEN NOTE: MAINLINE LOADS WHEN PRESSURE SWITCH AND TIMER RELAY IS UNL. (TR1) DOWN WHEN DE-ENERGIZED (SEE NOTE #3)

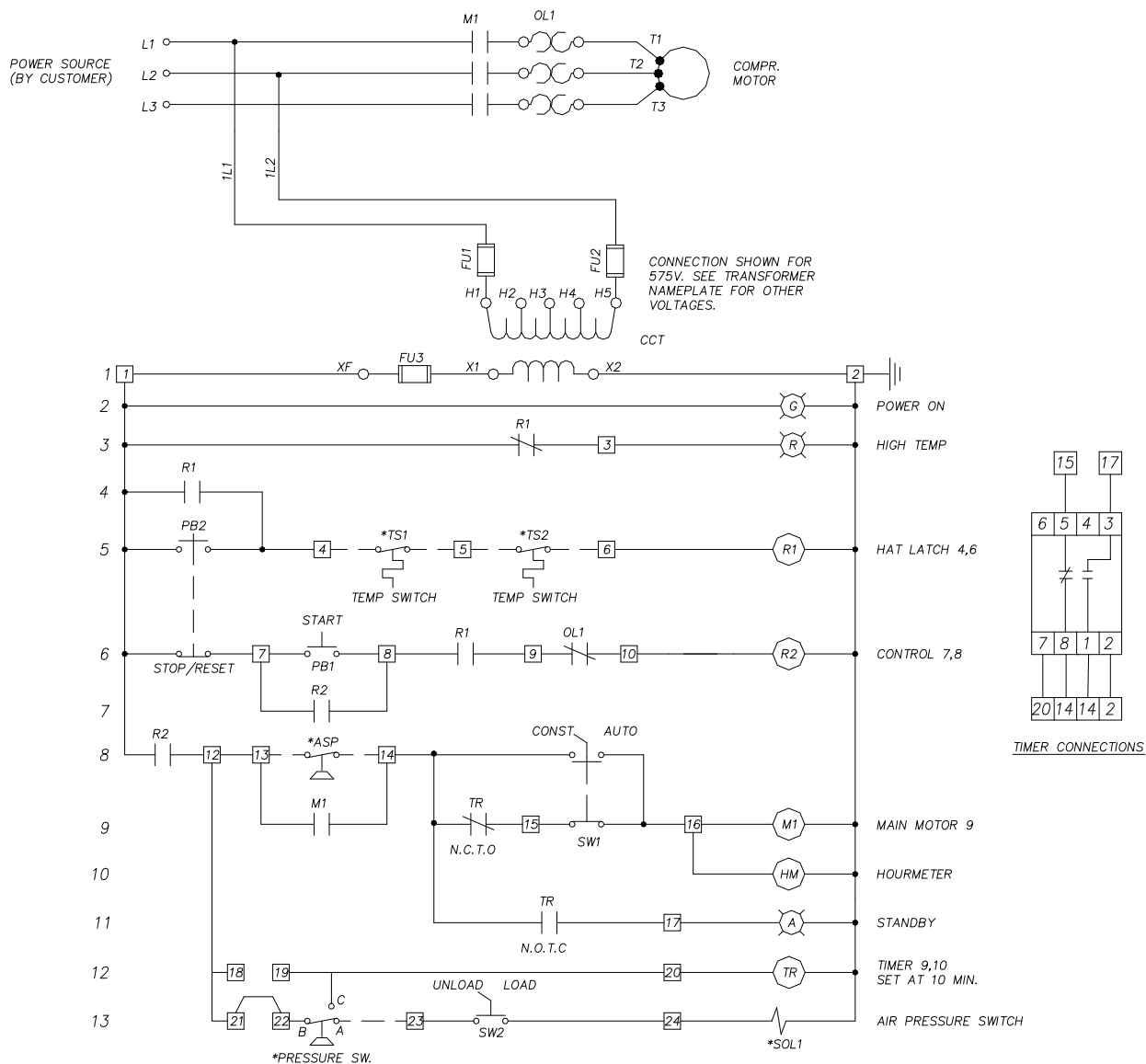


TR1 CONNECTIONS

TR2 CONNECTIONS

# WIRING DIAGRAM AND LOCATION DIAGRAM FOR WATERCOOLED RSB MODELS

CUSTOMER TO SUPPLY PROPERLY PROTECTED  
POWER SOURCE AS PRE LOCAL CODES  
(USE 60C OR 75C COPPER WIRE ONLY)



### Recommended Bolt HHCS Torque Specifications\*

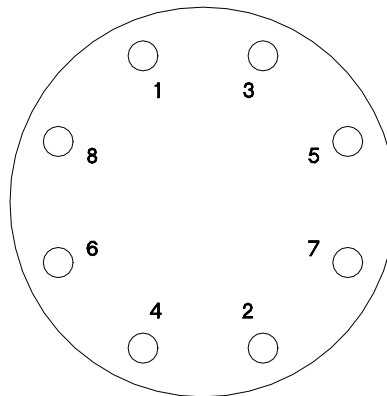
HHCS SAE 5	Tightening Torque
1/4-20UNC	10ft-lbs
5/16-18UNC	21 ft-lbs
3/8-16UNC	37 ft-lbs
1/2-13UNC	90 ft-lbs
5/8-11UNC	180 ft-lbs

\***Note:** these values are for metal-to-metal joints when SAE 10 oil is used as lubricant.

### Separator Tank Lid Bolt Torque Specifications

SEPARATOR TANK NUMBER	UNIT USED ON	BOLT SIZE AND QUANTITY	BOLT TORQUE (FT-LBS.)
RN10214-2	RSB 15-30	5/8"-11 (8)	80
RN10222-2	RSB 40, 50	5/8"-11 (8)	80

### Bolt Torque Sequence



FRONT





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