Quincy COMPRESSOR

an EnPro Industries company

QSF™ Series

Direct Drive Rotary Screw Air Compressors

Instruction Manual

This manual contains important safety information and should be made available to all personnel who operate and/or maintain this product. Carefully read this manual before attempting to operate or perform maintenance on this equipment.

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Manual Updates (October 2007):

Deleted old model id (was page 1).
Updated warranty (page 1).
Updated serial tag (page 3).
Revised 'Compressor Air/ Fluid Separator Element' (page 29).
Added 'QGV-200 Separator Installation' (page 30).
Added 'Standard Terms & Conditions' (back of manual).
Updated font, format and layout.

Standard Warranty

Quincy Compressor® Industrial Rotary Screw Products

QSF™ Compressors

Seller warrants products of its own manufacture against defects in workmanship and materials under normal use and service, as follows:

Packaged Compressors - Twelve (12) months from date of start-up or eighteen (18) months from date of shipment from the factory, whichever occurs first.

Airend on Packaged Compressors (service at full load pressure 150 PSIG and below) - Twenty-four (24) months from date of start-up or thirty (30) months from date of shipment from the factory, whichever occurs first. Five (5) and ten (10) year Extended Airend Warranties are available. See pages 40-41 for details.

Airend on Packaged Compressors (service at full-load pressure above 150 psig) - Twelve (12) months from date of start-up or eighteen (18) months from date of shipment from the factory, whichever occurs first.

Remanufactured Airend - Twelve (12) months from date of shipment from factory.

Parts - Ninety (90) days from date of Distributor sale or twelve (12) months from date of factory shipment, whichever occurs first.

With respect to products not manufactured by Seller, Seller will, if practical, pass along the warranty of the original manufacturer.

Notice of the alleged defect must be given to Seller in writing with all identifying details including serial number, model number, type of equipment and date of purchase, within thirty (30) days of the discovery of same during the warranty period.

Seller's sole obligation on this warranty shall be, at its option, to repair, replace or refund the purchase price of any product or part thereof which proves to be defective. If requested by Seller, such product or part thereof must be promptly returned to Seller, freight collect for inspection.

Seller warrants factory repaired or replaced parts of its own manufacture against defects in material and workmanship under normal use and service for ninety (90) days or for the remainder of the warranty on the product being repaired, whichever is longer.

This warranty shall not apply and Seller shall not be responsible or liable for:

a) Consequential, collateral or special losses or damages;

b) Equipment conditions caused by fair wear and tear, abnormal conditions of use, accident, neglect or misuse of equipment, improper storage or damages resulting during shipment;

c) Deviation from operating instructions, specifications, or other special terms of sales;

d) Labor charges, loss or damage resulting from improper operation, maintenance or repairs made by person(s) other than Seller or Seller's authorized service station.

e) Improper application of product.

In no event shall Seller be liable for any claims, whether arising from breach of contract or warranty of claims of negligence or negligent manufacture, in excess of the purchase price.

NOTICE!

This warranty is the sole warranty of seller. Any other warranties, expressed or implied, including any warranties of merchantability or fitness for a particular use are hereby excluded.

Safety Cautions and Warnings

Listed are some, but not all, cautions that must be observed with compressors and compressed air systems. Failure to follow any of these warnings may result in death, serious injury, property damage and/or compressor damage.

Air in the piping from this compressor will cause death or serious injury if used for breathing air. Additionally, air used in food processing or packaging requires the use of food grade fluid. Air used for these processes must meet OSHA 29 CFR 1910.134 regulations.

This compressor is designed for use in the compression of normal atmospheric air only. No other gases, vapors or fumes should be exposed to the compressor intake or processed through the compressor.

Disconnect and lock out all power supplies to the compressor plus any remote controllers prior to servicing the unit.

Relieve all pressure internal to the compressor prior to servicing. Do not depend on check valves to hold system pressure.

A properly sized pressure relief valve must be installed in the discharge piping ahead (upstream) of any shut-off valve (block valve), heat exchanger, orifice or any potential blockage point. Failure to install a relief valve could result in the rupturing or explosion of some compressor component.

Do not change the pressure setting of the relief valve, restrict the function of the relief valve or replace the relief valve with a plug. Over pressurization of system or compressor component can occur, resulting in death, serious injury and property damage.

Never use plastic pipe, rubber hose or soldered joints in any part of the compressed air system. Failure to ensure system compatibility with compressor piping is dangerously unsound.

Never use a flammable or toxic solvent for cleaning the air filter or any parts.

Do not attempt to service any part while the compressor is operating.

Do not operate the compressor at pressures in excess of its rating.

Do not remove any guards or canopy panels while the compressor is operating.

Observe gauges daily to ensure compressor is operating properly.

Follow all maintenance procedures and check all safety devices on schedule.

Never disconnect or tamper with the high air temperature (HAT) sensors.

Compressed air is dangerous, do not play with it.

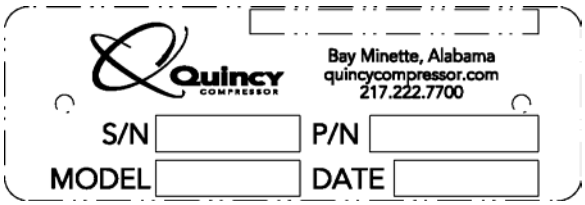
Use the correct fluid at all times.

NOTE:
Read this manual and follow all instructions prior to installing or operating this compressor.

These instructions, precautions and descriptions cover standard Quincy manufactured QSF series air compressors.

As a service to our customers, we often modify or construct packages to the customer's specifications. This manual may not be appropriate in those cases.

Every effort has been taken to ensure complete and correct instructions have been included in this manual, however, possible product updates and changes may have occurred since this printing. Quincy Compressor reserves the right to change specifications without incurring any obligation for equipment previously or subsequently sold. Not responsible for typographical errors.



Reference to the machine MODEL, SERIAL NUMBER and DATE OF ORIGINAL START-UP must be made in all communication relative to parts orders or warranty claim. A model/serial number plate is located on the frame and in the upper right corner inside of the control panel door.

SPARE PARTS ORDERING -- Quincy Compressor maintains replacement parts for Quincy compressors. A parts manual is shipped with all new machines. Order parts from your Authorized Quincy distributor. Use only genuine Quincy replacement parts. Failure to use genuine Quincy parts may void your warranty.

! DANGER !

Air from this compressor will cause death or serious injury if used for breathing or food processing (if non-food grade fluid is used). Air used for these processes must meet OSHA 29CFR1910.134 regulations or FDA21CFR178.3570 regulations.

IMPORTANT

Throughout this manual we have identified key hazards. The following safety alert symbols identify the level of the hazard.

! DANGER !

Hazards or unsafe practices that will result in death or serious injury.

! WARNING !

Immediate hazards which could result in death or serious injury.

! CAUTION !

Hazards or unsafe practices which may result in minor injury or product or property damage.

General Description of Quincy QSF Series Air Compressors

The compressor is a single stage, positive displacement, fluid-flooded helical screw type unit. The compressor consists of two precision-machined rotors. The male rotor is driven by a gear train, connected to motor shaft through a flexible drop out type coupling. The male rotor has four lobes that mesh with a female rotor consisting of six flutes. Both rotors are housed in a single cast iron cylinder. The unit has an inlet port at the power-input end and a discharge port at the opposite end.

All models use positive pressure in the reservoir to circulate fluid through the system.

All components are attached to a heavy-duty steel frame. Controls and indicators are arranged on a control panel. Acoustical cabinets are available to reduce sound levels.

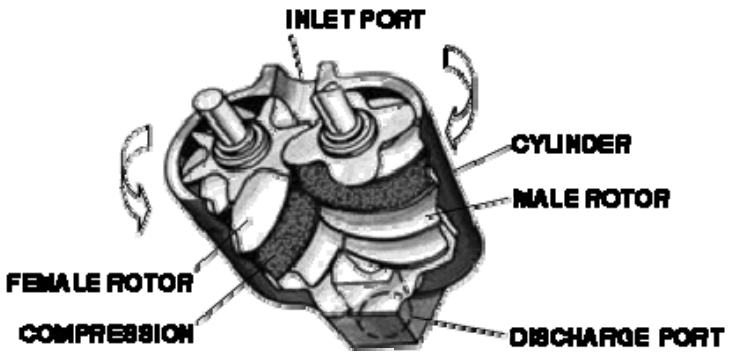


Figure 2-1

The Compression Cycle

The compression cycle of a rotary compressor is a continuous process from intake to discharge with no reciprocating mechanisms starting and stopping as found in reciprocating compressors. The compressor consists of two rotors in constant mesh, housed in a cylinder with two parallel adjoining bores. The male drive rotor has four lobes that mesh with six flutes in the female rotor. All parts are machined to exacting tolerances.

As the rotors rotate, (male-clockwise as viewed from the power-input end) air is drawn into the cylinder through the inlet port located at the power-input end. A volume of air is trapped as the rotor lobes pass the inlet cut off points in the cylinders. Compression occurs as the male rotor rolls into the female flute, progressively reducing the space thereby raising the pressure. Compression continues until the lobe and flute pass the discharge port. The compressed air is then discharged into the service line. There are four complete compression cycles for each complete rotation of the male rotor. (Figure 2-1).

Description of Air Flow

With the compressor operating, air entering via the compressor air filter flows directly into the rotor housing where it is compressed. Compressed air passes through the complete system then through a minimum pressure check valve to the service connection.

Description of Fluid Flow and Compressor Cooling System

The fluid serves three functions: it lubricates the bearings, rotors, and gears; it removes heat from the air as the air is being compressed thus lowering the compressed air discharge temperature; it also seals the rotor clearances.

Coolers

All models use positive pressure in the reservoir to circulate fluid. Fluid is circulated through the cooler, fluid filter, and into the compressor. In the compressor, some fluid is diverted directly through internal passages to ensure positive lubrication of the bearings, gears and shaft seal. The remainder of the fluid is injected into the early stage of the compression cycle to seal clearances, cool, and lubricate the rotors.

Fluid Coolers

Fluid coolers may use either air or water as a cooling medium. The following descriptions point out the major differences between the two types of coolers.

Air-cooled Fluid Coolers

The air-cooled fluid cooler and aftercooler are of the finned aluminum tube design. Ambient air is forced through the fins by a motor driven fan, cooling the fluid and air in the tubes. To maintain proper compressor operation, the temperature of the ambient air should not exceed the temperatures listed in the QSF specifications. The cooler fins must be kept clean at all times. Fluid leaving the receiver passes through a thermal mixing valve before traveling on to the cooler. The purpose of the thermal valve is to maintain a minimum fluid discharge temperature at the compressor of approximately 180^0 Fahrenheit.

Water-cooled Fluid Coolers

Water-cooled fluid coolers are of the shell and tube design. Fluid passes through the shell transferring its heat to the water flowing through the tubes. Fluid leaving the cooler does not pass through a thermal mixing valve as in an air-cooled unit, but goes directly to the fluid filter and the compressor. Fluid discharge temperature at the compressor is maintained by a water temperature regulating valve located in the discharge water line. The water temperature-regulating valve uses a probe to sense fluid temperature and opens and closes, governing water flow through the cooler.

Aftercoolers

Air-cooled aftercoolers are furnished as standard equipment on the QSF. Water-cooled aftercoolers are available as an option on standard QSF. Aftercoolers are used to lower the temperature of the discharge air, thereby condensing water vapor from the compressed air. This allows most of the contained water to be trapped and expelled from the unit, reducing water related problems downstream.

Air-cooled aftercoolers are part of the air-cooled fluid cooler. Cooling air from the fan is blown through the aftercooler and the fluid cooler.

Water-cooled aftercoolers are placed in series with the fluid cooler. Incoming water is first directed through the aftercooler and then on to the fluid cooler.

A combination moisture separator and water trap is provided for collecting and expelling water to the customer's drain.

Modulation Control Standard

As the motor starts driving the compressor rotors, air is drawn in, compressed and discharged into the reservoir. When the air pressure in the reservoir exceeds the set point of the pilot valve (normally 100 PSIG), the valve opens and passes a controlled volume of air to the inlet valve air cylinder. The air forces a piston to move within the cylinder, closing the inlet valve. The compressor will continue to run matching air demand with air delivery by constantly adjusting the position of the inlet valve. The inlet valve regulates compressor capacity between 100% and nearly 0% of rated delivery. When maximum pressure (typically 10 PSIG above normal full load pressure) has been obtained in the air system, complete compressor unloading occurs. The pressure transducer located in the control panel sends a signal to the control and the solenoid valve opens, venting the residual pressure from the blowdown valve. At the same time, control air from the reservoir check valve is directed through the solenoid to the inlet valve air cylinder.

The inlet valve is held in a closed position, preventing the intake of air into the compressor and serving as a check valve preventing reverse air/fluid flow through the inlet valve and air filter. See control schematic in parts manual.

Auto/Dual Standard

The Auto/Dual system is standard on the Quincy QSF Compressor.

The control uses a programmable timer to shut the compressor down if it stays unloaded for the programmed time period. The timer should be set during unit start up for a minimum of six (6) minutes.

During the unloaded/timing mode, if plant pressure should drop causing the electronic control to load the compressor, the timer will reset.

! WARNING !

Never assume it is safe to work on the unit because it is not operating. It may be in the automatic stand-by mode and may restart at any time. Follow all safety instructions in the "Preparing for Maintenance" or "Service" chapters.

Electrical System Description

A diagram of the electrical system is shown in the parts manual sent with the compressor. A wiring diagram is also included in the control panel on all Quincy QSF compressors.

NOTE:

Due to continuing product improvements and updates, it is suggested that the wiring diagram included in the control panel be used when servicing the electrical control.

NOTE:

Standard drive motors are open drip proof 1800 RPM with a maximum ambient temperature rating of 104^{0}F. They are not suitable for salt laden, corrosive, dirty, wet or explosive environments.

The QSF series compressors utilize 460V incoming power through a magnetic motor starter. A transformer in the control panel reduces this voltage to 120 VAC for the various controls on the unit, which is then reduced to 24 volt for the electronic controls. These controls include the pressure transducer, high air temperature switch and probe, solenoid valve and the various indicator lights. Other incoming line voltages are available as options. The compressor is provided with a NEMA 1 enclosure. Optional panels include NEMA 4.

Air-cooled models utilize a second magnetic starter for the fluid cooler fan motor. If the fan motor starter overload trips out for any reason, the compressor unit will shut down.

! WARNING !

High voltage could cause death or serious injury. Disconnect all power supplies before opening the electrical enclosure or servicing.

Safety Sensors

Two high air temperature **(HAT)** sensors are standard on the QSF units. These sensors protect the unit by sensing unusually high temperatures and shutting the unit down. One is located in the discharge line from the compressor. The second sensor is located at the minimum pressure check valve. These non-adjustable sensors are set to trip at approximately 225^{0}F.

! WARNING !

Never remove, bypass or tamper with this HAT switch. Failure to provide this safety feature could cause death, serious injury and/or property damage. If the compressor is shutting down due to high discharge temperature, contact a qualified service technician immediately.

Indicators

Main Power Light On

Indicates power from the main disconnect switch has been turned on and there is live power at the compressor starter and control panel. This light will remain on as long as there is power to the unit.

! CAUTION !

Always check power supply disconnect. The Power-on light may be inoperable.

High Discharge Air Temperature Light

Indicates the unit has sensed an unusually high discharge temperature.

Motor Overload Fault

Indicates excessive over amp of drive motor and fan motor if air-cooled.

Fluid Filter Change Light

This is used to determine fluid filter change intervals on the QSF, as programmed by the operator. It also indicates excessive pressure differential across the fluid filter on the standard QSF.

Air/Fluid Separator Element Change Light

This is used to determine separator element change intervals on the QSF, as programmed by the operator. It also indicates excessive pressure differential across the air/fluid separator element on the standard QSF.

Air Intake Filter Change Light

This indicator signals when the filter element needs to be cleaned or replaced on the QSF.

NOTE:

Both the standard and stock versions include a programmable change interval timer on the air filter, fluid filter and the air/fluid separator element.

Receiving

Upon receipt of the compressor, immediately inspect the compressor for any visible damage which may have occurred in shipment. If visible damage is found at the time of delivery, be sure the delivering carrier makes a notation on the freight bill and request a damage report. If the shipment is accepted and it is later found that the compressor unit has been damaged, this is classified as concealed damage. If concealed damage is found, report it within 15 days of delivery to the delivering carrier, who must prepare a damage report. Itemized supporting papers are essential to filing a claim.

Read the compressor nameplate to be sure the compressor is the model and size ordered and that optionally ordered items are included.

Check the reservoir and pressure relief valves to be sure they are adequate for the pressure at which you intend to operate.

Moving the Unit to the Installation Site

When a forklift is used to move the unit to its installation site, use forklift slots provided in one side and one end of the main frame. Use of chains and slings should be limited to the main frame. Do not attempt to lift the unit by attachment to any components. Optional lifting eyes are available.

NOTE:
See technical data pages for detailed technical information and dimensions.

! CAUTION !

Improper lifting can result in component of system damage or personal injury. Follow good shop practices and safety procedures when moving the unit.

Location

Locate the compressor on a level surface that is clean, well lit and well ventilated. Allow sufficient space (four feet of clearance on all sides and top of the compressor) for safe and proper daily inspection and maintenance. The entire length of the frame base must be supported. Shim where necessary but do not use wood. Ambient temperature should not exceed 110^0 F. (Failure to heed this may result in a high air temperature shutdown.) Careful consideration of room size and shape must be done so that hot exhaust air from the cooling fan does not recirculate within the room, causing the operating temperatures to rise. High temperature shutdown may result. All models are intended for indoor installation; however, it is possible, with certain modifications, to accommodate some outdoor locations. Cabinet models are water-resistant but not water tight. Sheltering from rain, snow and freezing temperatures is mandatory.

! CAUTION !

This compressor should not be operated in temperatures below 32 °F or above the limits outlined in the technical data section.

Do not locate the unit where the hot exhaust air from other compressors or heat generating equipment may be drawn into the unit. Never restrict the flow of exhaust air from the fluid cooler. The heated exhaust air must be exhausted to the outside to prevent high ambient conditions in the room. If the room is not properly ventilated, the compressor operating temperatures will increase and cause the high temperature probe to shut the unit off.

! CAUTION !

Clean, fresh air of sufficient quantity is required for proper compressor operation.

! WARNING !

Never locate the compressor system inlet where it can ingest toxic, volatile or corrosive vapors, air temperatures exceeding 110° F, water or extremely dirty air. Taking in any of the above would jeopardize the performance of the equipment or pose a health hazard to all personnel exposed to the total compressed air system.

In high humidity areas, avoid placing the compressor in a basement or other damp locations. Control the compressor temperatures and monitor compressor fluid for signs of water contamination. Fluid and filter changes may need to be increased in high humidity areas. Increased operating temperatures may be required.

! CAUTION !

Removal or modification of sound insulation will result in high sound levels which may be hazardous to personnel.

The Quincy QSF models are essentially vibration free; however, some customers may choose to bolt the unit to the floor to prevent the accidental breakage of piping or electrical connections as a result of being bumped. Only use lag bolts to locate the unit. Do not pull the bolts down tight as this may, under certain circumstances, place the frame in a twist or bind causing eventual breakage of fluid coolers, piping and reservoirs.

Piping Connections

Never join pipes or fittings by soldering. Lead-tin solders have low strength, a low creep limit, and may, depending on the alloy, start melting at 360°F. Silver soldering and hard soldering are forms of brazing and should not be confused with lead-tin soldering. Never use plastic, PVC, ABS pipe or rubber hose in a compressed air system.

Piping Fit -up

Care must be taken to avoid assembling the piping in a strain with the compressor. Piping should line up without having to be sprung or twisted into position. Adequate expansion loops or bends should be installed to prevent undue stress at the compressor resulting from the changes between hot and cold conditions. Pipe supports should be mounted independently of the compressor and anchored, as necessary, to limit vibration and prevent expansion strains. In no case should the piping be of smaller size than the connection on the compressor unit.

Relief Valves

Pressure relief valves are sized to protect the system. Never change the pressure setting or tamper with the valve. Only the relief valve manufacturer or an approved representative is qualified to make such a change.

! DANGER !

Relief valves are to protect system integrity in accordance with ANSI/ASME B19 safety standards. Failure to provide properly sized relief valves will result in death or serious injury.

Relief valves are to be placed ahead of any potential blockage point, which includes, but is not limited to, such components as shut-off valves, heat exchangers and discharge silencers. Ideally, the relief valve should be threaded directly into the pressure point it is sensing, not connected with tubing or pipe and pointed away from any personnel. Always direct discharge from relief valves to a safe area away from personnel.

Relief Valve

Pressure Vessels

Air receiver tanks should be in accordance with ASME Boiler and Pressure Vessel Code Section VIII.

! WARNING !

ASME coded pressure vessels must not be modified, welded, repaired, reworked or subjected to operating conditions outside the nameplate ratings. Such actions will negate code status, affect insurance status and will cause death.

Electrical

Before installation, the electrical supply should be checked for adequate wire size and capacity. During installation, a suitable fused disconnect switch or circuit breaker should be provided. Where a 3-phase motor is used to drive a compressor, any unreasonable voltage unbalance (5%) between the legs must be eliminated and any low voltage corrected to prevent excessive current draw. The installation, electric motor, wiring and all electrical controls must be in accordance with National Electric Code, and all state and local codes. A qualified electrician should perform all electrical work. **This unit must be grounded in accordance with applicable codes.** See control panel for the proper wiring diagram.

Quincy would like to emphasize the importance of providing adequate grounding for air compressors. The common practice of grounding units to building structure steel may not actually provide adequate grounding protection, as paint and corrosion build-up may exist.

! CAUTION !

NEMA electrical enclosures and components must be appropriate to the area in which they are installed.

Pneumatic Circuit Breakers or Velocity Fuses

The Occupational Safety and Health Act, Section 1926.303 Paragraph 7 published in Code of Federal Regulations 29 CFR 1920.1 revised July 1, 1982, states "all hoses exceeding 1/2" inside diameter shall have a safety device at the source of supply or branch line to reduce pressure in case of a hose failure." These pneumatic safety devices are designed to prevent hoses from whipping, which could result in a serious or fatal accident.

Guards

All mechanical action or motion is hazardous in varying degrees and needs to be guarded. Guarding shall comply with OSHA Safety and Health Standards 29 CFR 1910.219 in OSHA manual 2206 Revised November 7, 1978 and any state or local codes.

Manual Vent and Shutoff Valve

Install a manual valve to vent the compressor and the compressor discharge line to atmosphere. In those instances where the air receiver tank services a single compressor, the manual valve can be installed in the receiver. When a manual shut-off valve (block valve) is used, a manual valve should be installed upstream from the valve, and a pressure relief valve installed upstream from the manual vent valve. These valves are to be designed and installed as to permit maintenance to be performed in a safe manner. Never substitute a check valve for a manual shut-off valve (block valve) if the purpose is to isolate the compressor from a system for servicing.

! CAUTION !

Removal or painting over safety labels will result in uninformed conditions. This could result in personal injury or property damage. Warning signs and labels shall be provided with enough light to read, conspicuously located and maintained for legibility. Do not remove any warning, caution or instructional material attached.

Water and Sewer Facilities at the Installation Site (Water-cooled models only)

Make sure the water supply is connected and open. Piping supplied by the user should be at least equal to the connections provided on the compressor. Sewer facilities should be readily accessible to the installation site and meet all the requirements of local sewer codes, plus those of the compressor. **Make absolutely sure water inlet and discharge connections are correct. NOTE: The water temperature-regulating valve is located in the discharge water line. Water pressure should be 40 PSI minimum/100 PSI maximum. Water temperature should be 50°F minimum/90°F maximum.**

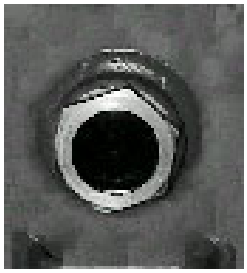
Clean air is essential for your Quincy QSF compressor. Always select a source providing the cleanest air possible. When an outside air source is used, keep all piping as short and direct as possible. Use vibration isolators and support all piping correctly. Piping size should be at least as large as the inlet valve opening and increased several sizes for extremely long piping runs. The piping must be leak free and absolutely clean after fabrication.

! WARNING !

Relieve compressor and system air pressure by opening the appropriate manual relief valve prior to servicing. Failure to relieve all system pressure could result in death, serious injury and property damage.

Fluid Level

The compressor is filled at the factory with the correct amount of fluid. A fluid tag is provided with the information concerning the initial fill of fluid. Fluid level is monitored by sight glass while in operation. Fluid level should be between the maximum and minimum level while in operation. **DO NOT OVER FILL.** The fluid level should be maintained in the run zone.



Fluid Level Sight Gauge

Compressor Rotation

The compressor rotation must be checked prior to start-up. Proper rotation is counter-clockwise as viewed from the power-input end. The power-input end of the compressor is marked with an arrow noting the proper rotation. Failure to operate the compressor in correct rotation will result in extreme damage to the compressor and warranty coverage will be voided. Briefly jog the starter button allowing the motor to turn 2 or 3 revolutions. Observe the drive element for correct direction. If incorrect rotation is observed, lock out power supply, reverse electrical leads L_1 and L_3 at the motor starter. Re-check for correct rotation.

NOTE:

Operating more than one second in reverse rotation may cause damage to the airend.

Fan Rotation (Air-cooled only)

After checking the compressor rotation, also check the fan rotation. Fan airflow should be outward, that is, pushing the air through the coolers.

! CAUTION !

Provisions should be made to have the instruction manual readily available to the operator and maintenance personnel. If, for any reason, any parts of the manual become illegible or if the manual is lost, have it replaced immediately. The instruction manual should be read periodically to refresh one's memory. This may prevent a serious accident.

Prior to Starting

Before starting the unit, review Sections II and III of this manual and be certain that all installation requirements have been met and that the purpose and use of each of the controls, warnings are thoroughly understood. The following checklist shall be adhered to before placing the compressor into operation:
Remove all loose items and tools from around the compressor installation.

- Check fluid level in the air/fluid reservoir. See Lubrication Section.
- Check the fan and fan mounting for tightness.
- Manually rotate the compressor through enough revolutions to be certain there are no mechanical interferences.
- Check all pressure connections for tightness.
- Check to make sure all relief valves are in place.
- Check to make sure all panels and guards are in place and securely mounted.
- Check fuses, circuit breakers and thermal overloads for proper size.
- After all the above conditions have been satisfied, close the main power disconnect switch, jog the starter switch button to check the rotational direction of the compressor. The compressor must rotate counter-clockwise when facing the compressor from the shaft end. Check the fan rotation, air flows through the coolers.
- Water-cooled models - Check inlet and discharge water piping for proper connections.
  NOTE: The water temperature-regulating valve is located in the discharge water line.

NOTE:
Please read detailed instructions in Section III prior to startup. Failure to follow instructions may void the warranty.

Starting the Compressor

- Open the service valve to the plant air distribution system.
- Select the mode of operation and start the compressor.
- Watch for excessive vibration, unusual noises or air/fluid leaks. If anything unusual develops, stop the compressor immediately and correct the condition.
- Control settings have been adjusted at the factory; however, they should be checked during start-up and readjusted, if necessary. Some applications may require a slightly different setting than those provided by the factory. Refer to the Service Adjustment Section VII. **Never increase air pressure settings beyond factory specifications.**
- Adjust the water temperature regulating valve to maintain 180°F discharge air temperature (water-cooled units only).
- Observe compressor operation closely for the first hour of operation and frequently for the next seven hours. Stop and correct any noted problems.

Stopping the Compressor - Normal Operation

- Close the service valve to the plant air distribution system.
- Allow the pressure to build within the reservoir and the compressor to fully unload.
- Press the stop button on the keypad.

NOTE:

It is always a good practice to close the service valve when the compressor is not being used. It will prevent the system's air pressure from leaking back into the reservoir if the check valve leaks or fails.

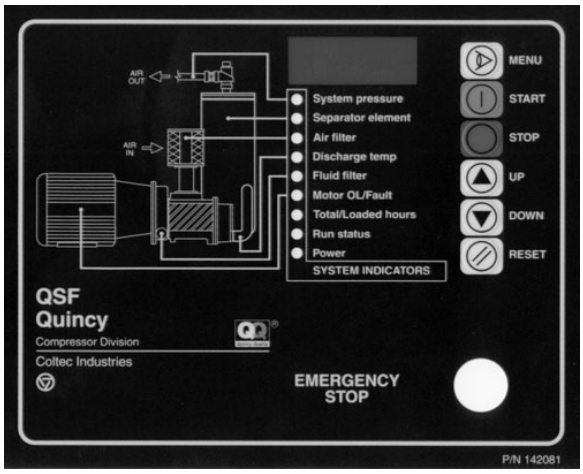
Stopping the Compressor - Emergency

- Press the emergency stop button or remove the power at the main disconnect switch or panel.

Electronic Control Operations

This manual describes the operation of the microprocessor control on the QSF Air Compressor.

The decal at the right shows the control layout for the electronic control panel.



The primary controls are on the right hand side of the panel, with the selected item being displayed on the LED digits in the top window.

The LED lamps in a vertical row, show the selected display parameter and/or any alarm conditions.

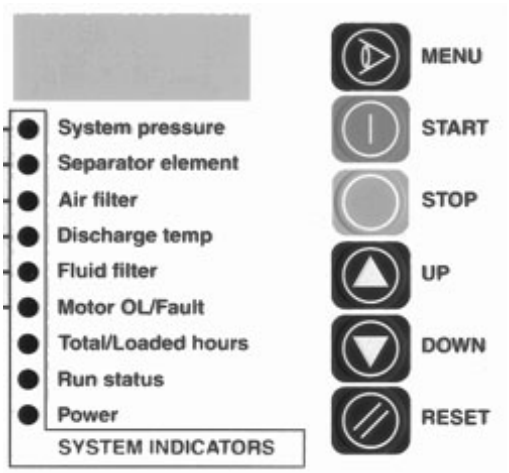
On applying system power, the LED status lights will blink and the numeric display will show the version number of the software code installed. The system will be ready to run, with the 'POWER' lamp on (showing that the control board has power) and the 'SYSTEM PRESSURE' LED will be lit, showing the pressure on the numeric display.

NOTE: A flashing '----' on the digit display, accompanied with an LED on the left, will signify a faulty sensor; either the pressure transducer or the temperature probe.

A **FAST** blinking LED indicates that the labeled function has been tripped; an over-pressure condition or motor overload or Reservoir High Air Temperature (HAT) trip.

A **SLOW** blinking LED indicates that a Differential Pressure (D.P) switch has been tripped. A **STEADY** LED indicates a service timeout, along with a message blinking on the display. The controller is programmed with recommended service intervals on the FLUID FILTER and the AIR filter. These filters should be checked and serviced when convenient.

Basic Controls:



1) MENU - This button scrolls through the set parameters as indicated by the LED lamps to the left, in the following order:
a) System Pressure (default)
b) Discharge Temperature
c) Running Hours; Shows 'run' followed by the hours in alternating form.
d) Loaded Hours; Shows 'load' followed by the hours in alternating form.
e) Separator Hours: 'SEPA', followed by the hours in alternating form.
f) Air Filter Hours; shows 'AIr.f' followed by the hours in alternating form.
f) Fluid Filter Hours; shows 'Flu.f' followed by the hours in alternating form.
g) Fluid Service/Sample Hours; ' FLu' followed by the hours in alternating form.

2) START will start the compressor, if no fatal faults are present (open sensor or overloads etc).

NOTE:
The RUN STATUS LED will be ON to show that a start cycle is in progress. The compressor will not start if the line pressure is above the load point; the compressor will start when the line pressure drops below the load point. If the compressor is waiting to start, the 'Run Status' LED will flash rapidly.

3) STOP will initiate a controlled stop on the compressor. The stop cycle will take about 5 seconds to complete, as the system has to unload and blow-down prior to halting the motor.

4) UP and DOWN are used to select parameters in the setup menus.

5) RESET is used to clear fault or service conditions from the display panel.

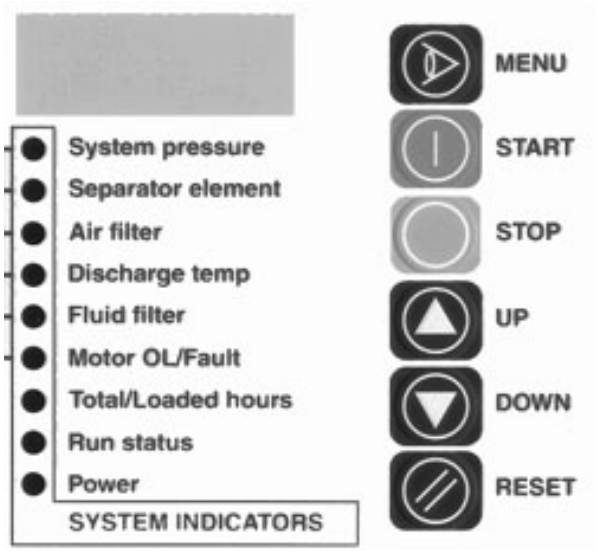
System Indicators:

RUN STATUS indicates that the compressor is in a run state. Steady indicates that the compressor is running. If this light is flashing, and the compressor is in a stopped condition, the compressor will re-start at any time. This also indicates that the compressor is about to start, when the auto-restart option is enabled.

LOAD/UNLOAD: The left-most digit on the numeric display will show 'L' when the compressor is loaded, and 'U' when unloaded.

Program Setup Menus

The program setup menus are accessed by holding both the UP and DOWN keys in, until the LED lamps on the left start to flash. Release the UP and DOWN keys, and when the numeric display shows -00- flashing, use the up key to select the desired menu (1, 2, 3 are user menus)



MENU 01: Basic operating Parameters.

LED-1: Use the MENU key to select the UNLOAD pressure, as indicated by a 'U' at the left-most digit. Use the UP or DOWN keys to adjust.
NOTE: Value is latched when display is no longer blinking.

Use the MENU key to then select the LOAD pressure, as indicated by a 'L' at the left-most digit. Use the UP or DOWN keys to adjust.

LED 2: This allows the adjustment of the wye-delta (Y/D) time on the contactor: this is set to optimum at the factory.

LED 4: This is the AUTO-DUAL timer setting. This is how long the compressor will run in an un-loaded state before shutting down (Minutes). If the delivery pressure falls below the LOAD setting, the compressor will start up. A 'd' will show in the left-most digit of the display.

LED 6: This is the *auto-restart* delay in Seconds. This is the time that the compressor will delay on power-up, before resuming operation. A 'r' will show at the left-most digit Set to 0 if no auto restart required. NOTE: AUTO-RESTART *refers to the automatic starting of the compressor on power application.*

MENU 02: Filter Service Hours.

LED 1: This is the Separator service hours setup. The display will show the hours remaining, alternating with 'SEPA'. On servicing the air filter, this counter is set to the desired service interval.

LED 2: This is the Air Filter service hours setup. The display will show the hours remaining, alternating with 'AIr.F'. On servicing the air filter, this counter is set to the desired service interval. An 'A' will blink at the left side of the display on time-out.

LED 4: This is the Fluid filter service hour setup.
The display will show the hours remaining, alternating with 'FLu.F'. Use the UP or DOWN keys to adjust this value to the desired range. An 'F' will blink at the left side of the display on time-out.

LED 6: This is the Fluid Sample/Service hours setup. The display will show the hours remaining, alternating with ' FLu'. On servicing the Fluid filter or taking a sample, this counter should be re-set to the desired service interval.

The LED's described above, will blink on the service intervals reaching '00'.

As before, the setting is 'taken' when the display reading is steady.

MENU 03: Display Units and Model Type.

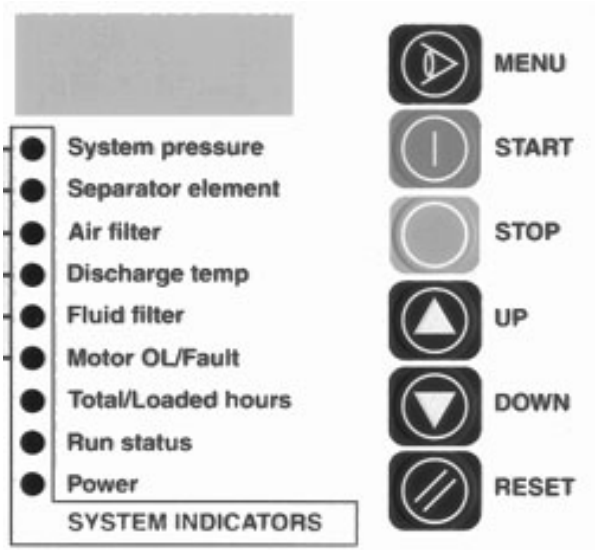
LED 1: Selects the Pressure display in PSIG or BAR.

LED 2: Selects the Temperature Display in 'F or 'C.

LED 4: Selects Compressor Model : QSF or QSB/QMB.

LED 6: Reset or Preset the Running Hours.

LED 7: Sets the I.D. of the compressor. This is used in the Networked control option (future product).



As before, the setting is 'taken' when the display reading is steady.

Faults:

1) EMERGENCY STOP: Pressing this button will cause the immediate halting of compressor operation. This is a redundant control; the microcontroller is signaled to halt operations and power is removed from all control relays, causing all circuits to open up. The LED indicators at the side of the panel will flash and 'STOP' will flash on the numeric display.

To reset, twist the stop button to release from the latched condition and press the RESET control button.

The redundant over-temperature HAT switch will also trip the same way as the EMERGENCY STOP, as it is part of the same circuit. This will trip if the discharge temperature exceeds the pre-set point. In this case, the emergency stop button is NOT engaged, and the display may be cleared with the RESET button.

2) CONTACTOR FAULT: The side LED's will flash if the main contactor fails to close properly or fails to open in a controlled shutdown (Motor OL/Fault LED).

LED & Message Indicators:

1) Excessive pressure Error: Top LED flashes fast.

2) Separator Element clogged: Second LED flashes slowly.

3) Air Filter Clogged: Third LED Flashes slowly.

4) Air Filter timer expired: Third LED is steady, and message 'AIRF' flashes on the display.

5) Excessive Temperature: Fourth LED flashes slowly.

6) Temperature error (broken wire etc.): Fourth LED flashes fast.

7) Fluid Filter clogged: Fifth LED flashes slowly.

8) Fluid timer expired: Fifth LED is steady, and message 'FLUI' flashes on the display.

9) Motor Overload: Sixth LED flashes fast.

10) Power line glitches (loss of cycles > 40ms), left 3 bars in the display flash, possible problems in the 3 phase power supply.

Service Replacements:

Prior to attempting any repairs of the electronic control or related components, disconnect and lock out all power supplies to the compressor plus any remote controllers. Assure yourself that power is removed from the compressor by checking for any AC voltage at the line side of the motor starter.

Replacing sensors or transducers:

To replace a temperature sensor (H A T probe), disconnect conduit from elbow of probe. Cut wires and remove probe from discharge tube. Install new probe into discharge tube. Connect wires of new probe to existing wires using suitable splice and insert in to conduit. Connect conduit to elbow of probe. Complete H A T test and assure system functions correctly.

To replace a pressure transducer, open enclosure door. The pressure transducer is located in the upper left-hand comer of the panel. Remove wire channel cover. Trace wires from transducer to the microprocessor. NOTE: Prior to touching any portion of the printed circuit board, you will need to ground yourself to remove any static electricity using a grounding wrist strap. After assuring the compressor is properly grounded, you may clip the grounding wrist strap to any exposed metal on the frame of the compressor. Disconnect transducer wires at microprocessor. Remove transducer from Delrin bushing. Replacement of the Delrin bushing is recommended any time a transducer is replaced. Install new Teflon bushing and transducer. Connect transducer wires to microprocessor and reinstall wire channel cover.

Replacing electronic control:

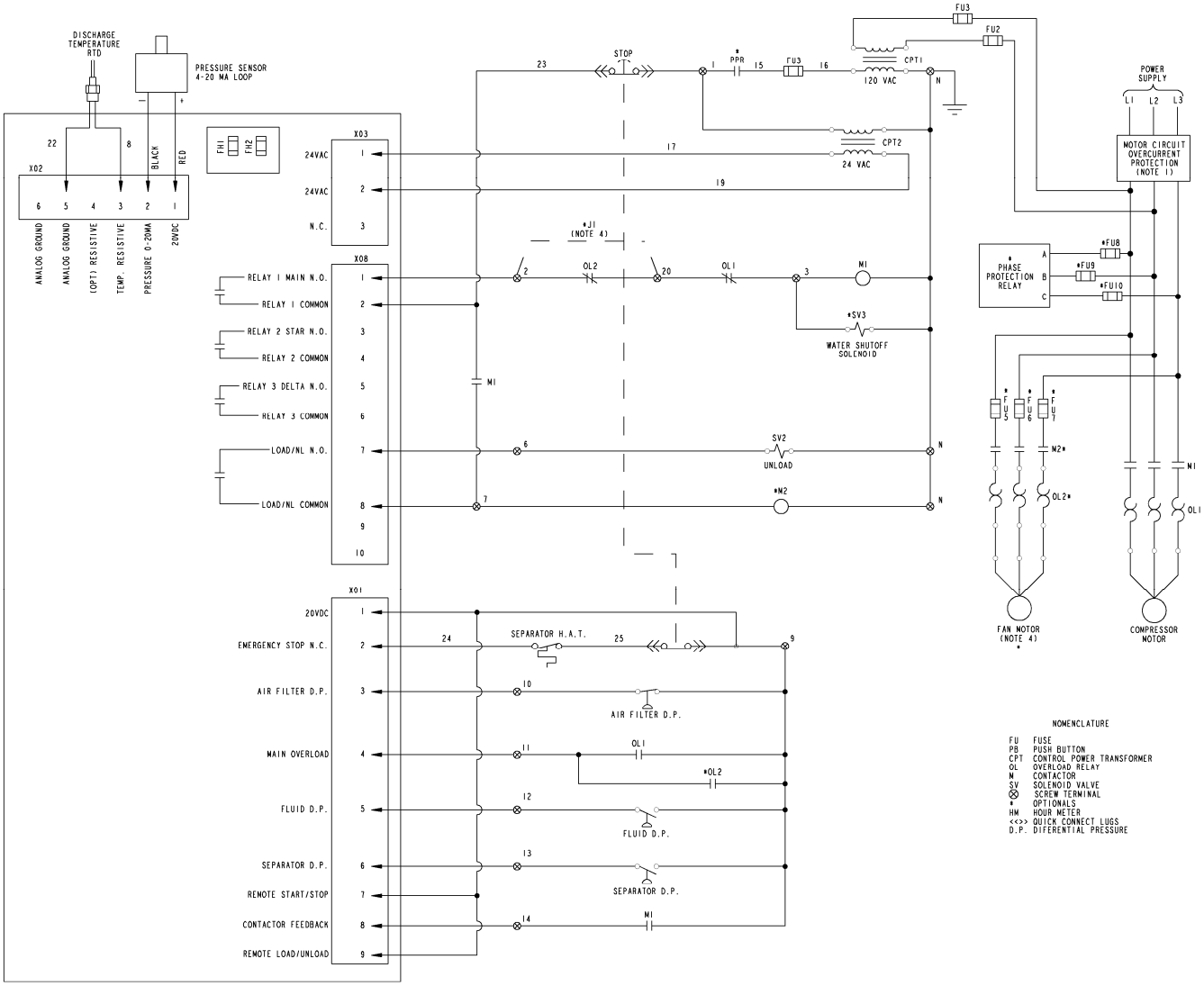
NOTE: Prior to touching any portion of the printed circuit board, you will need to ground yourself to remove any static electricity using a grounding wrist strap. After assuring the compressor is properly grounded, you may clip the grounding wrist strap to any exposed metal on the frame of the compressor.

Prior to replacing electronic control, it will be necessary to gather and retain information regarding total running hours, separator hours, air filter hours, fluid filter hours and fluid service/sample hours. This data will be transferred to the replacement control prior to start-up.

To replace the electronic control, remove screws attaching control to door of enclosure. Remove and discard wire tie-wraps. NOTE: Prior to removing any wiring from the electronic control, identify individual wire location. Refer to electrical wiring diagram. Install new electronic control panel and install wiring in accordance with electrical wiring diagram. Attach to door of enclosure using existing hardware. Install new wire tie-wraps to secure wiring to wire bundle.

Operational test:

Remove tag and lock out tools. Restore power to unit. If electronic control was replaced, refer to the Program Setup Menu to program the replacement electronic control. Once completed, perform an operational test to assure unit is operating correctly.



NOTES-UNLESS OTHERWISE SPECIFIED:
1) AT INSTALLATION THE CUSTOMER IS TO PROVIDE DISCONNECT AND BRANCH CIRCUIT OVERCURRENT PROTECTION IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE AND/OR ANY LOCAL CODES HAVING PRECEDENCE.
2) UNLESS OTHERWISE SPECIFIED ALL WIRES ARE RED EXCEPT "N" WIRES ARE WHITE AND "G" WIRE IS GREEN.
3) ALL PUSH BUTTONS, SELECTOR SWITCHES,HOURMETER, AND INDICATOR LIGHTS ARE LOCATED IN THE CONTROL PANEL
4) FAN MOTOR USED ON ALL AIR-COOLED UNITS AND ON WATER-COOLED UNITS WITH CABINET. JUMPER TO BE PLACED BETWEEN TERMINALS 2 AND 20 ON WATER-COOLED UNITS.

Preparing for Maintenance or Service

! WARNING !

Never assume the compressor is ready for maintenance or service because it is stopped. The automatic control may start the compressor at any time. Death or serious injury may result.

The following procedure should be used for maximum safety when preparing for maintenance or service.

1. Disconnect and lockout the main power switch and hang a sign at the switch of the unit being serviced.

2. Close shut-off valve (block valve) between receiver and plant air system to prevent any back up of airflow into the area to be serviced. NEVER depend upon a check valve to isolate the system.

3. Open the manual vent valve and wait for the pressure in the system to be completely relieved before starting service. DO NOT close the manual vent valve at any time while servicing.

4. Shut off water and depressurize system if water-cooled.

NOTE:
Only trained and qualified technicians should perform maintenance.

Safety

Safety procedures performed while servicing the compressor are important to both the service personnel at the time of servicing and to those who may be around the compressor and the system it serves. Listed below are some, but not all, procedures that should be followed:

- Wait for the unit to cool before starting service. Temperatures may exceed at 180°F when the compressor is working.
- Clean up fluid spills immediately to prevent slipping.
- Loosen, but do not remove, flange or component bolting. Then, carefully pry apart same to be sure there is no residual pressure before removing the bolting.
- Never use a flammable solvent such as gasoline or kerosene for cleaning air filters or compressor parts.
- Safety solvents are available and should be used in accordance with their instructions.

! CAUTION !

Unusual noise or vibration indicates a problem. Do not operate the compressor until the source has been identified and corrected.

Lubrication

Each unit comes equipped with a fluid level sight gauge, fluid fill opening, and a fluid drain located in the reservoir. **The fill plug is drilled to allow some pressure to escape before the plug is completely removed. Should you hear pressurized air venting through this hole, immediately screw the plug back in to the reservoir. Relieve the pressure before proceeding.**

Each unit is factory filled with QuinSyn IV synthetic fluid or QuinSyn F (food grade) synthetic fluid. The use of other brands or types of fluid may reduce the design life of the compressor or cause problems with filtration or carryover. Consult the Quincy factory before changing brands of fluid.

! WARNING !

Hot fluid under pressure could cause death or serious injury. Do not remove the fluid fill plug and attempt to add fluid to the air/fluid reservoir while the compressor is in operation or when the system is under pressure. Be sure that the compressor's red mushroom stop button is pushed in and locked, and that the main power disconnect switch is in the off position and locked out to assure that the compressor will not start automatically or by accident.

Fluid Specifications

We recommend that all Quincy gear drive rotary screw compressors be filled with QuinSyn IV or QuinSyn synthetic fluid. QuinSyn IV or QuinSyn is available from any authorized Quincy distributor. For applications requiring a food grade fluid, we recommend QuinSyn F. Sustained (3 hours or more) of discharge temperatures over 210°F, require the use of QuinSyn HP fluid.

Failure to follow the above recommendation will adversely affect your warranty.

Fluid Life

QuinSyn IV fluid can be used up to 4,000 hours depending upon application and recommendations from the fluid analysis. QuinSyn fluid can be used up to 8000 hours; QuinSyn F (food grade) can be used between 2,000 and 3,000 hours under good operating conditions. Draining of the fluid should be done while the fluid is hot to carry away more impurities. It is strongly suggested that a reputable fluid analysis program be followed to establish fluid change intervals.

A free service provided with the use of QuinSyn IV fluid is a fluid analysis. This analysis provides the end user with important information regarding the performance of the fluid and in detecting any special problems that might arise. Fluid samples should be taken at the time of fluid filter changes or at 1,000-hour intervals or sample as directed by analysis report. Fluid sample bottles, labels and instructions are provided with the compressor package at the time of shipment. Additional sample bottles may be purchased through your distributor.

Water Removal

Water vapor may condense in the separator reservoir and must be removed. The frequency with which water must be removed is determined by the ambient air conditions. During hot and humid conditions, water should be drained off the bottom of the reservoir daily. In cold and dry conditions, water may only need to be drained weekly. To drain water from the reservoir, turn the compressor off and let set for at least 5 minutes. Then open the drain valve. Water is heavier than the compressor fluid and will collect at the bottom of the reservoir. When the drain is first opened some compressor fluid may come out before the water starts to flow. Close the valve when the water flow changes to compressor fluid. Make certain that there is no pressure in the reservoir before opening the drain valve.

Understanding the Analysis Report

a) REPORT DATE - The date that the fluid was analyzed.

b) REPORT NUMBER - The assigned number to this report.

c) CUSTOMER ADDRESS - The name and address of person that this report is being mailed to. This information is being taken from the sample bottle as it is received.

d) CUSTOMER - The owner of the unit that sample came from.

e) COMPRESSOR MANUFACTURER - Brand of compressor sample taken from.

f) FLUID TYPE - This should always be QuinSyn IV or QuinSyn F fluids.

g) SERIAL NUMBER - The unit serial number of the Quincy compressor the fluid sample was taken from.

h) MODEL NUMBER - The model number of the Quincy compressor that the fluid sample was taken from.

i) HOURS ON FLUID - These are the actual hours that the QuinSyn IV has been in the unit since the last fluid change.

j) HOURS ON MACHINE - This is the total hours on the compressor hourmeter.

k) SAMPLE DATE - The date that the sample was taken from the compressor.

NOTE:
Items (c through k) are information provided by the service person supplying the fluid for analysis. Incomplete or incorrect information will affect the report's accuracy.

l) EVALUATION - This is a brief statement made by the technician performing the actual fluid analysis. This statement addresses the condition of the fluid and filter. This statement will also note any problems that need attention.

m) PHYSICAL PROPERTIES RESULTS - Particle size is measured in microns.

n) SPECTROCHEMICAL ANALYSIS - See parameters page.

Fluid levels should fill the sight level gauge while the compressor is in operation. **DO NOT OVERFILL.** Operating over full will result in high fluid carryover.

PRODUCT ANALYSIS REPORT

(a)

(b)

Customer	(d)
Comp. Mfr.	(e)
Fluid Type	(f)
Serial Number	(g)
Model Number	(h)
Hrs. on Fluid	(i)
Hrs. on Machine	(j)
Sample Date	(k)
I.D. #	

(c)

Evaluation: (1)

Physical Properties* Results (m)

Water by Karl Fischer (ppm)	Viscosity 40° C (cSt)	TAN Total Acid #	Particle Count								ISO Code	Antioxidant Level
			5 um	10 um	15 um	20 um	25 um	30 um	35 um	40 um		

* Property values, not to be construed as specifications

Spectrochemical Analysis (n)

Sample Date (Fluid Hours)	Values below are in parts per million (ppm)																	
	Silver (Ag)	Alum. (Al)	Chrom (Cr)	Copp. (Cu)	Iron (Fe)	Nickel (Ni)	Lead (Pb)	Tin (Sn)	Titan (Ti)	Vanad (V)	Bari (Ba)	Calc. (Ca)	Mag. (Mg)	Mol. (Mo)	Sod. (Na)	Phos. (P)	Sili. (Si)	Zinc (Zn)

Quincy Compressor Fluid Analysis
2300 James Savage Road
Midland, MI 48642-6535

Thank you for this opportunity to provide technical assistance to your company. If you have any questions about this report please contact us at 1-800-637-8628 or fax 1-517-496-2313.

*means this parameter not tested

Accuracy of recommendations is dependant on representative fluid samples and complete correct data on both unit and fluid.

CC List

FLUID PARAMETERS
QuinSyn, QuinSyn IV & QuinSyn F

Property	Units	Test Method	New Fluid	Marginal	Unacceptable
Viscosity	cSt	ASTM D-445	42-48	38-42, 48-52	<38, >52
40°C					
Antioxidant	%	Liquid Chromatography			
Acid No.	mg KOH/gm	ASTM D-947	0.1	0.8	>0.9
TAN					
Phosphorus	PPM	Plasma Emission	0	0-20	>20
Zinc	PPM	Plasma Emission	0	0-20	>20
Calcium	PPM	Plasma Emission	0	0-20	>20
Barium	PPM	Plasma Emission	0	0-20	>20
Iron	PPM	Plasma Emission	0	5-10	>10
Copper	PPM	Plasma Emission	0	5-10	>10
Lead	PPM	Plasma Emission	0	5-10	>10
Tin	PPM	Plasma Emission	0	5-10	>10
Aluminum	PPM	Plasma Emission	0	5-10	>10
Silicon	PPM	Plasma Emission	0	10-15	>15
Molybdenum	PPM	Plasma Emission	0	0-20	>20
Water	PPM	Karl Fisher	<100	75-175	>200
Particle Count	Microns	Hiac Royco			
ISO CODE			16/14	XX/19	XX/19

! WARNING !

Do not mix different grades or types of fluid. Do not use inferior grades of fluids. Use only QuinSyn HP if discharge air temperatures exceed 210 f for more than 3 hours. Failure to follow these recommendations will cause serious fluid breakdown, resulting in the information of heavy varnish and sludge throughout the system. This will result in clogging the fluid separators, coolers and internal fluid passages. Warranty will be voided.

Fluid Filter

The fluid filter is a spin on, full flow unit. Replacement of the filter requires spinning off the complete cartridge and replacing it with a new one.

USE GENUINE QUINCY REPLACEMENT FILTERS ONLY.

The initial filter change should occur after the first 500 hours of operation. During normal service, the filter cartridge should be replaced under the following conditions, **whichever occurs first**:

- As indicated by the fluid filter maintenance indicator when the fluid is up to it's operating temperature.
- Every 1,000 hours.
- Every fluid change.

NOTE:

The fluid filter maintenance indicator may read high upon start up on cool mornings due to sluggish fluid creating higher than normal differential pressures. Monitor indicator after the fluid warms up.

Spin-On Fluid Filter

Compressor Air/Fluid Separator Element

The element is a one piece construction that coalesces the fluid mist, as it passes through the filtering media, into droplets that fall to the bottom of the separator element to be picked up by a scavenging tube and returned to the compressor. Care must be taken in handling the separator element to prevent it from being damaged. Any denting may destroy the effectiveness of the filtering media and result in excessive fluid carryover. Even a very small hole punctured through the element will result in a very high carryover of fluid.

! WARNING !

QSF-50 thru 150 horsepower:
Do not remove the staples from the separator element. Their function is to prevent an electrostatic build-up, which could spark a fire. Use genuine Quincy replacement separators.

Continuity Testing of Separator Elements

NOTE:

Electrical continuity between all separator element metal surfaces must be checked prior to replacing any separator element. Do not install if continuity is not present. Return the separator element to your Quincy distributor for replacement.

Prior to installation, test the separator element as follows:

1) Locate a continuity test light or a volt-ohm-meter (v-o-m) capable of reading 20 ohms.
2) Assure that the battery has proper charge. Touch the probe leads together to assure the light works or to zero calibrate the meter.
3) Contact the grounding staple (on the separator element gasket) or grounding spring clip (on separator elements that do not require a gasket) with the ground probe of the test indicator.
4) Touch the top cap of the separator element with the other probe. The indicator light should illuminate on the test or the v-o-m test must read no more than 20 ohms.
5) Touch the bottom cap of the separator element. The indicator light should illuminate on the test or the v-o-m test must read no more than 20 ohms.
6) Touch the outside wire mesh. The indicator light should illuminate on the test or the v-o-m test must read no more than 20 ohms.
7) Touch the inside wire mesh (do not puncture the element media). The indicator light should illuminate on the test or the v-o-m test must read no more than 20 ohms.
8) If the separator element has a gasket on each side of the flange, repeat steps 3 through 7.
9) If the separator element fails any of the above tests, return it to your Quincy Distributor for replacement.
10) Make sure the compressor is bonded (wired) to an earth ground to dissipate static electricity.

QGV-200 Separator Installation

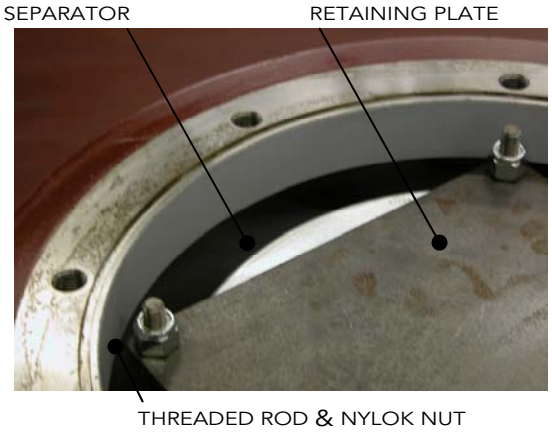
The 200 horsepower model utilizes an inside/out flow requiring the separator seal to be located on the inlet to the separator. The sealing surface is located inside the pressure vessel and is coated to prevent corrosion. Remove any loose material prior to separator installation.

After the continuity verification procedure is complete, install the separator as follows:

1. Lubricate the separator o-ring with compressor fluid and place separator inside the reservoir with o-ring end facing down, centered inside studs.
2. Place the square separator compression plate over the 4 studs.
3. Install the (4) Nylok nuts on studs and tighten as follows:

   Turn nuts down until they're touching the compression plate. Do not over compress o-ring.

   Tighten nuts by turning clockwise ½ turn in a cross pattern. Over tightening the compression plate will deform the separator, reducing performance.

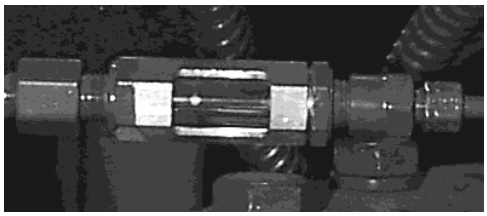


QGV-200 Separator Installation

Fluid Scavenging System

Fluid from inside the fluid separator element is returned to the inlet valve or air-end by way of a scavenger tube positioned inside the fluid separator element, through an orifice and via a stainless steel tube to the compressor. Failure to keep the orifice clean will result in excessive fluid carryover. Cleaning of the orifice should be performed **which ever occurs first.**

- **When no fluid is seen moving through the sight glass.**
- **When excessive fluid carryover is detected.**
- **Every fluid change.**
- **Once per year.**



Scavenge Line Sight Glass

NOTE:

Do not ream the orifice or change the orifice size. Do not install the orifice reversed.

Air Filter

The standard air filter for the QSF stock version consists of an automotive style disposable element(s). Removal and replacement is accomplished by unscrewing the wing nut and exchanging the element(s). Tighten the wing nut snugly after making certain the element is seated correctly on its mounting base.

An optional two stage dry-type heavy-duty filter is available for the QSF stock version.

The heavy-duty air filter is supplied on standard QSF models. The heavy-duty air filter is a two stage, dry type element. The first stage is cyclonic. That is, centrifugal airflow spins the larger dirt particles to the outside walls of the filter canister. In the second stage, air passes through the filter element with an efficiency of 99.9% as tested by SAE J7266 test code specifications. Removal and replacement of the element is accomplished by unscrewing the wing nut and exchanging the element. Tighten the wing nut snugly after making certain the element is seated correctly on its mounting base.

Service intervals of the air filter element depend on ambient conditions and should be established by checking at regular intervals until a pattern for servicing is found. Daily maintenance of the filter element is not uncommon in dirty conditions. If dirty conditions exist, it would be advisable to relocate the intake air to an outside source.

Each time a filter is serviced, inspect the filtered air side of the air cleaner canister and the suction manifold for dirt. If dirt is found, determine the cause and correct. Always make sure all gaskets, threaded connections, flange connections, and hose connections between the air filter and air compressor are absolutely airtight.

Dirty filters result in reduced airflow and can distort such that dirt will bypass the filter element.

NOTE:
Intake filtration equipment supplied from the factory may not be adequate for extremely dirty applications or some forms of dust or vapors. It is the customer's responsibility to provide adequate filtration for those conditions. Warranty will be void if a failure is determined to be caused by inadequate filtration.

Control Line Air Filter

An automatic draining control line filter is used. Draining occurs only when the compressor is in the unloaded condition.

Compressor Shaft Seal

Compressor shaft seals are wear items that may eventually have to be replaced. A complete understanding of the installation procedure and special tools are required for a successful seal replacement. Should you decide to replace the seal yourself, be certain to ask your Quincy distributor for the complete illustrated instructions (available as a Service Alert) at the time you order the seal and special tools. If your distributor does not have a copy of these instructions, ask him to order a copy from Quincy Compressor Division at no charge.

QSF compressor units incorporate a fluid scavenge system to complement the use of the triple lip seal assembly. Any complaint of shaft seal leakage requires that the scavenge system be inspected for proper operation prior to the replacement of the shaft seal. Proper inspection consists of the following:

If the check valve is stuck closed the seal cavity will not scavenge. On QSF 50/60 units, inspect the check valve by removing the fitting located at the bottom of the motor adapter. On QSF 75-100 remove the fittings located at the bottom of the seal adapter. Remove the check ball and inspect for wear. Replace if necessary.

1. Shaft seal replacement on the QSF requires the removal of the drive motor to allow use of the wear sleeve removal and installation tools.

2. Remove motor after coupling guards and coupling halves are removed. Remove the drive coupling hub and key from the compressor shaft.

3. Remove the four bolts that secure the seal adapter to the suction housing.

4. Insert two of the seal adapter retaining bolts into the seal adapter jack holes and turn clockwise pushing the seal adapter away from the suction housing.

5. After the seal adapter outer O-ring has cleared the seal adapter bore, the adapter can be removed for inspection. **Assure that bearing shims are not lost or bent during the removal process.** Disassemble the seal adapter for inspection or service by taking the following steps:

   a. With the face of the seal adapter up, insert two small, flat screwdrivers under the outer lip of the fluid slinger and pop the slinger from the seal adapter bore.
   b. Using a brass drift, tap the shaft seal assembly from the seal bore.
   c. Inspect both seal lips for excessive wear, lip flaws or damage.
   d. Inspect the outer o-ring on the fluid slinger for cuts or nicks.
   e. Inspect the outer o-ring on the seal adapter for cuts and nicks.
   f. **Use the tools listed in the Parts Manual for your specific machine needs.**
   g. To remove the seal wear sleeve, slide the wear sleeve removal tool over the end of the shaft and allow the jaws of the tool to snap on the backside of the wear sleeve. Tighten the outer shell of the tool down over the inner jaws. Using a ratchet and socket, turn the puller jackscrew clockwise in against the end of the compressor shaft. **Caution! Do not use an impact wrench with this tool.**

Preparation for New Seal Installation

1. Inspect the compressor shaft for burrs or deep scratches at the wear sleeve area. Using a 100 grit emery cloth, lightly sand horizontally any rust or "LOCTITE" that was between the wear sleeve and shaft. Using a fine file or emery cloth, deburr the key area of the rotor shaft. Cover the keyway with masking tape to prevent any damage to the new seal during installation.

2. Clean the seal adapter with clean, fast drying solvent. Assure that the scavenge drain in the seal adapter is clean and open. Place the outer face of the seal adapter on a flat, hard surface. Remove the new triple lip seal from the package and inspect for damage or imperfections on the seal lips. With the adapter sitting on the outer face, the mechanic would be looking down on the two lips that face the same direction facing toward the rotor and the single lip facing the scavenge cavity and drive motor.

3. With the lips of the seal facing the correct direction, apply a thin coat of "LOCTITE 290" to the outer steel case of the seal and position the seal in the seal adapter bore. Insert the proper seal driver over the seal. See Parts Manual for tool list for your specific machine needs. Insert the proper wear sleeve driver in the seal driver and tap the new seal into the bore with a medium sized hammer.

4. Preheat the seal wear sleeve to 350^0 in a small oven. Do not preheat in warm oil. Apply a thin film of "LOCTITE" to the inner diameter of the wear sleeve and immediately install on the compressor shaft using the proper wear sleeve driver. Drive the wear sleeve on the shaft until the driver bottoms on the shaft shoulder.

Seal Installation

1. Apply a thin coat of compressor fluid to the outer face of the seal wear sleeve and seal lip.

2. Cover the keyway in the compressor shaft with masking tape so there is no chance of damage occurring to the seal face during installation.

3. Inspect the bearing shims for damage. Assure they are installed correctly with the thickest shim toward the seal adapter.

4. Slide the proper seal installation sleeve against the wear sleeve with the taper toward the end of the rotor shaft. Install a new o-ring on the seal adapter and lubricate with compressor fluid. Install a new o-ring around the scavenge port, use petroleum jelly to hold the o-ring on the seal adapter face during installation. Carefully slide the seal adapter with the new seal installed over the end of the rotor shaft and up against the adapter bore.

5. Using care not to damage the o-ring, evenly draw the adapter into the bore, install the four retaining bolts and tighten to the specified torque. Remove the installation sleeve.

6. Apply a thin film of compressor fluid to the O-ring and seal lip of the outer fluid slinger. Install the outer slinger over the end of the rotor shaft and push into the scavenge bore using both thumbs.

7. Reinstall drives motor and coupling. Reinstall the coupling guards before starting the compressor.

Air and Fluid Tubing

Flareless tubing is used in the air piping to eliminate pipe joints and provide a cleaner appearance. Replacement tubing and fittings are available; however, special installation procedures must be followed. Your authorized distributor has the necessary instructions and experience to perform these repairs.

Failure to install flareless tubing or fittings correctly may result in the tubing coming apart under pressure. Serious personal injury and property damage may result.

! WARNING !

Failure to install flareless tubing or fittings correctly may result in the tubing coming apart under pressure. Serious injury and property damage may result.

! WARNING !

Never adjust the pressure higher than the factory setting. Death, serious injury and compressor or property damage may result.

Differential Pilot Valve

Open a manual vent valve to allow the compressor to exhaust air to the outside and start the unit. By manual regulation, slowly close the valve, allowing the unit to build air pressure to the desired modulation point and hold. (100 PSIG standard). Adjust the screw on the bottom of the differential pilot valve so that a slight stream of air can be felt coming from the orifice adjacent to the adjustment screw.

When this air is felt, air is beginning to pass through the pilot valve, causing the valve to modulate toward its closed position, thereby reducing the volume of air being compressed.

To raise pressure, turn the adjusting screw in (clockwise), to lower pressure turn screw out (counter clockwise). Maximum full load pressure is 100 PSIG for standard QSF units. Minimum full load pressure with modulation and standard controls is 75 PSIG.

Water Regulating Valve (water-cooled units only)

The water-regulating valve senses fluid temperature and opens or closes, regulating water flow from the unit. It is factory set to maintain 180^0 F air discharge temperature. Due to different incoming water temperatures and/or pressures at the customer's location, valve adjustment should be checked during start-up to maintain 180°F discharge temperature. To increase fluid temperature, decrease water flow by turning the adjustment screw clockwise. To decrease fluid temperature, increase water flow by turning the adjustment screw counter clockwise. **Water pressure should be 40-PSI minimum/100 PSI maximum. Water temperature should be 50°F minimum/90°F maximum.**

Water-cooled Heat Exchangers

The majority of water-cooled heat exchanger problems are due to underestimating the importance of water treatment and heat exchanger maintenance. Efficient, long service life can be obtained only when clean, soft and/or treated water is used and the exchanger tubes are cleaned on a regular basis.

In many instances, the cooling water supply for the heat exchanger will contain impurities dissolved in solution and/or in suspension. These substances can cause scale formation, corrosion and fouling (plugging) of any water-cooled heat exchanger equipment. Disregarding the possibility that one or more of these conditions exist may result in increased maintenance and operation expense, reduced equipment life and emergency shutdown. In some cases, what is normally considered plain drinking water can contain corrosive substances that will impact the heat exchanger's life.

It is strongly recommended that a reputable, local water treatment concern be engaged to establish the corrosion, scale forming and fouling tendency of the cooling water and take steps necessary to remedy the situation if a problem does exist. The need for water treatment may only involve filtration (screening) to remove debris, sand and/or silt in the cooling water supply. However, chemical treatment methods may be necessary, in certain instances, to inhibit corrosion and/or remove suspended solids, to alter the water's tendency to form scale deposits, or prevent growth of micro-organisms. The normal maintenance program for the unit should include periodic cleaning of the tube side (water side) of the heat exchanger to remove deposits that enhance fouling and corrosion.

If overheating or fluid leakage to the water side develops, remove the end caps and inspect for scale and corrosion. If present, this is usually the source of trouble. In the case of a closed system, the entire system, cooling tower, cooler inlet and outlet lines should be inspected and cleaned as necessary.

Except for obvious mechanical failures, the solution to most heat exchanger problems lies at the point of use. It is the users responsibility to provide the proper quality of water and to keep the exchange clean. No heat exchanger made will resist plugging and corrosion if the basic rules of clean water and regular maintenance are disregarded.

! WARNING !

FAILURES ON HEAT EXCHANGERS CAUSED BY PLUGGING OR CORROSION ARE NOT COVERED UNDER WARRANTY.

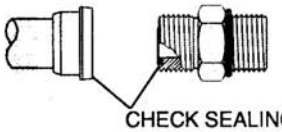
Fluid Piping

Fluid piping on QSF units incorporates a machine-rolled flare tube and a "SEAL-LOK" fitting. Proper assembly methods for "SEAL-LOK" fittings are listed below.

ASSEMBLING SEAL-LOK FITTINGS

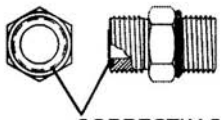
ASSEMBLING THE FACE SEAL END

1) CHECK SEALING SURFACES



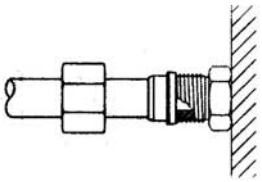
CHECK SEALING SURFACE AND GROOVE FOR DAMAGE OR MATERIAL BUILDUP.

2) INSTALL O-RING



CORRECTLY SIZED O-RING IS 0.070" THICK AND ITS O.D. TOUCHES THE OUTSIDE EDGE OF THE GROOVE.

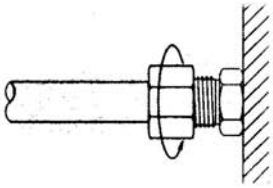
3) POSITION TO FITTING



ENSURE THAT O-RING IS PROPERLY SEATED IN THE GROOVE.

POSITION AND HOLD FLAT SEALING FACE AGAINST O-RING.

4) THREAD ON NUT BY HAND & 5) WRENCH TIGHTEN

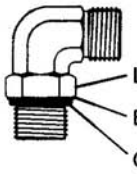


IF PROPERLY ALIGNED, THE NUT SHOULD THREAD ON EASILY BY HAND.

WRENCH TIGHTEN TO RECOMMENDED TORQUE FOR FACE SEAL END.

ASSEMBLING ADJUSTABLE END TO PORT

1) CHECK SEALING SURFACES & INSTALL O-RING

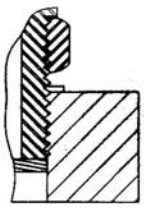


- INSPECT FITTING FOR DAMAGE
- USE O-RING INSTALLATION TOOL TO INSTALL O-RING
- APPLY SMALL AMOUNT OF LUBRICANT TO O-RING

2) BACK OFF NUT

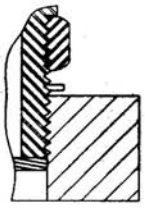
BACK OFF LOCKNUT TO ITS UPPERMOST POSITION

3) THREAD INTO PORT



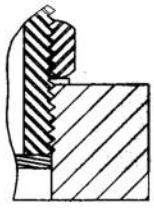
THREAD FITTING INTO THE PORT UNTIL THE BACKUP WASHER CONTACTS THE SURFACE

4) BACK OFF FOR ALIGNMENT



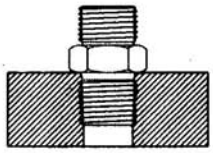
POSITION FITTING FOR ATTACHING LINE BY UNTHREADING UP TO 360°

5) WRENCH TIGHTEN



WRENCH TIGHTEN LOCKNUT

ASSEMBLING NON-ADJUSTABLE PORT END



- INSPECT SEALING SURFACES FOR DAMAGE
- INSTALL O-RING
- THREAD FITTING INTO PORT AND WRENCH TIGHTEN

SEAL-LOK ASSEMBLY TORQUES (IN/LBS)								
DASH SIZE	4	6	8	10	12	16	20	24
FACE SEAL END	220 ±10	320 ±25	480 ±25	750 ±35	1080 ±45	1440 ±90	1680 ±90	1980 ±100

PROBABLE CAUSE	CORRECTIVE ACTION
Failure to Start	
Power not turned "ON"	Turn the power "ON" by closing the main disconnect switch or circuit breaker
Blown control circuit fuse	Replace fuse. Find and correct cause.
Safety circuit shutdown resulting from high discharge air temperature	Correct the situation in accordance with the instruction in the "High Discharge Air Temperature " section of this troubleshooting guide. Restart the compressor.
Thermal overload relays tripping	Correct the cause of the overloaded condition, reset overload relay anc press the start button.
Low voltage	Ask the power company to make a voltage check at your entrance meter, then compare that reading to a reading taken at the motor terminals. Use these two readings as a basis for locating the source of low voltage.
Power failure	Check power supply.
Faulty control relay	Replace the relay.
Loose wire connections	Check all wiring terminals for contact and tightness.
Faulty transformer	Check secondary voltage on transformer.
Unscheduled Shutdown	
High air discharge temperature	Correct the situation in accordance with the instruction in the "High Discharge Air Temperature " section of this troubleshooting guide. Restart the compressor.
Thermal overload relays tripping	Correct the cause of the overloaded condition, reset the overload relay and press the reset button.
Power failure	Check the power supply.
Faulty HAT sensors	Contact qualified serviceman.
Loose wire connections	Check all wiring terminals for contact and tightness.
Low Air Delivery	
Plugged air intake filter element	Clean air filter element or replace with new element.
Excessive leaks in the service lines	Check service lines for leaks with soapsuds.
Inlet valve not fully open	Check for build up or gumming of shaft
Excessive air demand	Re-evaluate air demand. Add additional compressors as needed.
Excessive leaks in service lines	Check service for leaks using soap suds and repair as needed.
Inlet valve not fully open	Correct in accordance with the instructions in "Inlet valve not opening or closing in relation to air demand" section of troubleshooting guide.
Plugged air intake filter	Replace air filter element.

PROBABLE CAUSE	CORRECTIVE ACTION
Low Air Delivery	
Differential pilot valve not set correctly	Adjust differential pilot valve to achieve desired modulation range.
Air pressure switch not set correctly	Adjust air pressure switch to achieve desired cut-in and cut-out pressure
Faulty receiver pressure gauge	Check and replace as necessary.
Air pressure switch not set correctly	Adjust air pressure switch to assure unload pressure does not exceed the maximum operating pressure.
High Receiver Pressure	
Air pressure switch not set correctly	Adjust air pressure switch to assure unload pressure does not exceed maximum recommended operating pressure.
Inlet valve not closing at lower air demand	Correct in accordance with instruction on "Inlet valve not opening or closing in relation to air demand" section of this troubleshooting guide.
Blowdown valve not relieving receiver pressure	Check control solenoid and blowdown valve.
High Discharge Air Temperature	
Faulty thermal valve	Replace thermal valve element.
Cooler plugged	Clean cooler, find and correct cause of contamination.
Frequent Air/Fluid Separator Clogging	
Faulty air filter or inadequate filter for the environment	If faulty air filter elements, replace them. If air filter is inadequate for the environment, relocate the intake air to a clean source.
Faulty fluid filter	Replace fluid filter element.
Fluid breakdown	Correct in accordance with the instruction in "Fluid Breakdown" section of the troubleshooting guide.
Incorrect fluid separator element	Use genuine Quincy replacement elements only.
Extreme operating conditions such as high compressor discharge temperatures, high ambient temperature with high humidity and high reservoir pressure	Operate compressor at recommended reservoir pressure and air discharge temperature.
Mixing different grades or types of fluids	DO NOT MIX DIFFERENT GRADES OR TYPES OR FLUID. DO NOT MIX FLUIDS FROM DIFFERENT MANUFACTURERS. Follow compressor fluid specifications as described in lubrication section of this manual.
Incorrect fluid	Follow compressor fluid specifications as described in lubrication section of this manual.

PROBABLE CAUSE	CORRECTIVE ACTION
Fluid Discharge Out Blowdown Valve	
Too high fluid level in reservoir	Adjust fluid level to recommended fluid level by draining the reservoir. Use fluid level gauge as a guide.
Cycling too often between load and unload	Correct in accordance with instructions in "Too rapid cycling between load and unload" section of this troubleshooting guide.
Air/fluid reservoir blows down too fast	Check for proper blow-down valve size
Inlet valve not closing completely	Correct in accordance with instructions in "Inlet valve not opening or closing in relation to air demand" section of this troubleshooting guide.
Frequent Fluid Filter Clogging	
Faulty indicator (Standard QSF)	Replace indicator assembly.
Incorrect fluid filter	Use genuine Quincy replacement filters only.
Faulty, incorrect or inadequate air filter	Replace air filter element. Use genuine Quincy replacement elements only.
Fluid breakdown	See "Separator Clogging" section of this troubleshooting guide.
System contamination	Check and clean system of all dirt, corrosion and varnish.
Inadequate circulation of cooling air at the cooler	Check location of cooler and assure there is no restriction to free circulation of cooling air. Check fins at cooler and clean as necessary while machine is not running.
Low fluid level in reservoir	Add fluid to recommended level. Check fluid distribution system for leaks.
Clogged fluid filter	Replace fluid filter element.
Clogged fluid cooler	Check fluid cooler for varnishing and rust deposits. If condition exist, clean cooler thoroughly and contact Quincy service technician for instructions.
Excessive ambient temperatures	Maximum ambient for proper operation is listed in data sheet.
Incorrect fan rotation	Correct rotation is with the fan pushing the air through the cooler. Reverse motor starter leads L1 and L2.
Improper fluid	Use recommended fluids only. Refer to lubrication section of manual.
Clogged air filter	Clean or replace as necessary.
Faulty thermal valve	Repair or replace as necessary.
Faulty gauges	Check and replace as necessary.
Air end failure	Contact a Quincy authorized distributor.

PROBABLE CAUSE	CORRECTIVE ACTION
Excessive Fluid Consumption	
Too high fluid level in the receiver	Adjust fluid level to recommended fluid level by draining the reservoir. Use fluid level gauge as a guide.
Plugged scavenger line	Clean scavenger line orifice and tube.
High discharge temperature	Correct in accordance with the instructions in "High discharge air temperature" section of this troubleshooting guide.
Low reservoir pressure with fully open inlet valve.	Reservoir pressure should not fall below 50 PSIG when running loaded. Check system CFM requirement or minimum pressure check valve.
Faulty or damaged separator	Change air/fluid separator.
Leak in fluid lines	Check for leaks and correct.
Seal failure, leaks	Replace seal assembly and o-rings.
Cycling too often between load and unload	Correct in accordance with the instructions in "Too rapid cycling between load and unload" section of this troubleshooting guide.
Incorrect fluid	Use recommended fluids only. See lubrication section.
Frequent Air Cleaner Clogging	
Compressor operating in highly contaminated atmosphere	Use remote air intake mounting
Air cleaner not adequate for conditions	Use specialized air filter. Contact an Authorized Quincy Distributor.
Inlet valve not opening or closing in relation to air demand	
Improper setting of operating pressure	Adjust operating pressure to proper setting
Excessive moisture in control air line at air cylinder	Service control airline filter daily.
Improper functioning of inlet valve piston	Check piston and cylinder bore. Repair or replace as needed.
Jammed air inlet valve assembly	Check air inlet valve bushing and shaft. Check piston and cylinder bore. Repair or replace as necessary.
Faulty solenoid valve	Repair or replace as necessary.
Faulty shuttle valve	Repair or replace as necessary.
Loose wiring connections at solenoid valve	Check and tighten wiring terminals.

PROBABLE CAUSE	CORRECTIVE ACTION
Compressor does not unload when there is no air demand	
Incorrect unload pressure setting	Adjust to proper setting.
Faulty blowdown valve	Repair or replace as necessary.
Faulty solenoid valve	Repair or replace as necessary.
Faulty differential pilot valve	Repair or replace as necessary.
Leaks in control lines	Check all control line fittings and tubing.
Leaks in service lines	Check lines before MPC valve.
Loose or broken wires	Check all wire terminals for tightness. Replace any broken or pinched wires.
Compressor does not revert to load when service line pressure drops to reset pressure	
Incorrect load pressure setting	Adjust to proper setting.
Loose wiring connection	Check and tighten wiring terminals.
Jammed air inlet valve assembly	Check and repair air inlet valve.
Faulty solenoid	Repair or replace as necessary.
Faulty timer	Check and replace timer.
Faulty differential pilot valve	Orifice plugged. Clean or replace as necessary.
Compressor will not time-out or shut down when unloaded	
Loose wiring connections	Check and tighten wiring terminals.
Leaks in control lines	Check and repair any leaks.
Leaks in service lines	Check plant air distribution system for leaks.
Excessive Water in Plant Air Distribution System	
Incorrect operating temperatures	Check thermal valve. Discharge temperature should be a minimum of 170°F.
Clogged moisture separator/trap	Clean or replace as required.
Installation/Application	Check other compressors on same system.
Faulty cooler-leaks	Replace cooler.

PROBABLE CAUSE	CORRECTIVE ACTION
Excessive Water Content in Fluid	
Water drain intervals	Drain water as needed to reduce water content in fluid below 200 PPM.
Discharge temperature too low	Check operation of thermostatic valve or water regulating valve. If condition continues, consult factory service department.
Pressure Relief Valve Exhausting	
Differential pressure regulator not set correctly	Adjust differential pressure regulator to obtain desired modulation range.
Air pressure not set correctly	Readjust air pressure switch so that the compressor unloads at the desired pressure.
Air inlet valve not closing properly in relation to air demand	Correct in accordance with the instruction in "Inlet valve not opening or closing in relation to air demand" section of this troubleshooting guide.
Plugged separator	Replace with new air/fluid separator
Faulty receiver pressure gauge	Check gauge for accuracy and replace if necessary. Adjust control settings.
Faulty pressure relief valve	Check pressure relief valve for correct pressure setting. If valve is still leaking, replace with new relief valve.

Interval	Action
Periodically/Daily - 8 hours maximum	Monitor all gauges and indicators for normal operation.
	Check fluid level.
	Observe for fluid leaks.
	Observe for unusual noise or vibration.
	Drain water from air/fluid reservoir.
Monthly	Service air filter as needed (daily or weekly if extremely dirty conditions exist). Clean aftercooler and fluid cooler fins.
	Wipe entire unit down to maintain appearance.
	Clean aftercooler and fluid cooler fins.
6 months or every 1000 hours	Take fluid sample.
	Change fluid filter.
Every 4000 hours	Change fluid and fluid filter/ sooner if indicated by lubricant sample analysis.
Periodically/yearly	Go over unit and check all bolts for tightness.
	Change air/fluid separator.
	Change air filter.
	Lubricate motors.
	Check safety shutdown system. Contact a qualified serviceman.
	Test pressure relief valve for proper operation.

QUINCY COMPRESSOR AND ORTMAN FLUID POWER DIVISIONS

STANDARD TERMS AND CONDITIONS

LEGAL EFFECT: Except as expressly otherwise agreed to in writing by an authorized representative of Seller, the following terms and conditions shall apply to and form a part of this order and any additional and/or different terms of Buyer's purchase order or other form of acceptance are rejected in advance and shall not become a part of this order.

The rights of Buyer hereunder shall be neither assignable nor transferable except with the written consent of Seller.

This order may not be canceled or altered except with the written consent of Seller and upon terms which will indemnify Seller against all loss occasioned thereby. All additional costs incurred by Seller due to changes in design or specifications, modification of this order or revision of product must be paid for by Buyer.

In addition to the rights and remedies conferred upon Seller by this order, Seller shall have all rights and remedies conferred at law and in equity and shall not be required to proceed with the performance of this order if Buyer is in default in the performance of such order or of any other contract or order with seller.

TERMS OF PAYMENT: Unless otherwise specified in the order acknowledgment, the terms of payment shall be net cash within thirty (30) days after shipment. These terms shall apply to partial as well as complete shipments. If any proceeding be initiated by or against Buyer under any bankruptcy or insolvency law, or in the judgment of Seller the financial condition of Buyer, at the time the equipment is ready for shipment, does not justify the terms of payment specified, Seller reserves the right to require full payment in cash prior to making shipment. If such payment is not received within fifteen (15) days after notification of readiness for shipment, Seller may cancel the order as to any unshipped item and require payment of its reasonable cancellation charges.

If Buyer delays shipment, payments based on date of shipment shall become due as of the date when ready for shipment. If Buyer delays completion of manufacture, Seller may elect to require payment according to percentage of completion. Equipment held for Buyer shall be at Buyer's risk and storage charges may be applied at the discretion of Seller.

Accounts past due shall bare interest at the highest rate lawful to contract for but if there is no limit set by law, such interest shall be eighteen percent (18%). Buyer shall pay all cost and expenses, including reasonable attorney's fees, incurred in collecting the same, and no claim, except claims within Seller's warranty of material or workmanship, as stated below, will be recognized unless delivered in writing to Seller within thirty (30) days after date of shipment.

TAXES: All prices exclude present and future sales, use, occupation, license, excise, and other taxes in respect of manufacture, sales or delivery, all of which shall be paid by Buyer unless included in the purchase price at the proper rate or a proper exemption certificate is furnished.

ACCEPTANCE: All offers to purchase, quotations and contracts of sales are subject to final acceptance by an authorized representative at Seller's plant.

DELIVERY: Except as otherwise specified in this quotation, delivery will be F. O. B. point of shipment. In the absence of exact shipping instruction, Seller will use its discretion regarding best means of insured shipment. No liability will be accepted by Seller for so doing. All transportation charges are at Buyer's expense. Time of delivery is an estimate only and is based upon the receipt of all information and necessary approvals. The shipping schedule shall not be construed to limit seller in making commitments for materials or in fabricating articles under this order in accordance with Seller's normal and reasonable production schedules.

Seller shall in no event be liable for delays caused by fires, acts of God, strikes, labor difficulties, acts of governmental or military authorities, delays in transportation or procuring materials, or causes of any kind beyond Seller's control. No provision for liquidated damages for any cause shall apply under this order. Buyer shall accept delivery within thirty (30) days after receipt of notification of readiness for shipment. Claims for shortages will be deemed to have been waived if not made in writing within ten (10) days after the receipt of the material in respect of which any such shortage is claimed. Seller is not responsible for loss or damage in transit after having received "In Good Order" receipt from the carrier. All claims for loss or damage in transit should be made to the carrier.

TITLE & LIEN RIGHTS: The equipment shall remain personal property, regardless of how affixed to any realty or structure. Until the price (including any notes given therefore) of the equipment has been fully paid in cash, Seller shall, in the event of Buyer's default, have the right to repossess such equipment.

QUINCY COMPRESSOR AND ORTMAN FLUID POWER DIVISIONS

STANDARD TERMS AND CONDITIONS

PATENT INFRINGMENT: If properly notified and given an opportunity to do so with friendly assistance, Seller will defend Buyer and the ultimate user of the equipment from any actual or alleged infringement of any published United States patent by the equipment or any part thereof furnished pursuant hereto (other than parts of special design, construction, or manufacture specified by and originating with Buyer), and will pay all damages and costs awarded by competent court in any suit thus defended or of which it may have had notice and opportunity to defend as aforesaid.

STANDARD WARRANTY: Seller warrants that products of its own manufacture will be free from defects in workmanship and materials under normal use and service for the period specified in the product instruction manual. Warranty for service parts will be ninety (90) days from date of factory shipment. Electric Motors, gasoline and diesel engines, electrical apparatus and all other accessories, components and parts not manufactured by Seller are warranted only to the extent of the original manufacturer's warranty.

Notice of the alleged defect must be given to the Seller, in writing with all identifying details including serial number, type of equipment and date of purchase within thirty (30) days of the discovery of the same during the warranty period.

Seller's sole obligation on this warranty shall be, at its option, to repair or replace or refund the purchase price of any product or part thereof which proves to be defective. If requested by Seller, such product or part thereof must be promptly returned to seller, freight prepaid, for inspection.

Seller warrants repaired or replaced parts of its own manufacture against defects in materials and workmanship under normal use and service for ninety (90) days or for the remainder of the warranty on the product being repaired.

This warranty shall not apply and Seller shall not be responsible or liable for:

(a) Consequential, collateral or special losses or damages;

(b) Equipment conditions caused by fair wear and tear, abnormal conditions of use, accident, neglect or misuse of equipment, improper storage or damage resulting during shipping;

(c) Deviation from operating instructions, specifications or other special terms of sale;

(d) Labor charges, loss or damage resulting from improper operation, maintenance or repairs made by person(s) other than Seller or Seller's authorized service station.

In no event shall Seller be liable for any claims whether arising from breach of contract or warranty or claims of negligence or negligent manufacture in excess of the purchase price.

THIS WARRANTY IS THE SOLE WARRANTY OF SELLERS AND ANY OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED IN LAW OR IMPLIED IN FACT, INCLUDING ANY WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR USE ARE HEREBY SPECIFICALLY EXCLUDED.

LIABILITY LIMITATIONS: Under no circumstances shall the Seller have any liability for liquidated damages or for collateral, consequential or special damages or for loss of profits, or for actual losses or for loss of production or progress of construction, whether resulting from delays in delivery or performance, breach of warranty, negligent manufacture or otherwise.

ENVIROMENTAL AND OSHA REQUIREMENTS: At the time of shipment of the equipment from the factory, Quincy Compressor / Ortman Fluid Power will comply with the various Federal, State and local laws and regulations concerning occupational health and safety and pollution. However, in the installation and operation of the equipment and other matters over which the seller has no control, the Seller assumes no responsibility for compliance with those laws and regulations, whether by the way of indemnity, warranty or otherwise.

Notes

Quincy COMPRESSOR

an EnPro Industries company

Rotary/Vacuum/Systems: 251.937.5900
Nearest Distributor: 888.424.7729
E-mail: info@quincycompressor.com
Website: www.quincycompressor.com

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