SULLAIR

ADDENDUM

LS12 & LS16

ELECTRO-MECHANICAL CONTROLLER

OPERATOR'S MANUAL

KEEP FOR FUTURE REFERENCE

Part Number 02250126-405
eSullair Corporation

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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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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 can result in accidents and injuries. Read this manual prior to startup.

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 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 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. 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) inside diameter is to be connected to the shut–off (throttle) valve, to reduce pressure in case of hose failure, per all applicable Federal, State and Local codes, standards and regulations.

B. 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.

C. 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.

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

E. 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.

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

G. Open fluid filler 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.

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

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

J. 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.

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

L. DO NOT tamper with sump and unit (if provided) relief valves. Check the relief valve as recommended in the Maintenance Section of this manual or at a minimum of at least weekly to make sure it is not blocked, clogged, obstructed or otherwise disabled. **DO NOT** change the factory setting of the relief valve.

M. If the compressor 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.

1.4 FIRE AND EXPLOSION

⚠WARNING

When installing a Base Load Transfer (BLT) System, remove jumpers between 16-17 & 18-19 (Dual Control Compressors) so the other compressor does not backfeed defeating the shutdown circuitry.

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 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 any Federal, State or Local Codes or regulations.

⚠ DANGER

Death or serious injury can result from inhaling compressed air without using proper 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. Consult the compressor operator's manual lubrication section for information pertaining to compressor fluid fill.

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 antifreeze 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.

F. Dry test all shutdown circuits prior to starting the compressor after installation.

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 Federal, State and Local codes.

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.

O. DO NOT use the lifting eye bolt on the compressor motor, if supplied, to lift the entire compressor package.

1.10 ENTRAPMENT

A. If the compressor enclosure is large enough to hold a person 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.

2.1 INTRODUCTION

Your new Sullair flood–lubricated rotary screw air compressor will provide you with a unique experience in improved reliability and greatly reduced maintenance.

Compared to other types of compressors, the Sullair rotary screw is unique in mechanical reliability, with “no wear” and “no inspection” required of the working parts within the compressor unit.

Read Section 7 (Maintenance) in the Operator’s and Parts List Manual to see how surprisingly easy it is to keep your air compressor in top operating condition.

2.2 DESCRIPTION OF COMPONENTS

Refer to Figures 2–1 and 2–2. The components and assemblies of the air compressor are clearly shown. The complete package includes **compressor**, **electric motor**, **starter**, **compressor inlet system**, **compressor discharge system**, **compressor lubrication and cooling system**, **capacity control system**, **instrument panel**, **aftercooler**, a **combination separator** and **trap**, all mounted on a heavy gauge steel frame.

On air–cooled models, a fan draws air over the motor and forces it out through the combined aftercooler and fluid cooler thereby removing the compression heat from the compressed air and the cooling fluid.

On water–cooled models, a shell and tube heat exchanger is mounted on the compressor frame. Fluid is piped into the heat exchanger where compression heat is removed from the fluid. Another similar heat exchanger cools the compressed air.

Both air–cooled and water–cooled versions have easily accessible items such as the fluid filters and control valves. The inlet air filter is also easily accessible for servicing.

2.3 SULLAIR COMPRESSOR UNIT, FUNCTIONAL DESCRIPTION

Sullair air compressors feature the Sullair compressor unit, a single–stage, positive displacement,

Figure 2-1 Sullair Rotary Screw Air Compressor- Air-cooled (typical component layout)

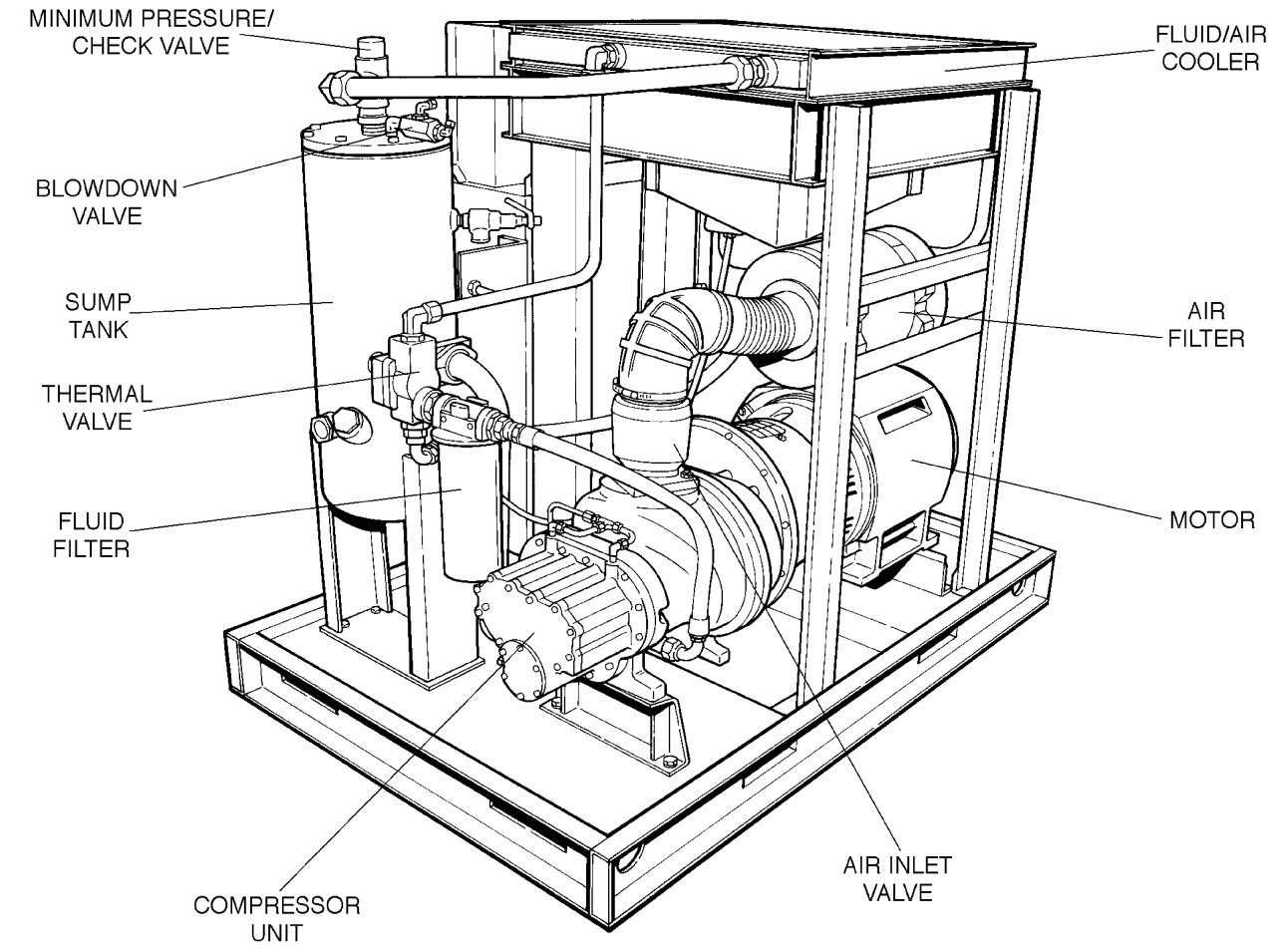
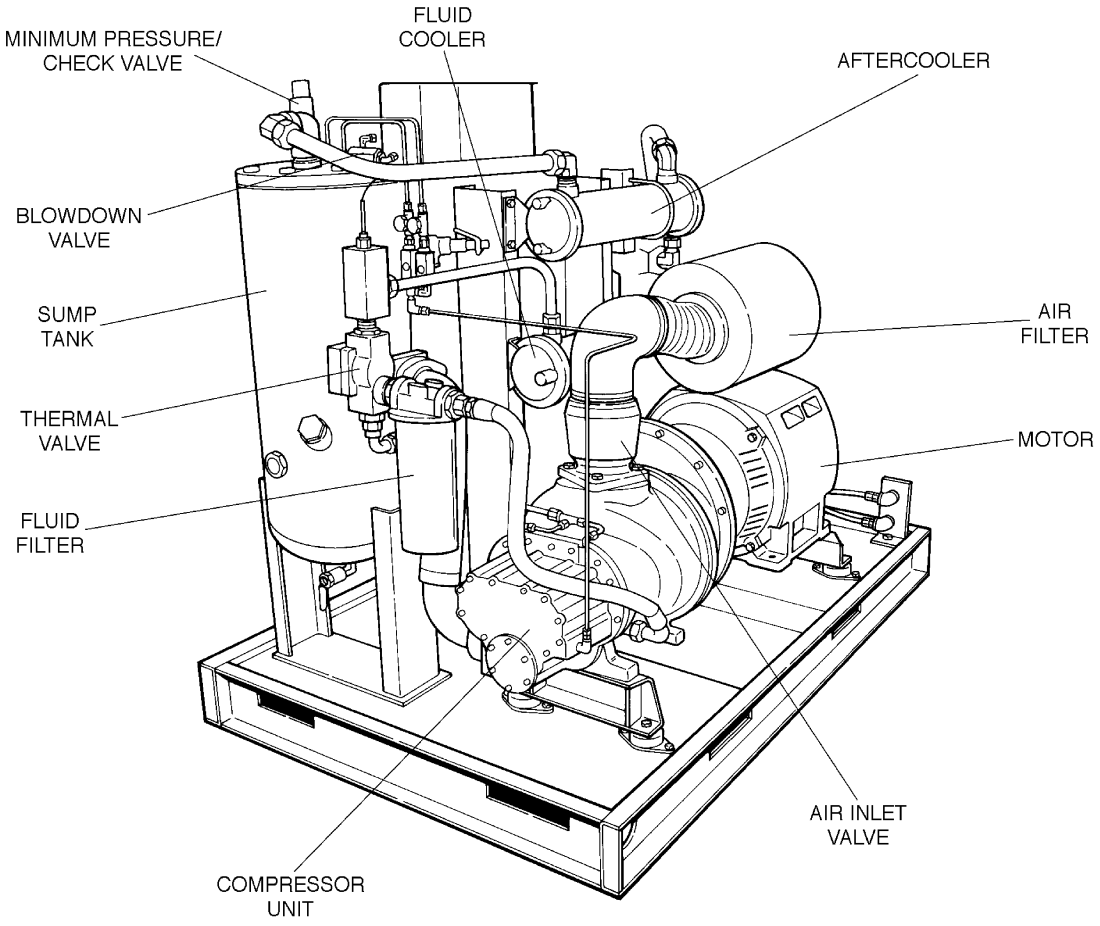


Figure 2-2 Sullair Rotary Screw Air Comprewssor- Water-cooled (typical component layout)



flood lubricated–type compressor. This unit provides continuous pulse–free compression to meet your needs.

2.4 COMPRESSOR COOLING AND LUBRICATION SYSTEM, FUNCTIONAL DESCRIPTION

Refer to Figures 2–3 and 2–4. The Cooling and Lubrication System (air–cooled version) consists of a **fan**, **fan motor**, **radiator–type aftercooler/fluid cooler**, **full flow fluid filter**, **thermal valve**, and **interconnecting piping** and **tubing**. For water–cooled models, two **shell and tube heat exchangers** and a **water–flow regulating valve** are substituted for the radiator–type cooler listed above.

The pressure in the receiver/sump causes fluid flow by forcing the fluid from the high pressure area of the sump to an area of lower pressure in the compressor unit.

Fluid flows from the bottom of the receiver/sump to the thermal valve. The thermal valve is fully open when the fluid temperature is below 170_F (77_C). The fluid passes through the thermal valve, the main filter and directly to the compressor unit where it lubricates, cools and seals the rotors and the compression chamber.

As the discharge temperature rises above 170_F (77_C), due to the heat of compression, the thermal valve begins to close and a portion of the fluid then flows through the cooler. From the cooler the fluid flows to the main filter and then on to the compressor unit.

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 the fluid filter, thus assuring properly filtered lubricant for bearing supply.

The fluid filter has a replacement element and an integral pressure bypass valve. A gauge on the instrument panel shows red when the filter needs servicing. This gauge has a pressure setting lower than that of the bypass valve. The gauge should be checked with compressor running at full system pressure.

Water–cooled versions of the compressor have a

Figure 2-3 Comporessor Fluid Cooling/Lubrication and Discharge System- Air-cooled

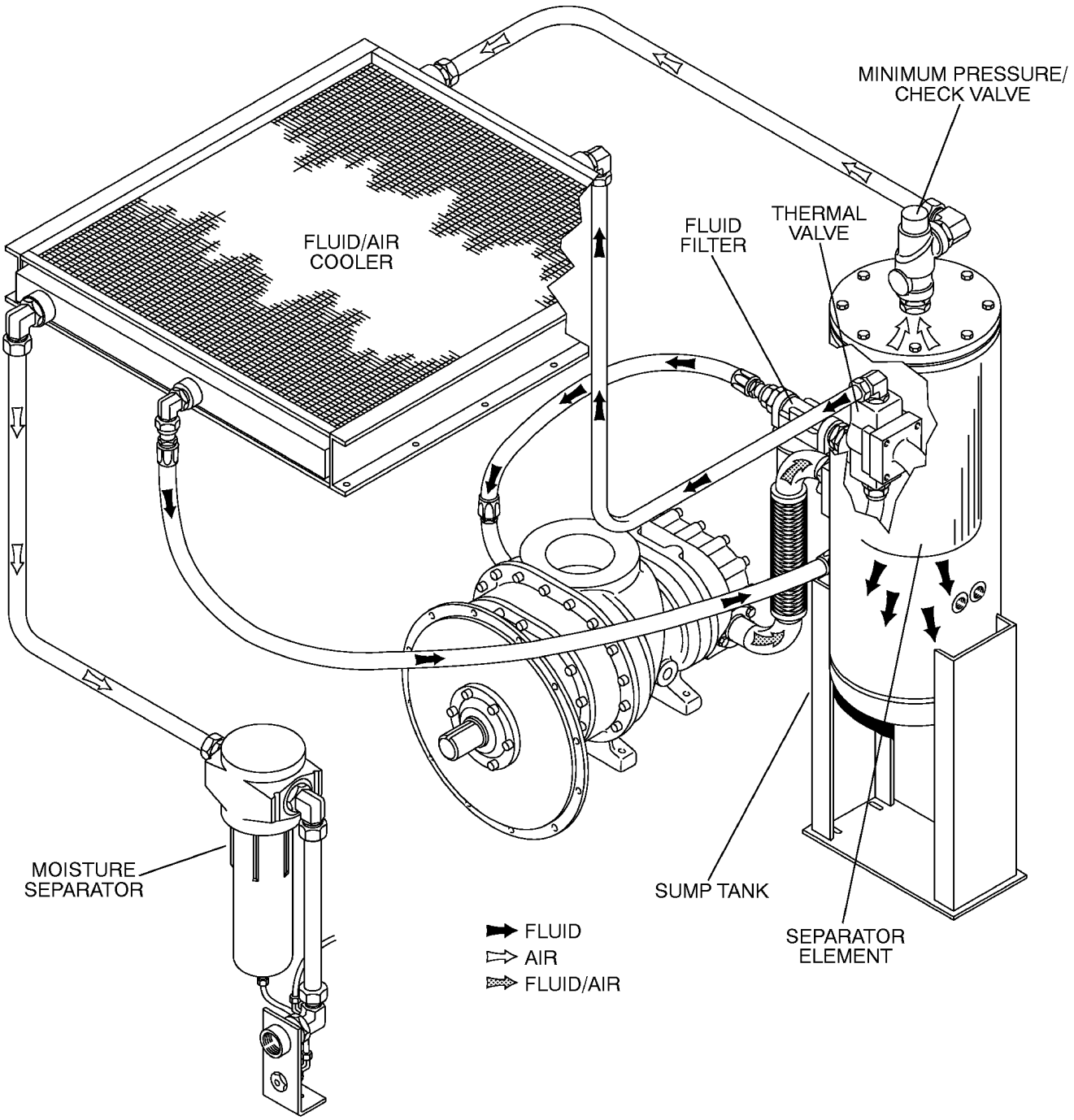
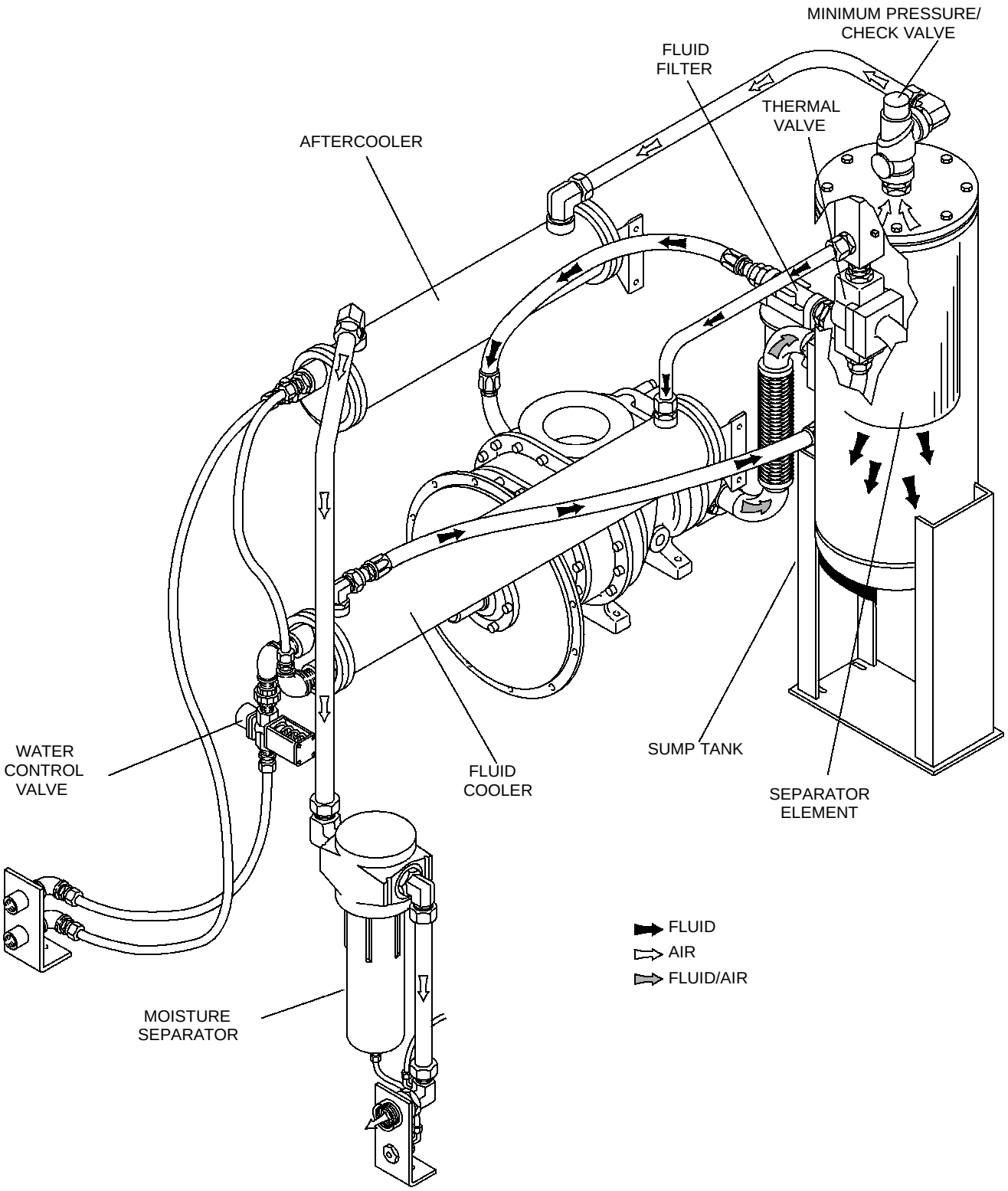


Figure 2-4 Compressor Fluid Cooling/Lubrication and Discharge System- Water-cooled



water−flow regulating valve (not shown) which operates to conserve water during periods of varying load on the compressor. This same valve automatically shuts off the water supply when the compressor is shut down. In addition, water−cooled models have a water pressure switch to prevent operation with inadequate water pressure.

2.5 COMPRESSOR DISCHARGE SYSTEM, FUNCTIONAL DESCRIPTION.
Refer to Figures 2−3 and 2−4. The compressor unit discharges the compressed air/fluid mixture into the combination receiver/sump.

The receiver has three basic functions:

1. It acts as a primary fluid separator.
2. Serves as the compressor fluid sump.
3. Houses the final fluid separator.

The compressed air/fluid mixture enters the receiver and is directed against the internal baffle. The direction of movement is changed and its velocity significantly reduced, thus causing large droplets of fluid to form and fall to the bottom of the receiver/sump. The fractional percentage of fluid remaining in the compressed air collects on the surface of the separator element as the compressed air flows through the separator. A return line (or scavenge tube) leads from the bottom of the separator element to the inlet region of the compressor unit. Fluid collecting on the bottom of the separator is returned to the compressor by a pressure differential between the receiver and the compressor inlet. A visual sight glass is located on the return line to observe this fluid flow. There is also an orifice in this return line (protected by a strainer) to assure proper flow. A secondary separator element with a separate return line, strainer, sight glass and orifice further reduce the fluid carry−over to less than 1 ppm (parts per million). A gauge, located on the instrument panel, shows red if abnormal pressure drop through the separator develops. At this time, separator element replacement is necessary. This gauge must be checked with the compressor running fully loaded.

A minimum pressure/check valve, located downstream from the separator, assures a minimum receiver pressure of 55 psig (3.8 bar) during loaded conditions. This pressure is necessary for proper air/fluid separation and proper fluid circulation.

A terminal check valve is incorporated into the minimum pressure/check valve to prevent compressed air in the service line from bleeding back into the receiver on shutdown and during operation of the compressor in an unloaded condition.

A pressure relief valve (located on the wet side of the separator) is set to open if the sump pressure exceeds the sump tank rating. A temperature switch will shut down the compressor if the discharge temperature reaches 235_F (113_C).

2.6 CONTROL SYSTEM, FUNCTIONAL DESCRIPTION- STANDARD ELECTRO-MECHANICAL
Refer to Figure 2−5. The purpose of the compressor Control System is to regulate the compressor air intake to match the amount of compressed air being used. At approximately 10 psig (0.7 bar) air line over−pressure, the control system will automatically blow down the compressor and greatly reduce the unload power consumption. The Control System consists of an **inlet valve**, (located on the compressor air inlet), **blowdown valve**, **solenoid valve**, **pressure switch**, and a **pressure regulator**. The functional descriptions of the Control System are given below in four distinct phases of compressor operation. The following guidelines apply to all LS−12 and LS−16 Series compressors. For explanatory purposes this description will apply to a compressor with an operating pressure range of 115 to 125 psig (7.9 to 8.6 bar). A compressor with any other pressure range would operate in the same manner excepting stated pressures.

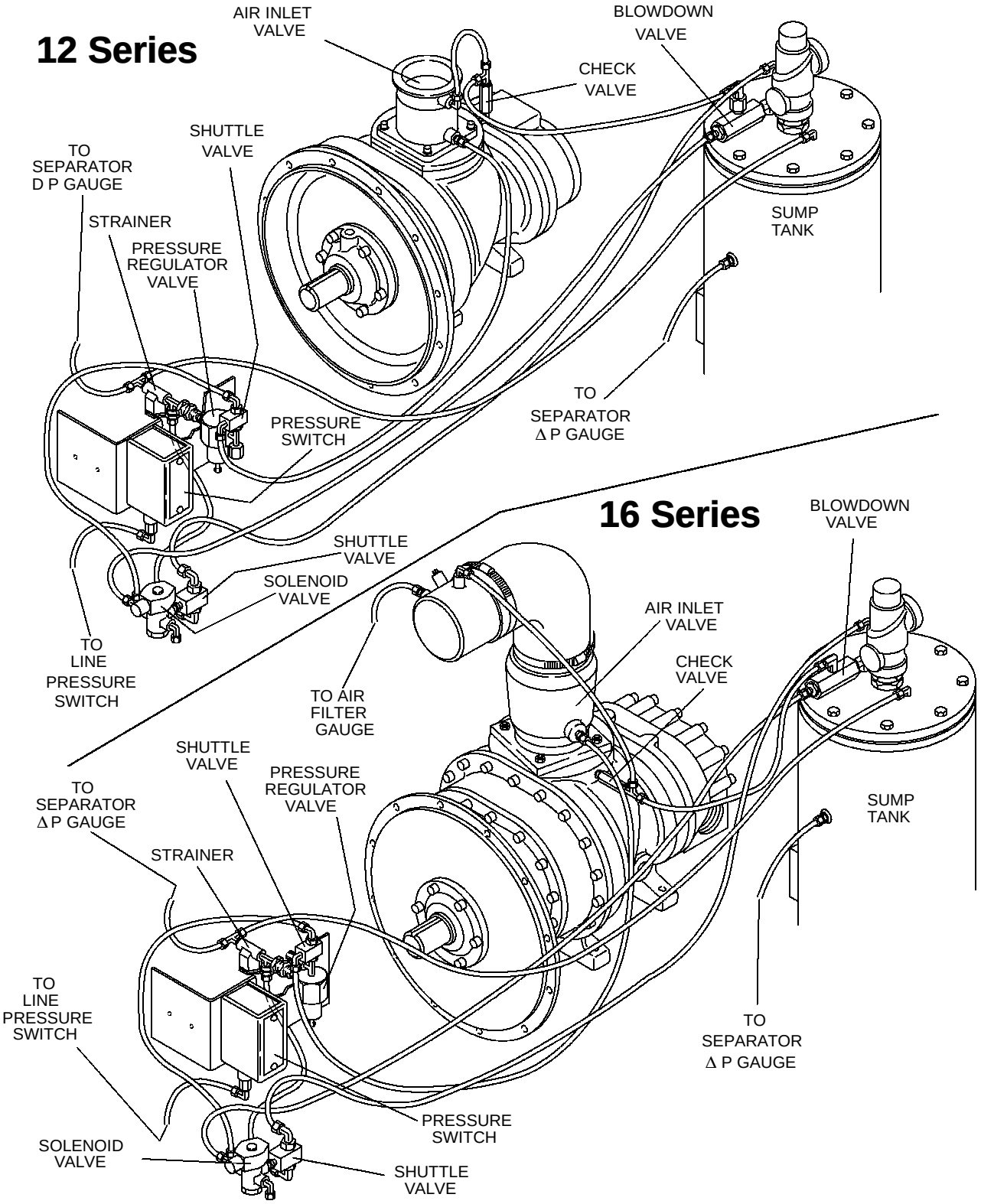
START - 0 TO 50 PSIG (0 TO 3.5 BAR)
When the compressor START button is depressed, the sump pressure will quickly rise from 0 to 50 psig (0 to 3.5 bar). During this period both the pressure regulator and the solenoid valve are closed, the inlet valve is fully open due to inlet air flow, and the compressor pumps at full rated capacity. The rising compressor air pressure is isolated from the service line in this phase by the minimum pressure valve, set at approximately 50 psig (3.5 bar).

NORMAL OPERATING MODE - 50 TO 115 PSIG (3.5 TO 7.9 BAR)
When the pressure air rises above 50 psig (3.5 bar), the minimum pressure/check 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 and a pressure switch usually set at 125 psig (8.6 bar). The pressure regulator and the solenoid valve remain closed during this phase. The inlet valve remains fully open for maximum capacity.

MODULATING MODE - 115 TO 125 PSIG (7.9 TO 8.6 BAR)
If less than the rated capacity of compressed air is being used, the service line pressure will rise above 115 psig (7.9 bar). The pressure regulator valve gradually opens, applying air pressure through the control line to the inlet valve piston. This causes the inlet valve to partially close 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 115 to 125 psig (7.9 to 8.6 bar), in response to varying demands from the service line.

The pressure regulator has an orifice which vents a small amount of air to the atmosphere when the pressure regulator controls the inlet valve. The orifice also bleeds any accumulated moisture from the control lines.

Figure 2-5 Control System



UNLOAD - IN EXCESS OF 125 PSIG (8.6 BAR) LINE PRESSURE

When 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 valve. At this time, the solenoid valve allows dry sump tank air pressure or service air pressure through a shuttle valve to be applied directly to the inlet valve piston and keep it closed. Simultaneously, the solenoid valve sends a pneumatic signal to the blowdown valve. The blowdown valve opens the sump to the compressor intake reducing the sump pressure to approximately 25 to 27 psig (1.7to 1.9 bar). The check valve in the air service line pressure prevents line pressure from returning to the sump.

When the line pressure drops to the low setting (cut-in pressure) of the pressure switch (usually 115 psig [7.9 bar]), the pressure switch closes, re-energizing the 3-way solenoid valve and allowing the blowdown valve to close. The re-energized solenoid valve again prevents pressure from reaching the inlet valve. The inlet valve is fully open and the compressor delivers full rated capacity. Should the pressure begin to rise, the pressure regulator will resume its normal function as previously described.

To accommodate varied periods of time when there are not any air requirements, "Dual-Control" is utilized. This feature allows you to set the compressor in an automatic position whereby the compressor will shut down when no compressed air requirement is present and restart as compressed air is needed.

For applications with varied periods of time when there are no air requirements, Supervisor's AUTOMATIC mode allows the compressor to shutdown (time delayed) when no compressed air requirement is present and restart as compressed air is needed.

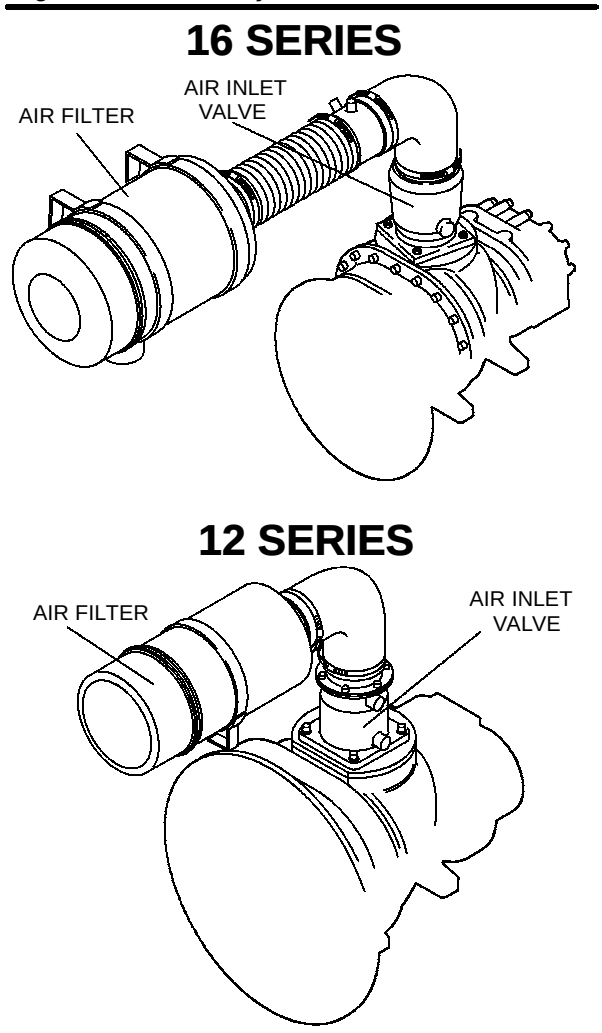
2.7 AIR INLET SYSTEM, FUNCTIONAL DESCRIPTION

Refer to Figure 2-6. The Compressor Inlet System consists of a **dry-type air filter**, a **restriction gauge** and an **air inlet valve**.

The restriction gauge (located on the instrument panel), indicates the condition of the air filter by showing red when filter maintenance is required.

The poppet-type modulating air inlet valve directly controls the amount of air intake to the compressor in response to the operation of the pressure regulator (see Modulating Mode, Section 2.6 [Standard Electro-Mechanical] or Section 2.7 [Optional Supervisor II]). The inlet valve also acts as a check valve, thus preventing reverse rotation when the compressor is shut down.

Figure 2-6 Air Inlet System



⚠ WARNING

"The Plastic Pipe Institute recommends against the use of thermoplastic pipe to transport compressed air or other compressed gases in exposed above ground locations, e.g. in exposed plant piping." (I)

Sullube 32 should not be used with PVC piping systems. It may affect the bond at cemented joints. Certain other plastic materials may also be affected.

(I) Plastic Pipe Institute, Recommendation B, Adopted January 19, 1972.

2.8 INSTRUMENT PANEL GROUP, FUNCTIONAL DESCRIPTION- STANDARD ELECTRO-MECHANICAL CONTROLLER

The electro-mechanical controller responds to signals from traditional pressure switch sensors and provides **stop/start**, **automatic control, common fault indication**, **sensor bypass timing**, **wye-delta transition timing**, and facilitates selectable

automatic restart after power failure. Two−wire remote Stop/Start input is provided.

Refer to Figures 2-7 and 2-8 for specific location of parts described.

S The **sump pressure gauge** continually monitors the sump pressure at the various load and/or unload conditions.

S The **discharge temperature gauge** monitors the temperature of the air leaving the compressor unit. For both air−cooled and water−cooled compressors the normal reading is approximately 180_F to 205_F (82_C to 96_C).

S The **separator maintenance gauge** monitors condition of the separator element and shows in the red zone when the element restriction is excessive.

S The **fluid filter maintenance gauge** monitors the condition of the bearing lube filter element and shows in the red zone when the element should be changed.

S The **START** (**I**) pad turns the compressor on.

S The **STOP** (**O**) pad turns the compressor off.

S The **hourmeter** records cumulative hours of operation for the compressor and is useful for planning and logging service operations. The hour meter should be active any time K1 is energized. Meter rolls over to zero at 100,000 hours.

S The **POWER ON** ( ) LED on the instrument panel indicates when power to the compressor is supplied.

S The **ON** LED indicates when the compressor is running.

S The **AUTO** ( ) pad is used to enable automatic control.

S The **RUN** Status LED indicates that control is in a standby mode and may start at any moment without any user intervention when this light is blinking. A solid light indicates that the machine is running.

2.9 ADDITIONAL FEATURES

Refer to Figure 2-7 for specific location of parts described.

S A separate input is provided for the **Remote Stop/Start** feature. A maintained, voltage−free contact is required for Remote Stop/Start.

S The **Wye−Delta Transition Timer**− K4 closed as soon as K1 closes and remains closed until timer setting is reached and then opens and stays open until machine is stopped (Output 8 goes high on start and drops at timeout).

S **Timer Adjustment**− Timer adjustment becomes effective the next time that function is required.

Figure 2-7 Typical Machine Connection

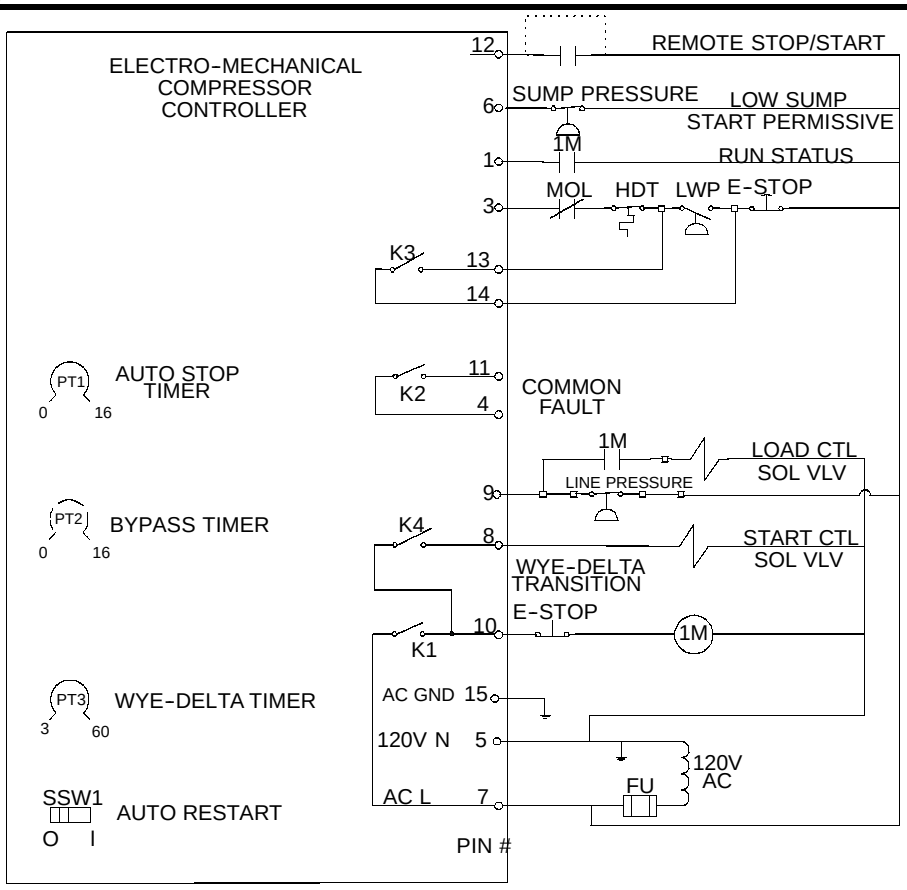
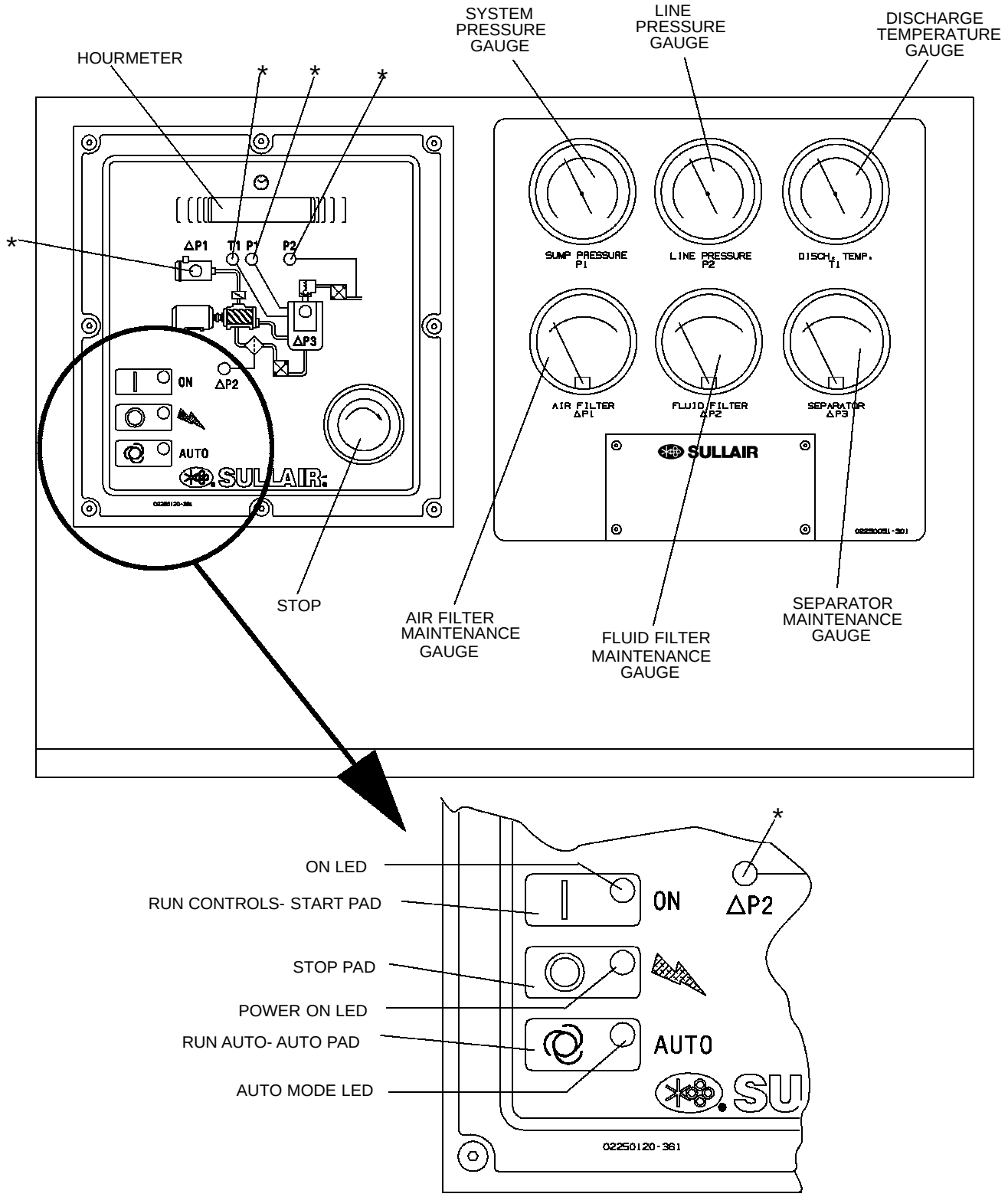


Figure 2-8 Instrument Panel Group and Controller Panel



*Locations of pressure and temperature pick-up points.

NOTES

3.1 TABLE OF SPECIFICATIONS

LS-12 SERIES 60 Hz MODEL (I)	HP/KW	CAPACITY (ACFM/M^3/MIN)	LENGTH (IN/MM)	WIDTH (IN/MM)	HEIGHT(II) (IN/MM)	WEIGHT(III) (LB/KG)	dBA(IV) w/ encl./ w/o encl. (Air-cooled)
L	50/37	235/6.65	72/1830	48/1220	60/1524	2060/934	80/87
H	50/37	212/6.00	72/1830	48/1220	60/1524	2060/934	80/87
	60/45	254/7.19	72/1830	48/1220	60/1524	2350/1066	80/87
HH	50/37	187/5.30	72/1830	48/1220	60/1524	2060/934	80/87
	60/45	227/6.43	72/1830	48/1220	60/1524	2350/1066	80/87
XH	50/37	154/4.36	72/1830	48/1220	60/1524	2060/934	80/87
	60/45	179/5.07	72/1830	48/1220	60/1524	2350/1066	80/87

LS-12 SERIES 50 Hz MODEL (I)	HP/KW	CAPACITY (ACFM/M^3/MIN)	LENGTH (IN/MM)	WIDTH (IN/MM)	HEIGHT(II) (IN/MM)	WEIGHT(III) (LB/KG)	dBA(IV) w/ encl./ w/o encl. (Air-cooled)
H	50/37	211/5.97	72/1830	48/1220	60/1524	2060/934	80/87
HH	50/37	173/4.90	72/1830	48/1220	60/1524	2060/934	80/87
	60/45	205/5.80	72/1830	48/1220	60/1524	2350/1066	80/87
XH	50/37	150/4.25	72/1830	48/1220	60/1524	2060/934	80/87
	60/45	182/5.15	72/1830	48/1220	60/1524	2350/1066	80/87

LS-16 SERIES 50 Hz MODEL (I)	HP/KW	CAPACITY (ACFM/M^3/MIN)	LENGTH (IN/MM)	WIDTH (IN/MM)	HEIGHT(II) (IN/MM)	WEIGHT(III) (LB/KG)	dBA(IV) w/ encl./ w/o encl. (Air-cooled)
H	60/45	258/7.31	72/1830	48/1220	60/1524	2590/1175	82/85
	75/55	312/8.83	72/1830	48/1220	60/1524	2680/1216	82/85
HH	60/45	229/6.48	72/1830	48/1220	60/1524	2590/1175	82/85
	75/55	263/7.45	72/1830	48/1220	60/1524	2680/1216	82/85
XH	60/45	195/5.52	72/1830	48/1220	60/1524	2590/1175	80/87
	75/55	247/6.99	72/1830	48/1220	60/1524	2680/1216	82/85

(I) Includes standard and 24KT. Rated pressure designations appearing after model number are as follows:
"L" – 100 psig /6.9 bar "H" – 115 psig/7.9 bar "HH" –140 psig/9.7 bar "XH"–175 psig/12 bar
Maximum pressure is rated pressure and 10 psig (0.7 bar).

(II) An additional length of 4 in./102 mm is needed for servicing the separator; 9 in./229 mm for enclosure models.

(III) Add 1450 lbs/658 kg for enclosure models.

(IV) Ratings for dBA at one meter.

Section 3
SPECIFICATIONS

LS-16 SERIES 60 Hz (CONTINUED)

MODEL (I)	HP/KW	CAPACITY (ACFM/M^3/MIN)	LENGTH (IN/MM)	WIDTH (IN/MM)	HEIGHT(II) (IN/MM)	WEIGHT(III) (LB/KG)	dBA(IV) w/ encl. / w/o encl. (Air-cooled)
L	60/45	286/8.10	72/1830	48/1220	60/1524	2590/1175	82/85
	75/55	356/10.08	72/1830	48/1220	60/1524	2680/1216	82/85
H	60/45	268/7.59	72/1830	48/1220	60/1524	2590/1175	82/85
	75/55	314/8.89	72/1830	48/1220	60/1524	2680/1216	82/85
HH	60/45	242/6.85	72/1830	48/1220	60/1524	2590/1175	82/85
	75/55	279/7.90	72/1830	48/1220	60/1524	2680/1216	82/85
XH	75/55	256/7.25	72/1830	48/1220	60/1524	2680/1216	82/85
ENCLOSURE (OPT) (V)			72/1830	48/1220	62/1588	500/227	

COMPRESSOR:	**STANDARD MODELS**	
Type:	Rotary Screw	
Standard Operating Pressure **(VI):**	100 psig (6.9bar) (L)	140 psig (9.7 bar) (HH)
	115 psig (7.9bar) (H) (XH)	175 psig (12 bar) (XH)
Bearing Type:	Anti-Friction	
Ambient Temperature (Max.) **(VII):**	105_F (41_C)	
Cooling:	Pressurized Fluid	
Compressor Fluid:	Sullair Sullube	
Sump Capacity:	8.0 U.S. gallons (30 liters)	
Control:	Electro-Pneumatic Supervisor II (optional)	

MOTOR (VIII):	**STANDARD MODELS**
Size:	50, 60 and 75HP
Type:	C-Flanged, Open Dripproof, Premium Efficiency Three Phase, 230/460 60 Hz, 380-415(400) 50 Hz 40_C Maximum Ambient Temperature Options Available: 200V and 575V T.E.F.C. Also Available: IP54

MOTOR (VIII):	**STANDARD MODELS (CONTINUED)**
Starter:	Full Voltage Magnetic or Wye Delta Options Available: 200V and 575V 60 Hz, 220 50Hz
Speed:	1770 RPM (60 Hz) or 1475 RPM (50 Hz)

(I) Includes standard and 24KT. Rated pressure designations appearing after model number are as follows:
"L" - 100 psig /6.9 bar "H" - 115 psig/7.9 bar "HH" -140 psig/9.7 bar "XH"-175 psig/12 bar
Maximum pressure is rated pressure and 10 psig (0.7 bar).

(II) An additional length of 4 in./102 mm is needed for servicing the separator; 9 in./229 mm for enclosure models.

(III) Add 1450 lbs/658 kg for enclosure models.

(IV) Ratings for dBA at one meter.

(V) The weights shown for Enclosure do not include the weight of the compressor package.

(VI) Special compressors are available for operation at higher pressures.

(VII) Special compressors are available for operation in higher ambient temperature.

(VIII) Multi-frequency and voltage motors are used. The compressors must be used only with the specified electrical frequency and voltage.

3.2 LUBRICATION GUIDE

For best value and longest uninterrupted service, the 12 and 16 Series compressors are factory filled and tested with a long life lubricant.

⚠ WARNING

Mixing of other lubricants within the compressor unit will void all warranties!

If, due to availability or other reasons, other fluids are required, follow Lubrication Guide 3.4 below.

⚠ WARNING

"The Plastic Pipe Institute recommends against the use of thermoplastic pipe to transport compressed air or other compressed gases in exposed above ground locations, e.g. in exposed plant piping." (l)

Sullube should not be used with PVC piping systems. It may affect the bond at cemented joints. Certain other plastic materials may also be affected.

(l) Plastic Pipe Institute, Recommendation B, Adopted January 19, 1972.

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

For light–duty high–humidity service where condensed moisture and emulsification (mayonnaise) may occur, the fluid change interval must be reduced to 300 hours maximum. A non–detergent fluid with rust, oxidation and foam inhibitors and good water separation characteristics should be used.

DO NOT MIX DIFFERENT TYPES OF FLUIDS. Contamination of non–detergent mineral fluids with traces of detergent motor fluids may lead to operational problems such as foaming, filter plugging, orifice or line plugging.

NOTE

Flush system when switching lubricant brands.

When ambient conditions exceed those noted or if conditions warrant use of "extended" life lubricants contact Sullair for recommendation.

3.3 APPLICATION GUIDE

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 the manual. Contact your Sullair dealer for details.

3.4 LUBRICATION CHANGE RECOMMENDATIONS AND MAINTENANCE

LUBRICANT	FLUID CHANGE	FLUID FILTER CHANGE	SEPARATOR CHANGE
Sullube	**A , E**	**G , C**	**A , D**
Sullair LLL–4–32	**A , E**	**G , C**	**A , D**
SRF 1/4000	**B , E**	**G , C**	**B , D**
24KT	**F , E**	**G , C**	**A , D**
CP–4600–32–F	**B , E**	**G , C**	**B , D**

A – 8,000 Hours or once a year.
B – 4,000 Hours or more frequently if conditions so require.
C – When measured pressure loss exceeds 20 psig (1.3 bar).
D – When measured pressure loss exceeds 10 psig (0.7 bar).
E – When required by fluid analysis or known contamination.
F – Does not require replacement during normal service conditions.
G – Every 1000 hours.

Section 3
SPECIFICATIONS

Figure 3-1 Wiring Diagram- LS12 & LS16 Air-cooled & Water-cooled

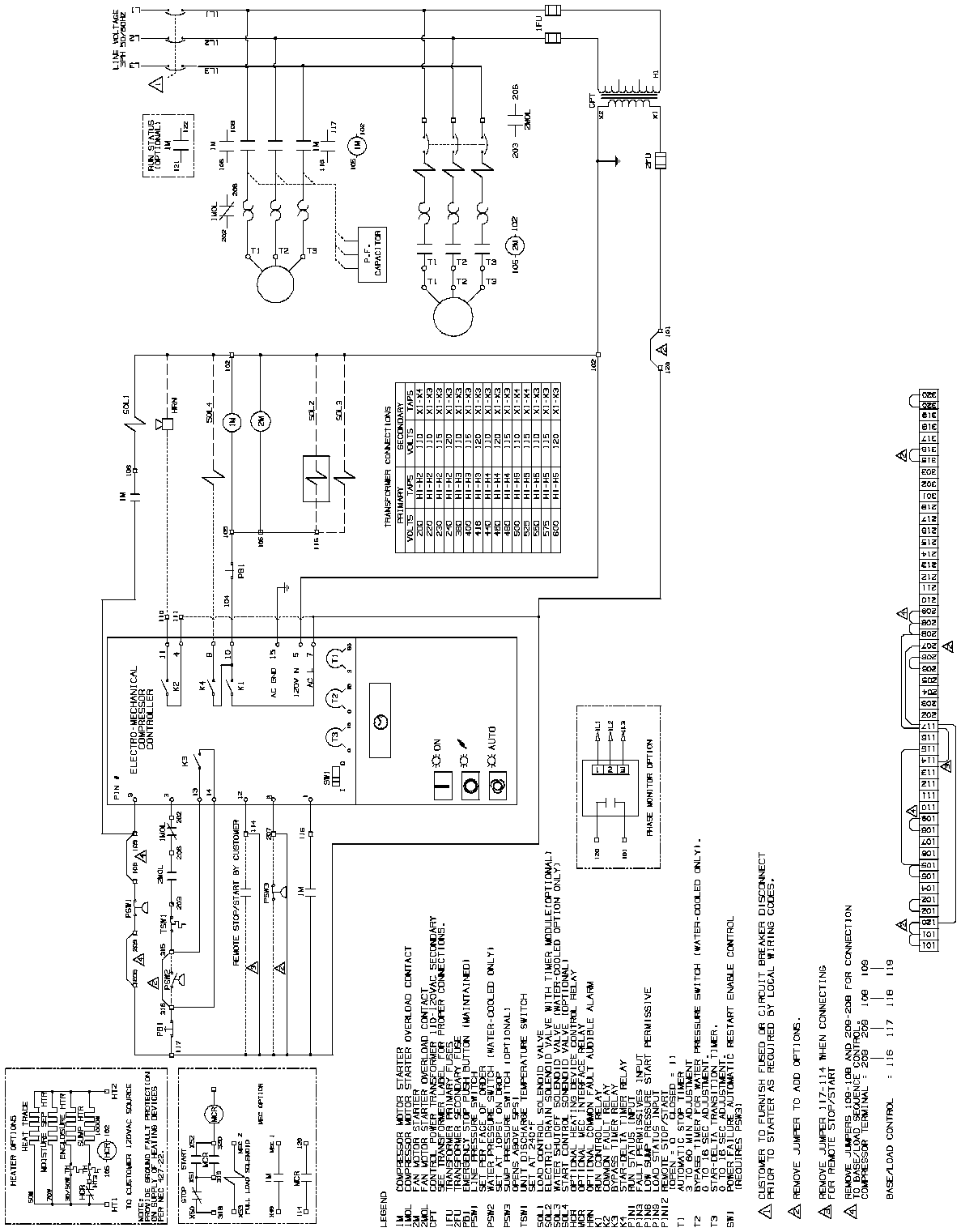
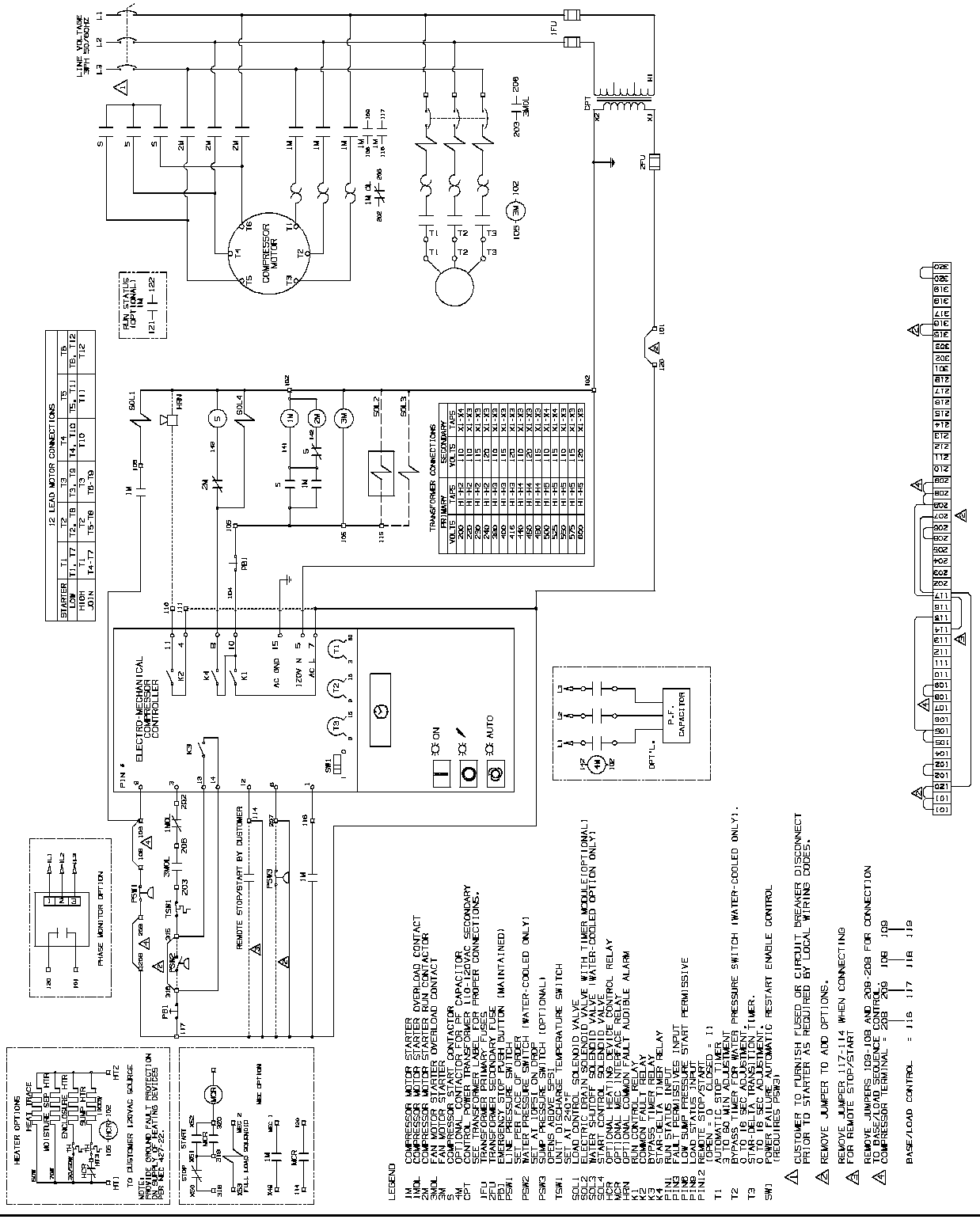


Figure 3-2 Wiring Diagram- LS12 & LS16 Air-cooled & Water-cooled- Wye-Delta



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. No piping loads shall be transmitted to the compressor at the external connections.

4.2 VENTILATION AND COOLING

For air-cooled compressors, select a location to permit sufficient unobstructed air flowing in and out to the compressor to keep the operating temperature stable. The minimum distance that the compressor should be from surrounding walls is three (3) feet (1m). To prevent excessive ambient temperature rise, it is imperative to provide adequate ventilation.

For water-cooled compressors, it is necessary to check the cooling water supply. The water system must be capable of supplying the flows shown in Table I-Water Supply Requirements (Water-cooled), and must be maintained at all times. These figures apply to a compressor running at full load with an aftercooler. For cooler water or a partially loaded compressor, slightly less water is required. However, for hotter water the flow requirements are significantly greater.

Table 2-Ventilation Requirements indicates the ventilation requirements necessary to keep the compressor running at a normal operating temperature. The fan air requirement is the volume of air which must flow through the compressor for proper ventilation. The specified heat rejection requirement is the amount of heat that is radiated by the compressor. This heat must be removed to assure a normal operating temperature. With air-cooled compressors it is possible to use this heat for space heating, providing no additional pressure drop is created across the fan. Consult a Sullair office for assistance in utilizing this heat.

DO NOT install a water-cooled or an air-cooled/aftercooled compressor where it will be exposed to temperatures less than 32_F(0_C).

4.3 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 if required. Also notice that the service line should be equipped with water legs and condensate drains throughout the system.

⚠ WARNING

"The Plastic Pipe Institute recommends against the use of thermoplastic pipe to transport compressed air or other compressed gases in exposed above ground locations, e.g. in exposed plant piping." (I)

Sullube should not be used with PVC piping systems. It may affect the bond at cemented joints. Certain other plastic materials may also be affected.

(I) Plastic Pipe Institute, Recommendation B, Adopted January 19, 1972.

TABLE 1-WATER SUPPLY REQUIREMENTS (WATER-COOLED) (I)

WATER TEMP. 0_F (_C)	WATER FLOW GPM (LITERS) 50HP (37KW)	60HP (45KW)	75HP (55KW)	100 HP (75KW)
70 (21)	7.0 (26.5)	9.0 (31.6)	10.5 (39.7)	14.0 (52.5)
80 (26.6)	10.5 (35.7)	11.5 (41.6)	14.0 (51.6)	18.8 (70.9)

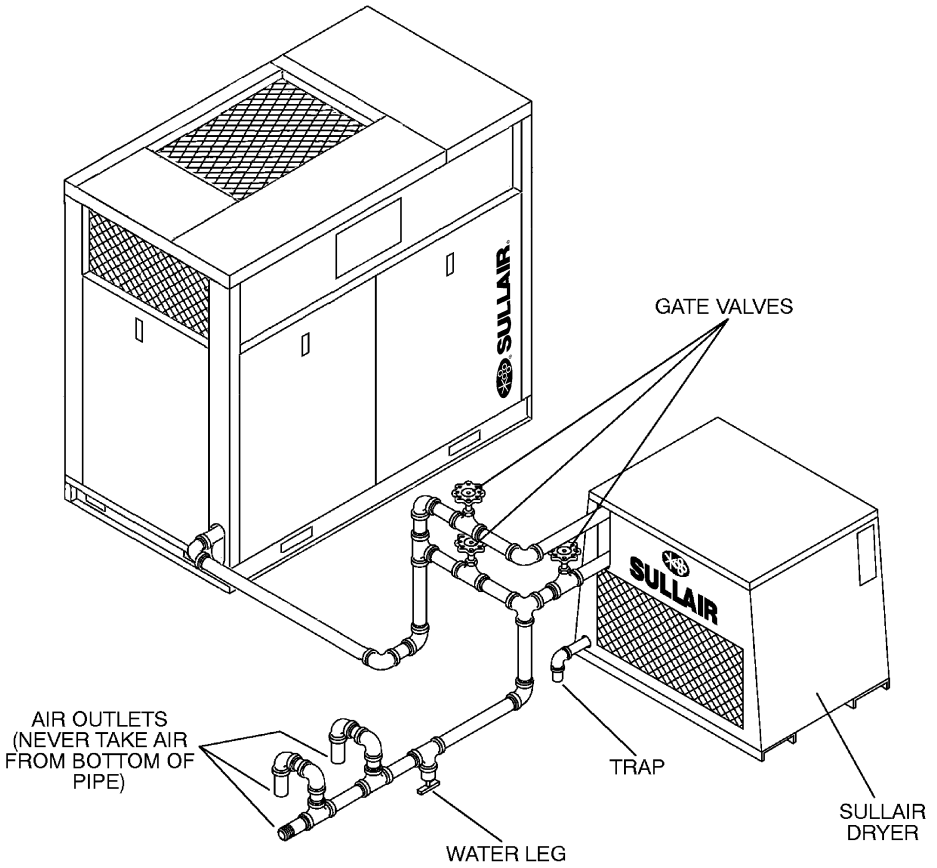
(I) Water pressure should be between 25 and 75 psig (1.7 and 5.2 bar).

TABLE 2- VENTILATION REQUIREMENTS

Cooling Type	Air-Cooled w/Aftercooler				Water-Cooled			
Motor HP/KW	50/37	60/45	75/55	100/75	50/37	60/45	75/55	100/75
Fan Air CFM/ M^3/Hr **(I)**	6,000/ 10,200	7,500/ 12,700	7,500/ 12,700	7,500/ 14,000	1,440/ 2,450	2,845/ 4,850	2,845/ 4,850	2,845/ 4,850
Ventilating Air/ Heat Rejection BTU/Hour	166,000	183,800	229,800	301,000	13,300	15,800	19,800	26,000
KCAL/HR	42,000	46,300	57,900	75,800	3,350	4,000	5,000	6,550
Cooling Water/ Heat Rejection BTU/Hour					153,000	168,000	210,000	275,000
KCAL/HR					38,600	42,300	53,000	69,300

(I) Applies to compressors with canopy only (vent fan).

Figure 4-1 Service Air Piping with Aftercooler and Optional Air Dryer (Typical)



4.4 COUPLING ALIGNMENT CHECK

No coupling alignment is required.

4.5 FLUID LEVEL CHECK

The 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, fluid should be visible in the sight glass while compressor is in run mode. The maximum fluid level is the level of the filler port.

4.6 ELECTRICAL PREPARATION-STANDARD ELECTRO-MECHANICAL

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/or any other applicable State, Federal and local electrical codes concerning isolation switches, fused disconnects, etc. Sullair provides a wiring diagram for use by the installer.

NOTE

Customer must provide electrical supply power disconnect within sight of machine.

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

⚠ WARNING

Lethal shock hazard inside. Disconnect all power at source before opening or servicing.

1. Check incoming voltage. Be sure that compressor is wired for the correct incoming voltage.
2. Check starter for correct size, proper overload relay, and heaters.
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 pressing the **"I" START** push button and check all protective devices to be sure that they will de-energize the starter coil when tripped.

5. Reconnect the motor leads and jog the motor for a direction of rotation check as explained in Section 4.7.

NOTE

Wiring diagram for standard compressors is supplied on the inside cover of the Control Center. Optional compressor wiring diagrams will vary.

4.7 MOTOR ROTATION DIRECTION CHECK - STANDARD ELECTRO-MECHANICAL

NOTE

Motor rotation check must be made at compressor start-up. Remove compressor panel as needed to view motor rotation.

After the electrical wiring has been done, it is necessary to check the direction of the motor rotation. This can be accomplished by toggling between the **"I" (START)** and **"O" (STOP)** push buttons on the control panel. Verify proper rotation by observing the motor shaft 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. A "Direction of Rotation" decal is located on the motor to show proper motor/compressor rotation.

An alternative to this procedure is to monitor the sump pressure gauge when pressing the **"I" (START)** push button. If immediate pressure is shown on the sump pressure gauge when the compressor is started, then the proper motor rotation has been achieved. If no pressure is indicated, press the **"O" (STOP)** push button immediately. This indicates improper motor rotation. Disconnect the power to the starter and exchange any two of the three power input leads. Recheck rotation as outlined above.

NOTES

OPERATION- ELECTRO-MECHANICAL

5.1 GENERAL

While Sullair has built into this compressor a comprehensive array of controls 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 and indicators – their purpose, location and use.

5.2 PURPOSE OF CONTROLS-STANDARD ELECTRO-MECHANICAL

CONTROL OR INDICATOR	PURPOSE
EMERGENCY STOP SWITCH	Pushing in this switch, found adjacent to the controller, cuts all AC outputs from the latter and de–energizes the starter. A fault message (E STOP) is displayed by the Supervisor until the button is pulled out and the "**O**" pad is depressed.
START "**I**" PAD	Depress to turn the compressor ON.
STOP "**O**" PAD	Depress to turn the compressor OFF and reset the common fault circuit.
AUTO " ◎ " PAD	To select between continuos (HAND) operation and automatic stop/start (AUTO) operation. Shuts off compressor automatically after the compressor runs unloaded for a specified time (ranging from 3–60 minutes [T1]). Restarts compressor when the pressure switch trips to the reload setting. Dual control is enabled by pressing the "AUTO" pad.
HOURMETER	Records cumulative hours of compressor operation; useful for planning and logging service schedules.
LINE PRESSURE GAUGE	Continually monitors service line air pressure. It is 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. For both air and water–cooled compressors, the normal reading should be approximately 180_F to 205_F (82_C to 96_C).
AIR FILTER RESTRICTION GAUGE	Indicates when the air filter element change is required. The gauge shows the red zone when drop through the filter is excessive. The compressor must be running full load for an accurate indication.
FLUID FILTER MAINTENANCE GAUGE	Indicates when a fluid filter element change is required. It shows red when the pressure drop through the filter is excessive.
SEPARATOR MAINTENANCE GAUGE	Indicates when separator element change is required. Shows red when the pressure drop through the filter is excessive. The compressor must be running full load for an accurate indication.
POWER ON (↘) LED	Indicates when the starter is receiving power.
ON LED	Indicates when compressor is in operation.
AUTO LED	Indicates when compressor is in auto mode.

5.2 PURPOSE OF CONTROLS–STANDARD ELECTRO-MECHANICAL (CONTINUED)

CONTROL OR INDICATOR	PURPOSE
FLUID LEVEL SIGHT GLASS	Monitors fluid level in the sump. The fluid must be visible in the glass. Check the level when the compressor is shut down. Maximum fill level is the level of the fill port, minimizing the risk of overfilling.
SEPARATOR RETURN LINE SIGHT GLASS	Used to indicate fluid flow in the return line. When the compressor is running at full load, fluid flow should be visible in this sight glass. 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 strainer.
THERMAL VALVE	Regulates flow of fluid to and around the cooler. It is designed to maintain a minimum operating temperature of 180_F (82_C); use for fast warm–up on start–up.
MINIMUM PRESSURE/CHECK VALVE	Maintains minimum of 55 psig (3.8 bar) in the compressor sump. Valve piston restricts receiver air discharge from receiver/sump when pressure falls to 55 psig (3.8 bar). Also prevents backflow into the sump during unload conditions and after shutdown.
COMPRESSOR DISCHARGE TEMPERATURE SWITCH	Designed to shut the compressor down when the discharge temperature reaches 235_F (113_C).
WATER PRESSURE SWITCH (water–cooled compressors only)	It prevents operation when water pressure of compressor is inadequate.
PRESSURE RELIEF VALVE	Opens sump pressure to the atmosphere should pressure inside the sump become too high. Operation of this valve indicates that the high pressure switch is either faulty or out of adjustment.
MODULATING INLET VALVE	Regulates the amount of air allowed to enter the air compressor. This regulation is determined by the amount of air being used at the service line. Also acts as a check valve to prevent reverse compressor rotation at shut down.
PRESSURE REGULATOR	Allows a pressure signal to reach the air inlet valve to control air delivery according to demand.
SOLENOID VALVE	Bypasses the pressure regulator valve causing the inlet valve to close when the compressor reaches maximum operating pressure. Also activates blow–down valve.
PRESSURE SWITCH	Senses service line pressure. When line pressure reaches maximum setting the pressure switch signals the pilot valves to unload the compressor.
BLOWDOWN VALVE	Vents sump pressure to the atmosphere during unload conditions and shutdown.
WATER REGULATING VALVE (water–cooled only)	Regulates the amount of cooling water used to keep the compressor running at a normal operating temperature.
T1 (AUTOMATIC STOP TIMER)	Adjustable from three (3) to 60 minutes. Located on rear of the controller.

5.2 PURPOSE OF CONTROLS-STANDARD ELECTRO-MECHANICAL (CONTINUED)

CONTROL OR INDICATOR	PURPOSE
T2 (BYPASS TIMER)	Adjustable from zero (0) to 16 seconds. Used to by-pass the water pressure switch on startup. Set to zero (0) for no function. Located on rear of controller.
T3 (STAR-DELTA TIMER)	Adjustable from zero (0) to 16 seconds. Transition timer for Wye-delta start. Located on rear of controller.
SW1 (POWER FAILURE RESTART ON/OFF CONTROL	With switch set to ON, machine will start after power recovery in the run mode selected prior to power failure as long as start permissives allow. Located on rear of controller.

5.3 INITIAL START-UP PROCEDURE- STANDARD ELECTRO-MECHANICAL

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 pressing the START "**I**" pad.
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 Adjustment in the Maintenance Section 7.7 of the main manual.
7. Observe the operating temperature. If the operating temperature exceeds 205°F (96°C), the cooling system or installation environment should be checked.
8. Observe return line sight glass 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- STANDARD ELECTRO-MECHANICAL

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

5.5 SHUTDOWN PROCEDURE- STANDARD ELECTRO-MECHANICAL

To shut the compressor down, simply press the STOP "**O**" pad.

NOTES

6.1 TROUBLESHOOTING- STANDARD ELECTRO-MECHANICAL

The information contained in the Standard Electro-Mechanical Troubleshooting chart has been compiled from field report data and factory experience. 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 a 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:

1. Check for loose wiring.
2. Check for damaged piping.
3. 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.

TROUBLESHOOTING- STANDARD ELECTRO-MECHANICAL

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.
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 line pressure switch; check pressure at which contact points open.
		Separator requires maintenance; check maintenance indicator under full load conditions.
		High pressure shutdown switch is defective; replace.
		Defective valve; regulator valve should cause inlet valve to close when the pressure switch contacts open. Repair if defective.
		Defective blowdown valve; blowdown valve should exhaust sump pressure to 10 to 15 psig (0.7 to 1.0 bar) when maximum operating pressure is reached. Repair if defective.
	Discharge Temperature Switch Open	Cooling water temperature too high; increase water flow (water-cooled only).
		Cooling water flow insufficient; check water lines and valves (water-cooled only).
		Cooler plugged; clean tubes. If plugging persists, install water conditioner (water-cooled only).
		Cooling air flow restricted; clean cooler and check for proper ventilation.
		Ambient temperature is too high; provide sufficient ventilation.
		Low fluid level; add fluid.
		Clogged filter; change the fluid filter element and change the bearing filter element if maintenance indicator shows red.

TROUBLESHOOTING- STANDARD ELECTRO-MECHANICAL (CONTINUED)

SYMPTOM	PROBABLE CAUSE	REMEDY
COMPRESSOR SHUTS DOWN WITH AIR DEMAND PRESENT (cont.)	Discharge Temperature Switch Open (cont.)	Thermal valve not functioning properly; replace element.
		Water flow regulating valve not functioning properly; change (water-cooled only).
		Defective discharge temperature switch; check for a short or open circuit to probe and correct wiring.
COMPRESSOR WILL NOT BUILD FULL DISCHARGE PRESSURE.	Air Demand is Too Great	Check service lines for leaks or open valves up
	Dirty Air Filter	Check the filter indicator and inspect and/or change element if required.
	Pressure Regulator Out of Adjustment	Adjust regulator according to control adjustment instructions in the Maintenance section.
	Defective Pressure Regulator	Check diaphragm and replace if necessary (kit available).
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 not damaged. Replace if necessary.
	Defective Regulator Valve	Check that air bleeds from control orifice when the pressure switch contacts open. Readjust; Repair or replace it if necessary (kit avail able).
	Plugged Control Line Strainer	Clean strainer (screen and o-ring replacement kit available).
	Defective Blowdown Valve	Check that sump pressure is exhausted to the atmosphere when the pressure switch contacts open. Repair or replace if neces- sary (kit available).
	High Pressure Shutdown Switch is Defective or Incorrectly Adjusted	Readjust or replace.
EXCESSIVE COMPRESSOR FLUID CONSUMPTION	Clogged Return Line or Orifice	Clean strainer (screen and o-ring replace- ment kit available). Clean orifice.
	Separator Element Damaged or Not Functioning Properly	Change separator.
	Leak in the Lubrication System	Check all pipes, connections and compo- nents.
	Excess Fluid Foaming	Drain and change.
	Fluid Level Too High	Drain and change.
PRESSURE RELIEF VALVE OPEN REPEATEDLY	Defective Pressure Relief Valve	Replace.
	Plugged Separator	Check separator differential.
LIQUID WATER IN COMPRESSED AIR LINES	Water Vapor Condensation from Cooling and Compression Occurs Naturally	Remove the water vapor from compressed air prior to distribution through the air system. Check opera- tion of aftercooler and moisture separator. Install a compressed air dryer sized for the flow and dryness level required. (Note: Filters may also be required to remove particulates, liquid oil aerosols or for oil vapor removal. Change cartridges as recommended by the filter manufacturer). Check all drain traps routinely to insure their proper operation. Maintain them regu- larly.

NOTES

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