



**INDUSTRIAL
AIR COMPRESSOR
20/12 SERIES - 2 STAGE
AIR-COOLED AND WATER COOLED
500 - 750 CFM**

**OPERATOR'S
MANUAL**

Part Number 250041-546
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Effective 5/93

AIR CARE SEMINAR TRAINING

Sullair Air Care Seminars are 3-day courses that provide hands-on instruction in the proper operation, maintenance and service of Sullair equipment. Individual seminars on Industrial compressors and compressor electrical systems are presented at regular intervals throughout the year at a dedicated training facility at Sullair's corporate headquarters in Michigan City, Indiana.

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Michigan City, IN 46360
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1.1 GENERAL

Sullair Corporation and its subsidiaries design and manufacture all of their products so they can be operated safely. However, the responsibility for safe operation rests with those who use and maintain these products. The following safety precautions are offered as a guide which, if conscientiously followed, will minimize the possibility of accidents throughout the useful life of this equipment.

The compressor should be operated only by those who have been trained and delegated to do so, and who have read and understood this Operator's Manual. Failure to follow the instructions, procedures and safety precautions in this manual may result in property damage, accidents and injuries.

NEVER start the compressor unless it is safe to do so. **DO NOT** attempt to operate the compressor with a known unsafe condition. Tag the compressor and render it inoperative by disconnecting and locking out all power at source or otherwise disabling its prime mover so others who may not know of the unsafe condition cannot attempt to operate it until the condition is corrected.

Install, use and operate the compressor only in full compliance with all pertinent OSHA regulations and all applicable Federal, State, and Local codes, standards and regulations.

DO NOT modify the compressor and/or controls in any way except with written factory approval.

While not specifically applicable to all types of compressors with all types of prime movers, most of the precautionary statements contained herein are applicable to most compressors and the concepts behind these statements are generally applicable to all compressors.

1.2 PERSONAL PROTECTIVE EQUIPMENT

Prior to installing or operating the compressor, owners, employers, and users should become familiar with, and comply with, all applicable OSHA regulations and any applicable Federal, State and Local codes, standards, and regulations relative to personal protective equipment, such as eye and face protective equipment, respiratory protective equipment, equipment intended to protect the extremities, protective clothing, protective shields and barriers and electrical protective equipment, as well as noise exposure administrative and/or engineering controls and/or personal hearing protective equipment.

1.3 PRESSURE RELEASE

A. Open the pressure relief valve at least weekly to make sure it is not blocked, closed, obstructed or otherwise disabled.

B. Install an appropriate flow-limiting valve between the service air outlet and the shut-off (throttle) valve, either at the compressor or at any other point along the air line, when an air hose exceeding 1/2" (13mm)

(13mm) inside diameter is to be connected to the shut-off (throttle) valve, to reduce pressure in case of hose failure, per OSHA Standard 29 CFR 1926.302(b)(7).

C. When the hose is to be used to supply a manifold, install an additional appropriate flow-limiting valve between the manifold and each air hose exceeding 1/2" (13mm) inside diameter that is to be connected to the manifold to reduce pressure in case of hose failure.

D. Provide an appropriate flow-limiting valve at the beginning of each additional 75 feet (23m) of hose in runs of air hose exceeding 1/2" (13mm) inside diameter to reduce pressure in case of hose failure.

E. Flow-limiting valves are listed by pipe size and rated CFM. Select appropriate valves accordingly, in accordance with their manufacturer's recommendations.

F. DO NOT use air tools that are rated below the maximum rating of the compressor. Select air tools, air hoses, pipes, valves, filters and other fittings accordingly. **DO NOT** exceed manufacturer's rated safe operating pressures for these items.

G. Secure all hose connections by wire, chain or other suitable retaining devices to prevent tools or hose ends from being accidentally disconnected and expelled.

H. Open fluid filter cap only when compressor is **not running and is not pressurized**. Shut down the compressor and bleed the sump (receiver) to zero internal pressure before removing the cap.

I. Vent all internal pressure prior to opening any line, fitting, hose, valve, drain plug, connection or other components, such as filters and line oilers, and before attempting to refill optional air line anti-icer systems with antifreeze compound.

J. Keep personnel out of line with and away from the discharge opening of hoses or tools or other points of compressed air discharge.

K. Use air at pressures less than 30 psig (2.1 bar) for cleaning purposes, and then only with effective chip guarding and personal protective equipment per OSHA Standard 29 CFR 1910.242 (b).

L. DO NOT engage in horseplay with air hoses as death or serious injury may result.

M. This equipment is supplied with an ASME designed pressure vessel protected by an ASME rated relief valve. Lift the handle once a week to make sure the valve is functional. **DO NOT** lift the handle while machine is under pressure.

N. If the machine is installed in an enclosed area it is necessary to vent the relief valve to the outside of the structure or to an area of non-exposure.

Section 1

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1.4 FIRE AND EXPLOSION

A. Clean up spills of lubricant or other combustible substances immediately, if such spills occur.

B. Shut off the compressor and allow it to cool. Then keep sparks, flames and other sources of ignition away and **DO NOT** permit smoking in the vicinity when checking or adding lubricant or when refilling air line anti-icer systems with antifreeze compound.

C. DO NOT permit fluids, including air line anti-icer system antifreeze compound or fluid film, to accumulate on, under, or around acoustical material, or on any external surfaces of the air compressor or on internal surfaces of the enclosure. Wipe down using an aqueous industrial cleaner or steam clean as required. If necessary, remove acoustical material, clean all surfaces and then replace acoustical material. Any acoustical material with a protective covering that has been torn or punctured should be replaced immediately to prevent accumulation of liquids or fluid film within the material. **DO NOT** use flammable solvents for cleaning purposes.

D. Disconnect and lock out all power at source prior to attempting any repairs or cleaning of the compressor or of the inside of the enclosure, if any.

E. Keep electrical wiring, including all terminals and pressure connectors in good condition. Replace any wiring that has cracked, cut, abraded or otherwise degraded insulation or terminals that are worn, discolored or corroded. Keep all terminals and pressure connectors clean and tight.

F. Keep grounded and/or conductive objects such as tools away from exposed live electrical parts such as terminals to avoid arcing which might serve as a source of ignition.

G. Remove any acoustical material or other material that may be damaged by heat or that may support combustion and is in close proximity, prior to attempting weld repairs.

H. Keep suitable fully charged Class BC or ABC fire extinguisher or extinguishers nearby when servicing and operating the compressor.

I. Keep oily rags, trash, leaves, litter or other combustibles out of and away from the compressor.

J. DO NOT operate the compressor without proper flow of cooling air or water or with inadequate flow of lubricant or with degraded lubricant.

K. DO NOT attempt to operate the compressor in any classification of hazardous environment unless the compressor has been specially designed and manufactured for that duty.

1.5 MOVING PARTS

A. Keep hands, arms and other parts of the body and also clothing away from couplings, fans and other moving parts.

B. DO NOT attempt to operate the compressor with the fan, coupling or other guards removed.

C. Wear snug fitting clothing and confine long hair when working around this compressor, especially when exposed to hot or moving parts.

D. Keep access doors, if any, closed except when making repairs or adjustments.

E. Make sure all personnel are out of and/or clear of the compressor prior to attempting to start or operate it.

F. Disconnect and lock out all power at source and verify at the compressor that all circuits are de-energized to minimize the possibility of accidental start-up or operation, prior to attempting repairs or adjustments. This is especially important when compressors are remotely controlled.

G. Keep hands, feet, floors, controls and walking surfaces clean and free of fluid, water or other liquids to minimize the possibility of slips and falls.

1.6 HOT SURFACES, SHARP EDGES AND SHARP CORNERS

A. Avoid bodily contact with hot fluid, hot coolant, hot surfaces and sharp edges and corners.

B. Keep all parts of the body away from all points of air discharge.

C. Wear personal protective equipment including gloves and head covering when working in, on or around the compressor.

D. Keep a first aid kit handy. Seek medical assistance promptly in case of injury. **DO NOT** ignore small cuts and burns as they may lead to infection.

1.7 TOXIC AND IRRITATING SUBSTANCES

A. DO NOT use air from this compressor for respiration (breathing) except in full compliance with OSHA Standards 29 CFR 1910 and any other Federal, State or Local codes or regulations.

▲ DANGER

Death or serious injury can result from inhaling compressed air without using proper safety equipment. See OSHA standards on safety equipment.

B. DO NOT use air line anti-icer systems in air lines supplying respirators or other breathing air utilization equipment and **DO NOT** discharge air from these systems in unventilated or other confined areas.

C. Operate the compressor only in open or adequately ventilated areas.

D. Locate the compressor or provide a remote inlet so that it is not likely to ingest exhaust fumes or other toxic, noxious or corrosive fumes or substances.

E. Coolants and lubricants used in this compressor are typical of the industry. Care should be taken to avoid accidental ingestion and/or skin contact. In the event of ingestion, seek medical treatment promptly. Wash with soap and water in the event of skin contact.

F. Wear goggles or a full face shield when adding antifreeze compound to air line anti-icer systems.

G. If air line anti-icer system antifreeze compound enters the eyes or if fumes irritate the eyes, they should be washed with large quantities of clean water for 15 minutes. A physician, preferably an eye specialist, should be contacted immediately.

H. DO NOT store air line anti-icer system antifreeze compound in confined areas.

I. The antifreeze compound used in air line anti-freeze systems contains methanol and is toxic, harmful or fatal if swallowed. Avoid contact with the skin or eyes and avoid breathing the fumes. If swallowed, induce vomiting by administering a tablespoon of salt in each glass of clean, warm water until vomit is clear, then administer two teaspoons of baking soda in a glass of clean water. Have patient lay down and cover eyes to exclude light. Call a physician immediately.

1.8 ELECTRICAL SHOCK

A. This compressor should be installed and maintained in full compliance with all applicable Federal, State and Local codes, standards and regulations, including those of the National Electrical Code, and also including those relative to equipment grounding conductors, and only by personnel that are trained, qualified and delegated to do so.

B. Keep all parts of the body and any hand-held tools or other conductive objects away from exposed live parts of electrical system. Maintain dry footing, stand on insulating surfaces and **DO NOT** contact any other portion of the compressor when making adjustments or repairs to exposed live parts of the electrical system. Make all such adjustments or repairs with one hand only, so as to minimize the possibility of creating a current path through the heart.

C. Attempt repairs in clean, dry and well lighted and ventilated areas only.

D. DO NOT leave the compressor unattended with open electrical enclosures. If necessary to do so, then disconnect, lock out and tag all power at source so others will not inadvertently restore power.

E. Disconnect, lock out, and tag all power at source prior to attempting repairs or adjustments to rotating

machinery and prior to handling any ungrounded conductors.

1.9 LIFTING

A. If the compressor is provided with a lifting bail, then lift by the bail provided. If no bail is provided, then lift by sling. Compressors to be air lifted by helicopter must not be supported by the lifting bail but by slings instead. In any event, lift and/or handle only in full compliance with OSHA standards 29 CFR 1910 subpart N.

B. Inspect points of attachment for cracked welds and for cracked, bent, corroded or otherwise degraded members and for loose bolts or nuts prior to lifting.

C. Make sure entire lifting, rigging and supporting structure has been inspected, is in good condition and has a rated capacity of at least the weight of the compressor. If you are unsure of the weight, then weigh compressor before lifting.

D. Make sure lifting hook has a functional safety latch or equivalent, and is fully engaged and latched on the bail or slings.

E. Use guide ropes or equivalent to prevent twisting or swinging of the compressor once it has been lifted clear of the ground.

F. DO NOT attempt to lift in high winds.

G. Keep all personnel out from under and away from the compressor whenever it is suspended.

H. Lift compressor no higher than necessary.

I. Keep lift operator in constant attendance whenever compressor is suspended.

J. Set compressor down only on a level surface capable of safely supporting at least its weight and its loading unit.

K. When moving compressors by forklift truck, utilize fork pockets if provided. Otherwise, utilize pallet if provided. If neither fork pockets or pallet are provided, then make sure compressor is secure and well balanced on forks before attempting to raise or transport it any significant distance.

L. Make sure forklift truck forks are fully engaged and tipped back prior to lifting or transporting the compressor.

M. Forklift no higher than necessary to clear obstacles at floor level and transport and corner at minimum practical speeds.

N. Make sure pallet-mounted compressors are firmly bolted or otherwise secured to the pallet prior to attempting to forklift or transport them. **NEVER** attempt to forklift a compressor that is not secured to its pallet, as uneven floors or sudden stops may cause the compressor to tumble off, possibly causing serious injury or property damage in the process.

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1.10 ENTRAPMENT

A. If the compressor enclosure is large enough to hold a man and if it is necessary to enter it to perform service adjustments, inform other personnel before doing so, or else secure and tag the access door in the open position to avoid the possibility of others closing and possibly latching the door with personnel inside.

B. Make sure all personnel are out of compressor before closing and latching enclosure doors.

Section 2 DESCRIPTION

2.1 INTRODUCTION

Your new Sullair electric 2-stage, motor-driven air compressor offers superior performance and reliability requiring a minimal amount of maintenance.

Your compressor is equipped with a 2-stage Sullair rotary screw air compressor. Compared to other compressors, the Sullair is unique in mechanical reliability, with virtually no wear or loss of performance. With a Sullair compressor, there is no inspection required of the working parts within the compressor unit.

As you will see in the following pages, it is very easy to care for, and/or, to maintain a Sullair compressor. By careful and step-by-step adherence to the guidelines and procedures, operator(s) will be able to keep the compressor in top operational condition.

2.2 DESCRIPTION OF COMPONENTS

Refer to Figure 2-1 and 2-2. The components of the Sullair 2-stage electric compressor include **com-**

pressor unit, electric motor, cooling and lubrication system, air inlet system, compressor discharge system, capacity control system and instrument panel.

The 2-stage Sullair compressor unit is driven by an electric motor designed to provide enough horsepower for more than adequate reserve at rated conditions.

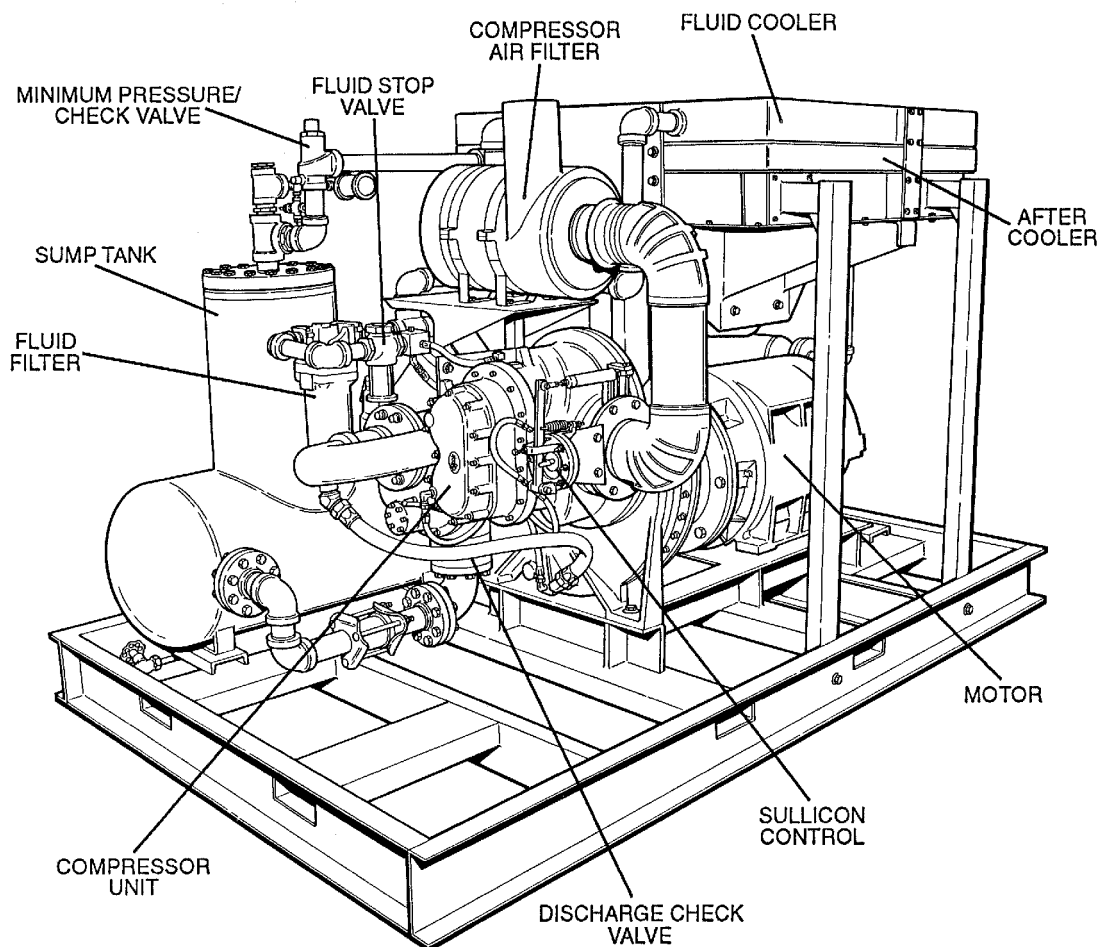
On air-cooled models, a separate motor-driven fan forces air through the cooler, thereby removing the heat of compression from the cooling fluid.

Provisions are made for easy access to such components as the fluid filters, control valves and the air filter. There will be no problem in gaining access to any components in the event they require service.

2.3 SULLAIR COMPRESSOR UNIT, FUNCTIONAL DESCRIPTION

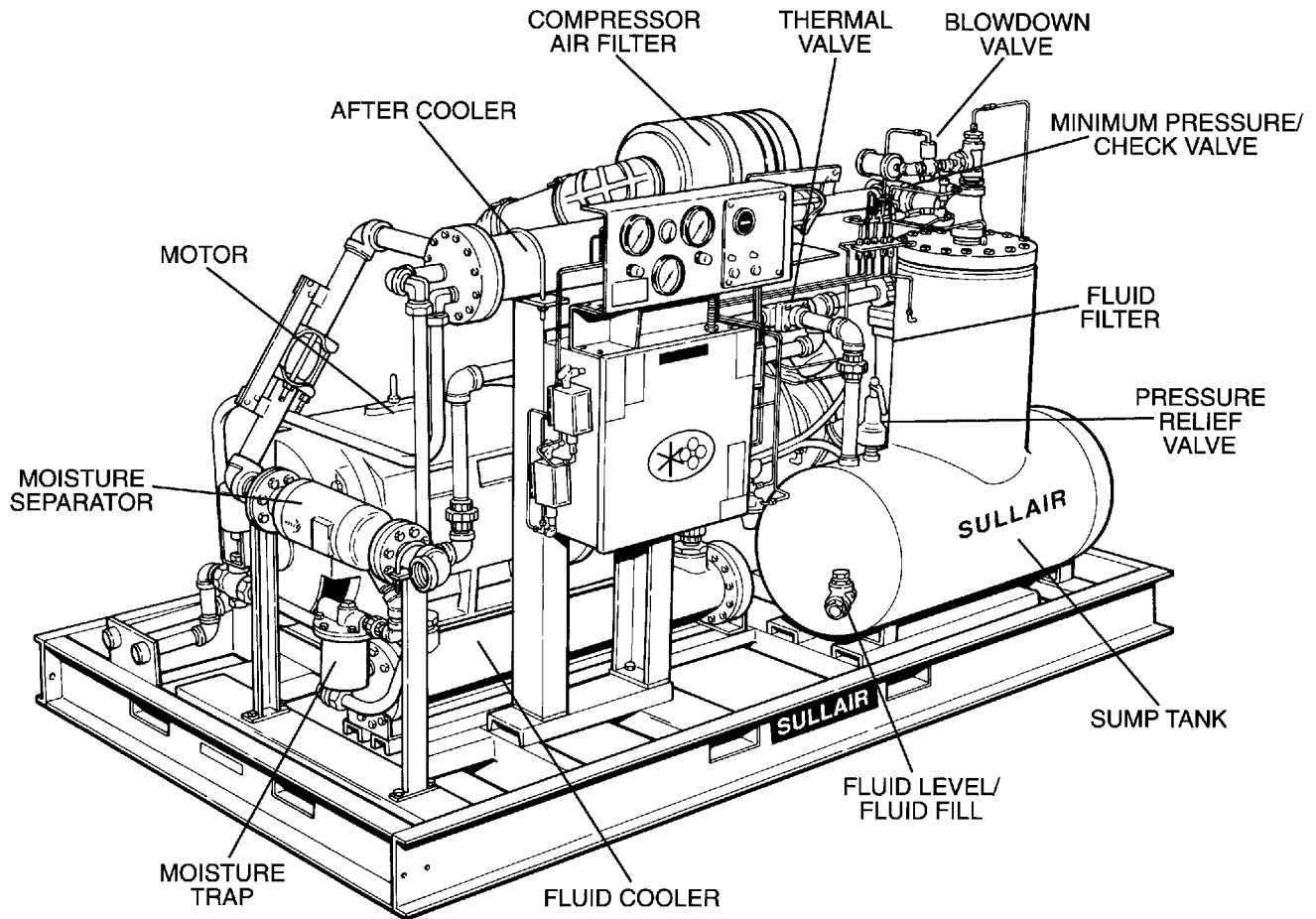
The compressor unit supplied with your compressor is a 2-stage, positive displacement, flood lubricated-type rotary screw air compressor.

Figure 2-1 Sullair 20/12 Rotary Screw Air Compressor (Air-cooled)



Section 2 DESCRIPTION

Figure 2-2 Sullair 20/12 Rotary Screw Air Compressor (Water-cooled)



As the rotors turn, air is drawn into the compressor unit at the first stage inlet. At the outlet of the first stage the air is compressed and discharged into the second stage where it is compressed again to obtain a higher pressure.

Lubricating fluid is injected into the compressor unit at each stage which mixes directly with the air as the rotors turn, compressing the air. The fluid flow has three basic functions:

1. As coolant, it controls the rise of air temperature normally associated with the heat of compression.
2. It seals the leak paths between the rotors as well as between the rotors and stators.
3. It acts as a lubricating film between the rotors allowing the male rotors to directly drive the female rotors (which are idlers).

After the air has been compressed in both stages of the compressor unit, it is discharged in the form of an air/fluid mixture. This mixture is routed through the discharge system where the fluid is separated from the air. At this time, the air flows to your service

line and the fluid is directed through the cooling and lubrication system in preparation for reinjection.

2.4 COMPRESSOR COOLING AND LUBRICATION SYSTEM, FUNCTIONAL DESCRIPTION

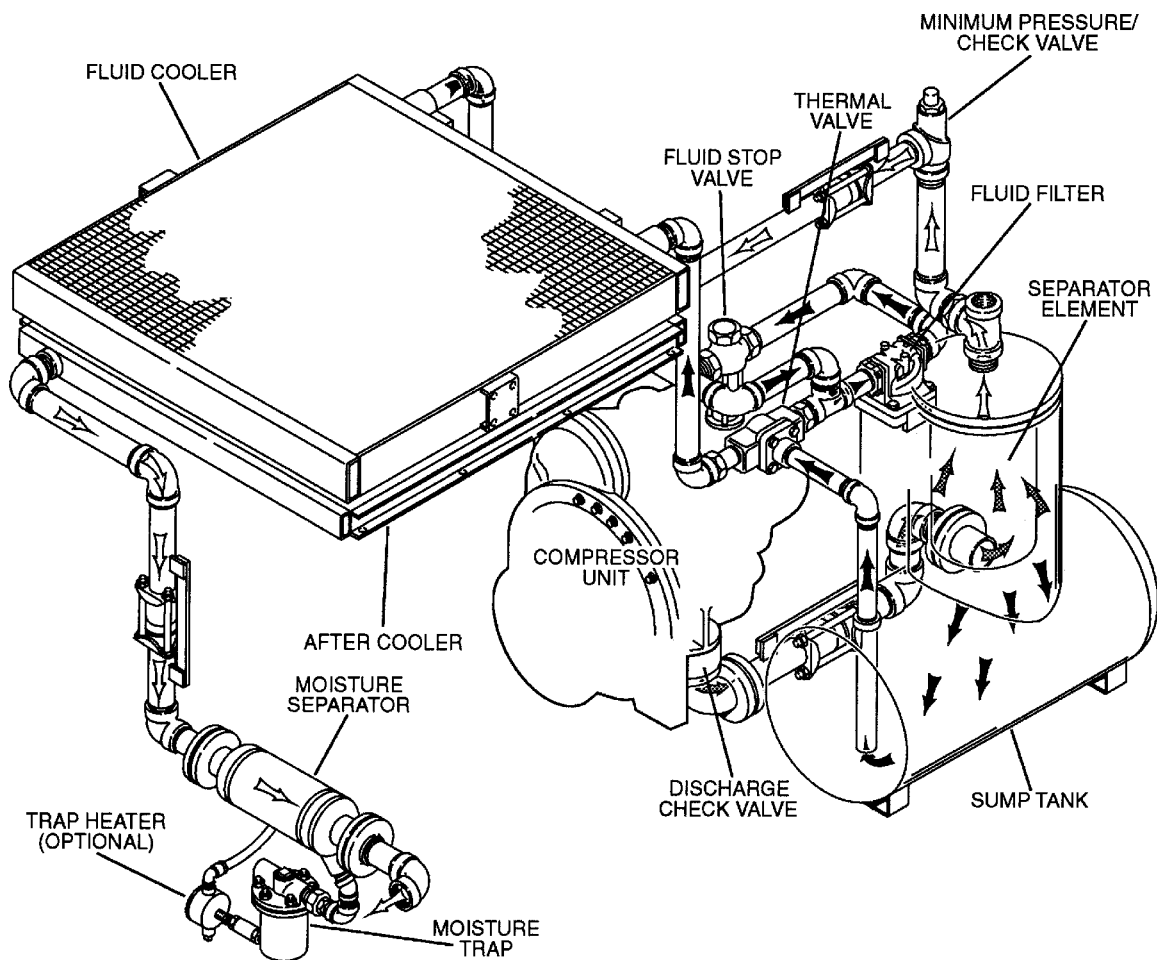
Refer to Figures 2-3, 2-4 and 2-5. The compressor cooling and lubrication system is designed to provide adequate lubrication as well as maintain the proper operating temperature of the compressor. The system is comprised of a shell and tube or radiator type heat exchanger, main line filter, extra-fine bearing lube filter, thermal valve, fluid stop valve and interconnecting piping.

Fluid is used in the system as a coolant and lubricant and is housed in the receiver/sump (from this time forward, the receiver sump will be referred to as the sump). Fluid circulation is achieved by forcing the fluid from the higher pressure area of the sump to lower pressure regions at the compressor unit.

Fluid flows from the bottom of the sump to the thermal valve. The thermal valve is fully open to the compressor unit when the fluid temperature is below 220°F (104°C).

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Figure 2-3 Compressor Cooling/Lube and Discharge (Air-cooled)



After the fluid passes through the thermal valve, it is then directed through the fluid filter. There the fluid is filtered in preparation for injection into the compression chambers. This filter has a cleanable element and built-in bypass which allow some fluid to flow even when the filter becomes plugged and requires changing, or when the viscosity of the fluid is too high for adequate flow. After the fluid is properly filtered, it then flows to the fluid stop valve and on to the bearing filter.

The fluid stop valve prevents the fluid from filling the compressor unit when it is shut down. When the compressor is in operation, the fluid stop valve is held open by air pressure from the compressor unit allowing a free flow of fluid from the sump back to the compressor unit. On shutdown, the compressor unit pressure is reduced, causing the fluid stop valve to close and isolate the unit from the cooling system. The fluid stop valve solenoid valve also opens to assist in relieving the stop valve pilot signal pressure at shutdown.

A portion of the fluid flowing to the compressor is routed to the anti-friction bearings which support the rotors inside the compressor unit. Prior to entering the compressor unit, this fluid is taken through an extra-fine bearing filter, thus assuring properly filtered fluid for bearing supply.

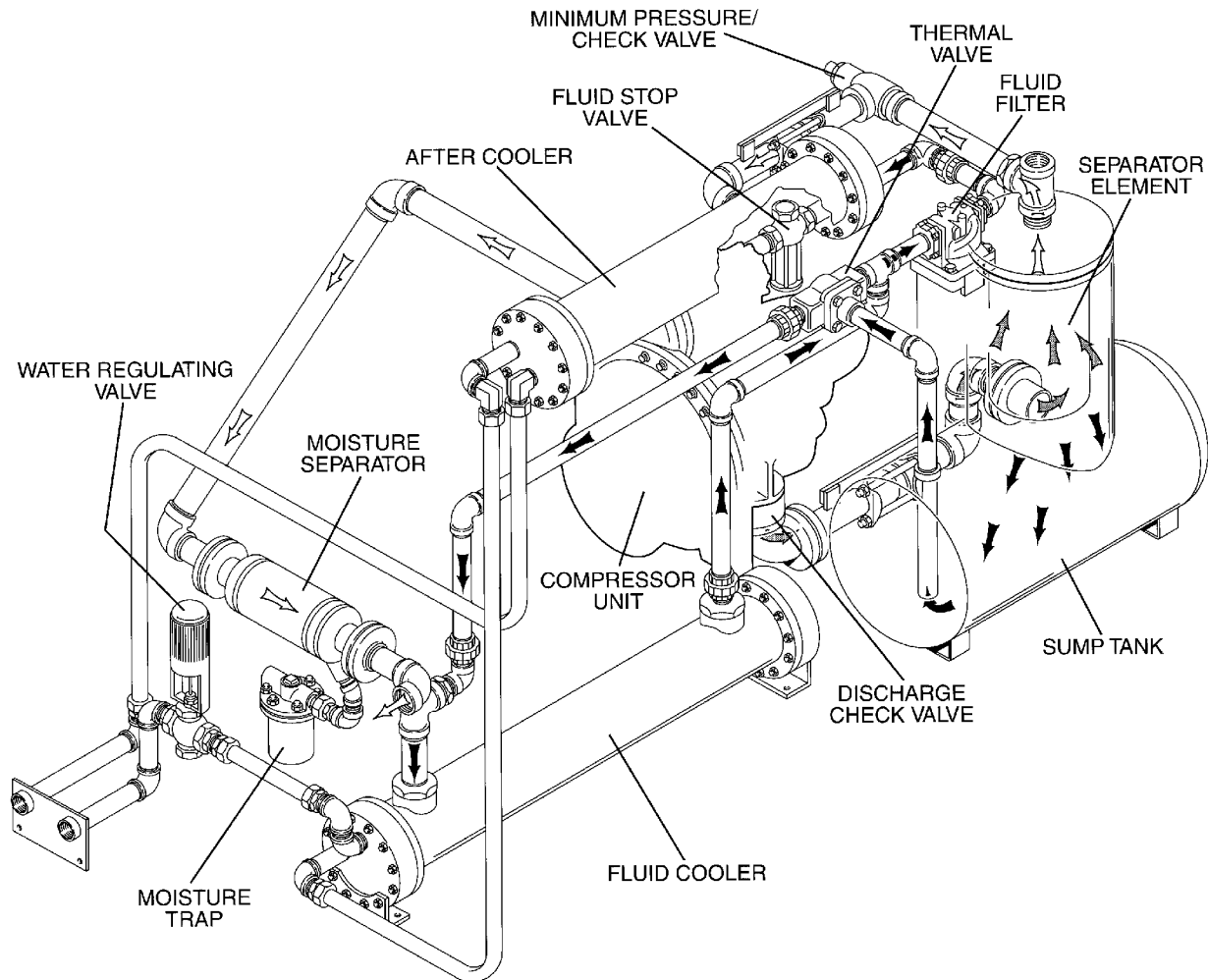
The bearing filter has a replaceable element and an integral pressure bypass valve. An associated maintenance indicator shows red when the filter needs servicing. This indicator has a pressure setting lower than that of the bypass valve. After the initial 50 hour filter change, the filter indicator will show red when filter conditions require a filter change.

2.5 COMPRESSOR DISCHARGE SYSTEM, FUNCTIONAL DESCRIPTION

Refer to Figures 2-3, 2-4 and 2-5. The Sullair compressor unit discharges the compressed air/fluid mixture through a discharge check valve into the combination receiver/sump. The discharge check valve prevents air in the sump from returning to the compression chamber after the compressor has

Section 2 DESCRIPTION

Figure 2-4 Compressor Cooling/Lube and Discharge System (Water-cooled)



been shut down. The receiver has three basic functions:

1. It acts as a primary fluid separator.
2. It serves as the compressor fluid sump.
3. It houses the final fluid separator element.

The compressed air/fluid mixture enters the receiver and is directed against the wall of the sump. By change of direction and impingement action, the larger droplets of fluid fall to the bottom of the sump. The fractional percentage of fluid remaining in the compressed air collects on the surface of the final separator elements as the air flows through the separators. As more and more fluid collects on the surface of the elements, the fluid descends to the bottom of the separators, where return lines (scavenge tubes) lead from the bottom of the separator elements to the compressor unit. Fluid collected at the bottom of the elements is returned to the compressor unit by a pressure difference between the area

surrounding the separator elements and the compressor. Orifices (protected by strainers) are inserted in the return lines to assure proper flow.

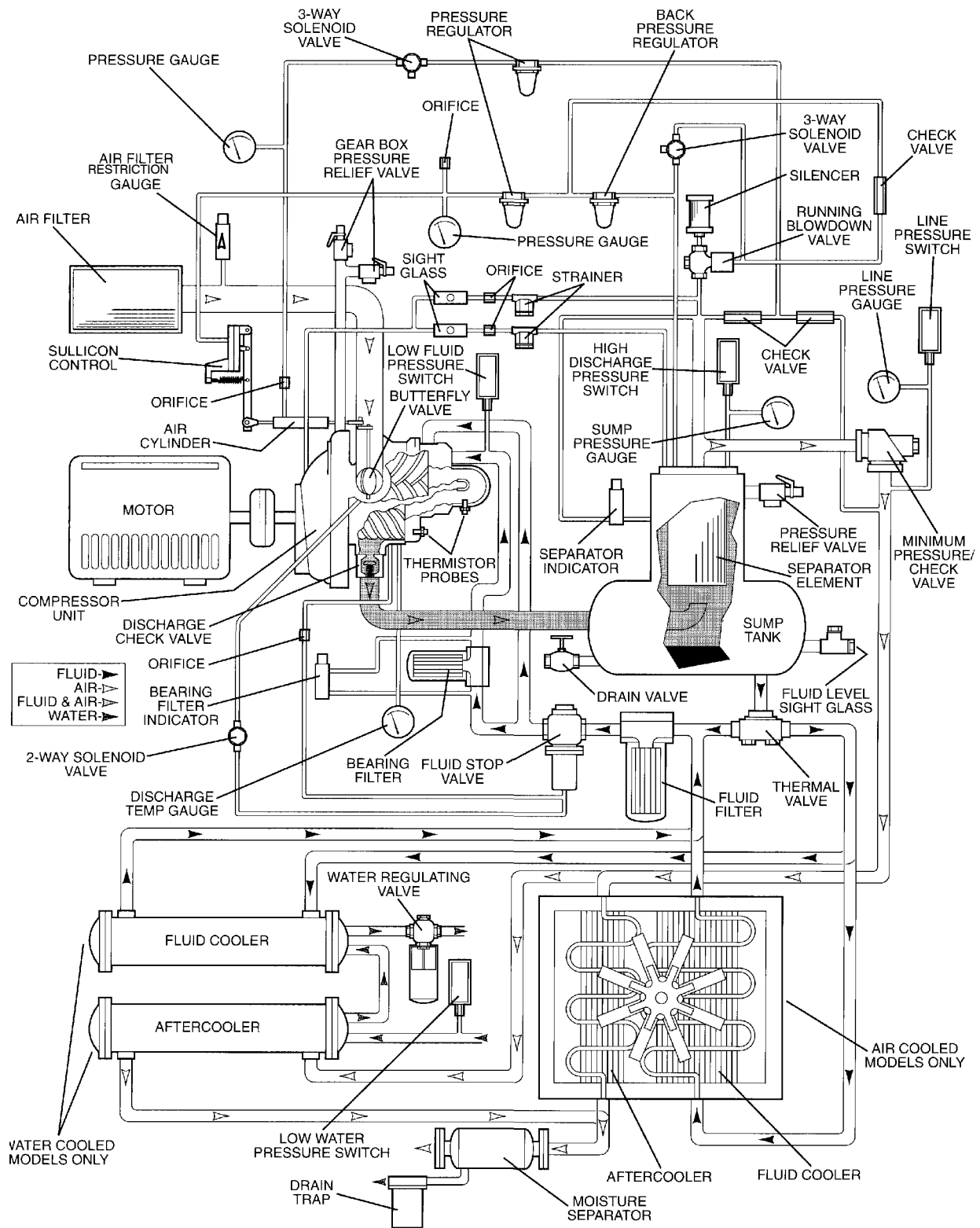
The sump is ASME code rated at 400 psig (27.6 bar) working pressure. A minimum pressure valve, located downstream from the separator, assures a minimum receiver pressure of 160 psig (11 bar), which is maintained during all conditions. This pressure is necessary for proper fluid circulation and air/fluid separation.

A pressure relief valve (located on the wet side of the separator) is set to open if the sump pressure exceeds 375 psig (25.9 bar). Also a temperature switch will shut down the compressor when the discharge temperature reaches 265°F (130°C) on first stage or 265°F (130°C) on second stage.

All Sullair compressor models are equipped with a high pressure shutdown switch to shut down the compressor at 365 psig (25.2 bar). This prevents the

Section 2 DESCRIPTION

Figure 2-5 Piping and Instrumentation



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pressure relief valve from opening under routine conditions, thereby preventing fluid loss through the pressure relief valve.

Fluid is added to the sump via a capped fluid filler opening, placed low on the tank to prevent overflowing. A sight glass enables the operator to visually monitor the sump fluid level.

▲ WARNING

DO NOT open the fluid filler cap when the compressor is pressurized. Shut down the compressor and bleed the sump to 0 psig before removing the cap.

A check valve is also provided to prevent air in the service line from bleeding back into the sump at shutdown or when the compressor is being run in parallel with other compressors tied to a large system. It is recommended that an optional gate-type service valve be used downstream of the check valve before the point at which service lines are connected.

An indicator, located on the instrument panel, signals red if abnormal pressure drop through the separator elements develops. At this time, separator element replacement is necessary.

2.6 CAPACITY CONTROL SYSTEM, FUNCTIONAL DESCRIPTION

Refer to Figure 2-6. The purpose of the compressor control system is to regulate the compressor air intake to match the amount of compressed air being used.

The Control System consists of a **pneumatic actuator cylinder**, a **butterfly valve** (located on the compressor air inlet), a **pilot pressure regulator valve**, a **solenoid pilot valve**, **closed inlet solenoid valve**, **Sullicon Control** and a **blowdown valve**.

The functional description of the Control System is described below in five distinct phases of compressor operation. For explanation purposes, this description will apply to compressors with an operating pressure range of 340 to 360 psig (23.5 to 24.8 bar). A compressor with any other pressure range would operate in the same manner except for the stated pressures.

START MODE - 0 TO 160 psig (0 TO 11 BAR)

When the compressor START button is depressed, the sump pressure will quickly rise from 0 to 160 psig (0 to 11 bar). During this period, both the pilot pressure regulator and the solenoid pilot valve are closed and the inlet cylinder is inoperative. Until the closed inlet timer is satisfied, the inlet actuator cylinder remains withdrawn holding the inlet butterfly valve closed (start Mode A). When the timer is satisfied, the closed inlet solenoid valve opens allowing

the cylinder to extend, opening the butterfly valve fully and the compressor then pumps at full rated capacity (start Mode B). The rising compressed air pressure is isolated from the service line in this phase by the minimum pressure valve, set at approximately 160 psig (11 bar).

NORMAL OPERATING MODE - 160 TO 340 PSIG (11 TO 23.4 BAR)

When the sump pressure rises above 160 psig (11 bar), the minimum pressure valve opens and delivers compressed air to the service line. From this point on, the line air pressure is continually monitored by a line pressure gauge. The pilot pressure regulator and the solenoid pilot valve remain closed during this phase, keeping the Sullicon Control inactive.

MODULATING MODE - 340 TO 360 PSIG (23.4 TO 24.8 BAR)

If less than the rated capacity of compressed air is being used, the service line pressure will rise above 340 psig (23.4 bar). The pilot pressure regulator valve gradually opens, applying air pressure to the Sullicon Control which partially closes the butterfly valve on the compressor air inlet reducing the amount of air entering the compressor until it matches the amount of air being used. The Control System functions continually in this manner, between the limits of 340 to 360 psig (23.4 to 24.8 bar), in response to varying demands from the service line.

The pilot pressure regulator has an orifice which vents a small amount of air to the atmosphere when the pressure regulator controls the butterfly valve.

UNLOAD MODE - IN EXCESS OF 360 PSIG (24.8 BAR) LINE PRESSURE

When a relatively small amount or no air is being used, the service line pressure rises to the setting (cut-out pressure) of the pressure switch. The pressure switch opens, interrupting the electrical power to the solenoid-type pilot valve. At this time, this solenoid valve allows dry sump tank air pressure to be applied directly to the Sullicon Control keeping the butterfly valve closed. Simultaneously, this solenoid valve sends a pneumatic signal to the blowdown valve. The blowdown valve opens the sump to the atmosphere, reducing the sump pressure to approximately 160 to 180 psig (11 to 12.4 bar).

The check valve in the air service line prevents the pressure from returning to the sump.

At a 0 to 10 percent air output, the control system will automatically blow down the sump and greatly reduce the unload power consumption.

When the line pressure drops back to the low setting (cut-in pressure) of the pressure switch (usually 340 psig [23.4 bar]), the pressure switch closes, re-energizing the three-way solenoid pilot valve and allowing the blowdown valve to close. The re-energized solenoid valve again prevents line pressure from

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reaching the Sullicon Control. Should the pressure begin to rise, the pilot pressure regulator will resume its normal function as previously described.

For a compressor with varied periods of time when there are no air requirements, a "Dual Control" option is available. This option allows you to set the compressor in an automatic position whereby the compressor will shut down (time delayed) when no compressed air requirement is present and restart as compressed air is needed.

2.7 AIR INLET SYSTEM, FUNCTIONAL DESCRIPTION

Refer to Figure 2-7. The compressor inlet systems consists of a dry-type air filter, a restriction gauge, inlet actuator cylinder, Sullicon Control, and an air inlet valve.

The restriction gauge, located on the compressor instrument panel, indicates when air filter maintenance is required.

The butterfly-type air inlet valve directly controls the amount of air intake to the compressor in response

to the operation of the Sullicon Control (Section 2.6). The inlet actuator cylinder holds the butterfly valve closed during the compressor start mode.

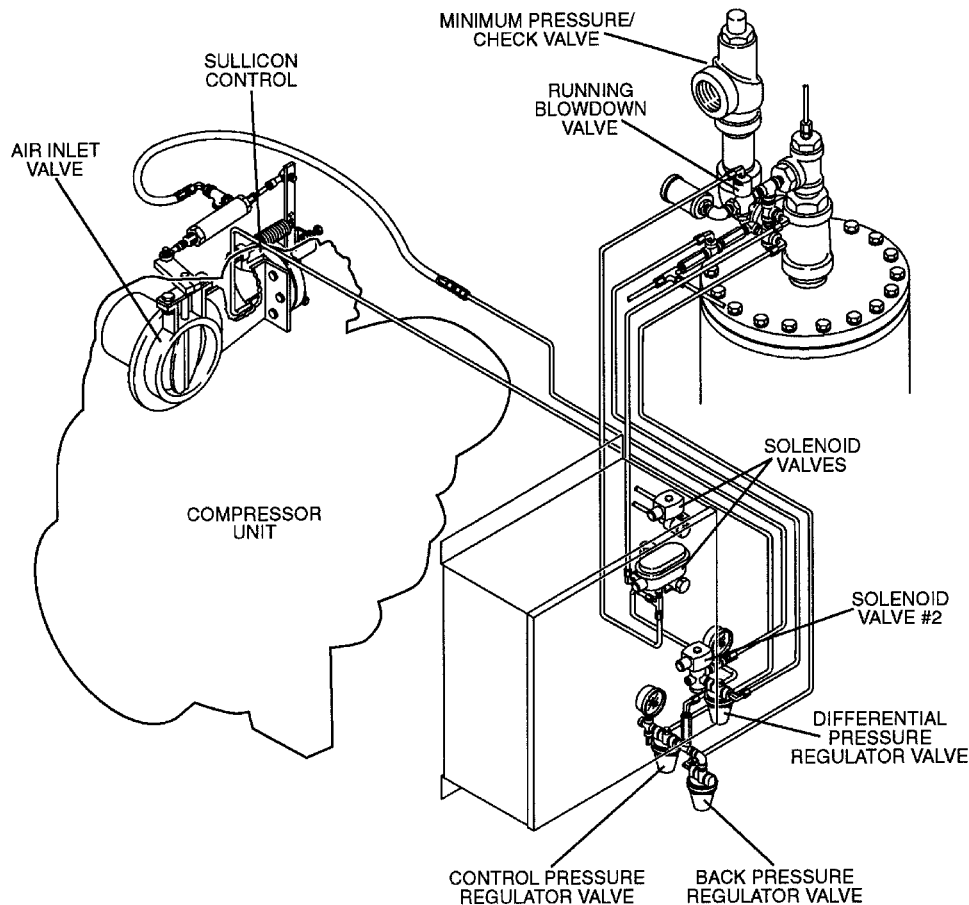
2.8 INSTRUMENT PANEL GROUP, FUNCTIONAL DESCRIPTION

Refer to Figure 2-8 for specific location of parts described. The instrument panel group consists of a **line pressure gauge**, **air filter maintenance gauge**, **sump pressure gauge**, **compressor discharge temperature gauge** and **maintenance indicators** for the **separator elements** and **bearing filter** all located on a heavy gauge instrument panel. Located on the electric control panel are **START**, **STOP** and **RESET** (optional) pushbuttons, **power and run indicators**, an **hourmeter**, plus various (optional) **fault indicator lights** (see Figure 2-8).

Refer to Figure 2-8 for functional locations of the following indicators and controls:

- The **line (terminal) pressure gauge** is connected to the dry side of the receiver downstream from the check valve and continually monitors the air pressure.

Figure 2-6 Control System



Section 2 DESCRIPTION

- The **sump pressure gauge** continually monitors the sump pressure at the various load and/or unload conditions.
- The **discharge temperature gauge** monitors the temperature of the air leaving the compressor unit. The normal reading for the compressor is 230°F (110°C).

Figure 2-7 Air Inlet System (Typical)

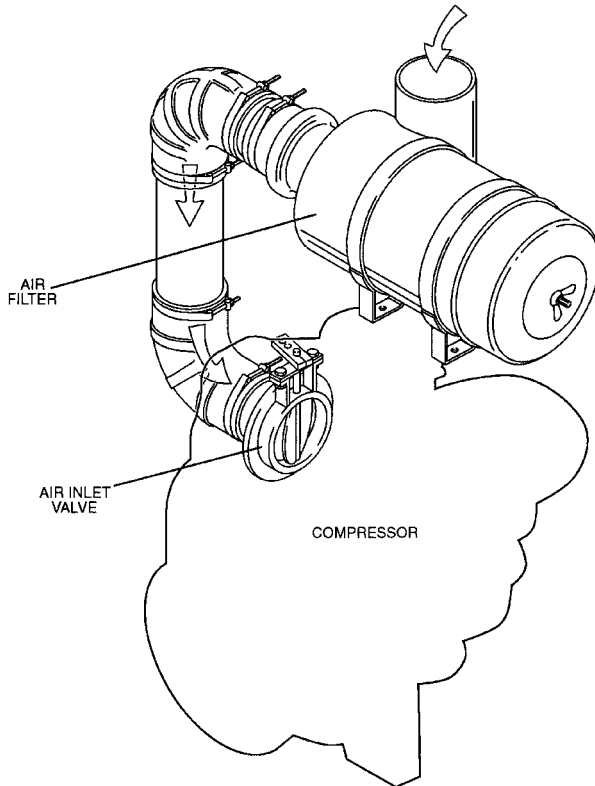
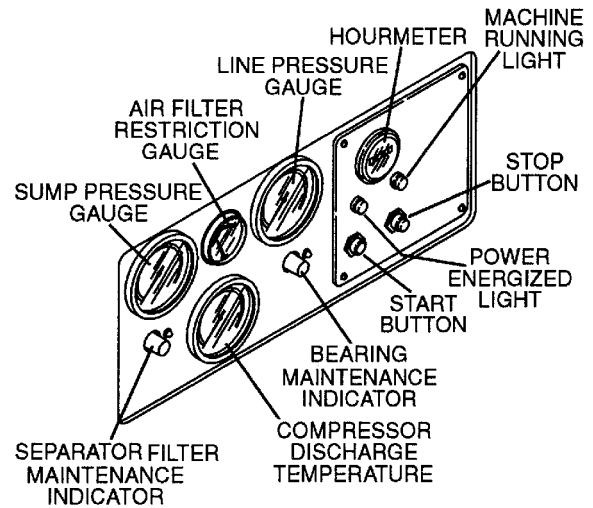


Figure 2-8 Instrument Panel



- The **START pushbutton** turns the compressor on.
- The **STOP pushbutton** turns the compressor off.
- The **RESET (optional) pushbutton** clears the protective shutdown interlocks after a fault has been corrected.
- The **hourmeter** records the cumulative hours of operation for the compressor and is useful for planning and logging service operations.
- The **separator maintenance indicator** monitors the condition of the separator elements and shows red when the element restriction is excessive.
- The **bearing lube filter maintenance indicator** monitors the condition of the bearing filter element and shows red when the element should be changed. This indicator is automatically reset.

Section 3 SPECIFICATIONS

3.1 SPECIFICATIONS

<u>Model Series</u>	<u>DIMENSIONS WITHOUT ENCLOSURE</u>						<u>Weight</u>	
	<u>Length</u>		<u>Width</u>		<u>Height</u>		<u>lb</u>	<u>kg</u>
	<u>in</u>	<u>mm</u>	<u>in</u>	<u>mm</u>	<u>in</u>	<u>mm</u>		
CFM/PSIG/HP								
20/12 (500/250/200)	120	3048	72	1829	75	1905	8500	3856
20/12 (500/350/200)	120	3048	72	1829	75	1905	8500	3856
20/12 (600/225/200)	120	3048	72	1829	75	1905	8500	3856
20/12 (630/350/250)	120	3048	72	1829	75	1905	9000	4082
20/12 (750/250/250)	120	3048	72	1829	75	1905	9000	4082
20/12 (750/350/300)	120	3048	72	1829	75	1905	9000	4082

COMPRESSOR:

Type:	2-Stage Oil Flooded Rotary
Maximum Full Load Operating Pressure:	350 psig (24.1 bar)
Bearing Type:	Anti-Friction
Cooling:	Pressurized Compressor Fluid
Lubricant:	Sullube 32
Sump Capacity:	35 U.S. Gallons (132.5 liters)
Control:	Electro-Pneumatic

MOTOR:

Type:	O.D.P., 460V, A.C., Three Phase, 60 Cycles
Size:	See Model Series above.
Speed:	a) 1800 RPM and b) 1200 RPM for 500 CFM units.

3.2 LUBRICATION GUIDE

Sullair standard compressors are filled with Sullube 32 fluid as factory fill. **MIXING OF OTHER FLUIDS WITHIN THE COMPRESSOR WILL VOID ALL WARRANTIES.**

Sullube 32 fluid should be changed every 8000 hours when indicated by fluid analysis or once a year, whichever comes first. The fluid should be changed more frequently under severe operating conditions, such as high ambient temperatures coupled with high humidity, or when high particulate

level, corrosive gases or strong oxidizing gases are present in the air.

Maintenance of all other components is still recommended as indicated in the Operator's Manual.

Sullair encourages the user to participate in a fluid analysis program with the fluid suppliers. This could result in a fluid change interval differing from that stated in this manual. Contact your Sullair Representative for details.

NOTES

4.1 MOUNTING OF COMPRESSOR

A foundation or mounting capable of supporting the weight of the compressor, and rigid enough to maintain the compressor frame level and the compressor in alignment is required. The compressor frame must be leveled and secured with foundation bolts, and full uniform contact must be maintained between the frame and foundation. It is recommended that the frame be grouted to the foundation. The compressor unit and driver must be aligned after installation as specified in the Operator's Manual. No piping loads shall be transmitted to the compressor at the external connections.

4.2 SERVICE AIR PIPING

Service air piping should be installed as shown in Figure 4-1. A shut-off valve should be installed to isolate the compressor from the service line. Also notice that the service line should be equipped with water legs and condensate drains throughout the system.

NOTE

Under certain conditions for inside installations, it may be desirable to pipe the relief valves to the outside of the building.

4.3 COUPLING ALIGNMENT CHECK

In preparation for the factory test, the coupling supplied with your compressor is properly aligned for operation. The motor is flange-mounted to the compressor unit. Therefore it is not necessary to re-check this alignment.

4.4 FLUID LEVEL CHECK

The 2-stage air compressor is also supplied with the proper amount of fluid. However, it is necessary to check the fluid level at installation. The level is checked by looking at the sight glass located near the sump. If the sump is properly filled, the fluid level should be visible in middle of the sight glass. **DO NOT OVER FILL THE FLUID LEVEL OF THE COMPRESSOR.**

4.5 MOTOR ROTATION DIRECTION CHECK

After the electrical wiring has been done, it is necessary to check the direction of the motor rotation. This can be done by jogging the START and STOP buttons on the instrument panel. When looking at the motor from the end opposite the compressor unit, the shaft should be turning clockwise. If the motor shaft is not turning clockwise, disconnect the power to the starter and exchange any two of the three power input leads, then re-check rotation.

4.6 ELECTRICAL PREPARATION

Interior electrical wiring is performed at the factory. Required customer wiring is minimal, but should be done by a qualified electrician in compliance with OSHA, National Electrical Code, and any other applicable local electrical code concerning isolation switches, fused disconnects, etc. Sullair provides a wiring diagram for use by the installer.

A few electrical check should be made to help assure that the first start-up will be trouble free.

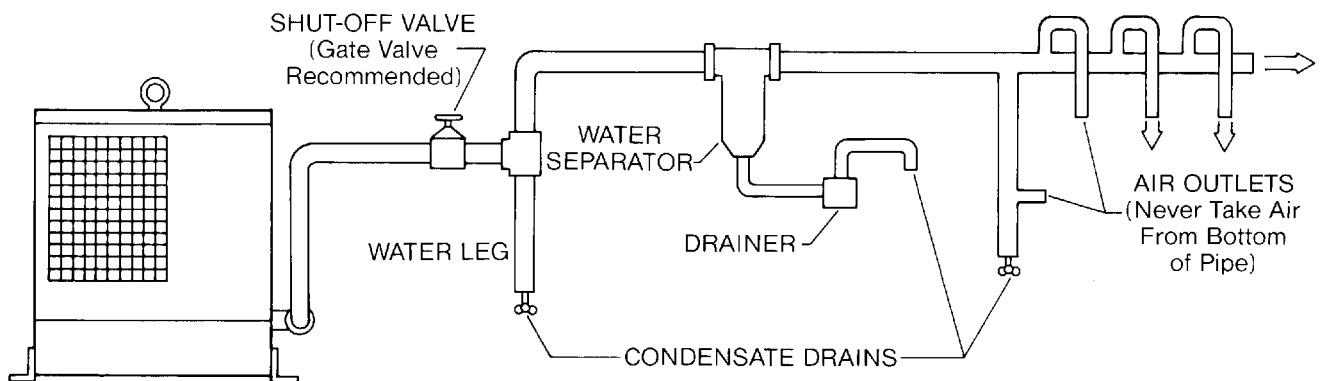
⚠ DANGER

Lethal shock hazard inside.

Disconnect all power at source before opening or servicing.

1. Check incoming voltage. Be sure that the incoming voltage is the same voltage that the compressor was wired for.
2. Check starter and overload heater sizes (see instrument panel and electric control box in Parts List Manual P/N 02250041-547).
3. Check all electrical connections for tightness.
4. "DRY RUN" the electrical controls by disconnecting the three (3) motor leads from the starter. Energize the control circuits by pushing the START button and check all protective devices to be sure that they will de-energize the starter coil when activated.
5. Reconnect the three (3) motor leads and jog the motor for a direction of rotation check, as explained in Section 4.5.

Figure 4-1 Service Air Piping



NOTES

Section 5 OPERATION

5.1 GENERAL

While Sullair has built into this compressor a comprehensive array of controls, protective devices and indicators to assure you that it is operating properly, you will want to recognize and interpret the reading which will call for service or indicate the

beginning of a malfunction. Before starting your Sullair compressor, read this section thoroughly and familiarize yourself with the controls, protective devices and indicators - their purpose, location and use.

5.2 PURPOSE OF CONTROLS

CONTROL OR INDICATOR	PURPOSE
START PUSHBUTTON	Depress to turn the compressor ON.
HOURMETER	Records the cumulative hours of compressor operation; useful for planning and logging service schedules.
LINE PRESSURE GAUGE	Continually monitors service line air pressure. Located on dry side of receiver downstream from check valve.
SUMP PRESSURE GAUGE	Continually monitors receiver/sump pressure at various load and/or unloaded conditions.
DISCHARGE TEMPERATURE GAUGE	Monitors temperature of the air leaving the compressor unit. The normal reading should be approximately 230°F (110°C).
BEARING FLUID FILTER MAINTENANCE INDICATOR	Indicates when a bearing fluid filter element change is required. Shows red when the pressure drop through the filter is excessive.
SEPARATOR MAINTENANCE INDICATOR	Indicates when separator element change is required. Shows red when the pressure drop through the separator elements is excessive. The separators must be replaced. DO NOT CLEAN.
FLUID LEVEL SIGHT GLASS	Monitors fluid level in the sump. Proper level is to fill the sight glass.
FLUID RETURN LINE SIGHT GLASSES	Used to indicate fluid flow in the return lines. When the compressor is running at full load, fluid flow should be visible in this sight glasses. There may be little or no flow when the compressor is running unloaded, but a sluggish flow at full load indicates a need to clean the return line strainers.
FLUID STOP VALVE	Cuts off flow of fluid to compressor unit at compressor shutdown and allows flow of fluid to unit on start-up.
COMPRESSOR DISCHARGE CHECK VALVE	Cuts off the reverse flow of air/fluid mixture through compressor discharge system at compressor shutdown.
THERMAL VALVE	Regulates flow of fluid to and around the cooler. Designed to maintain an operating compressor discharge temperature of 230°F (110°C). Used for fast warmup on start-up.
HIGH PRESSURE SHUTDOWN SWITCH	Designed to shut down the compressor when the pressure becomes too high. This switch is set for 365 psig (25.2 bar).
PRESSURE RELIEF VALVE (Sump)	Opens sump pressure to the atmosphere should pressure inside the sump become too high (375 psig [25.9 bar]).

Section 5 OPERATION

5.2 PURPOSE OF CONTROLS

CONTROL OR INDICATOR	PURPOSE
PRESSURE RELIEF VALVE (Interstage)	Opens inner stage to atmosphere should the pressure become too high (140 psig [9.7 bar]).
NOTE	
Under certain conditions, it may be desirable to pipe the relief valves to the outside of the building for inside installation.	
TERMINAL CHECK VALVE	Prevents line pressure backflow into the sump during unload conditions and after shutdown.
SULLICON CONTROL	Regulates the amount of air allowed to enter the air inlet valve. This regulation is determined by the amount of air being used at the service line.
PILOT PRESSURE REGULATOR	Opens a pressure line between the sump and Sullicon Control allowing the Sullicon to regulate air delivery to air demand.
SOLENOID PILOT VALVE	Bypasses the pilot pressure regulator valve causing the Sullicon Control to close the inlet butterfly valve when the compressor reaches maximum operating pressure.
BLOWDOWN VALVE	Vents sump pressure to the atmosphere during unload conditions and shutdown.
PRESSURE SWITCH	Senses service line pressure. When line pressure reaches maximum operating pressure, the pressure switch signals the solenoid pilot valve to unload the compressor.
MINIMUM PRESSURE/CHECK VALVE	Maintains a minimum pressure of 160 psig (11 BAR) in the sump. This valve restricts air discharge from the sump when the pressure falls to 160 psig (11 bar). However, full flow is allowed at normal operating pressures.
HIGH DISCHARGE TEMPERATURE SWITCH	Shuts the compressor down if the discharge temperature from the first stage exceeds 265°F (130°C) or the second stage exceeds 265°F (130°C).
LOW FLUID PRESSURE SWITCH	Shuts the compressor down if the fluid pressure downstream of the bearing filter drops below 90 psig (6.2 bar).
INLET CYLINDER	Holds butterfly valve closed during start mode.
CLOSED INLET SOLENOID VALVE	Prevents the inlet cylinder from opening the inlet butterfly valve during start-up.
FLUID STOP VALVE SOLENOID VALVE	Vents the fluid stop valve solenoid signal upon shutdown of the compressor.

5.3 INITIAL START-UP PROCEDURE

The following procedure should be used to make the initial start-up of the compressor:

1. Read the preceding pages of this manual thoroughly.
2. Be sure that all preparations and checks described in the Installation section have been made.
3. Crack open the shut off valve to the service line.
4. Start the compressor by pushing the START button.
5. Check for possible leaks in piping.
6. Slowly close the shut-off valve and check that the setting on the pressure switch is set correctly. If set correctly, the compressor will unload at the desired unload pressure. If adjustments are necessary, see [Control System Adjustments](#) in the Maintenance Section of the manual.

7. Observe the operating temperature. If the operating temperature exceeds 230°F (110°C), the cooling system or installation environment should be checked.
8. Observe return line sight glasses and maintenance indicators.
9. Open shut-off valve to service line.
10. Reinspect the compressor for temperature and leaks the following day.

5.4 SUBSEQUENT START-UP PROCEDURE

On subsequent start-ups, check that the proper level is visible in the fluid sight glass and simply press the START button. When the compressor is running, observe the instrument panel and maintenance indicators.

5.5 SHUTDOWN PROCEDURE

To shut the compressor down, simply press the STOP button.

NOTES

Section 6 MAINTENANCE

6.1 GENERAL

A good maintenance program is the key to long compressor life. Below is a program that when adhered to should keep your compressor in top running condition. Included in this program are routine service operations for every major serviceable component of the compressor. See Section 6.6 for instructions on Parts Replacement and Adjustment Procedure.

⚠ WARNING

DO NOT remove caps, plugs, and/or other components when compressor is running or pressurized.

Stop compressor and relieve all internal pressure before doing so.

6.2 DAILY OPERATION

Prior to starting the compressor it is necessary to check the fluid level in the sump. Should the level be low, simply add the necessary amount. **DO NOT OVER FILL THE FLUID LEVEL.** If the addition of fluid becomes too frequent, a simple problem has developed which is causing this excessive loss. See the Troubleshooting Section (6.8) under [Excessive Fluid Consumption](#) for a probable cause and remedy.

After a routine start has been made, observe the instrument panel gauges and be sure they indicate the correct readings for each particular phase of operation. After the compressor has warmed up, it is recommended that a general check on the overall compressor and instrument panel be made to assure that the compressor is running properly.

6.3 MAINTENANCE AFTER INITIAL 50 HOURS OF OPERATION

After the initial 50 hours of operation, a few maintenance requirements are needed to rid the system of any foreign materials. Perform the following maintenance operations to prevent unnecessary problems.

1. Clean the return line strainers.
2. Clean the return line orifices.
3. Change the bearing filter element.
4. Clean the main strainer element.

6.4 MAINTENANCE AS REQUIRED BY LUBRICATION GUIDE (SECTION 3)

1. Drain the sump and change the compressor fluid.
2. Replace the bearing filter element.
3. Clean the return line strainer.
4. Lubricate the inlet cylinder linkage.
5. Clean the main strainer element.

6.5 FILTER MAINTENANCE

Replace your bearing filter element when the maintenance indicator shows red, or at every lubricant change. This must be done even if the bearing filter indicator does not show red. Also check the main filter element and install a new gasket kit at this time.

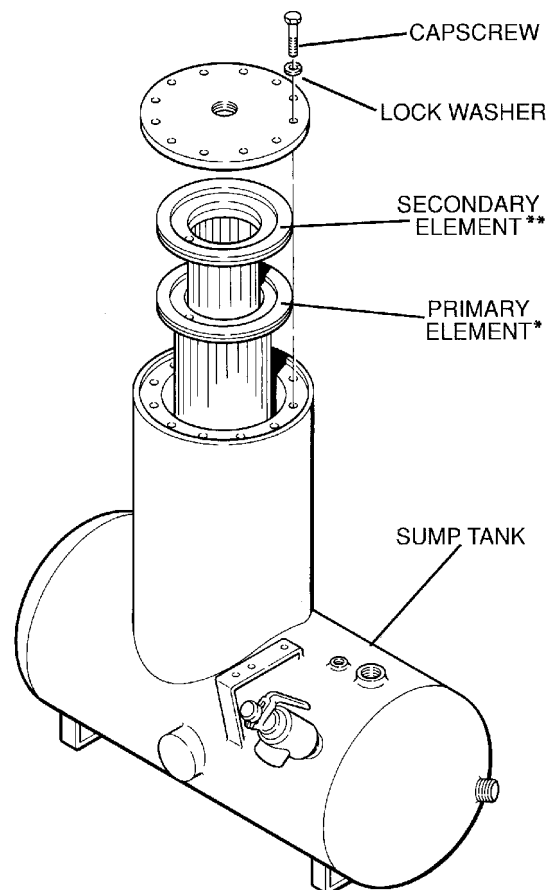
6.6 PARTS REPLACEMENT AND ADJUSTMENT PROCEDURES

SEPARATOR MAINTENANCE

Refer to Figure 6-1. Separator element replacement is required when indicated by the maintenance indicator or once a year, whichever comes first, use the following procedure for separator replacement. Follow the procedure explained below for separator element replacement.

1. Relieve all pressure from the separator and all compressor lines.
2. Disconnect all piping connected to the separator cover to allow removal (return lines, service lines, etc.)
3. Loosen and remove the 12 hex head capscrews (3/4" x 3") from the cover plate.
4. Lift the cover plate from the separator.
5. Remove the primary and secondary separator elements.

Figure 6-1 Separator Element
Primary P/N 250034-121
Secondary P/N 250034-133



* Repair Kit P/N 250034-122

** Repair Kit P/N 250034-134

Section 6 MAINTENANCE

6. Scrape the old gasket material from the cover and flange on the sump being careful not to let the scraps fall in the sump.
7. Inspect the separator tank for rust, dirt, etc.
8. Reinsert the separator elements with gaskets attached into the sump taking care not to dent them against the tank opening. **DO NOT** remove gasket staples. **DO NOT** use gasket sealer as it can insulate the staples, causing the element not to be properly ground for insulation.
9. Clean the underside of the separator tank cover and remove any rust.
10. Replace the cover plate, washers and capscrews. Torque to 155 ft.-lbs. (210 Nm).
11. Reconnect all piping making sure the return line tube extends to the bottom or 1/4" (6mm) above the bottom of the separator element. This will assure proper fluid return flow to the compressor. The return line should not contact the separator element end cap.
12. Clean or replace fluid return line strainers.
13. Clean the fluid return line orifices.
14. After assembly is complete, check for electrical continuity between the separator flange and the lid and tank flange with an ohmmeter.

SERVICING THE BEARING FLUID FILTER

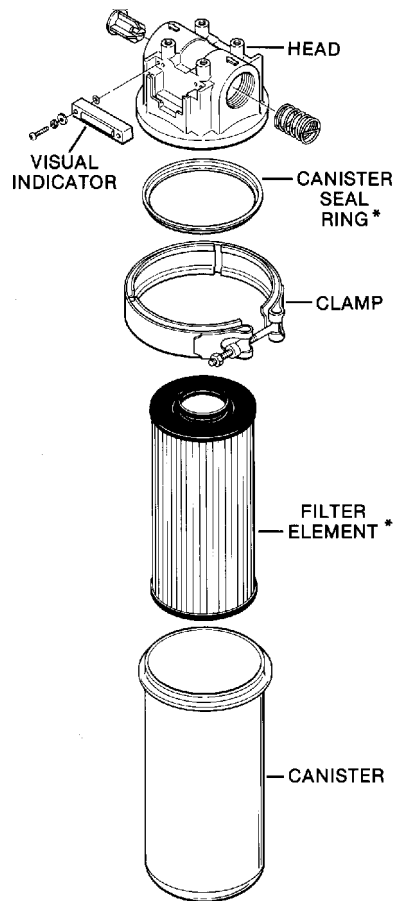
Refer to Figure 6-2. When a need for a fluid filter element (P/N 250019-296) replacement is indicated by the maintenance indicator located on the filter head or at every fluid change, use the following instructions.

1. When servicing is required, the compressor system must be shutdown to be sure no positive pressure remains on the lubricant in the filter.
2. To remove the canister, loosen band nut on the band that holds canister to filter head, then gently pull down canister. Filter element sits freely in canister.
3. Remove filter element and gasket seal ring and discard.
4. Install new fluid filter element in canister and install the gasket seal ring to the canister flange.
5. Before reinstalling the canister to the filter head, make sure mounting surface on filter head is clean and free of dirt.
6. Apply a film of fluid to the gasket seal ring and then install the canister to the filter head. Reinstall band and tighten band nut to 200 in.-lbs. (22.6 Nm).

AIR FILTER MAINTENANCE

Refer to Figure 6-3. Air filter maintenance should be performed when air filter restriction gauge reads 20 inches water column. The air filter is equipped with a primary element and a secondary element. As previously stated, the restriction gauge will alert you as to when the primary element maintenance is necessary. When removing the primary element, always check the secondary element for visible dirt, grease, oil or damage. If any of these conditions exist, the secondary element must be replaced at this time. Otherwise the secondary element must be changed after every sixth primary element inspection. The pri-

Figure 6-2 Bearing Filter (P/N 250019-296)



* Element Repair Kit P/N 602568-001

mary and secondary elements are designed for replacement only. **DO NOT** clean the elements.

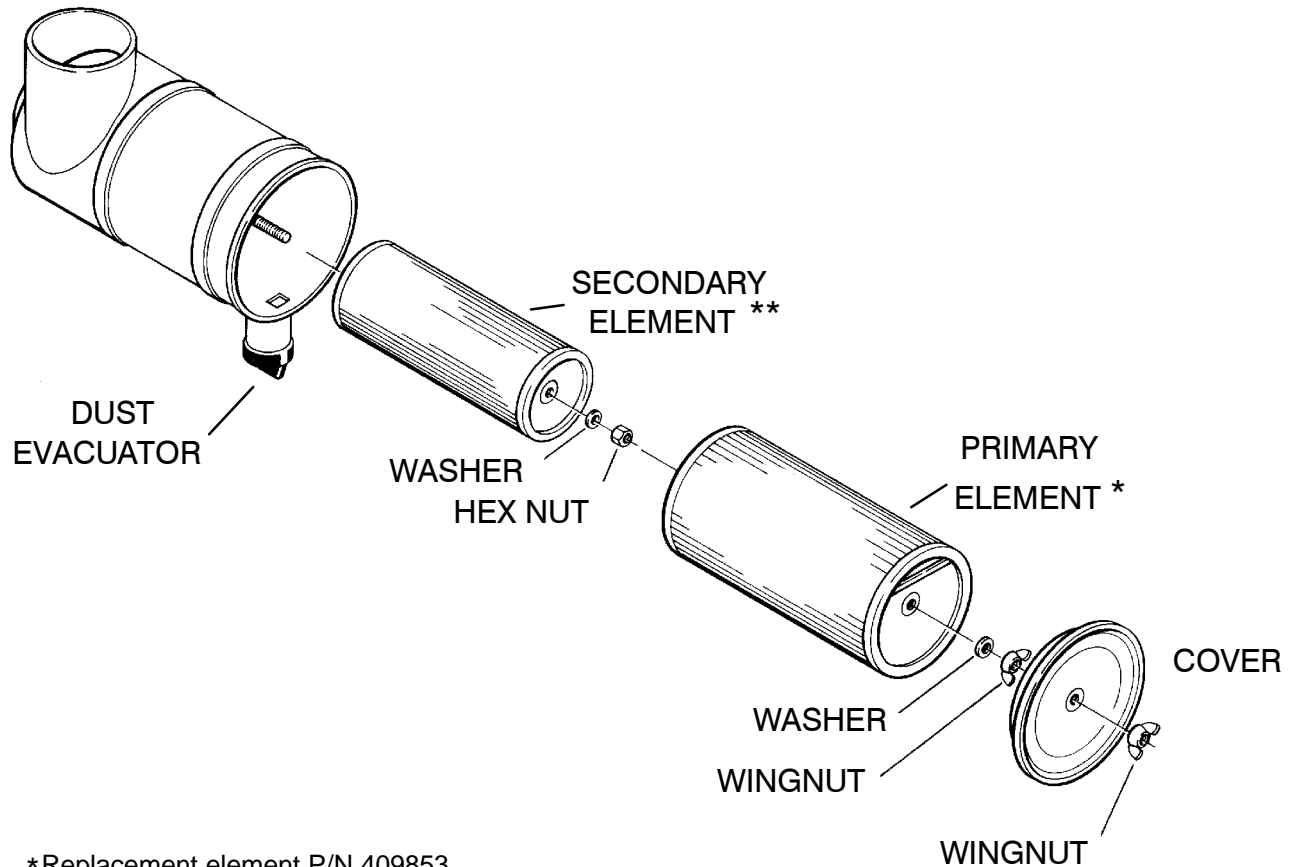
ELEMENT REMOVAL

1. Clean the exterior of the air filter housing.
2. Remove the cover assembly by loosening the wingnut securing it.
3. Pull the element assembly out of the housing.
4. Clean the interior of the housing by using a damp cloth. **DO NOT** blow dirt out with compressed air.
5. Inspect the secondary element and replace if necessary. This element is not cleanable.
6. To remove the secondary element, remove the hex nut and sealing washer from the threaded rod running through the element and pull the element out of the housing.
7. Install the new secondary element and replace the sealing washer and hex nut.
8. With the secondary element in place, replace the primary element.

ELEMENT INSPECTION

1. Place a bright light inside the element to inspect for damage or leak holes. Concentrated light will shine through the element and disclose any holes.

Figure 6-3 Air Filter (P/N 409264)



* Replacement element P/N 409853
 ** Replacement element P/N 409854

2. Inspect all gaskets and gasket contact surfaces of the housing. Should faulty gaskets be evident, correct the condition immediately.
3. If the element is to be stored for later use, it must be stored in a clean container.
4. After the element has been installed, inspect and tighten, if necessary, all air inlet connections prior to resuming operation.

PRIMARY ELEMENT REPLACEMENT

1. Place the element in position over secondary element. Replace the sealing washer and wingnut. Tighten the wingnut so as to fully seat the element gasket.
2. Install the cover/element assembly and replace the wingnut.

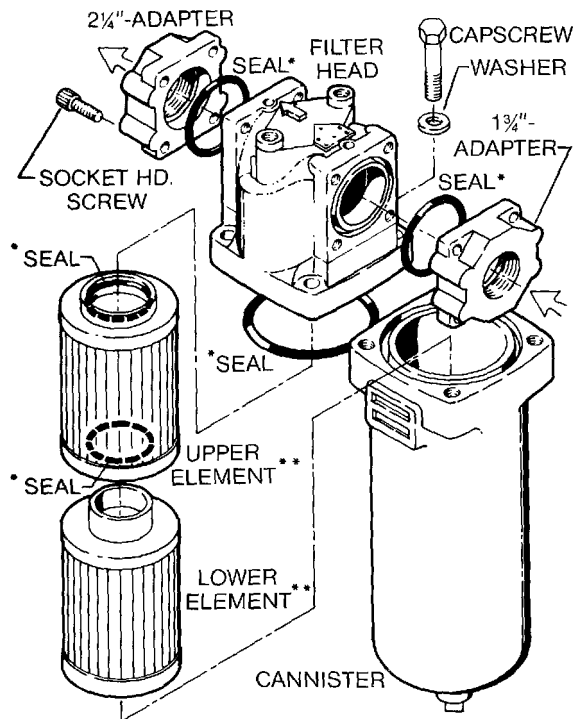
SERVICING THE MAIN FLUID FILTER

Refer to Figure 6-4. The main fluid filter (P/N 045111) is located schematically between the sump and the fluid stop valve. When servicing the main fluid filter, shut down the compressor and use seal kit no. 001132 and follow the instruction below. For element replacement, order kit no. 001094.

1. Remove the four (4) capscrews which secure the filter head to the canister.
2. Pull the canister away from the filter head. The filter elements will be attached to the head.
3. Separate the elements from the filter head (the elements will pull apart).
4. Remove the seals from both ends of the upper element. Remove the canister seal.
5. Thoroughly clean the elements, filter head and canister in solvent.
6. Lubricate the new seals with the same type of fluid used in the compressor and position each seal in its appropriate place.
7. Carefully push the upper element back into the position on the filter head. The element will protrude from the bottom of the head (approximately 5" [127mm]) when properly seated.
8. Carefully push the lower element into position under the upper element.
9. Hold the canister in position under the housing and replace the capscrews, securing the canister and filter head.

Section 6 MAINTENANCE

Figure 6-4 Main Fluid Filter (P/N 045111)



* Seal Repair Kit P/N 001132
** Element Repair Kit P/N 001094

CONTROL SYSTEM ADJUSTMENT

Refer to Figures 6-5 and 6-6. Prior to adjusting the Control System, it is necessary to determine the desired operating pressure range and also the maximum pressure at which your compressor is to operate. The pressure must not exceed the maximum operating pressure which is stamped on the compressor serial number nameplate. The following explanation applies to a typical installation with a desired operating range of 250 to 260 psig (17.2 to 17.9 bar). This information will apply to a compressor with any other operating range except for the stated pressures.

With the shut-off valve closed (or slightly cracked open) start the compressor. Observe the line pressure gauge and pressure switch contacts. When the line pressure reaches the desired pressure, the pressure switch contacts should open. If the pressure switch contacts do not open or they open prior to the desired pressure, the pressure switch setting will require adjustment (refer to Figure 6-5).

FOR PRESSURE RANGE ADJUSTMENT:

1. Remove cover to pressure switch.
2. Turn the range adjusting screw to the high pressure (unload) setting. Turning the screw counterclockwise lowers both the high and low pressure equally.

FOR DIFFERENTIAL PRESSURE ADJUSTMENT: Differential is the difference between the high and low pressure settings (10 psig [0.7 bar]) typical.

Turn the differential adjusting screw to the lower (reset) setting. Turning the screw counterclockwise widens the differential by lowering the reset (lower) setting only.

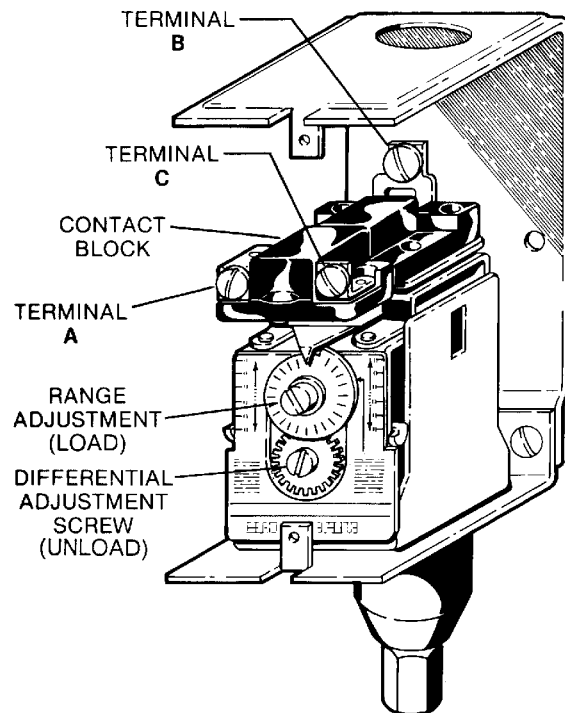
When the pressure switch adjustment is complete, the pressure regulator should be adjusted for the pressure at which modulation of air delivery should begin. In this case, that pressure will be 250 psig (17.2 bar). The regulator is adjusted by loosening the jam nut on the end of the cone shaped cover of the pilot pressure regulator (refer to Figure 6-7 for the location). When the jam nut is loosened, turn the adjusting screw clockwise to increase or counterclockwise to decrease the setting.

Once the pressure rises above 260 psig (17.9 bar), the solenoid pilot valve opens allowing pressure to flow into the Sullicon Control. At this time the Sullicon Control should be fully stroked.

⚠ DANGER

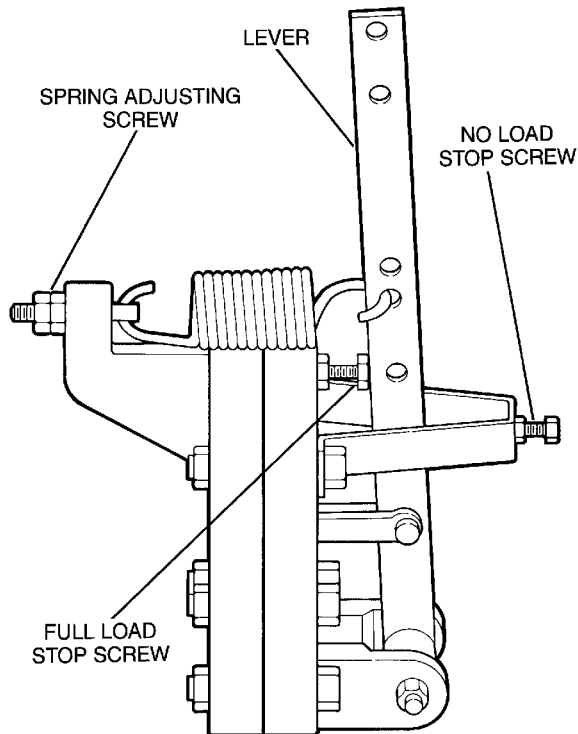
DO NOT touch the electrical contacts of the pressure switch with any metallic object. Severe electrical shocks may occur. Cycle the Control System several times and recheck all the pressure settings.

Figure 6-5 Pressure Switch (P/N 245753)



Section 6 MAINTENANCE

Figure 6-6 Sullicon Control (P/N 011682-003)



* Repair Kit P/N 250020-353

PILOT PRESSURE REGULATOR VALVE MAINTENANCE

Refer to Figure 6-7. Pressure regulator valve (P/N 048059) maintenance normally requires the replacement of the internal diaphragm. Use repair kit no. 048409 and follow the procedure below for proper installation.

1. Loosen the locknut and turn the adjusting screw counterclockwise until the inner spring tension is relieved. The adjusting screw should turn freely when the spring tension is relieved.
2. Remove the spring chamber from the body to allow access to internal parts.
3. Next, remove the spring button and the spring. The dampener will stay inside the spring as it is removed. Leave the dampener inside the spring as there is no need to remove it.
4. After removing the spring, remove the diaphragm stop.
5. At this time, remove the pressure plate nut and disassemble the pressure plate, diaphragm, diaphragm gasket (rubberized asbestos), seat disc and seat gasket.
6. Remove and discard the seat ring.
7. The next step is to reassemble the regulator using the new parts provided in the repair kit.
8. Reassemble the diaphragm, pressure plate, diaphragm gasket, seat disc and seat disc gasket

and tighten the nut. All of these parts with the exception of pressure plate are provided in the repair kit.

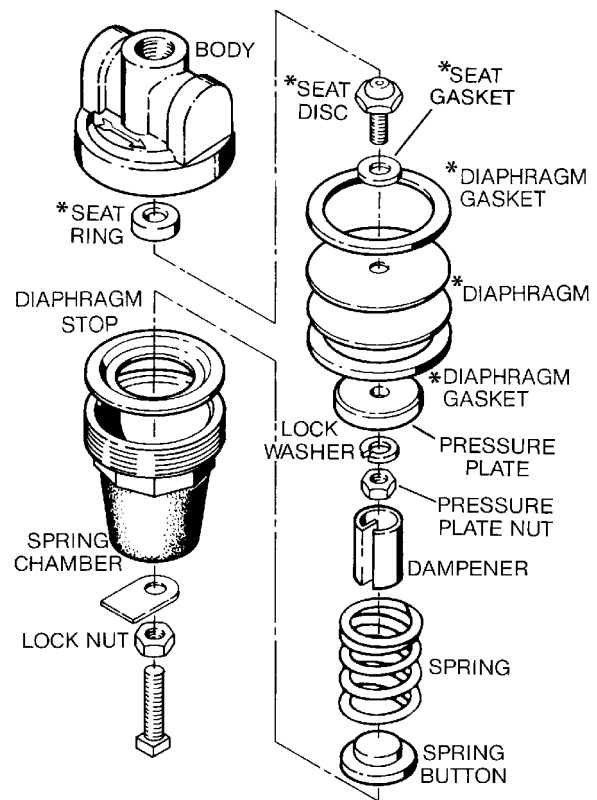
9. Replace the seat ring with the new seat ring provided.
10. Replace the existing diaphragm stop.
11. Next, place these parts in their proper place on the body and replace the spring as it was prior to disassembly.
12. Place the spring button over the spring as shown.
13. With all parts in order, replace the spring chamber and tighten.
14. Tighten the adjusting screw until tension is realized.
15. At this time, refer to Control System Adjustment Procedure to readjust the control regulator.

CONTROL PRESSURE REGULATOR VALVE

Refer to Figure 6-8. Maintenance for the control pressure regulator valve (P/N 048354) normally requires the replacement of the internal diaphragm. Use repair kit no. 048410, and follow the procedure below for proper installation.

1. Loosen the locknut and turn the adjusting screw counterclockwise until the inner spring tension is relieved. The adjusting screw should turn freely

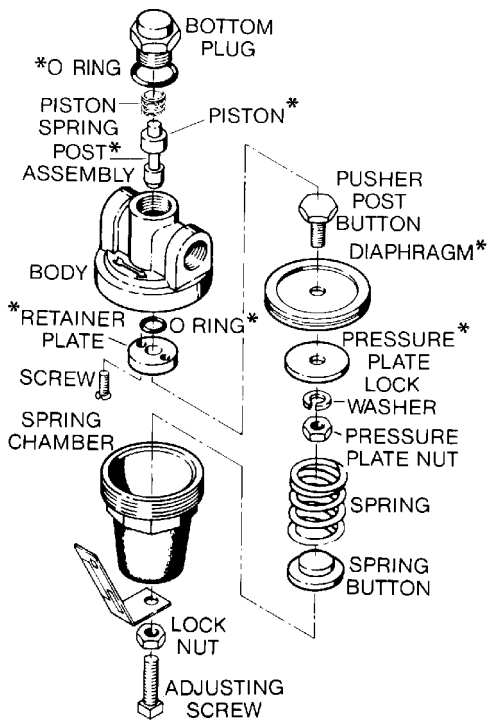
Figure 6-7 Pressure Regulator Valve (P/N 048059)



* Repair Kit P/N 048409

Section 6 MAINTENANCE

Figure 6-8 Control Pressure Regulator
(P/N 048354)



* Repair Kit P/N 048410

1. when the spring tension is relieved.
2. Remove the spring chamber from the body to allow access to internal parts.
3. Next, remove the spring button and spring.
4. At this time, remove the pressure plate nut and disassemble the pressure plate, diaphragm, diaphragm gaskets (rubberized asbestos), seat disc and seat gasket.
5. Remove the body plug from the body to allow access to the post assembly. Remove and discard the o-ring on the plug.
6. Extract the piston spring, piston and pusher post from the valve body.
7. Turn the body over and remove the retainer plate by extracting the retainer plate screws. This will allow access to the o-ring and seal the pusher post.
8. Remove and discard the o-ring.
9. The next step is to reassemble the regulator using the new parts provided in the repair kit.
10. Reassemble the diaphragm, pressure plate diaphragm gasket, pusher post button, seal disc gasket and tighten the nut. All of these parts with the exception of the pressure plate are provided in the repair kit.
11. Replace the pusher post o-ring with the new one provided in the kit. Also place the new o-ring on the body plug.

12. Replace the retainer plate.
13. Screw the pusher post into the piston and replace them as shown in the body.
14. Replace the body plug.
15. Next, place these parts in their proper place on the body and replace the spring as it was prior to disassembly.
16. Place the spring over the spring button as shown.
17. With all parts in order, replace the spring chamber and tighten.
18. Tighten the adjusting screw until tension is realized.
19. At this time, refer to the Control System Adjustment Procedure to readjust the control pressure regulator valve.

FLUID STOP VALVE

Refer to Figure 6-9. When servicing the fluid stop valve (P/N 250038-489) use repair kit numbers 250038-490 and 250038-494. Use all parts provided in the kit. The valve may be serviced without removing it from its associated piping if it is accessible.

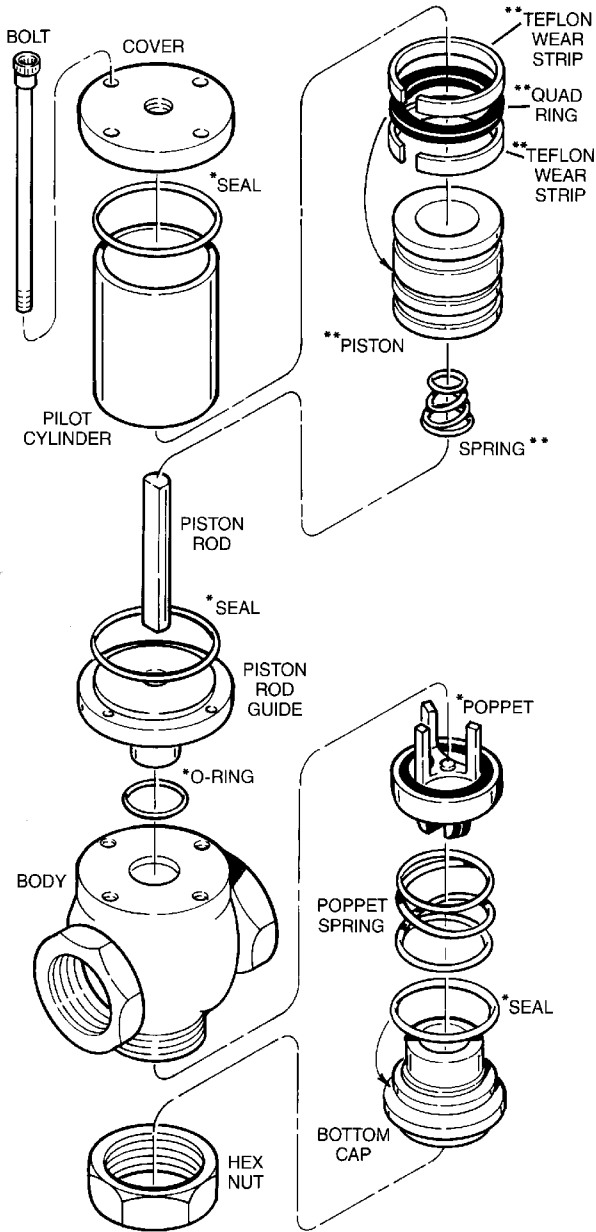
NOTE

Repair kit P/N 250038-490 does not contain lower poppet assembly.

1. Remove the large hex nut on the bottom of the valve. Be careful not to lose the parts restrained by the nut as they are under light spring pressure.
2. Remove the bottom cap, poppet spring, and poppet assembly. Discard spring and poppet assembly.
3. Remove seal from bottom cap and discard. Install new seal provided in kit.
4. Install new poppet assembly and spring. Install bottom cap.
5. Replace large hex nut and tighten securely.
6. Remove the four (4) bolts and cylinder cover on the top of the valve. Restrain cover as it is under light spring tension.
7. Remove seal from cover and discard. Install new seal.
8. Remove pilot cylinder. Remove piston from cylinder.
9. Remove the quad ring and wear strips from piston and discard. If you are installing the piston repair kit (P/N 250038-490), discard piston also.
10. Remove piston rod.
11. Remove piston rod guide. Remove cylinder seal and o-ring from guide and discard.
12. Check operation of new poppet assembly installed in lower body assembly.
13. Clean all parts thoroughly before reassembling valve.
14. Install piston rod guide with new o-ring installed.
15. Install piston rod if provided.
16. Install the spring onto the piston rod guide with large side down.
17. Install the quad ring and the two (2) Teflon rings onto the piston. Coat the quad ring with Parker

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Figure 6-9 Fluid Stop Valve (P/N 250038-489)



* Repair Kit P/N 250038-494 (o-rings & poppet)
 ** Repair Kit P/N 250038-490 (piston & parts)

Super "O" ring seal or equivalent quality silicone grease.

18. Install the piston into the pilot cylinder.

NOTE

Cylinder is chamfered on one end. Install from this side.

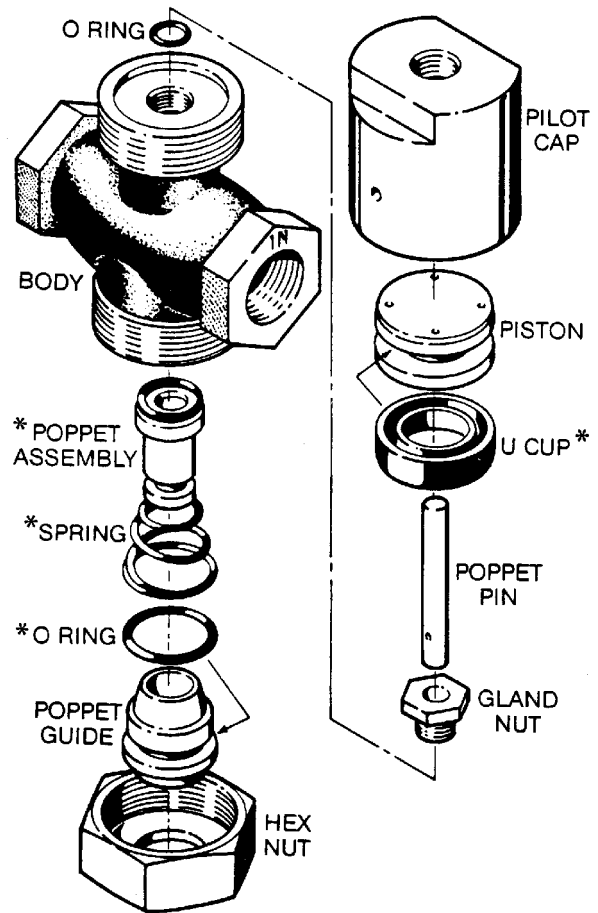
19. Install the two (2) seals; one into the cover and the other onto the piston rod guide.
20. Place cylinder over pilot guide.
21. Replace the cover and the four (4) nuts onto the cover. Tighten nuts alternately at opposite sides of the cover in a crisscross pattern. Check to see that cylinder is seated on seals on both ends.

RUNNING BLOWDOWN VALVE MAINTENANCE

Refer to Figure 6-10. When it is necessary to repair the running blowdown valve (P/N 045116), use repair kit no. 047524, and follow the instructions provided below.

1. Remove the hex nut from the bottom of the valve. The poppet guide which is secured by the hex nut is under slight spring tension.
2. Remove the poppet guide, poppet assembly and spring from the valve body.
3. Remove and discard the old o-ring on the poppet guide and replace it with the new o-ring provided in the kit. Be sure to lubricate the o-ring with a sili-

Figure 6-10 Running Blowdown Valve (P/N 045116)



* Repair Kit P/N 047524

Section 6 MAINTENANCE

cone base lubricant such as Parker Super “O” lube or an equivalent quality grease.

4. Place the new spring and poppet assembly in the valve body as shown. Then place the poppet guide (with the o-ring in position) over the poppet assembly.
5. Push the hex nut down over the poppet guide and compress the spring while turning the hex nut until tight. Tighten securely with a wrench.
6. Remove the pilot cap from the top of the valve body and pull the piston out of the cap.
7. Remove the U-cup from the piston and replace it with the new one provided in the kit. The U-cup should be lubricated with a silicone base lubricant also.
8. Remove the gland nut from the valve body and pull the poppet pin out to allow access to the small o-ring in the top of the body.
9. Remove the small o-ring and replace it with the new one provided in the kit. The o-ring must be lubricated with a silicone base lubricant.
10. Replace the poppet pin and gland nut.
11. Place the piston with the new U-cup in position back in the pilot cap with the recessed side showing at the valve body end of the cap.
12. Replace the pilot cap and tighten securely with a wrench. As this time the running blowdown valve is ready to be installed for operation.

THERMAL VALVE MAINTENANCE

Refer to Figure 6-11. For thermal valve (P/N 250001-456) maintenance, order the following Sullair parts: one (1) quad ring (P/N 046425), one (1) gasket (P/N 049812) and if necessary, thermal element P/N 250001-349. Follow the procedure explained below for installation.

DISASSEMBLY

1. Remove the appropriate piping from the thermal valve before starting disassembly.
2. Remove the four (4) capscrews holding the housing together and separate the upper housing from the lower housing.
3. Pull firmly on the thermal element and remove.

NOTE

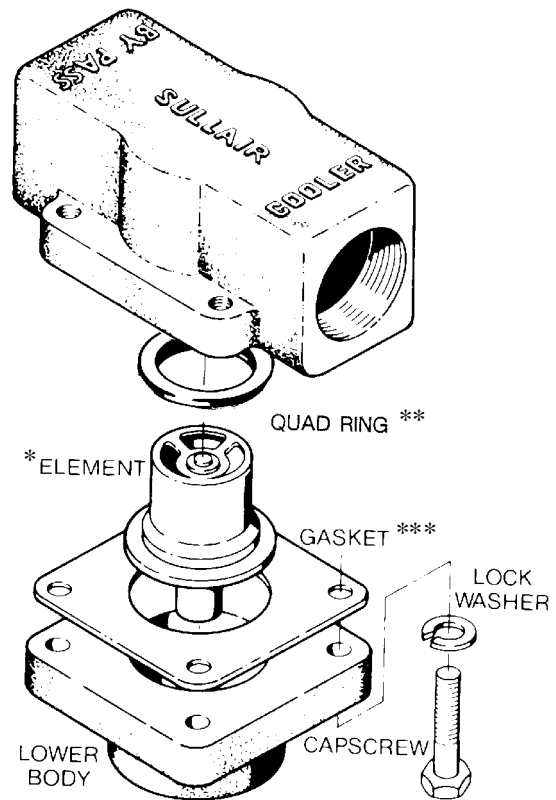
There will be a slight resistance from the seal ring centered in the lower housing.

4. Remove the seal ring from the lower housing and discard.

REASSEMBLY

1. Grease and replace the gasket in the center of the lower housing.
2. Reinsert the thermal element by pushing down until the brass ring is flush with the surface of the lower housing.
3. Position a new quad ring over the thermal element.

Figure 6-11 Thermal Valve (P/N 250001-456)



* Element Replacement Kit P/N 250001-349

** Quad Ring Seal Replacement Kit P/N 046425

*** Gasket Replacement Kit P/N 049812

4. Place the upper housing on the lower housing and retighten the capscrews.
5. Replace all piping connected to the thermal valve.

MINIMUM PRESSURE/CHECK VALVE MAINTENANCE

Refer to Figure 6-12. Minimum pressure/check valve (P/N 250022-735) maintenance is quite minimal. The only part which normally requires replacement is the seal ring on the piston. To replace this ring, order seal repair kit no. 250022-736 and follow the procedure explained below.

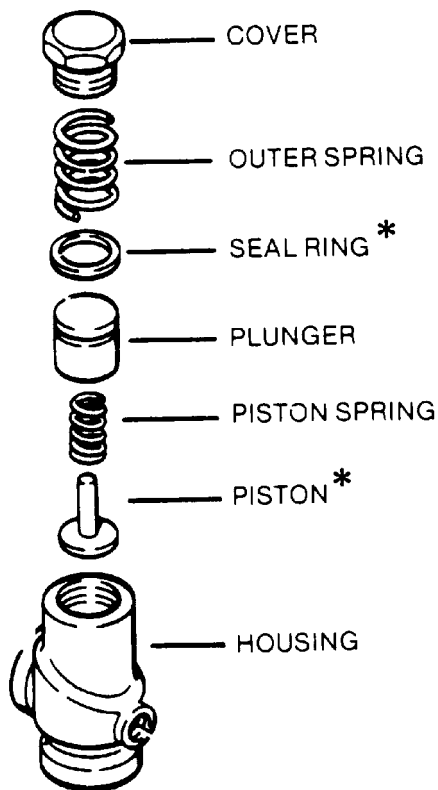
WARNING

Before performing maintenance on the valve, be sure that all pressure has been relieved in the compressor sump, and all downstream pressure has been vented to the atmosphere. Also be sure that the components of the compressor are cool to the touch.

1. Unscrew the minimum pressure/check valve (P/N 250022-735) from the receiver cover.
2. Remove the hexagonal retaining cover from the main body.

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Figure 6-12 Minimum Pressure / Check Valve
(P/N 250022-735)



* Repair Kit P/N 250022-736

3. Remove the flat washer and heavy spring from the main body.
4. Tap the piston assembly (with a screwdriver) from the bottom of the main body and remove. The seal ring will now be seen easily.
5. Remove the seal ring and discard.
6. Clean piston assembly and valve thoroughly.
7. Replace seal ring and coat the piston and seal with Parker Super "O" Ring Seal or an equivalent quality grease.

▲ WARNING

Extreme caution should be used when removing the cap from the body because there is spring tension on the cap.

8. Reset piston assembly into the main body and reposition spring and flat washer.
9. Replace retaining cap.
10. Reattach valve to receiver cover and reconnect all piping.

6.7 MOTOR CONNECTION INSTRUCTIONS

1. Once a year while the equipment is disconnected from the power source and locked out for maintenance remove tag cover to the motor conduit box.
2. Inspect the rubber boots or connecting insulating materials covering the motor connections for signs of thermal damage.
3. If boots or insulating materials remain pliable and there is no sign of damage, connections are satisfactory.
4. If boots or insulating material show distress as mentioned above tag and investigate to determine the source of thermal damage and repair the connection as necessary.
5. Replace the damaged boot(s) with new boots as required or retape connections per National, State or Local codes.
6. Replace the conduit cover prior to reconnecting the power source.

▲ WARNING

Electrical shock hazard. Disconnect all power at the source before attempting maintenance.

6.8 TROUBLESHOOTING

The information in the Troubleshooting Chart is based upon both the tests conducted at the factory and the applied situations in the field. It contains symptoms and usual causes for the described problems. However **DO NOT** assume that these are the only problems that may occur. All available data concerning the problem should be systematically analyzed before undertaking any repairs or component replacement procedures.

A detailed visual inspection is worth performing for almost all problems and may avoid unnecessary additional damage to the compressor. Always remember to:

- Check for loose wiring.
- Check for damaged piping.
- Check for parts damaged by heat or an electrical short circuit, usually apparent by discoloration or a burnt odor.

Should your problem persist after making the recommended check, consult your nearest Sullair representative or the Sullair Corporation factory toll free at 1-800-348-2722.

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TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE	REMEDY
COMPRESSOR WILL NOT START	Main Disconnect Switch Open	Close switch.
	Line Fuse Blown	Replace fuse.
	Control Transformer Fuse Blown	Replace fuse.
	Motor Starter Overloads Tripped	Reset. Should trouble persist, check whether motor starter contacts are functioning properly.
	Low Incoming Line Voltage	Check voltage. Should voltage check low, consult power company.
	Defective Discharge Temperature Thermistor Switch	Replace probe and/or board.
COMPRESSOR SHUTS DOWN WITH AIR DEMAND PRESENT	Loss of Control Voltage	Reset. If trouble persists, check that line pressure does not exceed maximum operating pressure of the compressor (specified on nameplate).
	Low Incoming Voltage	Consult power company.
	Excessive Operating Pressure	Defect in pressure switch; check pressure at which contact points open. Separator requires maintenance; check maintenance indicator under full load conditions. High pressure shutdown switch is adjusted too low; readjust.
		Defective pilot solenoid valve; solenoid valve should cause Sullicon Control to close the inlet butterfly when the pressure switch contacts open. Repair if defective.
		Defective blowdown valve; blowdown valve should exhaust sump pressure to the atmosphere when maximum operating pressure is reached. Repair.
	Discharge Temperature Thermistor Switch Open	Cooling water temperature too high; increase water flow. Cooling water flow insufficient; check water lines and valves. Cooler plugged; clean tubes. If plugging persists, install water conditioner. Low fluid level; add fluid.
		Clogged filter; change the fluid filter element and change the bearing filter element if maintenance indicator shows red. Thermal valve not functioning properly; replace element.
	check for proper ventilation (air cooled),	Cooling air flow restricted; clean cooler and
	sufficient ventilation (air cooled).	Ambient temperature too high; provide sufficient
		Defective discharge temperature thermistor switch; check for a short or open circuit to probe and correct wiring, or also check for short or open circuit to the control card. If current is not present, replace the control card. Should the above check out normally, it is possible that the thermistor probe is defective.
Low Fluid Pressure	Clogged filter; clean main fluid filter element or change bearing filter element.	
Low Water Pressure	Check water lines and valves.	

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TROUBLESHOOTING (Continued)

SYMPTOM	PROBABLE CAUSE	REMEDY
COMPRESSOR WILL NOT BUILD UP FULL DISCHARGE PRESSURE	Air Demand is Too Great	Check service lines for leaks or open valves.
	Dirty Air Filter	Check the filter indicator and change or clean element if required.
	Pilot Pressure Regulator Out of Adjustment	Adjust regulator according to control adjustment instructions in the Maintenance section.
	Defective Pilot Pressure Regulator	Check diaphragm and replace if necessary (kit available).
	Defective Minimum Pressure Valve Inlet Valve Not Opening Completely	Check that the piston is moving freely. Check and readjust control linkage. Broken spring in Sullicon Control. Replace spring. Inlet cylinder not extended.
	Defective Closed Inlet Solenoid Valve	Repair or replace.
COMPRESSOR WILL NOT BUILD UP FULL DISCHARGE PRESSURE (Cont'd.)	Defective Closed Inlet Solenoid Valve Timer	Replace.
LINE PRESSURE RISES ABOVE CUT-OUT PRESSURE SETTING ON PRESSURE SWITCH	Leak in Control System Causing Loss of Pressure Signals	Check for leaks.
	Defective Pressure Switch	Check that diaphragm and contacts are functioning properly and are not damaged. Repair or replace if necessary (kit available).
	Defective Solenoid Valve	Check that Sullicon Control lever is moved to a completely stroked position when the pressure switch contacts close. Repair or replace if necessary (kit available).
	Defective Blowdown Valve	Check that sump pressure is exhausted to the atmosphere when the pressure switch contacts close or repair or replace if necessary (kit available).
	High Pressure Shutdown is Defective or Adjustment is Incorrect	Readjust or replace.
EXCESSIVE COMPRESSOR LUBRICANT CONSUMPTION	Clogged Return Line Strainer or Orifice	Clean strainer (screen and o-ring replacement kit available). Clean orifice.
	Separator Element Damaged or Not Functioning Properly	Change separator element.
	Leak in the Lubrication System	Check all pipes, connections and components. Drain fluid and change.
	Excessive Fluid Forming Fluid Level Too High	Drain excess fluid.
PRESSURE RELIEF VALVE OPENS REPEATEDLY	High Pressure Shutdown Switch is Defective or Out of Adjustment	Readjust below pressure relief valve setting or replace.
	Defective Pressure Relief Valve	Replace pressure relief valve.
	Defective Pressure Gauge	Replace.
	Defective Minimum Pressure Valve	Repair or replace.
	High Separator Differential	Replace separator.

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TROUBLESHOOTING (continued)

SYMPTOM	PROBABLE CAUSE	REMEDY
PRESSURE RELIEF VALVE OPENS REPEATEDLY (cont.)	Defective Blowdown Valve	Repair or replace.
	Defective Muffler	Replace.
	Defective Pressure Switch	Repair or replace.
	Defective Solenoid Valve	Repair or replace.
	Defective Sullicon Diaphragm	Replace diaphragm.
	Incorrect Unload Stop Screw Position	Reposition and tighten.
	Incorrect Inlet Butterfly Position	Reposition and tighten.
	Inlet Butterfly Loose	Reposition and tighten.
	Plugged or Frozen Control Lines	Replace or thaw as needed.

Section 7

ILLUSTRATIONS AND PARTS LIST

7.1 PROCEDURE FOR ORDERING PARTS

Parts should be ordered from the nearest Sullair Representative or the Representative from whom the compressor was purchased. If for any reason parts cannot be obtained in this manner, contact the factory directly at the address or phone numbers below.

When ordering parts always indicate the **Serial Number** of the compressor. This can be obtained from the Bill of Lading for the compressor or from the Serial Number Plate located on the compressor.

SULLAIR CORPORATION
 Subsidiary of Sundstrand Corporation
 3700 East Michigan Boulevard
 Michigan City, Indiana 46360

Telephone: 1-800-348-2722
 or (219) 879-5451
 FAX: (219) 874-1273

SULLAIR CORPORATION
 Parts Distribution Division and Service Department
 1625 E. Second Street
 Michigan City, Indiana 46360

FAX: (219) 874-1835 (Parts)
 FAX: (219) 874-1805 (Service)

7.2 RECOMMENDED SPARE PARTS LIST

DESCRIPTION	KIT NUMBER	QUANTITY
replacement element for separator 250034-121 (primary)	250034-122	2
replacement element for separator 250034-133 (secondary)	250034-134	2
replacement element for main fluid filter 045111	001094 (element)	2
	001132 (seal)	2
replacement element for air filter 409264 (primary)	409853	1
replacement element for air filter 409264 (secondary)	409854	1
repair kit for fluid stop valve 250038-489	250038-490 (piston and parts)	1
	250038-494 (o-rings & poppet)	1
replacement element for bearing filter 250019-296	602568-001	2
repair kit for shaft seal	001811A	1
repair kit for running blowdown valve 045116	047524	1
repair kit for pressure regulator valve 048059	048409	1
repair kit for control pressure regulator 048354	048410	1
repair kit for air cylinder 250016-990	250014-573	1
repair kit for solenoid valve 250038-666	250038-672	1
replacement coil for solenoid valve 250038-666	250038-730	1
repair kit for solenoid valve 250038-846	250038-847	1
replacement coil for solenoid valve 250038-846	250038-730	1
repair kit for Sullicon control 011682-003	250020-353	1
repair kit for valve assembly 016732B	606208-001	1
repair kit for minimum pressure/check valve 250022-735	250022-736	1
repair kit for thermal valve 250001-456	250001-349 (element)	1
	046425 (quad ring seal)	1
	049812 (gasket)	1
repair kit for solenoid valve 250041-243	250017-300	1
	(replacement basket)	
replacement coil for solenoid valve 250041-243	250031-431	1
Sullube 32 lubricant (5 gallon container)	250022-669	1
Sullube 32 lubricant (55 gallon drum)	250022-670	1

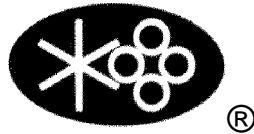
PLEASE NOTE: WHEN ORDERING PARTS PLEASE INDICATE SERIAL NUMBER.

WORLDWIDE SALES AND SERVICE

SULLAIR CORPORATION

A SUBSIDIARY OF SUNDSTRAND CORPORATION

3700 E. Michigan Blvd. Michigan City, Indiana 46360-9990
Telephone (219) 879-5451



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