



The Science of Compressed Air

# Refrigerated Air Dryers



**NON-CYCLING REFRIGERATED AIR DRYERS**

**OPERATOR'S MANUAL**

DATE OF PURCHASE:

MODEL:

SERIAL NO.:

Record above information from nameplate.  
Retain this information for future reference.

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# GENERAL INFORMATION

The Quincy Air Drying System is designed to cool and remove moisture from compressed air.

When properly installed, the unit requires little maintenance or adjustment.

## WARNING

**DO NOT install, operate, maintain, adjust or service this unit without thoroughly reading this manual.**

This manual contains important safety information. Read THOROUGHLY and follow the Safety Instructions provided in this manual and posted on the unit. Keep this manual near the unit and in a safe place. Replace this manual if it becomes torn or dirty and cannot be properly used.

Please read the Installation Instructions and Start-up and Operation sections of this manual before attempting to operate the unit.

Please read the Maintenance and Troubleshooting sections of this manual before beginning any maintenance or service work on this unit.

## INSPECTION

**Inspect equipment. Any concealed shipping damage must be reported to the carrier immediately. Damage claims should be filed by the consignee with the carrier.**

## SAFETY INSTRUCTIONS

When using air compressors and compressed air accessories, basic safety rules and precautions must always be followed, including the following:

1. **READ ALL INSTRUCTIONS FULLY.**
2. **WIRING & BREAKERS**  
Wiring, breakers and other electrical equipment must conform to local and national electrical codes. Do not operate this unit with damaged wiring or after the unit or air handling parts have been dropped or damaged in any manner. Notify authorized service facility for examination, repair or other adjustments.

3. **USE SUITABLE PARTS & ACCESSORIES**  
Do not use air pressurized accessories or parts in the air system not suitable for the maximum air pressure.
4. **RELEASE AIR PRESSURE SLOWLY**  
Fast moving air will stir up dust and debris, which may be harmful. Release air pressure slowly when depressurizing your system to avoid bodily injury.
5. **SECURE DRAIN LINES**  
Fasten drain lines to floor or drain. Pressurized air may periodically pass through drain lines, which will cause an unsecured line to whip and may cause bodily injury.

## WARNING

**Air from compressor and from Quincy Air Drying System, as equipped, is not safe for human respiration (breathing).**

To provide safe, breathable air, compressor must be capable of producing at least Grade D breathing air as described in Compressed Gas Association Commodity Specification G7.1-1966. Special filtering, purifying and associated alarm equipment must be used to convert compressed air to "Breathing Air." Other special precautions must also be taken.

Refer to OSHA 29 CFR 1910.134.

## DISCLAIMER OF WARRANTY

If this unit is used to produce breathing air, the special equipment and precautions expressed in OSHA 29 CFR 1910.134 for specifications of the necessary equipment and special precautions to make Breathing Air MUST BE used or any warranties are VOID and manufacturer disclaims any liability whatsoever for loss, personal injury or damage.

# INSTALLATION INSTRUCTIONS

COMPRESSED AIR SYSTEM  
RECOMMENDED INSTALLATION  
FLOW DIAGRAM

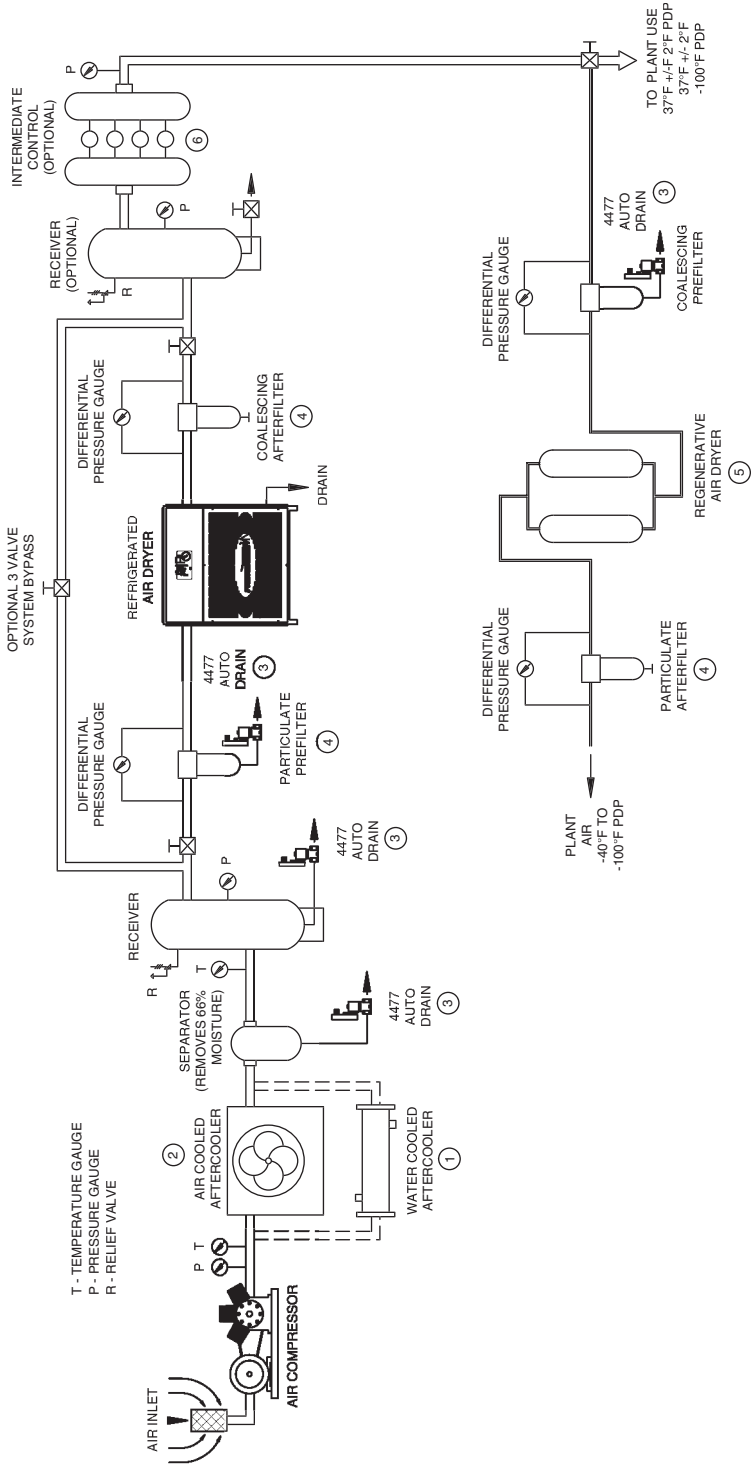


FIGURE 1 — COMPRESSED AIR SYSTEMS RECOMMENDED INSTALLATION FLOW DIAGRAM

- A. Install the dryer INDOORS in an area where the ambient temperature will be above 40°F and below 110°F. Temperatures below 40°F and above 110°F may cause erratic operation of the air dryer.

Air-cooled dryers must be installed INDOORS in a location with proper ventilation which will maintain ambient temperatures as specified above.

- B. Position the dryer to permit free circulation of cooling air through the condenser. Keep two feet minimum clearance space around the dryer, and also on the top for servicing.

Lack of ventilation can build up the room temperature by recirculating the same cooling air through the condenser over and over again. This will eventually shut down the refrigerant compressor on high head pressure and/or on internal overload.

- C. Connect the compressed air to the dryer inlet. Connect the plant compressed air line to the dryer outlet. A three-valve bypass around the dryer is recommended for dryer service. See Figure 1. A coalescing afterfilter is recommended for oil-flooded air compressor systems.

- D. Make sure when piping is in place that no undue stress is placed on dryer connections. Union joints or flexible connections are recommended to relieve stress. Also, properly support the pipes as needed with hangers or brackets. Air piping must be installed by an experienced pipefitter.

- E. An aftercooler (air-cooled or water-cooled) must be installed between the air compressor and the dryer. Installing the dryer without the proper aftercooler will bring high inlet temperature compressed air to the air dryer which will cause premature failures. Aftercoolers must be followed by a separator and an automatic drain to remove the condensed moisture before the compressed air reaches the air dryer.

If the condensed water is not removed at the aftercooler separator drain, it will reduce the cooling capacity of the air dryer. Aftercoolers will condense approximately 2-1/2 to 3 times more water than that of the air dryer.

- F. Float type auto drains are installed on dryer models QPNC-10 through QPNC-50. For models QPNC-75 through QPNC-3200 electronic timer operated drains are standard. Dryers QPNC-75 and larger include a particle strainer upstream from the drain valve. To clean, close the shut-off valve and depressurize the drain line.

All drain outlets may be combined for condensate disposal. Dispose the condensate in compliance to local and federal government requirements.

**⚠ WARNING**

**Drain outlet tubing will periodically contain pressurized air. An unsecured drain tube will whip around potentially causing bodily injury.**

**⚠ CAUTION**

**Do not combine any two or more drain inlet lines through one single automatic drain valve. This will reduce or eliminate the proper drainage.**

- G. For water-cooled air dryers, connect cooling water lines to the water-cooled condenser from the water supply. Water pressure must be a minimum of 35 PSIG.

Do not connect city water to a condenser which is piped for tower water or vice versa. Strainers are recommended at the water inlet to the condenser. Proper chemical treatment is recommended for cooling tower water to avoid scaling and sludge inside the condenser.

**⚠ CAUTION**

**Do not reduce pipe sizes connected to water and drain lines. They should be the same or larger than sizes supplied on the dryer to avoid excess pressure drop.**

- H. Connect electric power, according to the wiring diagram and nameplate power requirements, to the electrical terminals. The refrigerated dryer is designed to run continuously; therefore, it must be wired separately from the air compressor cycling switch. The dryer must not cycle with the air compressor. All units are prewired internally.

Follow the recommendation on the electrical drawing for the fuse size and the incoming power details. Connect the power to the air dryer only through a properly sized fused disconnect switch.

## WARNING

**Wiring to the dryer must meet the national (NEC) and local code requirements. Check the voltage specified on the nameplate to the electrical power connecting to the dryer. Electrical connections must be made by an electrician.**

## CAUTION

### **SCROLL COMPRESSOR**

**Air dryers with a scroll compressor are unidirectional and to function properly they must be phased correctly. To turn the compressor clockwise, use a phase sequence indicator to determine phases A, B, & C. For proper compressor rotation, connect the power supply phases A to L1, B to L2, & C to L3. Reverse rotation may damage the compressor. If the compressor is wired backwards the compressor will be noisy, vibrate excessively and the oil sump will become warm. The suction pressure will begin to rise, and the discharge pressure will fall.**

# START-UP AND OPERATION

The non-cycling design of the refrigerated dryer assures proper dew point control at all load conditions. The refrigerant compressor runs continuously when the dryer is "ON". All dryers are installed with fan cycling switches. These fans will cycle with respect to the load changes, ambient temperature fluctuations, and the cleanliness of the condenser. Standard units are designed to operate under the following conditions:

## DESIGN CONDITIONS

1. **Inlet Air Temperature:**  
100°F design 120°F maximum
2. **Inlet Air Pressure:**  
100 PSIG design 150 PSIG maximum
3. **Ambient Air Temperature:**  
40°F minimum 110°F maximum
4. **Cooling Water Temperature:**  
90°F maximum
5. **Cooling Water Pressure:**  
35 PSIG minimum 100 PSIG maximum

At temperatures above the 100°F design, refrigeration capacity will decrease. Operating air pressures below the 100 PSIG design will reduce system capacity.

## START-UP PROCEDURE

1. If the suction pressure gauge reads zero, refrigerant loss has occurred. Call the factory or distributor for service.
2. **Air dryers with three-phase power supply are equipped with a compressor crankcase heater (except scroll compressors). This heater must be energized by closing the disconnect switch or circuit breaker a minimum of 6 to 10 hours before start-up. Power to the air dryer can be left on to energize the crankcase heater for the off-cycle, during evening or weekend shutdowns.**
3. Check the temperature on the crankcase of the compressor to make sure the crankcase heater is working before starting the dryer.
4. For water-cooled Air Dryers make sure the water supply (Minimum Pressure 35 PSIG) is available at the condenser inlet. The water regulating valve will modulate and control the water flow with respect to the dryer load conditions. The water-cooled condenser drain plug (located inside enclosure) must be installed.
5. For open frame design units [Models QPNC-1500 & larger], the following valves **must be open** prior to start-up. All valves are tagged with specific instructions.
  - a. Compressor isolation valves (suction & discharge service valves).
  - b. Receiver valve(s) (air-cooled models only).
  - c. Condenser outlet liquid line valve (water-cooled models only).

## CAUTION

**STARTING THE DRYER WITHOUT ENERGIZING THE CRANKCASE HEATER WILL CAUSE PREMATURE FAILURES OF THE REFRIGERANT COMPRESSOR. Failure to comply with procedure of energizing crankcase heater before start-up may void warranty.**

## CAUTION

### CRANKCASE HEATER

**Air dryers with three-phase power supply are equipped with a compressor crankcase heater. This heater must be energized by closing the disconnect switch a minimum of 6 to 10 hours before start-up. Power to the air dryer can be left on to energize the crankcase heater for off-cycle, during evening or weekend shutdowns (except scroll compressors).**

- d. Hot gas line valve – Models QPNC-2500 & larger. Located on the hot gas line before the Hot Gas Bypass Valve.
  - e. Liquid line valve on water-cooled condenser outlet (water-cooled models only).
6. Turn the power ON/OFF switch to the ON position.
  7. The suction pressure will gradually come down to the blue or green range depending on the type of refrigerant used in the air dryer. Check the refrigerant suction pressure gauge reading. If the suction pressure is above or below the suggested color range, a hot gas bypass valve adjustment is required. (Refer to the Hot Gas Bypass Valve section of this manual.) For proper operating range and control settings see listing below.
  8. The Expansion valve is factory set for the correct superheat of 8-10°F and should not be re-adjusted. If any malfunction is noticed on the expansion valve, contact the factory or your Quincy distributor.
  9. Allow 10 to 15 minutes of cooldown time before adding the compressed air load.
  10. Keeping the dryer outlet isolation valve closed, pressurize the dryer to the line pressure. See Figure 1.
  11. Check for any leaks in the system.
  12. Slowly open the dryer outlet isolation valve to pressurize the downstream system.

## OPERATING RANGE AND CONTROL SETTINGS

1. **Refrigerant Suction Pressure:**  
53 to 60 PSIG (Refrigerant-22)  
(R-22 Green color range)  
25 to 33 PSIG (Refrigerant-134a)  
(R-134a Blue color range)
2. **Refrigerant Discharge Pressure (R-22):**  
135 to 275 PSIG (R-22) air-cooled units with fan cycling; 190 to 210 PSIG (R-22) water-cooled units
3. **Refrigerant Discharge Pressure (R-134a):**  
75 to 170 PSIG (R-134a) air-cooled units;  
115 to 135 PSIG (R-134a) water-cooled units
4. **Refrigerant Low Pressure Switch:**  
CUT OUT 20 PSIG (R-134a)  
CUT IN 40 PSIG (R-134a)  
CUT OUT 45 PSIG (R-22)  
CUT IN 70 PSIG (R-22)

5. **Refrigerant High Pressure Switch:**  
250 PSIG (R-134a) air-cooled units  
405 PSIG (R-22) air-cooled units  
(375 PSIG\*) (R-22) air-cooled units  
(325 PSIG\*) (R-22) water-cooled units
6. **Fan Control (R-134a):**  
CUT OUT 110 PSIG  
CUT IN 150 PSIG
7. **Fan Control #1 (R-22):**  
CUT OUT 175 PSIG (180 PSIG\*)  
CUT IN 230 PSIG (220 PSIG\*)
8. **Fan Control #2 (R-22):**  
CUT OUT 195 PSIG (190 PSIG\*)  
CUT IN 250 PSIG (230 PSIG\*)

\* Settings indicated in parentheses are for units equipped with adjustable pressure switches.

Consult factory for pressure switch settings on dryers equipped with optional Low Ambient Headmaster control.

## MASTER CONTROL OPERATION (MC)

(Available on some models as standard and others as an option.)

The Master Control is capable of 4-channel temperature display, drain control, and service due and alarm indication.

### Temperature Display

The Master Control (MC) is capable of 4-channel temperature display. The unit displays refrigerant suction temperature (measured immediately downstream from the refrigerant/air heat exchanger), incoming air temperature, ambient air temperature (or incoming water temperature for units with a water-cooled condenser), and dew point temperature (optional). Only one temperature can be displayed on the LCD screen at a time. In the normal operational mode, pushing the UP (↑) or DOWN (↓) arrow keys will cycle the temperature displayed, while LEDs on the MC unit indicate which temperature is being displayed. Pushing the SELECT key will cycle between Fahrenheit and Celsius temperature scales. The LED labeled "OPTIONAL" corresponds to the dew point temperature. If your unit does not include this option, the temperature displayed when the "OPTIONAL" LED is lit will be about 30° by default. This does NOT indicate that the dew point is actually 30°.

## Drain Operation

**Locking/Unlocking Drain Time Settings:** The ON TIME and OFF TIME settings for all modes of drain operation can be unlocked or locked to avoid inadvertent changes to these settings. In the unlocked condition, the time settings will flash after the SELECT key is pressed momentarily, indicating that the values can be changed by pressing the UP (↑) or DOWN (↓) arrow keys. In the locked condition, the SELECT key must be held down for 5 seconds before the display will flash and the settings can be changed. With the display flashing, pushing the SELECT key momentarily will return to normal unlocked operation and holding the SELECT key down for 5 seconds will return to normal locked operation.

### Setting Drain ON TIME and OFF TIME:

1. Press the UP (↑) or DOWN (↓) arrow keys until the LED indicates that ON TIME or OFF TIME has been selected.
2. Press SELECT momentarily (if unlocked) or hold until the display starts flashing (if locked). If you do not know whether the setting is locked or not, simply press the select button momentarily. If the digits on the LCD display do not start flashing, the setting is locked.
3. Press UP (↑) or DOWN (↓) arrow keys to change the settings. The ON TIME is indicated in seconds and changes in 0.5-second increments in a range of 0 to 60 seconds. The OFF TIME is indicated in minutes and changes in 0.5-minute increments in a range of 0 to 60 minutes.

**Modes of Drain Operation:** The Master Control (MC) has two modes of drain operation for different drain types. The mode of operation for timed drains is described below as item "A." The mode of operation for fully automatic float operated drains is described as item "B." For all modes, the "DRAINS POWER ON" LED indicates that the drain is receiving power. Pushing the DRAIN TEST key will send power to the drain if it is not already receiving power.

#### A. Timed Drain Mode:

Set ON TIME and OFF TIME to non-zero values. Settings should be such that fluid is adequately drained without allowing excessive air loss.

#### B. Demand Drain Mode:

Set ON TIME and OFF TIME to zero. Drain is given continuous power supply and will operate normally. In this mode, pushing the DRAIN TEST button will have no effect.

## Alarm Indication

The following conditions can cause the alarm indicator to light:

- Compressor overload
- Low refrigerant suction pressure
- High refrigerant discharge pressure
- Low oil pressure (semi-hermetic compressors only)

A qualified refrigeration mechanic should identify and correct the problem if an alarm condition occurs. **In most cases it will be necessary to firmly depress the reset push-button located on the dual-pressure switch, which is inside the electrical enclosure.**

Follow all safety procedures applicable to electrical equipment when opening the electrical enclosure. Refer to the Installation, Operation, Start-Up, and Maintenance Manual for more information.

## Service Due Indication

"Service Due" indicates the dryer is due for routine maintenance. Please read the maintenance section or contact your Quincy dealer. In SERVICE DUE mode, several functions relating to the accumulated run time can be accessed. The accumulated run time can be viewed, and the service due threshold (total accumulated run time before SERVICE DUE indicator lights) can be viewed and tested.

## CAUTION

**Drains will not operate normally in Service Due mode. Drains will not receive power in Service Due mode unless the DRAIN TEST key is held down. Never operate the unit in Service Due mode for an extended period of time.**

To enter the SERVICE DUE mode (and view the accumulated run time) press SELECT, UP (↑) and DOWN (↓) keys simultaneously. The display will show the accumulated run time in tens of hours. If the display reads 50, for example, the accumulated run time is 500 hours.

1. To display the service due threshold, hit the DOWN (↓) arrow key. The service due indicator will light.
2. To test the service due timer function, push the SELECT and UP (↑) keys simultaneously. The accumulated run time will temporarily be set to a value that is 60 seconds less than the service due

threshold setting. If the service due timer is functioning properly, the SERVICE DUE indicator will flash after the 60 seconds has elapsed. After a few seconds, SERVICE DUE mode will return to normal operation. The indicator will stop flashing and the accumulated run time will return to its previous value.

3. To reset the accumulated run time to zero, hold the SELECT key for 5 seconds.

To exit SERVICE DUE mode, press the UP (↑) and DOWN (↓) keys simultaneously. This can not be done while a service due timer test is in progress.

## SHUTDOWN PROCEDURE

1. Open the bypass valve to allow process flow to continue downstream. Then close the outlet isolation valve on the dryer bypass piping.
2. Close the inlet isolation valve on the dryer bypass piping. At this time the dryer is isolated and can be depressurized, ready for servicing.
3. Turn the power switch to the OFF position.

**NOTE:** The alarm indication light (red) signifies the refrigerant compressor is not running. The reasons can be:

- Low suction pressure
- High discharge pressure
- Electrical problems
- Loss of refrigerant
- Dirty condenser
- Leaking evaporator, etc.

Refer to Troubleshooting Guide, Page 15, for problem analysis and remedy. Call the factory if further assistance is required.

## CAUTION

**Contact factory before authorizing any warranty refrigeration service on the air dryer. Identify the dryer by model and serial numbers when calling factory.**

## OPERATING CONDITIONS

### Entering Air Temperature

Units are designed for entering air temperature of 100°F. If the temperature of entering air is to be greater than 100°F, the factory should be consulted to determine the maximum possible air flow through the unit.

## CAUTION

**The increased heat content or higher temperature air requires the dryer to be oversized to prevent overloading of the refrigerant compressor.**

### Entering Air Pressure

Standard units are designed for operating air pressure 100 PSIG (150 PSIG MAX.). Operating below 100 PSIG will reduce system capacity.

### Ambient Air Temperature

The allowable ambient temperature range is 40°F to 110°F. As temperatures approach freezing conditions, frost or icing may develop in the unit. At temperatures above 100°F, refrigeration capacity will decrease, therefore affecting dew point.

# MAINTENANCE

## AIR DRYER MAINTENANCE

The dryer is factory tested before shipping. All controls are calibrated for automatic operation. If the dryer is installed in clean surroundings, within the temperature limits of the specified ambient, the dryer will run trouble-free for a very long time. Routine maintenance procedures recommended are the following:

1. Checking the fan motor(s) for proper operation to maintain the cooling air to be drawn through the condenser and blown over the refrigerant compressor. If the dryer is equipped with condenser ambient filters, check, clean or replace as needed to maintain the proper air flow through the condenser.

Dirty ambient filters will reduce the air flow through the condenser, and trip the compressor "off" at the overload control.

2. For dryers without ambient filters, clean the condenser periodically to maintain the proper heat transfer on the condenser coil. Dirty condenser will raise the head pressure of the refrigeration system and trip the compressor "off" at the overload control.

Running the compressor on high head pressures may cause premature failures. Check the ambient temperature limits to be maintained at the installation.

3. Check and clean water-cooled condensers for dirt, scale and sludge buildup every year or as needed. Cooling tower water condensers may need cleaning more often if the water is not properly treated.
4. Check the suction pressure gauge. Reading should be within the specified range after a few minutes of start-up. Suction pressure below the range will cause freeze-up inside the air system, increasing the pressure drop across the air dryer. Suction pressure above the range will reduce the refrigeration cooling capacity.
5. Check the pressure drop across the air dryer at full capacity flow. If it is higher than specified value (normally 5 PSI or less), consult factory. If pressure drop increases over years of operation, it may be due to particulate buildup from air compressor intake. In that event, back-flush the dryer with any **MILD DETERGENT**. See Figure 2.

To back-flush, disconnect air dryer, plug the drain line and fill the air system with the detergent water solution. Hold it for 4-6 hours. Circulate the detergent from air outlet to air inlet with a pump. Flush the system with warm water. If pressure-drop still exists, contact factory.

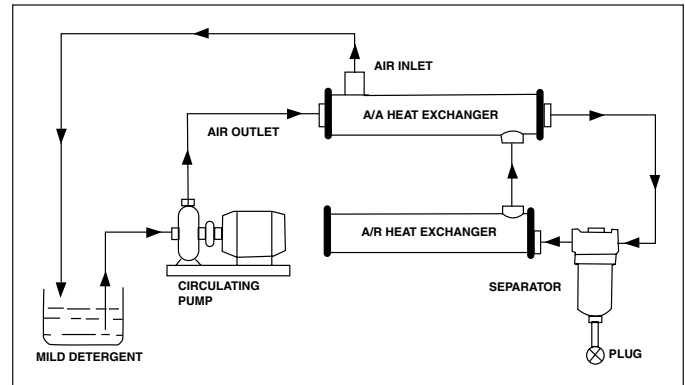


FIGURE 2 — BACK FLUSH FLOW DIAGRAM

## AUTOMATIC DRAINS

The recommended settings for the drain time is determined by the moisture load. The cycle time should be adjusted to approximately 3 to 4 minutes. The drain time should be set so the drain expels all of the liquid and then a short burst of air.

Periodically check the automatic drains for proper drainage. If the drains are not functioning, the condensed moisture will be re-entrained downstream of the air dryer. Float operated automatic drains need periodic cleaning with soap and water to remove solids from the valve seat. If the valve is stuck open, clean with soap and water and then use compressed air to clean the valve seat. Electronic solenoid operated drains may be manually tested periodically for proper operation.

## Drain Valve Clean Up Procedure

- A. Depressurize the drain valve.
- B. Disconnect the power source.
- C. Remove the valve from the compressed air system.
- D. Remove the solenoid coil.
- E. Remove the stainless steel sleeve from valve body.
- F. Clean the valve body internals, and all other components.
- G. Replace diaphragm as needed. The valve rebuild kit is available.
- H. Assemble the valve parts.
- I. Connect the solenoid coil.
- J. Install the drain valve in the system.

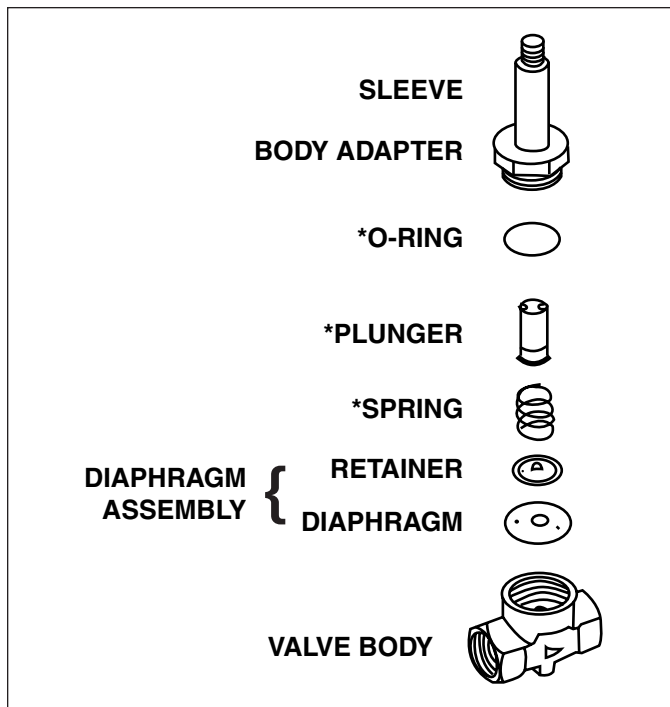


FIGURE 3 — DRAIN VALVE

## Recommended Operation and Maintenance for the Particle Strainer

The particle strainer should be cleaned once every week or as needed.

1. Close the shut-off valve on the particle strainer.
2. Depressurize the drain by pressing the drain PRESS TO TEST or DRAIN TEST key.

### **CAUTION**

**Failure to depressurize may cause bodily injury.**

3. Unscrew bottom of the particle strainer and clean the screen.

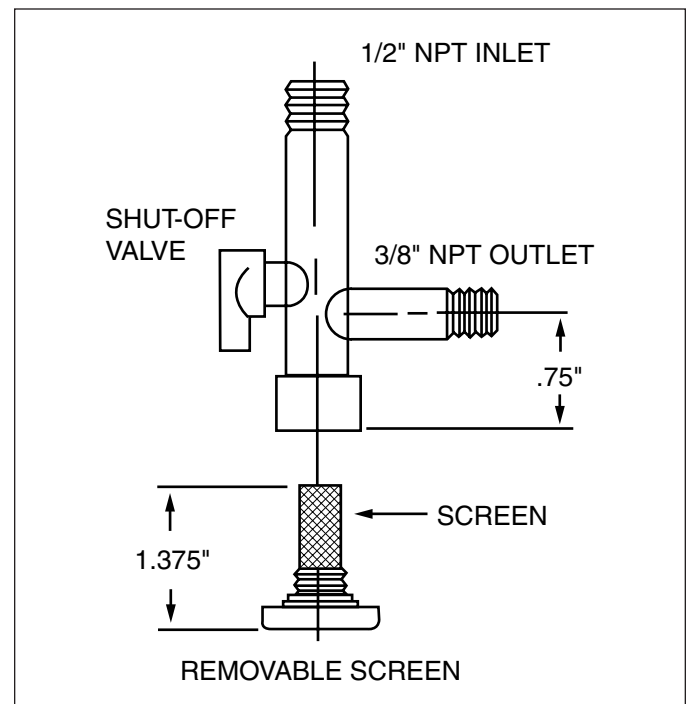


FIGURE 4 — PARTICLE STRAINER

## COMPRESSOR

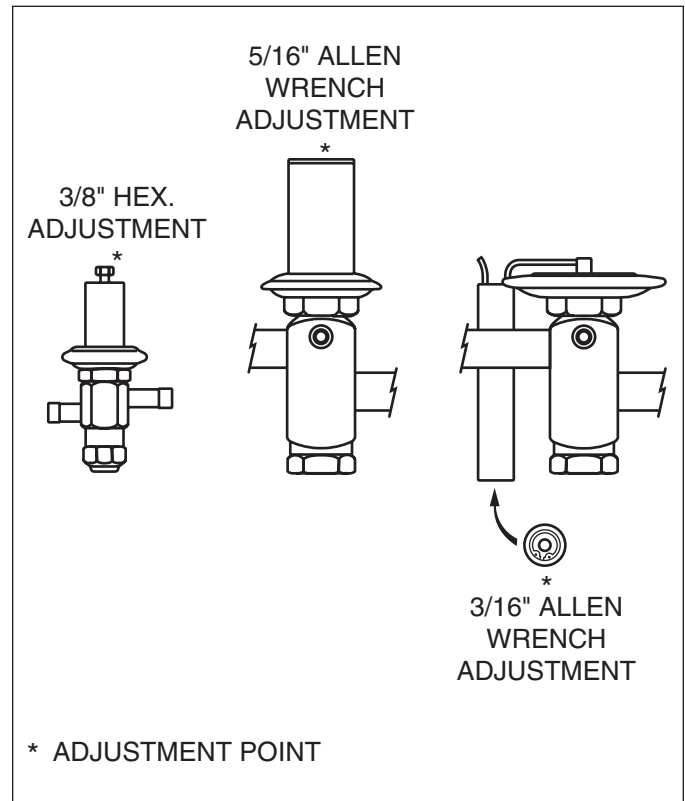
Refrigerant compressors normally do not need any maintenance. The compressor will unload or adjust for different load conditions with the refrigeration controls. Any time power is applied to the compressor, and the suction pressure is higher than the specified readings, the compressor is either not pumping or failed electrically, or tripped "off" at the overload protection. If the compressor does not automatically reset within a few minutes, it requires servicing. Service must be performed by a qualified refrigeration technician.

## EXPANSION VALVE

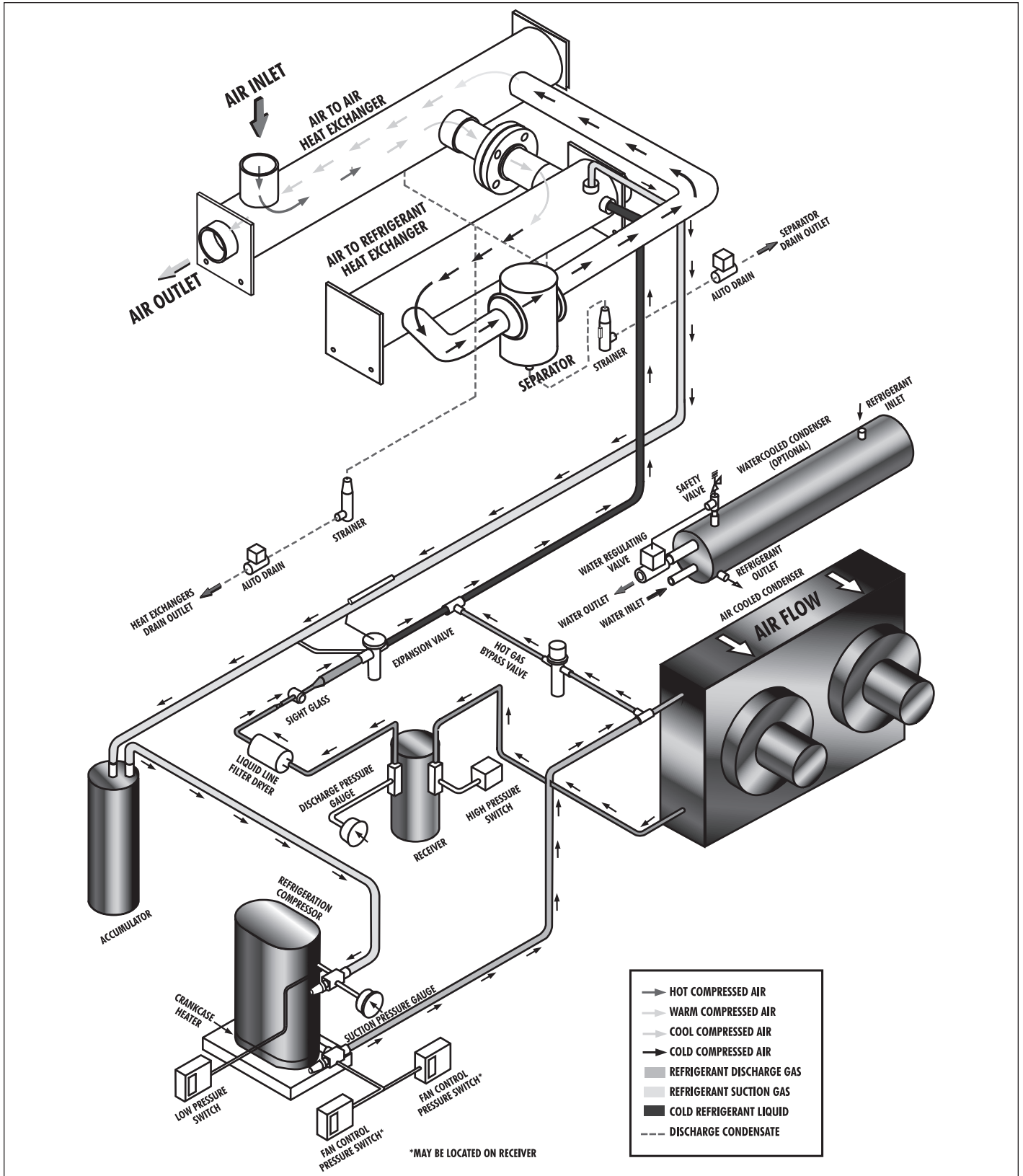
Air dryers equipped with an automatic expansion valve are factory adjusted for proper cooling. The valve adjusting stem is secured with a lock nut at the factory to maintain proper setting. Larger units are equipped with a thermostatic expansion valve, factory set to maintain a superheat of 8 to 10°F. These valves do not need adjustment in normal operation. Generally, superheat adjustments are needed only at the time of valve replacement. Expansion valve service must be performed by a qualified refrigeration technician.

## HOT GAS BYPASS VALVE

Model QPNC-10 and larger air dryers come equipped with modulating hot gas bypass valves. This valve maintains the refrigerant suction pressure in varying load conditions. The dryer will run from no load to full load conditions without freeze-up. The operation of this valve is automatic. If the valve needs adjustment, turn the adjusting stem clockwise to raise the suction pressure, and counterclockwise to lower the suction pressure. This adjustment should be made under a no-load condition if possible. When the adjustment is made, turn one quarter of a turn at a time, and wait 3 to 5 minutes between adjustments. Once the adjustment is complete, secure the adjusting stem with the locknut that is provided. Careful adjustment of this valve is necessary for normal operation of the air dryer. Hot gas bypass valve adjustment may be made by maintenance personnel. (See Figure 5.)



**FIGURE 5 — HOT GAS BYPASS VALVE ADJUSTMENTS**



**FIGURE 6 — FLOW DIAGRAM**

# REFRIGERATED AIR DRYER SERVICE CHECKLIST

Please get answers to as many questions as you can before writing or calling for service.

1. Customer's Name \_\_\_\_\_  
Phone no. \_\_\_\_\_ Fax no. \_\_\_\_\_
2. Model no. \_\_\_\_\_ Serial no. \_\_\_\_\_  
Voltage L1 \_\_\_\_\_ L2 \_\_\_\_\_ L3 \_\_\_\_\_ PH \_\_\_\_\_ HZ \_\_\_\_\_  
Amp draw L1 \_\_\_\_\_ L2 \_\_\_\_\_ L3 \_\_\_\_\_  
Actual air flow (SCFM) \_\_\_\_\_ HP \_\_\_\_\_
3. Description of problem  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
4. Air in temperature (°F) \_\_\_\_\_
5. Air out temperature (°F) \_\_\_\_\_
6. Air in pressure (PSIG) \_\_\_\_\_
7. Air out pressure (PSIG) \_\_\_\_\_
8. Refrigerant suction pressure when unit is operating (PSIG) \_\_\_\_\_
9. Refrigerant suction pressure when unit is not operating (PSIG) \_\_\_\_\_
10. Refrigerant discharge pressure when unit is operating (PSIG) \_\_\_\_\_
11. Inspect refrigerant suction line at the outlet of air to refrigerant heat exchanger:  
Cold \_\_\_\_\_ Hot \_\_\_\_\_ Temperature (°F) \_\_\_\_\_
12. Inspect refrigerant suction line at inlet of compressor: Temperature (°F) \_\_\_\_\_
13. Oil pressure when unit is operating (PSIG) \_\_\_\_\_
14. Separator skin temperature (°F) \_\_\_\_\_
15. Location of unit Indoor \_\_\_\_\_ Outdoor \_\_\_\_\_  
Clean \_\_\_\_\_ Dusty \_\_\_\_\_
16. Ambient temperature (°F) \_\_\_\_\_ Air-cooled condenser clean? Yes \_\_\_\_\_ No \_\_\_\_\_
17. a. Water-cooled condenser: City \_\_\_\_\_ Tower \_\_\_\_\_  
b. Inlet water temperature (°F) \_\_\_\_\_ Outlet water temperature (°F) \_\_\_\_\_  
c. Inlet water pressure (PSIG) \_\_\_\_\_ Outlet water pressure (PSIG) \_\_\_\_\_
18. Inspect auto drain, operation: Stuck open \_\_\_\_\_ Stuck closed \_\_\_\_\_

**NOTE:** Maintenance Personnel, Copy This Page, Fill In Form and contact Quincy Compressor.



# TROUBLESHOOTING

## The following conditions can cause abnormal operation or malfunction of the air dryer

- High inlet air temperatures
- High cooling water inlet temperatures
- Untreated cooling water
- Dirty condenser
- Low ambient temperatures
- Malfunctioning automatic drains at aftercooler, or dryer
- Refrigerant overcharge
- Leaky evaporator
- Electrical power supply more than  $\pm 10\%$  of the rated voltage
- Low inlet air pressures
- Contaminated cooling water
- Condenser water pressure below 35 PSIG
- High ambient temperatures
- Compressed air flow greater than rated capacity
- Undersized fuses
- Refrigerant undercharge
- Clogged air compressor air intake filter

If any of these symptoms are noticed, refer to Troubleshooting Guide.

**Table 1 — Troubleshooting Guide**

Symptoms	Cause	Remedy
A. Unit does not run.	<ol style="list-style-type: none"> <li>1. Motor line open.</li> <li>2. Fuse blown.</li> <li>3. Tripped overload.</li> <li>4. Safety controls open.</li> <li>5. Air switch open. (Dead end control)</li> <li>6. Frozen (locked) compressor.</li> <li>7. Wiring improper or loose.</li> </ol>	<ol style="list-style-type: none"> <li>1. Close disconnect switch, to start.</li> <li>2. Replace fuse.</li> <li>3. Turn switch off, wait 15 minutes, check for overload condition.</li> <li>4. Repair or replace.</li> <li>5. Check air pressure. Adjust air and/or switch. If defective repair or replace.</li> <li>6. Repair or replace.</li> <li>7. Check wiring against diagram.</li> </ol>
B. Unit short cycles.	<ol style="list-style-type: none"> <li>1. Motor compressor overload cutting out.</li> <li>2. Shortage of refrigerant.</li> <li>3. Suction pressure low.</li> <li>4. Sticking expansion valve.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check for high head pressure, clogged condenser, high ambient, or air overload. Check high pressure cutout, repair or replace.</li> <li>2. Repair leak and recharge.</li> <li>3. Check hot gas bypass adjust, repair or replace.</li> <li>4. Repair or replace.</li> </ol>
C. Compressor will not start – hums.	<ol style="list-style-type: none"> <li>1. Improperly wired.</li> <li>2. Low line voltage.</li> <li>3. Starting capacitor defective.</li> <li>4. Relay or contactor not closing.</li> <li>5. Start winding open.</li> <li>6. Single-phasing.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check wiring against diagram.</li> <li>2. Check voltage – correct.</li> <li>3. Replace.</li> <li>4. Check for reason – repair or replace.</li> <li>5. Check leads, if leads OK replace motor.</li> <li>6. Check fuses.</li> </ol>

**Table 1 — Troubleshooting Guide, continued**

<b>Symptoms</b>	<b>Cause</b>	<b>Remedy</b>
D. Compressor starts and runs – short cycles on overload.	<ol style="list-style-type: none"> <li>1. Low voltage, or phase unbalance.</li> <li>2. Additional current going thru overload.</li> <li>3. Overload protectors defective.</li> <li>4. Run capacitor weak.</li> <li>5. High discharge pressure.</li> <li>6. Short in winding.</li> <li>7. Current relay sticking.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check voltage to be within <math>\pm 10\%</math> of voltage listed on name plate.</li> <li>2. Check wiring diagram, check for added electrical devices connected thru protector.</li> <li>3. Check current, replace.</li> <li>4. Check capacitance, replace.</li> <li>5. Refer to G 1-8.</li> <li>6. Check resistance, replace compressor.</li> <li>7. Check floor level, tap &amp; release.</li> </ol>
E. Relay burned out.	<ol style="list-style-type: none"> <li>1. Low or high line voltage.</li> <li>2. Incorrect running capacitor.</li> <li>3. Short cycling.</li> <li>4. Wrong relay.</li> <li>5. Incorrect mounting.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check voltage to be within <math>\pm 10\%</math> of voltage listed on name plate.</li> <li>2. Replace with proper capacitance.</li> <li>3. Refer to B and C.</li> <li>4. Replace with proper relay.</li> <li>5. Mount in correct, rigid position.</li> </ol>
F. Capacitors burn out.	<ol style="list-style-type: none"> <li>1. Improper capacitor.</li> <li>2. High line voltage.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace with proper capacitor.</li> <li>2. Lower voltage to not more than 10% above rating.</li> </ol>
G. Head pressure too high.	<ol style="list-style-type: none"> <li>1. Refrigerant overcharge.</li> <li>2. Air in system.</li> <li>3. Dirty condenser.</li> <li>4. Location too hot.</li> <li>5. Defective condenser pressure switch.</li> <li>6. Defective fan motor.</li> <li>7. Fan operating in wrong direction.</li> <li>8. Defective water regulating valve.</li> </ol>	<ol style="list-style-type: none"> <li>1. Purge or vacuum and recharge.</li> <li>2. Check for reason, repair.</li> <li>3. Blow clean with compressed air.</li> <li>4. Cool ambient, relocate unit, add ventilation.</li> <li>5. Repair or replace.</li> <li>6. Replace.</li> <li>7. Switch two wires at disconnect.</li> <li>8. Adjust, repair or replace.</li> </ol>
H. Head pressure too low.	<ol style="list-style-type: none"> <li>1. Refrigerant shortage.</li> <li>2. Compressor suction or discharge valves inefficient.</li> <li>3. Defective condenser pressure switch.</li> <li>4. Defective water regulating valve.</li> </ol>	<ol style="list-style-type: none"> <li>1. Repair leak and recharge.</li> <li>2. Repair or replace.</li> <li>3. Repair or replace.</li> <li>4. Adjust, repair or replace.</li> </ol>
J. Noisy unit.	<ol style="list-style-type: none"> <li>1. Mountings loose.</li> <li>2. Bent fan blade.</li> <li>3. Fan motor bearing worn.</li> <li>4. Refrigerant flooding back.</li> <li>5. Compressor oil charge low.</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten mounting, etc.</li> <li>2. Straighten or replace blade.</li> <li>3. Replace.</li> <li>4. Check expansion valve, adjust, repair or replace. Check crankcase heater.</li> <li>5. Check oil level.</li> </ol>
K. Frosted liquid line.	<ol style="list-style-type: none"> <li>1. High side service valve partially closed or restricted.</li> <li>2. Restricted filter/dryer.</li> </ol>	<ol style="list-style-type: none"> <li>1. Open valve or remove restriction.</li> <li>2. Replace.</li> </ol>
L. Frosted suction line.	<ol style="list-style-type: none"> <li>1. Expansion valve and/or hot gas bypass out of adjustment.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust the hot gas bypass valve to bring the suction pressure into the proper range.</li> </ol>

**Table 1 — Troubleshooting Guide, continued**

Symptoms	Cause	Remedy
M. Top condenser coils cool when unit in operation.	<ol style="list-style-type: none"> <li>1. Refrigerant shortage.</li> <li>2. Compressor inefficient.</li> </ol>	<ol style="list-style-type: none"> <li>1. Repair leak and recharge.</li> <li>2. Repair or replace.</li> </ol>
<p>N. Unit runs but air temperature is high.</p> <p><b>NOTE:</b> Outlet air temperature gauge may read higher than actual temperatures at low air flow conditions.</p>	<ol style="list-style-type: none"> <li>1. Refrigerant leak.</li> <li>2. Evaporator controls set too high.</li> <li>3. Filter/dryer clogged.</li> <li>4. Refrigerant shortage.</li> <li>5. Dirty condenser.</li> <li>6. Air in system.</li> <li>7. Compressor inefficient.</li> <li>8. Evaporator control(s) stuck.</li> <li>9. Defective insulation.</li> <li>10. Air overload.</li> <li>11. Unit too small.</li> <li>12. High ambient.</li> <li>13. Entering air temperature too high.</li> </ol>	<ol style="list-style-type: none"> <li>1. Locate with leak detector. Repair or replace defective part.</li> <li>2. Refer to L – above.</li> <li>3. Replace.</li> <li>4. Repair leak and recharge.</li> <li>5. Clean condenser.</li> <li>6. Check reason, repair, vacuum, recharge.</li> <li>7. Repair or replace.</li> <li>8. Repair as required, adjust.</li> <li>9. Repair.</li> <li>10. Reduce load.</li> <li>11. Add unit or replace.</li> <li>12. Reduce or change location.</li> <li>13. Lower entering air temperature.</li> </ol>
P. Unit runs but low air pressure.	<ol style="list-style-type: none"> <li>1. System pressure low.</li> <li>2. Precooler and/or evaporator clogged.</li> <li>3. Incorrect piping.</li> <li>4. Air overload.</li> <li>5. Unit too small.</li> <li>6. Excess water in unit.</li> <li>7. Evaporator freeze-up.</li> <li>8. Clogged air compressor intake filter.</li> <li>9. Dirty air system.</li> </ol>	<ol style="list-style-type: none"> <li>1. Increase pressure.</li> <li>2. Back-flush using mild detergent, Figure 2 on Page 10.</li> <li>3. Increase line size and/or correct piping as required.</li> <li>4. Reduce overload.</li> <li>5. Add another unit or replace with larger unit.</li> <li>6. Check drain, repair or replace if needed.</li> <li>7. Adjust hot gas bypass valve.</li> <li>8. Clean or replace air intake filter.</li> <li>9. Back-flush as described in Figure 2 on Page 10.</li> </ol>
Q. Unit runs, but air flow erratic or zero.	<ol style="list-style-type: none"> <li>1. Freeze-up.</li> <li>2. Precooler and/or evaporator clogged.</li> <li>3. Restriction in piping upstream from unit.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check suction temperature at evaporator outlet or turn off unit and allow it to thaw to determine if this is problem. Adjust controls at no-load if freezing is occurring.</li> <li>2. Refer to P-2 above.</li> <li>3. Correct as required.</li> </ol>
R. Evaporator freeze-up.	<ol style="list-style-type: none"> <li>1. Hot gas bypass valve out of adjustment.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust suction pressure. Adjust hot gas bypass valve.</li> </ol>
S. Condenser fan blows outward.	<ol style="list-style-type: none"> <li>1. Improper wiring at disconnect (3-phase only)</li> </ol>	<ol style="list-style-type: none"> <li>1. Reverse two wires.</li> </ol>

www.quincycompressor.com



The Science of Compressed Air

701 North Dobson Avenue  
Bay Minette, AL 36507  
Phone 251.937.5900  
Fax 251.937.1457

Nearest Distributor:  
888.424.7729

Email:  
info@quincycompressor.com



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