SULLAIR

INDUSTRIAL AIR COMPRESSOR ES–16

60 & 75 HP (45 & 55kW) STANDARD & 24 KT

OPERATOR'S MANUAL AND PARTS LIST

Part Number 02250093–507

STATEMENT OF WARRANTY

Sullair Corporation ("Sullair") warrants that, under normal use and service, if properly stored, handled, installed, operated and maintained, its portable and stationary air compressors ("Compressors") shall, for a period of twelve (12) months ("Warranty Period") (1) beginning at machine start-up if the registration card is returned within ten (10) days after start-up and the start-up occurs within twelve (12) months after shipment by Sullair from the factory, or (2) if not, beginning thirty (30) days after shipment by Sullair from the factory, be free of defects in materials and workmanship, under normal use and service; and that its rotary screw air-end ("Air-end") utilized in Compressors, shall, for a period of twenty-four (24) months ("Warranty Period"), (1) beginning at machine start-up if the registration card is returned within ten (10) days after start-up and the start-up occurs within twelve (12) months after shipment by Sullair from the factory, or (2) if not, beginning thirty (30) days after shipment by Sullair from the factory, be free of defects in materials and workmanship, under normal use and service. Should any such defect become apparent within such time, and written notice of each and every such defect is promptly provided to Sullair, and Sullair reasonably determines that any such Product is defective in material or workmanship, Sullair will, at its option, replace or repair such Product. Sullair's obligation with respect to such Product shall be limited to repair or replacement, F.O.B. Sullair's place of business, without any further expense to Sullair, and except as expressly provided herein, Sullair shall not in any event be liable for any other labor, transportation, installation, adjustment or other expenses which may arise in connection with such Product. Any misuse or abuse of the Product(s) voids this limited warranty.

The Sullair warranty does not extend to Products not assembled by Sullair. As to Products assembled by others including the driver (whether engine, turbine or electric motor), Purchaser shall be entitled to proceed only upon the terms of that particular manufacturer's warranty. The Sullair warranty does not apply to defects in materials provided by Purchaser or design stipulated by Purchaser.

Used Products, and Products not assembled by Sullair, are sold AS IS with no representation or warranty, and ALL WARRANTIES OF QUALITY, WRITTEN, ORAL OR IMPLIED, other than may be expressly agreed to by Sullair in writing, INCLUDING WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY OR FITNESS, ARE HEREBY DISCLAIMED.

IN NO EVENT SHALL SULLAIR BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES however arising whether in warranty, strict liability, contract, tort, negligence or otherwise, including but not limited to loss of profits of revenue, loss of total or partial use of the Products, facilities or services, downtime costs, or claims of Purchaser for such or other damages whether on account of Products furnished hereunder or delays in delivery thereof of services performed upon or with respect to such Products. Sullair's liability on any claim whether in warranty, strict liability, contract, tort, negligence or otherwise for any loss or damage arising out of, connected with, or resulting from this warranty or the performance or breach thereof, or from the design, manufacture, sale, delivery, resale, repair, replacement, installation, technical direction of installation, inspection, servicing, operation or use of any Product covered by or furnished under this warranty shall in no case exceed the purchase price allowable to the Product or part thereof which give rise to the claim. Notice of claims against Sullair hereunder for any reason, including breach of warranty, must be made to Sullair in writing within forty-eight (48) hours of discovery to afford Sullair an opportunity to make a prompt investigation of surrounding facts and mitigate any damage which might ensue, should it be determined to be Sullair's responsibility. Failure to give such notice to Sullair shall constitute a waiver by Purchaser of any right later to assert such a claim.

Any cause of action against Sullair arising out of or relating to the warranty or the performance hereof shall expire unless brought within one (1) year of the time of accrual thereof.

THE FOREGOING LIMITED WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

SULLAIR CORPORATION

A Subsidiary Of Sundstrand Corporation

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COMPRESSOR TROUBLESHOOTING

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ILLUSTRATIONS AND PARTS LIST

1.1 GENERAL

Sullair Corporation and its subsidiaries design and manufacture all of its 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.

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 ½" 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 ½" 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 of hose in runs of air hose exceeding ½" 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 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.

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 (2.07 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.

1.4 FIRE AND EXPLOSION

A. Clean up spills of lubricant or other combustible substances immediately, when 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, liter 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.

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 administrating 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 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 conditions 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 level surfaces 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 full 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, if any, 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.

NOTES

2.1 LOCATION OF COMPRESSOR

The ES–16 Series compressor package may be placed on any surface rigid and smooth enough to support its weight and maintain a level compressor frame. 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.

2.2 VENTILATION AND COOLING

Select a location to permit sufficient unobstructed air flow in and out of the compressor to keep the operating temperature stable. The minimum distance that the machine should be from surrounding walls and ceiling is what is needed for service and three (3) feet (914mm) or more from the compressor fluid cooler.

For water–cooled compressors, it is necessary to check the cooling water supply. The proper water flow should be as shown in Table One in this section.

TABLE 1 – WATER FLOW REQUIREMENTS

	GPM (LPM) @ 70° F(21°C)	GPM (LPM) @ 80°F(27°C)
60 HP (45kW)	9 (34)	12 (45)
75 HP (55kW)	11 (42)	15 (57)

Table Two 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. 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 temperature less than 32° F (0°C)

2.3 SERVICE AIR PIPING

Service air piping should be installed as shown in Figure 2–1. 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.

⚠ 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.

2.4 FLUID LEVEL CHECK

A fluid sight glass on the sump serves as a level indicator. During operation, the level should not exceed 1/4 to 1/2 of the sight glass. With the compressor shut down the level will rise to the bottom of the fluid fill plug located above the sight glass.

2.5 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 done by toggling the **"I" (START)** and **"O" (STOP)** positions of the rotary switch on the control box door. 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. A "Direction of Rotation" decal is located on the motor to show proper motor/compressor rotation.

An alternative to this procedure is to monitor

TABLE 2 – VENTILATION REQUIREMENTS

Compressor Cooling Type	Air–cooled with Aftercool		Water–cooled	
Motor hp (kW)	60hp (45kW)	75hp (55kW)	60hp (45kW)	75hp (55kW)
Heat Rejection BTU/hr (kcal/hr)	182000 (45900)	227000 (57200)	20600 (5190)	25700 (6480)

the sump pressure gauge when toggling the **"I" (START)** switch. 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, turn switch to the **"O" (STOP)** position 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.

2.6 MOTOR ROTATION DIRECTION CHECK SUPERVISOR II

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.

Pull out the **EMERGENCY STOP** button and press once, quickly and in succession, the **"I" (START)** and **"O" (STOP)** pads. This action will bump start the motor for a very short time. When looking at the motor from the end opposite the compressor unit, the shaft should be turning clockwise. If the reversed rotation is noted, 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 set the Supervisor to display P1. Pull out the **EMERGENCY STOP** button and press once, quickly and in succession, the **"I" (START)** and **"O" (STOP)** pads. This action will bump start the motor for a very short time. If motor rotation is correct there will be immediate pressure shown. If no pressure is present, reverse rotaion is occurring. Disconnect the power to the starter and exchange any two of the three power imput leads. Recheck rotation as outlined above.

2.7 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 turning the **"O/I" STOP/START** switch to **"I" START** 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 2.5.

NOTE

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

2.8 ELECTRICAL PREPARATION SUPERVISOR II

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 Electric Code and/or any applicable local electrical code concerning isolation switches, fused disconnects, etc. Sullair provides a wiring diagram for use by the installer.

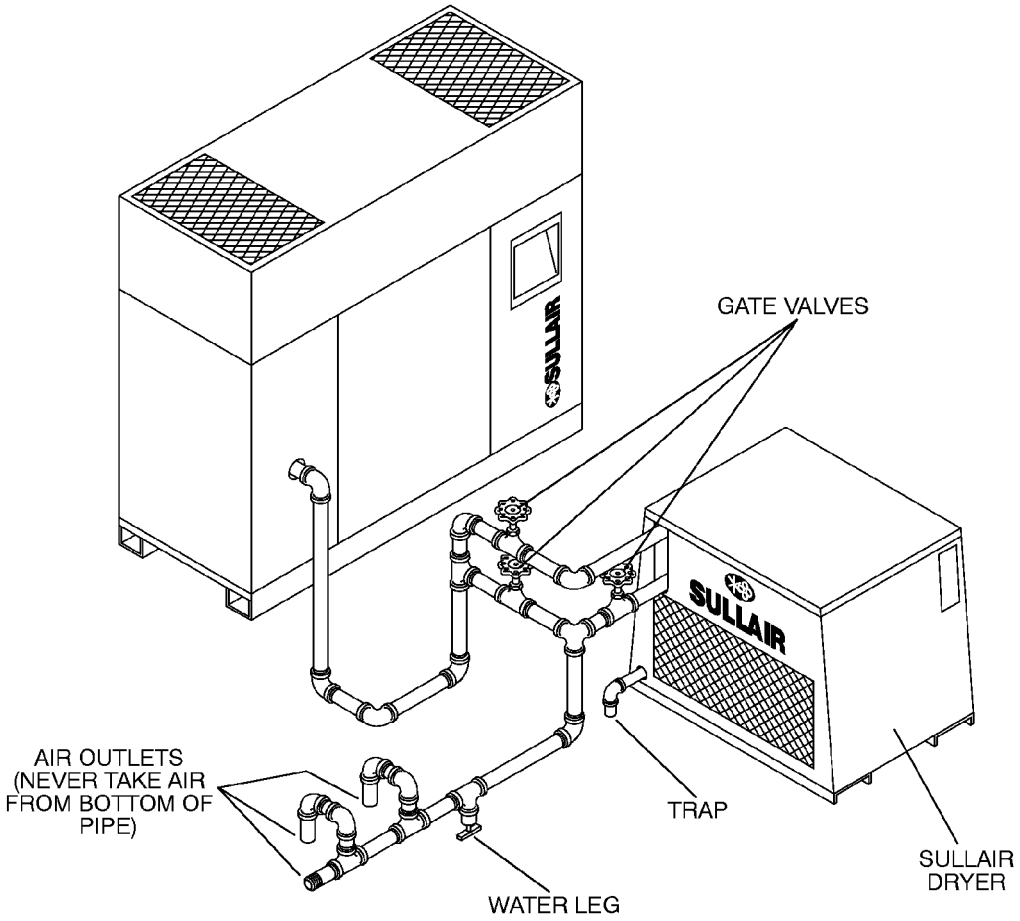
An electrical check should be made to help assure that the first start–up will be trouble free.

⚠ 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.

Figure 2–1 Service Air Piping



2. Check starter and overload heater sizes.
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 **"I" (START) pad** and check all protective devices to be sure that they will de–energize the starter coil when tripped.
5. Reconnect the three (3) motor leads and jog the motor for a direction of rotation check, as explained in Section 2.6.

NOTES

3.1 TABLE OF SPECIFICATIONS								
50 HZ MODEL	kW	M^3/MIN	BAR	LENGTH (MM)	WIDTH (MM)	HEIGHT (MM)	WEIGHT (I) (KG)	dBA (II) AIR–COOLED
60L	45	8.2	7	2108	838	1803	1180	76
60HH	45	6.3	10	2108	838	1803	1180	76
60XH	45	5.5	12	2108	838	1803	1180	76
75L	55	10.3	7	2108	838	1803	1225	76
75HH	55	7.9	10	2108	838	1803	1225	76
75XH	55	7.0	12	2108	838	1803	1225	76

60 HZ MODEL	HP	ACFM	PSIG	LENGTH (IN)	WIDTH (IN)	HEIGHT (IN)	WEIGHT (I) (LB)	dBA (II)
60L	60	294	100	83	33	71	2600	76
60H	60	248	125	83	33	71	2600	76
60HH	60	217	150	83	33	71	2600	76
60XH	60	195	175	83	33	71	2700	76
75L	75	363	100	83	33	71	2700	76
75H	75	315	125	83	33	71	2700	76
75HH	75	275	150	83	33	71	2700	76
75XH	75	248	175	83	33	71	2700	76

(I) The weights shown for the Enclosure and EES packages does not include the weight of the compressor package.

(II) Ratings for dBA at one meter.

COMPRESSOR:

Type:	Single Stage Fluid Injected Screw Compressor
Minimum Full Load Operating Pressure:	50 psig (3.4 bar)
Maximum Full Load Operating Pressure:	Nameplate Pressure (I)
Bearing Type:	Anti–friction
Cooling:	Pressurized Fluid
Lubricant:	See Lubricant Specification
Sump Capacity:	8 gallons (30 liters)

(I) Compressors are available for full load pressures up to 175 psig (12 bar) & unload pressure 185 psig (12.8 bar).

Section 3
SPECIFICATIONS

MOTOR	60Hz	50Hz
Type:	TEFC, C–Flange	TEFC, C–Flange
Synchronous Speed:	60 HP–1800 RPM 75 HP–1800 RPM	45kW–1500 RPM 55kW–1500 RPM
Voltage:		
Standard All Sizes:	230/460	380/415
Optional All Sizes:	200	220
Optional All Sizes:	575	
Insulation Class:	F	F
Maximum Ambient Temp:	40˚C (104˚F)	40˚C (104˚F)

FLUID FILTER

Type:	Spin–on, Sullair Proprietary
MIcron:	23 Microns Abs.
Internal Bypass Valve:	Set at 25 psig (1.7 bar)

FLUID SEPARATOR ELEMENT

Type:	Push–in Cartridge, Sullair Proprietary
Efficiency at Maximum Capacity:	4PPM Maximum

3.2 LUBRICATION GUIDE

For best value and longest uninterrupted service, the ES–16 compressor is factory filled and tested with a long life lubricant.

If, due to availability or other reasons, other fluids are required, follow Lubrication Guide 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." (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.

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.

Sullair encourages the user to participate in a fluid analysis program. This could result in a fluid change interval that is different from those stated in this manual.

3.3 LUBRICANT CHANGE RECOMMENDATIONS AND MAINTENANCE			
LUBRICANT	**FLUID CHANGE**	**FLUID FILTER CHANGE**	**SEPARATOR CHANGE**
Sullube 32	A,E	A,C	A,D
Sullair LLL--4--32	A,E	A,C	A,D
SRF 1/4000	B,E	B,C	B,D
24KT	F,E	A,C	A,D
CP--4600--32--F	B,E	B,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

NOTES

4.1 INTRODUCTION

Your new Sullair 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 6 (Maintenance) to see how surprisingly easy it is to keep your air compressor in top operating condition.

4.2 DESCRIPTION OF COMPONENTS

Refer to Figures 4–1. 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.

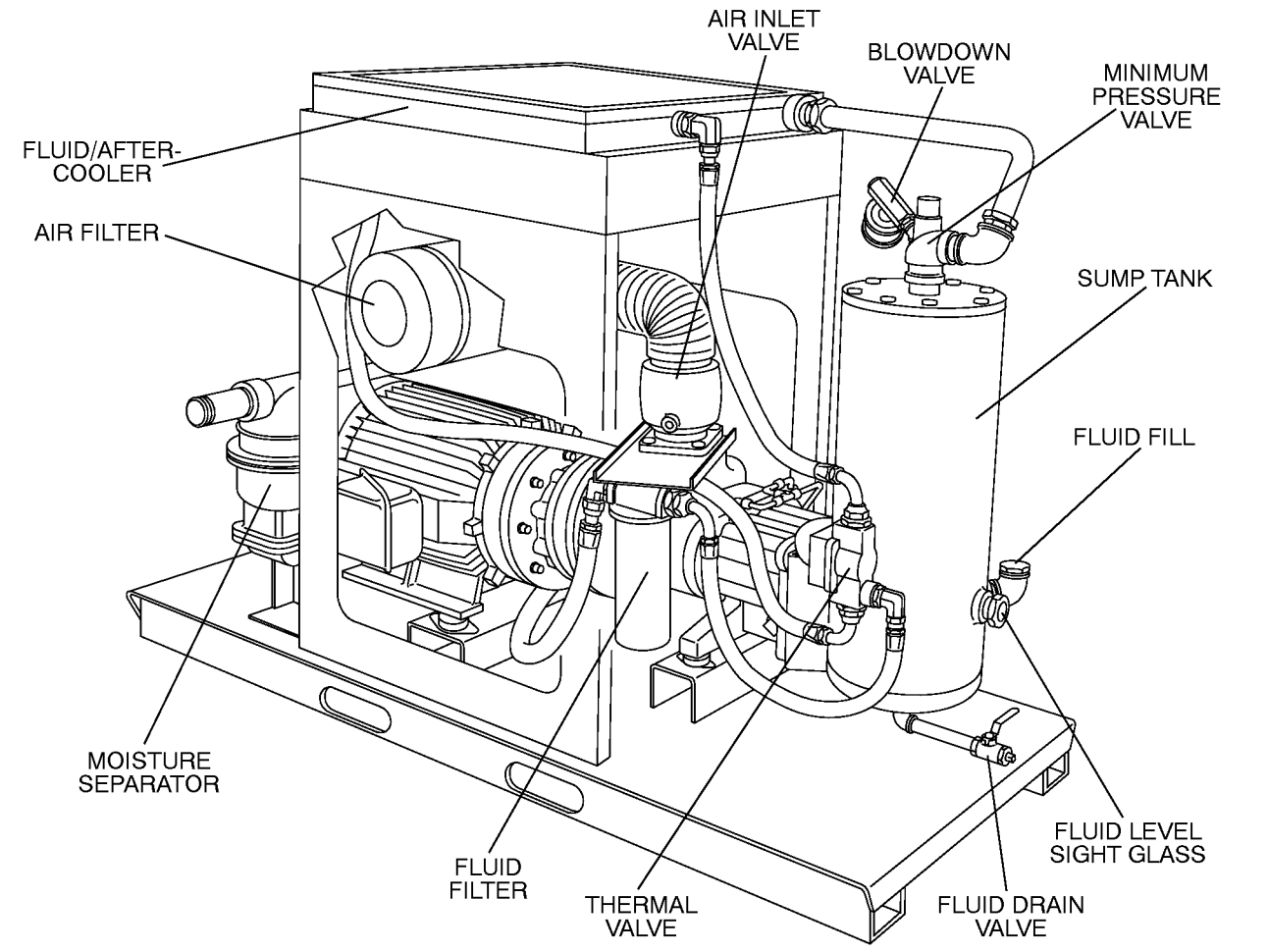
On water–cooled models, a shell and tube heat exchanger is mounted on the compressor frame. Fluid is piped into the heat exchanger where compression heat is removed from the fluid. Another similar heat exchanger cools the compressed air.

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.

4.3 SULLAIR COMPRESSOR UNIT, FUNCTIONAL DESCRIPTION

Sullair air compressors feature the Sullair compressor unit, a single–stage, positive displacement, flood lubricated–type compressor. This unit pro-

Figure 4–1 Sullair Rotary Screw Air Compressor



vides continuous pulse–free compression to meet your needs. With a Sullair compressor, there is no maintenance or inspection of the internal parts of the compressor unit permitted in accordance with the terms of the warranty.

Sullair 24KT compressors are filled with a fluid which rarely needs to be changed. In the event a change of fluid is required, use only Sullair 24KT fluid. **MIXING OF OTHER LUBRICANTS WITHIN THE COMPRESSOR UNIT WILL VOID ALL WARRANTIES**!

Sullair recommends that a 24KT sample be taken at the first filter change and sent to the factory for analysis. This is a free service. The sample kit with instruction and self–addressed container is to be supplied by your Sullair dealer at start–up. The user will receive an analysis report with recommendations.

Fluid is injected into the compressor unit in large quantities and 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. Seals the leakage paths between the rotors and the stator and also between the rotors themselves.
3. Acts as a lubricating film between the rotors allowing one rotor to directly drive the other, which is an idler.

After the air/fluid mixture is discharged from the compressor unit, the fluid is separated from the air. At this time, the air flows through an aftercooler and separator then to your service line while the fluid is being cooled in preparation for reinjection.

4.4 COMPRESSOR COOLING AND LUBRICATION SYSTEM, FUNCTIONAL DESCRIPTION

Refer to Figures 4–2 & 4–2A. The cooling 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.

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. After the initial 50 hour filter change, the gauge will rarely show red under normal operating conditions.

Water–cooled versions of the compressor have a 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.

4.5 COMPRESSOR DISCHARGE SYSTEM, FUNCTIONAL DESCRIPTION.

Refer to Figures 4–2 & 4–2A. The compressor unit discharges the compressed air/fluid mixture into the combination receiver/sump.

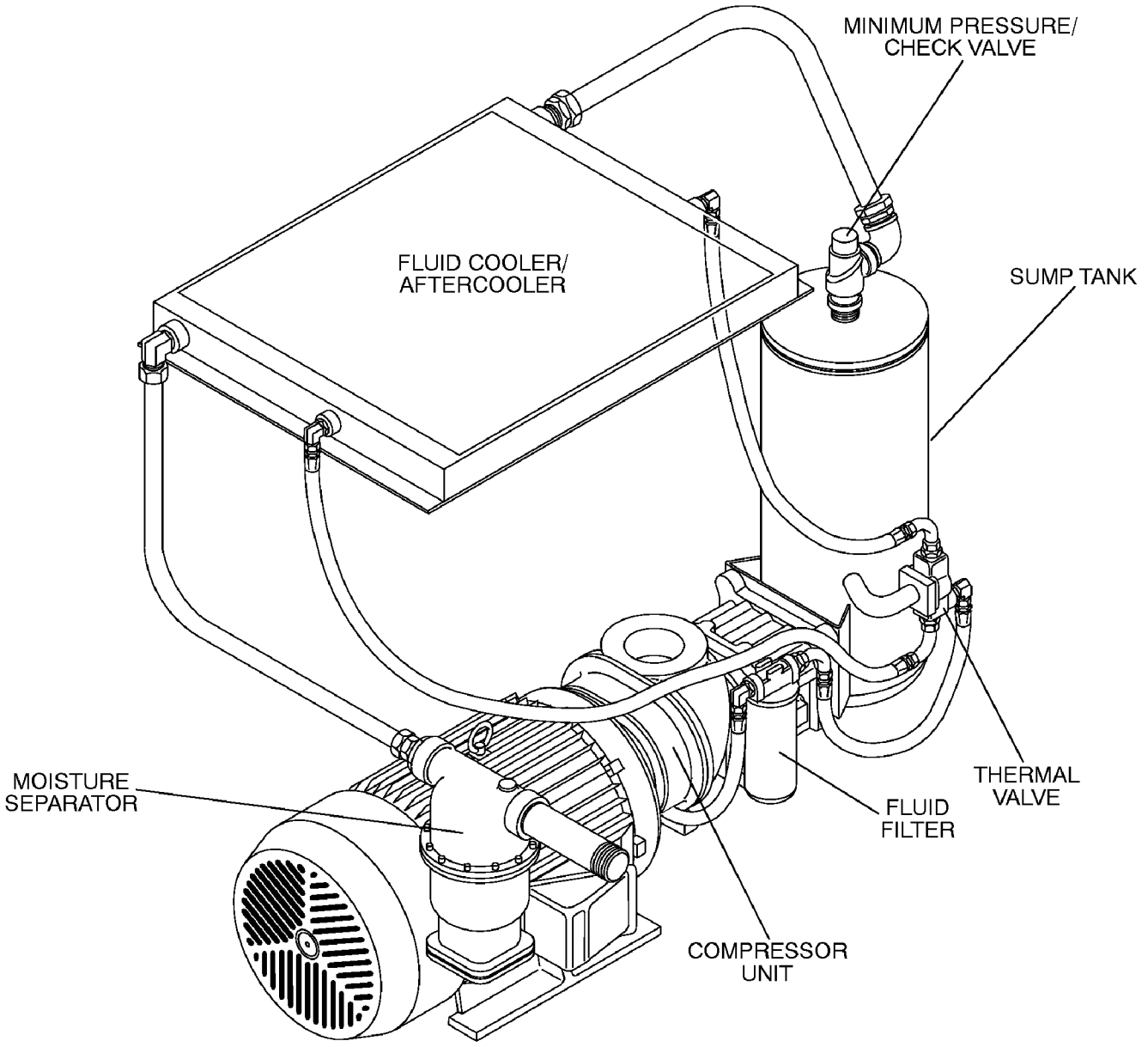
The receiver has three basic functions:

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 separate receiver and is directed towards the side of the receiver/sump. The direction of movement is changed and its velocity significantly reduced, thus causing the large droplets of fluid to 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. On standard electro–mechanical compressors 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. On compressors with Supervisor II an LED flashing P1 denotes replacement of separator is needed.

A minimum pressure/check valve, located down-

Figure 4–2 Compressor Fluid Cooling/Lubrication and Discharge System – ES–16 AIRCOOLED



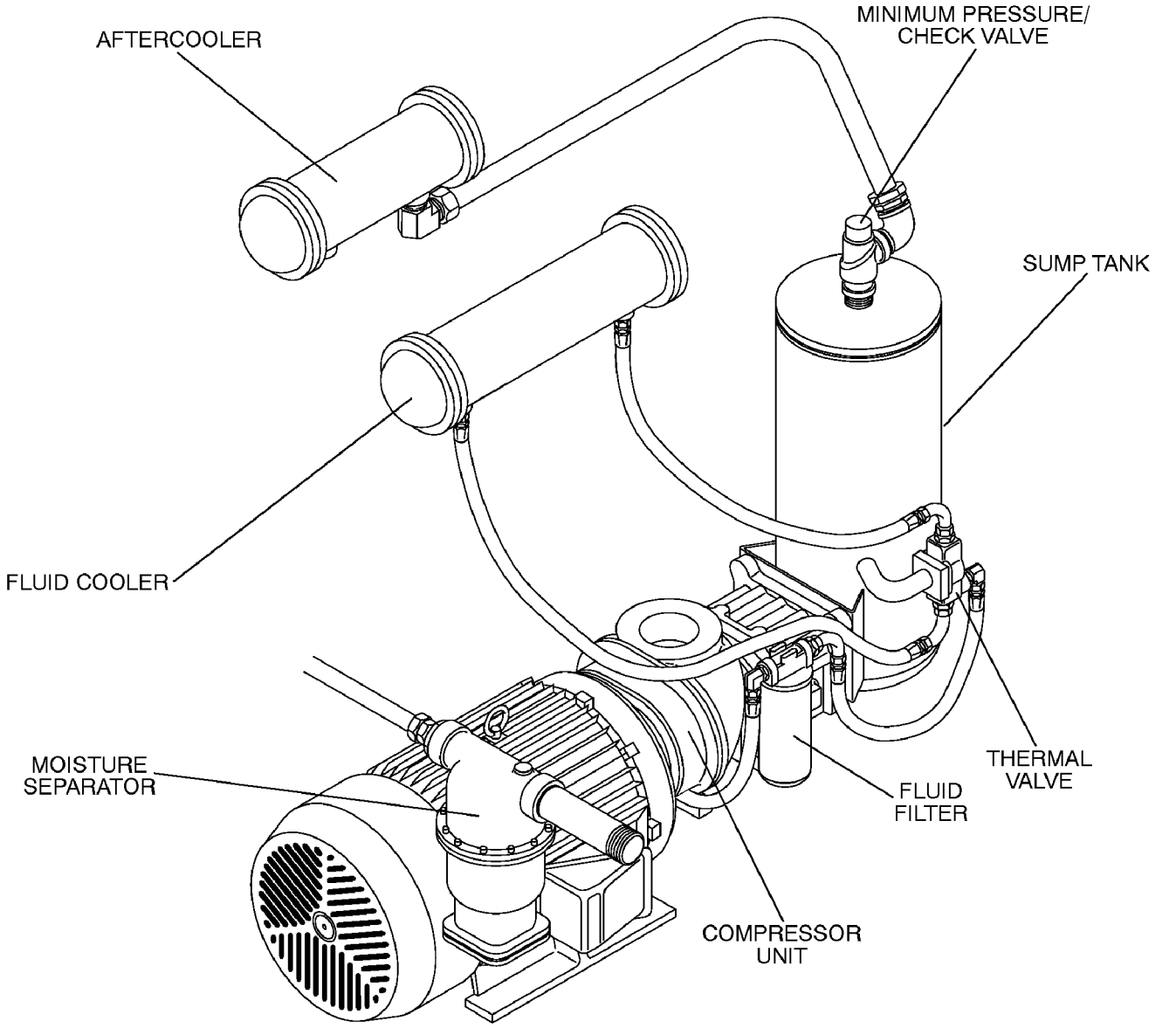
stream from the separator, assures a minimum receiver pressure of 50 psig (3.4 bar) during all conditions. This pressure is necessary for proper air/fluid separation and proper fluid circulation.

A terminal check valve is incorporated into the minimum pressure/check valve to prevent compressed air in the service line form 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).

All compressor models are equipped with a high pressure shutdown switch. This prevents the pressure relief valve from opening under routine conditions, thereby preventing fluid loss through the pressure relief valve.

Figure 4–2A Compressor Fluid Cooling/Lubrication and Discharge Systems – ES–16 WATERCOOLED



⚠ WARNING

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

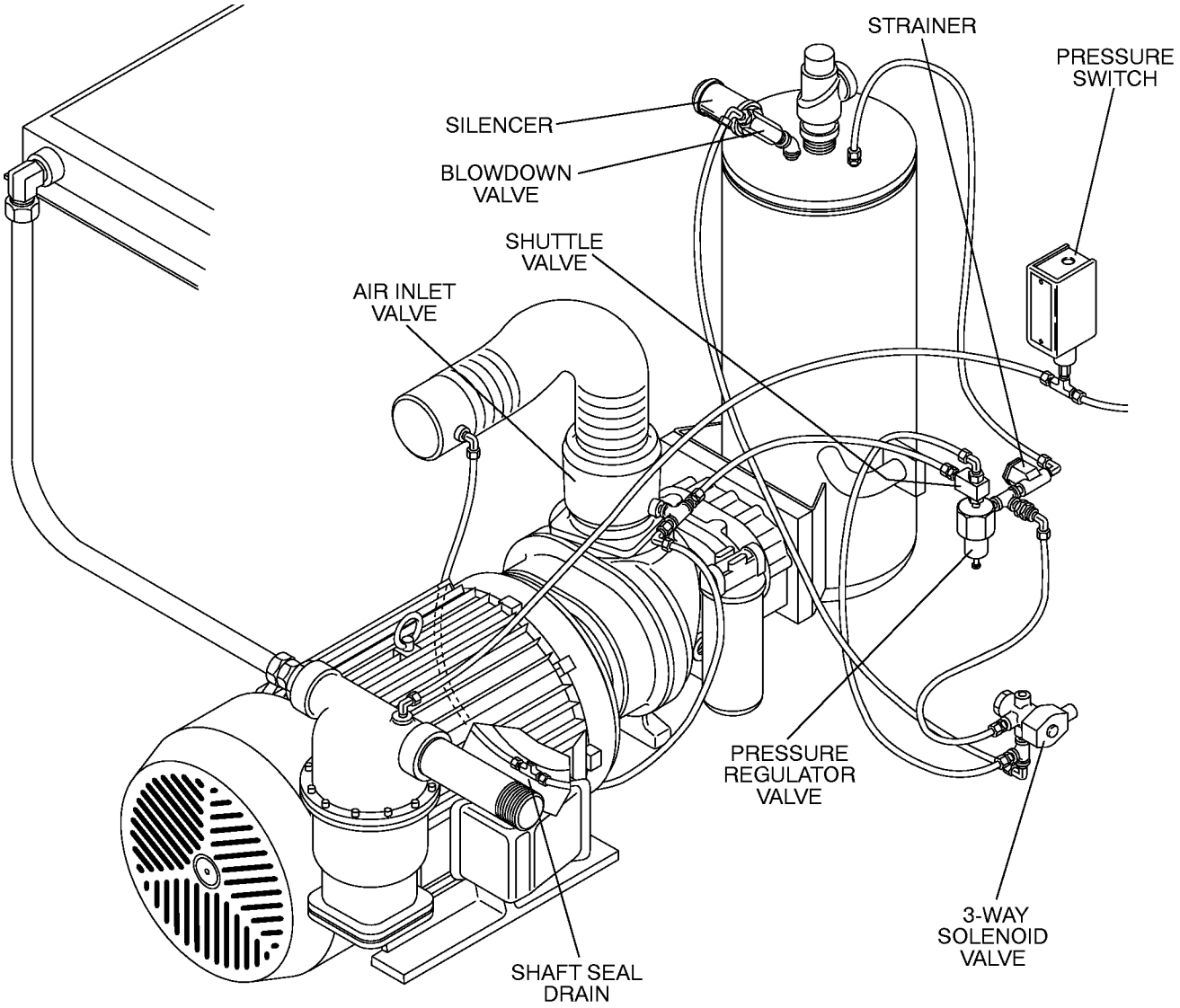
Stop compressor and relieve all internal pressure before doing so.

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

4.6 CONTROL SYSTEM, FUNCTIONAL DESCRIPTION – STANDARD ELECTRO–MECHANICAL

Refer to Figure 4–3. 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 (.7 bar) air line over pressure, the control system will automatically blow down the compressor and greatly reduce the unload power consumption. The control sys-

Figure 4–3 Control System – Standard

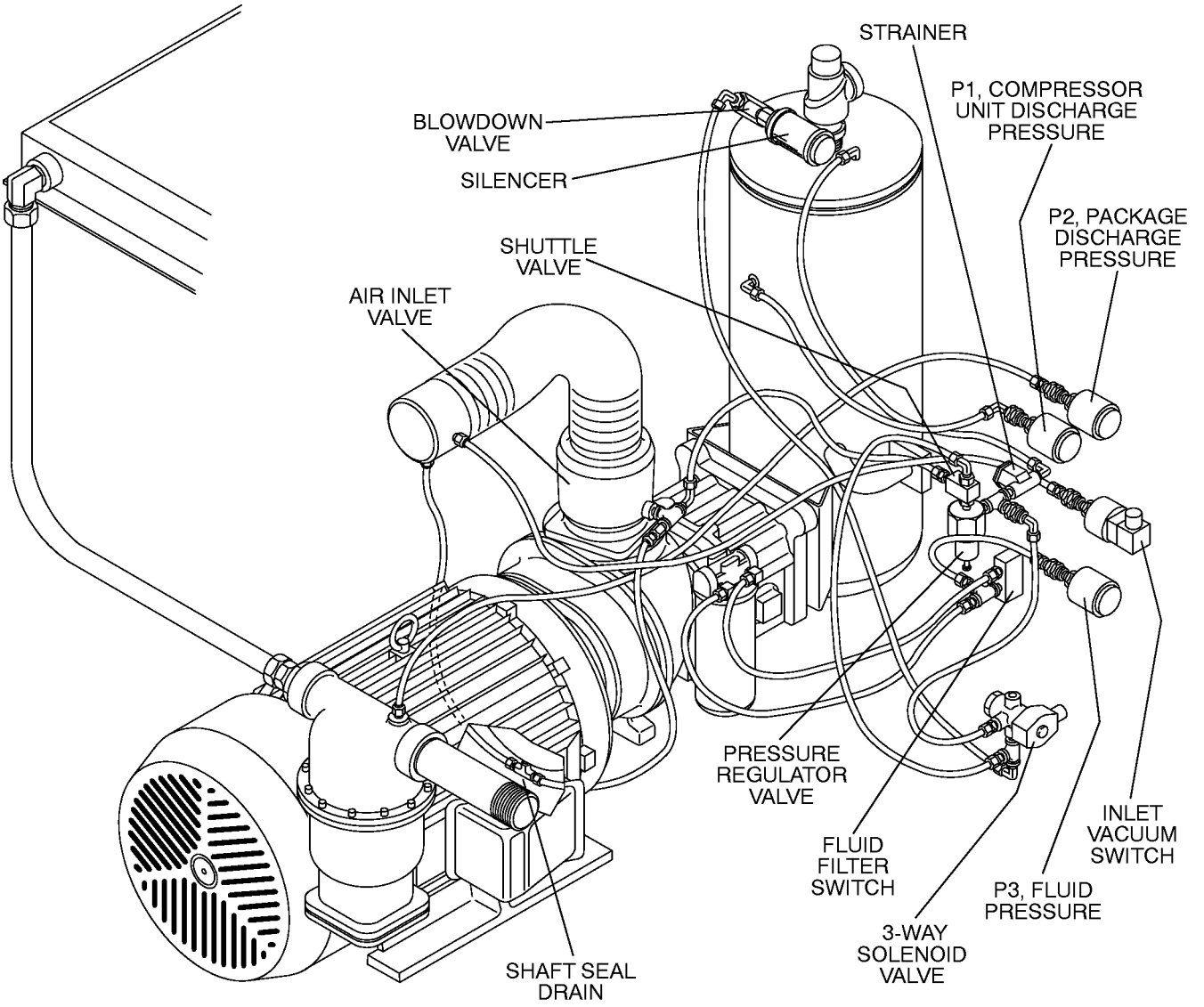


tem consists of an inlet valve, (located on the compressor air inlet), blowdown valve, solenoid valve, pressure switch, and a pressure regulator. The functional descriptions of the control system are given below in four distinct phases of compressor operation. The following guidelines apply to all STANDARD ES–16 Series compressors. For explanatory purposes this description will apply to a compressor with an operating pressure range of 125 to 135 psig (8.6 to 9.3 bar). A compressor with any other pressure range would operate in the same manner excepting stated pressures.

START – 0 TO 50 PSIG (0 TO 3.4 BAR)
When the compressor **"I" (START)** switch position is engaged momentarily and released, the sump pressure will quickly rise from 0 to 50 psig (0 to 3.4 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 (3.4 bar).

NORMAL OPERATING MODE – 50 TO 125 PSIG (3.4 TO 8.6 BAR)
When the pressure air rises above 50 psig (3.4 bar), the minimum pressure/check valve opens and delivers compressed air to the service line. From this

Figure 4–3A Control System – Supervisor II



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 – 125 TO 135 PSIG (8.6 TO 9.3 BAR)

If less than the rated capacity of compressed air is being used, the service line pressure will rise above 125 psig (8.6 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 125 to 135 psig (8.6 to 9.3 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.

UNLOAD – IN EXCESS OF 135 PSIG (9.3 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 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 to the atmosphere reducing the sump pressure to approximately 20 to 30 psig (1.4 to 2.1 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 125 psig [8.6 bar]), the pressure switch closes, re–energizing the 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.

4.7 CONTROL SYSTEM, FUNCTIONAL DESCRIPTION -- SUPERVISOR II

Refer to Figure 4-3A . The purpose of the compressor control system is to regulate the amount of air being compressed to match the amount of compressed air being used. The capacity control system consists of a **solenoid valve**, **regulator valve** and an **inlet valve**. The functional description of the control system is described below in 4 distinct phases of operation. The following description text applies to all Series ES–16 compressors with optional Supervisor II. For explanatory purposes, this description will apply to a compressor with an operating range of 100 to 110 psig (6.9 to 7.6 bar). A compressor with any other pressure range would operate in the same manner except stated pressures.

START MODE -- 0 TO 50 PSIG (0 TO 3.5 bar)
When the compressor **"I" (START)** pad is depressed, the sump pressure will quickly rise from 0 to 50 psig (0 – 3.4 bar). During this period, both the pressure regulator and the solenoid valve are closed, the inlet valve is fully open 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 (3.4 bar).

FULL LOAD MODE -- 50 TO 100 PSIG (3.4 TO 6.9 bar)
When the compressed air pressure rises above 50 psig (3.4 bar), the minimum pressure valve opens allowing compressed air to flow into the service line. From this point on, the line air pressure is continually monitored by the Supervisor. The pressure regulator and the solenoid valve remain closed during this phase. The inlet valve is in the fully open position as long as the compressor is running at 100 psig (bar) or below.

MODULATING MODE -- 100 TO 110 PSIG (6.9 TO 7.6 bar)
If less than the rated capacity of compressed air is being used, the service line pressure will rise above 100 psig (6.9 bar). The pressure regulator valve gradually opens, directing air pressure to the inlet control valve, reducing 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 100 to 110 psig (6.9 to 7.6 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 control valve. The orifice also bleeds any accumulated moisture from the pressure regulator.

UNLOAD MODE -- IN EXCESS OF 110 PSIG (7.6 bar)
When a relatively small amount or no air is being used, the service line pressure continues to rise. When it exceeds 110 psig (7.6 bar), the Supervisor Control System de–energizes the solenoid valve allowing sump air pressure to be supplied directly to close the inlet valve. Simultaneously, the solenoid valve sends a pneumatic signal to the blowdown valve. The blowdown valve opens the atmosphere, reducing the sump pressure to approximately 20 to 30 psig (1.4 to 2.1 bar). The check valve in the air service line prevents line pressure from returning to the sump.

When the line pressure drops to the low setting (cut–in pressure; usually 100 psig [6.9 bar] on low pressure ["L"] compressors and 125 psig [8.6 bar] on high pressure ["H"] compressors, 150 psig [10. bar] on ["HH"] compressors), Supervisor energizes the solenoid valve and allows the blowdown valve to close. The re–energized solenoid valve again prevents line pressure from reaching the inlet control valve. Should the pressure begin to rise, the pressure regulator will resume its normal function as previously described.

AUTOMATIC OPERATION
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.

4.8 AIR INLET SYSTEM, FUNCTIONAL DESCRIPTION

Refer to Figure 4–4. The compressor inlet systems 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. This indicator must be manually reset after the air filter has been serviced.

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). The inlet valve also acts as a check valve, thus preventing reverse rotation when the compressor is shut down.

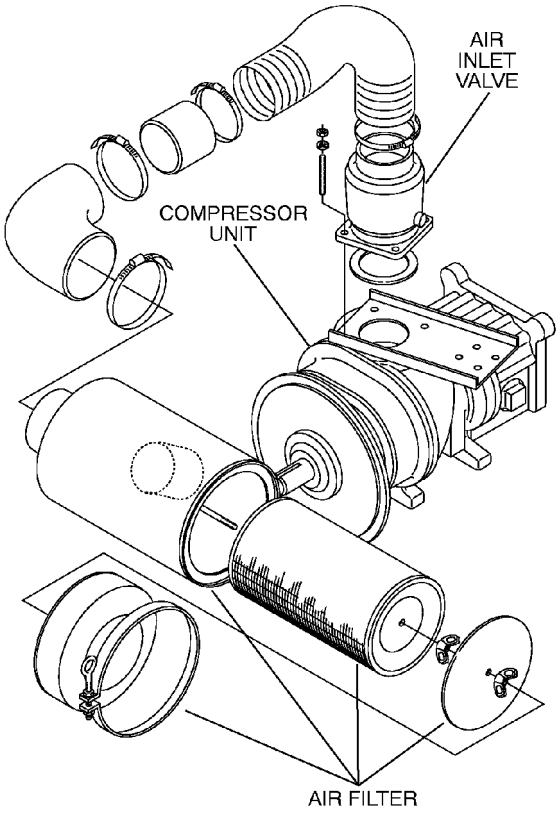
⚠ WARNING

"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.

Figure 4–4 Air Inlet System



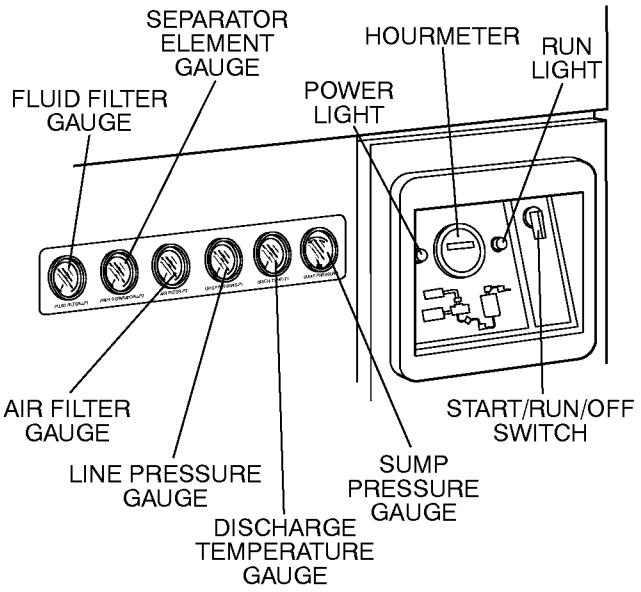
COMPRESSOR OPERATION

5.1 GENERL INTRODUCTION -- STANDARD ELECTRO--MECHANICAL

Refer to Figure 5–1. The instrumentation for the ES–16 Series air compressors consists of a panel group which continually monitors the operating condition of the compressor. The standard panel group has the following gauges: A **discharge temperature gauge**, a **sump pressure gauge**, a **line pressure gauge** and an **hourmeter**. The optional panel includes the standard gauges plus a **fluid filter gauge**, a **separator maintenance gauge**, and an **air filter restriction indicator gauge**.

- The **line(terminal) pressure gauge** is connected to the package discharge port, downstream from the moisture separator/ trap. It continually monitors the air pressure.
- The **discharge temperature gauge** monitors the temperature of the air/fluid mixture discharged from the compressor unit. The normal reading should be approximately 180˚F (77˚C) with 80˚F (21˚C) ambient.
- The **hourmeter** records the cumulative hours of operation for the compressor. It is useful for planning and logging service operations. The hourmeter is located in the door of the control box.
- The **air filter restriction indicator** monitors the condition of the air filter and shows red when the element restriction is excessive, which is manually reset after the element has been changed.
- The **separator maintenance gauge** monitors the condition of the separator element. It indicates when the element restriction is excessive.
- The **fluid filter maintenance gauge** monitors the condition of the fluid filter element. It indicates when the element should be changed.

Figure 5–1 Instrument Panel Group (OPTIONAL)



- The **sump pressure gauge** is used to determine at start–up whether proper electrical connections were made for motor rotation. An immediate pressure reading indicates proper rotation of the compressor unit. It can also be used to verify a pressure drop in the system.

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
START/RUN/STOP	START/RUN – Turn switch momentarily to **"I" START** position to start the compressor, upon release the switch will return to the RUN position. STOP – Turn switch to **"O" STOP** position to stop compressor.
HOURMETER	Records cumulative hours of compressor operation; useful for planning and logging service schedules.
LINE PRESSURE GAUGE	Continually monitors service line air pressure.

5.2 PURPOSE OF CONTROLS -- STANDARD (continued)

CONTROL OR INDICATOR	PURPOSE
DISCHARGE TEMPERATURE GAUGE	Monitors temperature of the air/fluid mixture discharged from the compressor unit. For air–cooled compressors normal reading is approximately 180°F (82°C) with a 80°F (27°C) ambient temperature.
FLUID FILTER MAINTENANCE GAUGE	Indicates when a filter element change is required.
FLUID SEPARATOR MAINTENANCE GAUGE	Indicates when separator element change is required.
AIR FILTER MAINTENANCE INDICATOR	Shows red when air filter element servicing is required. This indicator must be manually reset after servicing filter.
PRESSURE REGULATOR	Opens a pressure line between the sump and air inlet valve allowing the inlet valve to regulate air delivery according to demand.
FLUID LEVEL SIGHT GLASS	Indicates fluid level in the sump. Proper level is not to fall below the center of the sight glass. Check level when compressor is shut down. **DO NOT OVERFILL.**
COOLER BYPASS VALVE	Regulates flow of fluid to and around the cooler. Designed to maintain a minimum operating temperature of 180°F (82°C); used for fast warm–up on start–up.
MINIMUM PRESSURE/CHECK VALVE	Maintains minimum of 50 psig (3.4 bar) in the compressor sump. Valve piston restricts receiver air discharge from receiver/sump when pressure falls to 50 psig (3.4 bar). Also incorporated in this valve is a terminal check valve which prevents line pressure backflow into the sump during unload conditions and after shutdown.
DISCHARGE TEMPERATURE SWITCH	Shuts the compressor down when the discharge temperature exceeds 240°F (116°C).
PRESSURE RELIEF VALVE	Protects compressor by venting compressed air in excess of 200 PSIG (13.8 BAR) to atmosphere.
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.
SOLENOID VALVE	Bypasses the pressure regulator valve causing the inlet valve to close when the compressor reaches maximum operating pressure. Also activates blowdown valve.
WATER REGULATING VALVE (water–cooled only)	Regulates the amount of cooling water used in the cooler to keep the the compressor running at a normal operating temperature of 180°F (82°C).
SUMP PRESSURE GAUGE	The sump pressure gauge is used to determine at start–up whether proper electrical connections were made for motor rotation. An immediate pressure reading indicates proper rotation of the compressor unit. It can also be used to verify a pressure drop in the system.

5.2 PURPOSE OF CONTROLS -- STANDARD (continued)

CONTROL OR INDICATOR	PURPOSE
PRESSURE SWITCH	Senses service line pressure. When line pressure reaches maximum setting the pressure switch signals the solenoid valve to unload the compressor.
BLOWDOWN VALVE	Vents sump pressure to the atmosphere during unload conditions and shutdown.

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 turning the START/RUN/STOP selector switch to the **"I" (START)** position momentarily and release..
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 200°F (93°C), the cooling system or installation environment should be checked.
8. Observe maintenance indicators.
9. Open shut–off valve to service line.
10. Re–inspect 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 turn the START/RUN/STOP selector switch to the "I" START position momentarily and release. When the compressor is running, observe the instrument panel and maintenance indicators.

5.5 SHUTDOWN PROCEDURE

To shut the compressor down, simply turn the selector switch to the "O" STOP position.

5.6 GENERAL INTRODUCTION -- SUPERVISOR II

Reference Supervisor II Section 6. 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.

5.7 SUPERVISOR II PARAMETER SETUP

Pressing the program key enters parameter display and edit mode. To move to the next parameter press the program key. To increment a parameter press the up arrow key or logo key. The logo key will increment by 10. To decrement the value press the down arrow key.

The parameters are displayed in the following order:

- **Unload pressure** – The pressure where the machine is unloaded. For example if this parameter is set to 110 psi (7.6 bar) the machine will unload when the line pressure is above 110 psi (7.6 bar).

  UNLOAD
  100 PSI

- **Load differential** – The pressure differential below the unload pressure where the machine is loaded. For example, if the unload pressure is set to 110 psi (7.6 bar) and the load differential is set to 10 psi (.7 bar), the machine will load when the line pressure goes below 100 psi (6.9 bar).

  LOAD
  10 PSI

- **P1 Max** – Maximum sump pressure. An alarm and shut down will occur when the sump pressure rises above this pressure.

  P1 MAX
  135 PSI

- **Wye to delta transition timer** – For full voltage starters this parameter is set to 0.

  WYE DELT
  10 SEC

- **Restart time** – Time to wait after power up before starting machine. This parameter is used to keep several machines from starting at the same time after power up, or to

delay start until other equipment is started. If disabled the machine will not automatically start after power up.

RST TIME
10 SEC

- **Unload Stop Timer** – If the machine is running in AUTO mode, this parameter specifies the amount of time that the machine will run unloaded before shutting off. If the time is set less than 15 minutes (for example five minutes), there may be times when the machine will run unloaded for more than five minutes. This is because there is another timer that keeps the machine from being started more than four times an hour.

UNLD TIM
15 MIN

- **Language select** – English, German, Spanish, Italian and French may be selected for display language.

LANGUAGE
ENGLISH

- **Units** – English or metric units may be selected.

UNITS
ENGLISH

- **Communications ID #** – This is the network address of a machine. If there is more than one machine connected to the network, each machine must have a unique number.

COM ID #
1

- **Communications baud rate** – This should always be selected to 9600 baud for all sequencing modes. It may be lower for slave or monitoring modes.

BAUDRATE
9600

- **Sequence method** – This parameter sets the method used for optional sequencing. The choices are DISABLED, REMOTE, SLAVE, HOURS, COM ID#. See the Sequencing & Protocol Manual (See Recommended Spare Parts List) for details about these modes.

SEQUENCE
HOURS

- **Drain interval** – The time between actuation of the drain valve.

DRN INTV
10 MIN

- **Drain time** – The amount of time that the drain valve is actuated.

DRN TIM
1 SEC

- **Last Communication Number** – Used only for sequencing, see Sequencing & Protocol Manual for details.

LAST COM
3

- **Lowest Allowable Pressure** – Used only for sequencing, see Sequencing & Protocol Manual for details.

LOWEST
90 PSI

- **Recovery Time** – Used only for sequencing, see Sequencing & Protocol Manual for details.

RECOVER
10 SEC

- **Rotate Time** – Used only for sequencing – units in HOURS, see Sequencing & Protocol Manual for details.

ROTATE
50 HOURS

- **Machine Capacity** – Used only for sequencing – units in CFM (M^3/min), see Sequencing & Protocol Manual for details.

CAPACITY
100

- **Sequence Hours** – Used only for sequencing, see Sequencing & Protocol Manual for details.

SEQ HRS
1000

5.8 OPERATING THE COMPRESSOR

Before operating the compressor the operating parameters must be setup. See the previous section on operating parameter setup.

MANUAL OPERATION MODE

In this mode the compressor will run indefinitely, as long as temperatures and pressure remain within the valid operating ranges, and the motor overload or emergency stop contacts are not tripped. Pressing the "**I**" will turn on the compressor and put it in manual mode. If the compressor is already running, but in automatic mode, pressing "**I**" will switch operation to manual. Pressing "**I**" while already running in manual mode will cause the Supervisor to turn off the common fault relay, if engaged, and clear any maintenance indicators.

To stop the compressor, press "**O**" If the compressor is already off when "**O**" is pressed, the common fault relay will be turned off, if engaged, and it will try to clear the alarm and maintenance indicators. Regardless of what the compressor is doing, pressing "**O**" puts the Supervisor in manual stop mode.

AUTOMATIC OPERATION MODE

In this mode the compressor will start if line pressure (P2) is less than the **LOAD** parameter. It will stop if the compressor runs unloaded for the number of minutes indicated by the **UNLD TIM** parameter. To put the compressor in automatic mode press "⚙". If P2 is already less than **LOAD** the compressor will start immediately, otherwise the system status will indicate **STANDBY** and the LED marked **AUTO** will flash.

If the compressor is already running, but in continuous mode, pressing "⚙" will switch operation to automatic. Pressing "⚙" while already running in automatic mode will cause the Supervisor to turn off the common fault relay, if engaged, and clear any maintenance indicators.

In automatic mode the compressor can be stopped manually by pressing "**O**" Stopping the compressor using "**O**" will put the Supervisor in manual stop mode.

Regardless of whether in "automatic" or "manual" mode, control of the load solenoid will be based on the parameters **UNLD** and **LOAD.** This operation is as follows:

P2 > UNLD – – > load solenoid turned off
P2 < LOAD – – > load solenoid turned on

POWER FAILURE RESTART

If the restart timer (RST TIME parameter) is disabled the compressor will not try to start after a power up. If this time is set to a value the machine will go into standby after power up. When the line pressure drops below the load setpoint, the restart timer will start timing. When the timer expires the machine will start.

SEQUENCING MODES

The following is a brief description of sequencing modes. For details see the Supervisor II Sequencing & Protocol Manual (See Recommended Spare Parts List)**.**

- **DISABLED** – Responds to status and parameter change messages via the RS485 network but will not respond to start, stop, load or unload messages.
- **REMOTE** – Responds to status and parameter change messages but will not respond to start, stop, load or unload messages. The remote inputs and are enabled (start/stop, load/unload, master/local).
- **SLAVE** – Will respond to all messages, but will not start or load unless commanded to do so by a message. This mode is used to control the machine from a master computer.
- **HOURS** – Sends status message about once a second; starts, loads and unloads machines based on sequencing hours.
- **COM ID #** – Sends status message about once a second; starts, loads and unloads machines based on machine Com ID#.

5.9 PURPOSE OF CONTROLS -- SUPERVISOR II

CONTROL OR INDICATOR	PURPOSE
EMERGENCY STOP SWITCH	Pushing in this switch, found adjacent to the Supervisor, 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.
DISCHARGE TEMPERATURE PROBE–T1	Shuts the compressor down when the compressor discharge temperature exceeds 240°F (116°C). Continually monitors air/fluid mixture discharged from the compressor unit.
AIR END DISCHARGE PRESSURE–P1	Shuts the compressor down when the compressor discharge pressure exceeds P1 MAX. Continually monitors the discharge pressure of the compressor unit. Indicates pressure in compressor sump upon start–up to verify rotor motor rotation.
PACKAGE OUTLET PRESSURE–P2 (Service Line Pressure)	Continually monitors service line pressure. When line pressure reaches the UNLOAD setting, the Supervisor control signals the solenoid valve to unload the compressor.
FLUID PRESSURE–P3	Continually monitors injection fluid pressure and shuts down the compressor in the event of low fluid pressure.
FLUID FILTER DIFFERENTIAL SWITCH	Continually monitors fluid filter differential and generates an alarm when the fluid filter needs replacement.
INLET FILTER MAINTENANCE SWITCH	Monitors condition of compressor inlet air filter and indicates when replacement is required.
FLUID LEVEL SIGHT GLASS	Indicates fluid level in the sump. Proper level is not to fall below the center of the sight glass. Check level when compressor is shut down. **DO NOT OVERFILL.**
COOLER BYPASS VALVE	Regulates flow of fluid to and around the cooler. Designed to maintain a minimum operating temperature of 180°F (82°C); used for fast warm–up on start–up.
MINIMUM PRESSURE/CHECK VALVE	Maintains minimum of 50 psig (3.4 bar) in the compressor sump. Valve piston restricts receiver air discharge from receiver/sump when pressure falls to 50 psig (3.4 bar). Also incorporated in this valve is a terminal check valve which prevents line pressure backflow into the sump during unload conditions and after shutdown.
PRESSURE RELIEF VALVE	Protects compressor by venting compressed air in excess of 200 PSIG (13.8 BAR) to atmosphere.
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.
SOLENOID VALVE	Bypasses the pressure regulator valve causing the inlet valve to close when the compressor reaches maximum operating pressure. Also activates blowdown valve.

5.9 PURPOSE OF CONTROLS -- SUPERVISOR II (continued)

CONTROL OR INDICATOR	PURPOSE
WATER REGULATING VALVE (water–cooled only)	Regulates the amount of cooling water used in the cooler to keep the the compressor running at a normal operating temperature of 170°F (77°C).

5.10 SUPERVISOR OUTPUT RELAYS

RELAY	OPERATION
RUN RELAY (K1)	Contact closure energizes the compressor starter.
*–DELTA (K2)	A timed contact used to provide wye–delta transition time.
UNLOAD/LOAD (K3)	Controls ON LOAD/OFF LOAD operation of the load control solenoid valve.
COMMON FAULT (K4)	May be used to provide remote indication of any pre–alarm, maintenance or fault shutdown condition.
DRAIN VALVE (K5)	Controls optional solenoid valve to provide automatic condensate removal.
FULL LOAD/MODULATE (K6)	Used with optional sequencing feature.

NOTE: All output relays will handle 8 amps at 120/240 VAC.

5.11 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. Jog motor to check for correct rotation of motor (refer to Section 2.6).
3. Be sure that all preparations and checks described in the Installation Section have been made.
4. Open the shut–off valve to the service line.
5. Check for possible leaks in piping.
6. Slowly close the shut–off valve to assure proper nameplate pressure unload setting is correct. The compressor will unload at nameplate pressure. If adjustments are necessary, see Control System Adjustments.
7. Observe the operating temperature. If the operating temperature exceeds 200°F (93°C), the cooling system and installation environment should be checked.
8. Open shut–off valve to the service line.
9. Reinspect the compressor for temperature and leaks the following day.

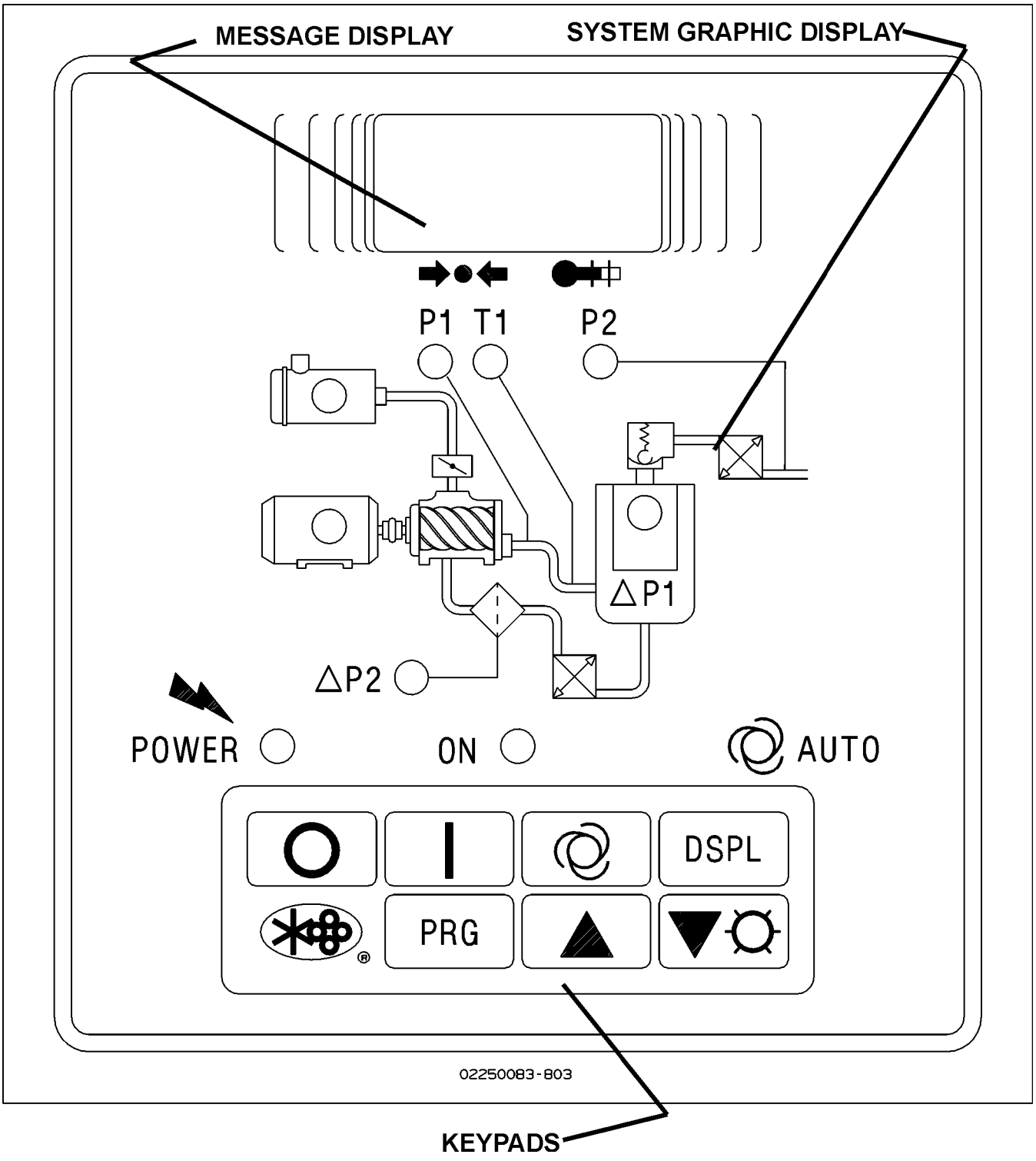
5.12 SUBSEQUENT START–UP PROCEDURE

On subsequent start–ups, check that the proper level is visible in the fluid level sight glass and simply press "**I**" for manual or "⏻" for automatic operation. When the compressor is running, observe the various parameter displays.

5.13 SHUTDOWN PROCEDURE

To shut the compressor down, push "**O**" pad.

Figure 6–1 Supervisor II Panel



6.1 INTRODUCTION – SUPERVISOR II

Refer to Figure 6–1 and Section 5 for information regarding your compressor with Supervisor II. The Supervisor II has a two line display to show temperature, pressure and status. It has a keypad for operating the compressor, programming the control points and selecting displays. There is a graphic illustration with lamps that light to show the item being displayed. The lamps flash if that component is in an alarm condition.

6.2 KEYPAD

The keypad is used to control the machine as well as display status and change setpoints. Refer to figure 6–1 for following key descriptions.

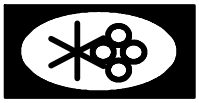
- **Stop** – Used to put the machine into manual stop. It is also used to clear alarm conditions.

- **Continuous** – Starts machine if no alarm conditions are present. Also used to clear alarm conditions while machine is running.

- **Auto** – Starts machine and selects auto mode if no alarm conditions are present. Also used to clear alarm conditions while machine is running.

- **Display** – Used to display pressures, temperatures and other status information (See section on STATUS DISPLAYS).

- **Logo** – Used for various functions described in later sections



- **Program** – Used to enter the parameter change mode where control parameters may be displayed and changed (See PARAMETER SETUP).

- **Up arrow** – Used in status displays to change displays and in parameter setup mode to increment a value.

- **Down arrow, lamp test** – Used in status displays to change displays and in parameter setup mode to increment a value. When in the default display the key will light all the lamps for three seconds.

6.3 STATUS DISPLAYS

By default the line pressure (P2) and discharge temperature (T1) are shown on the bottom line of the display, and machine status on the top line. The following are the various machine status messages that indicate the state of the compressor with LCD graphics listed below:

- **STOP** – Compressor is off.
- **STANDBY** – Compressor is off but armed to start. This state may be entered because of a power up, or the unload timer had expired and stopped the machine. NOTE : The machine may start at any time.
- **STARTING** – Machine is trying to start.
- **OFF LOAD** – Machine is running and off loaded.
- **ON LOAD** – Machine is running and loaded.
- **FULL LD** – Machine is running and fully loaded. This state is only displayed if the machine has a full load valve and under sequence control.
- **RMT STOP** – Compressor is off but armed to start. The machine will start when the remote start contact is closed. NOTE : the machine may start at any time.
- **SEQ STOP** – Compressor is off but armed to start. The machine will start when the sequencing conditions meet the criteria to start. NOTE : the machine may start at any time.

This default display appears as follows:

```
STOP
110  180
```

If there are alarms active they will alternately be shown with the default display. The machine status will be displayed for 2 seconds, then the alarms for 2 seconds each. For example:

```
T1 HI
110  180
```

To view other status press the DSP key. All temperatures and pressures may be displayed as well as other status information. To scroll through the displays press the up arrow or down arrow keys. Up arrow moves to the next display, down arrow the previous display. To return to the default display press the display key.

- Separator differential pressure and the maximum limit. If the limit is exceeded, a separator maintenance warning will be displayed.

```
△P1  4
MAX 10
```

- Sump pressure and line pressure.

```
P1  113
P2  108
```

- Unit discharge temperature and the maximum limit. If the temperature exceeds the limit a T1 HI shutdown will occur.

```
T1  210
MAX 235
```

- Total hours that the compressor has been running.

```
HRS RUN
001234.0
```

- Total hours that the compressor has been loaded.

```
HRS LOAD
000987.0
```

- Last fault log. This shows the fault on the first line and the run hours when the fault occcured.

```
T1 HI
@1  234
```

- Next to last fault log. This shows the fault on the first line and the run hours when the fault occcured.

```
T1 HI
@2 204
```

6.4 LAMP INDICATORS

Embedded into the front panel schematic of the compressor are several lamps. Pressing the lamp test key will light all the lamps for 3 seconds. Each LED lamp has the following purpose.

P1 – If lit steady, signifies that P1 is being displayed, if flashing denotes the presence of an alarm.

P2 – If lit steady, signifies that P2 is being displayed, if flashing denotes the presence of an alarm.

△P1 – If lit steady, signifies that △P1 is being displayed, if flashing denotes replacement of separator is needed.

△P2 – If lit, indicates replacement of oil filter is needed.

T1 – If lit steady, signifies that T1 is being displayed, if flashing denotes the presence of an alarm.

INLET FILTER – Same as △P2

MOTOR – If flashing, indicates the motor overload contact has opened.

POWER ON – Lit if 120VAC power is applied to the Supervisor II.

ON – If lit steady, the compressor is running. If flashing, indicates that the compressor is armed but stopped because of restart timer not expired, remote stop or sequence stop. The compressor may start at any time.

AUTO – If lit steady, the compressor is running and in auto mode. If flashing, indicates that the compressor is armed but stopped because of restart timer not expired, remote stop or sequence stop. The compressor may start at any time.

7.1 GENERAL

As you proceed in reading this section, it will be easy to see that the Maintenance Program for the air compressor is quite minimal. The use of the service indicators provided for the bearing filter, air filter and fluid separator, will alert you when service maintenance is required. When the maintenance gauge shows red, maintenance for that specific item is required. See instructions for each item in Section 6.7, Parts Replacement and Adjustment procedures.

7.2 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. If the addition of fluid becomes too frequent, a simple problem has developed which is causing this excessive loss. See the Troubleshooting Section 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 monitor the correct readings for that 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.

⚠ WARNING

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

Stop compressor and relieve all internal pressure before doing so.

7.3 MAINTENANCE AFTER INITIAL 50 HOURS OF OPERATION

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

1. Clean the return line strainer.
2. Clean the return line orifice.

7.4 MAINTENANCE EVERY 1000 HOURS

After 1000 hours of operation, it will be necessary to perform the following:

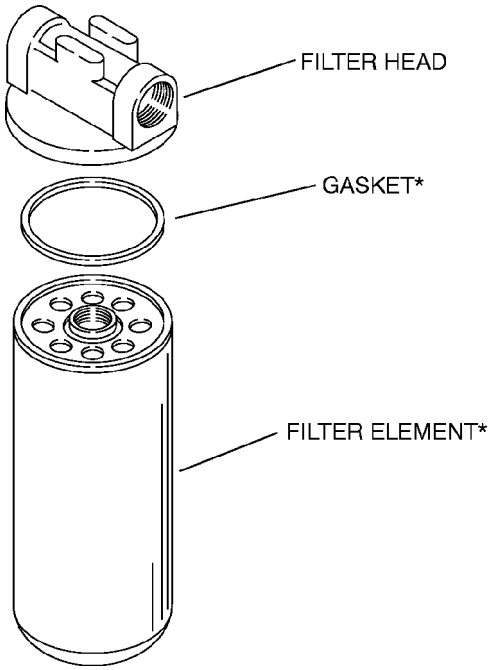
1. Clean the return line strainer.
2. Lubricate the Control linkage.
3. Replace the fluid filter element and gasket.
4. **STANDARD COMPRESSORS ONLY!** Drain the sump and change the compressor fluid.

7.5 FILTER MAINTENANCE

Replace your fluid filter element and the gasket under any of the following conditions, whichever occurs first:

1. As indicated by the maintenance gauge.
2. Every 1000 hours.
3. Every 6 months.

Figure 7–1 Fluid Filter (P/N) 02250054–605



* Replacement element (P/N) 250025–526

4. **STANDARD COMPRESSORS ONLY!** Every fluid change.

7.6 SEPARATOR MAINTENANCE

Replace the separator element when your separator maintenance gauges shows red or after one (1) year, whichever comes first. The separator element must be replaced. **DO NOT** clean the separator element.

7.7 PARTS REPLACEMENT AND ADJUSTMENT PROCEDURES

FLUID FILTER ELEMENT REPLACEMENT

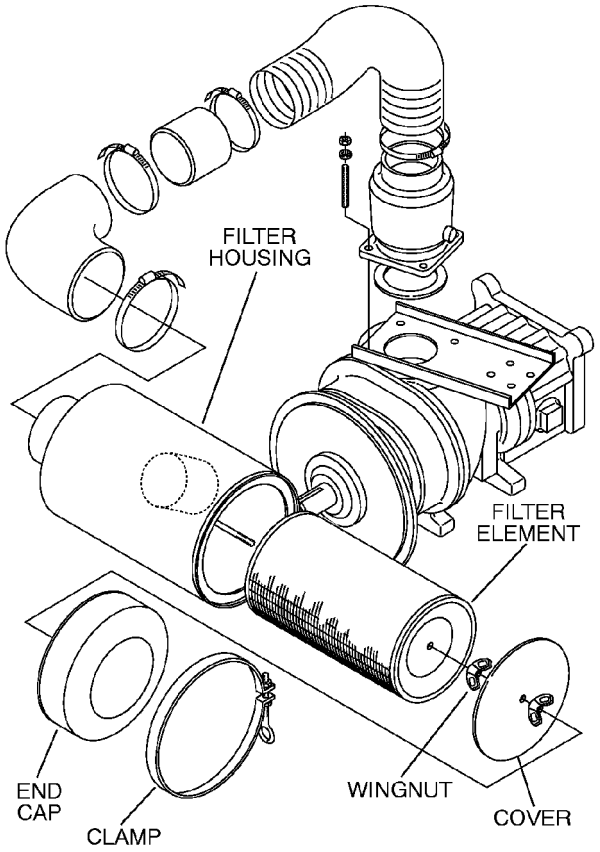
Refer to Figure 7–1.

1. Using a strap wrench, remove the old element and gasket.
2. Clean gasket seating surface.
3. Apply a light film of fluid to the new gasket.
4. Hand tighten new element until new gasket is seated in the gasket groove. Avoid any nick, cuts or pinches to the gasket.
5. Continue tightening element by hand an additional ½ to ¾ turn.
6. Restart compressor and check for leaks.

⚠ CAUTION

To minimize the possibility of filter element rupture, it is important that ONLY replacement elements identified with the Sullair name, logo and appropriate part number be used and that substi-

Figure 7–2 Air Filter Replacement (P/N) 02250091–634



*Replacement Element Kit P/N 02250093–655

tuted elements not be used, due to the fact that such filters may have inadequate or questionable working pressure ratings.

AIR FILTER MAINTENANCE

Refer to Figure 7–2. Air filter maintenance should be performed when the maintenance gauge shows red or once a year, whichever comes first. Below you will find procedures on how to replace the air filter element.

AIR FILTER ELEMENT REPLACEMENT

1. Clean exterior of air filter housing.
2. Release clamp and remove end cap and end cover.
3. Remove element.
4. Clean interior of housing using a damp cloth. **DO NOT** blow dirt out with compressed air.
5. Replace element and reassemble in reverse order of disassembly.

ELEMENT INSPECTION

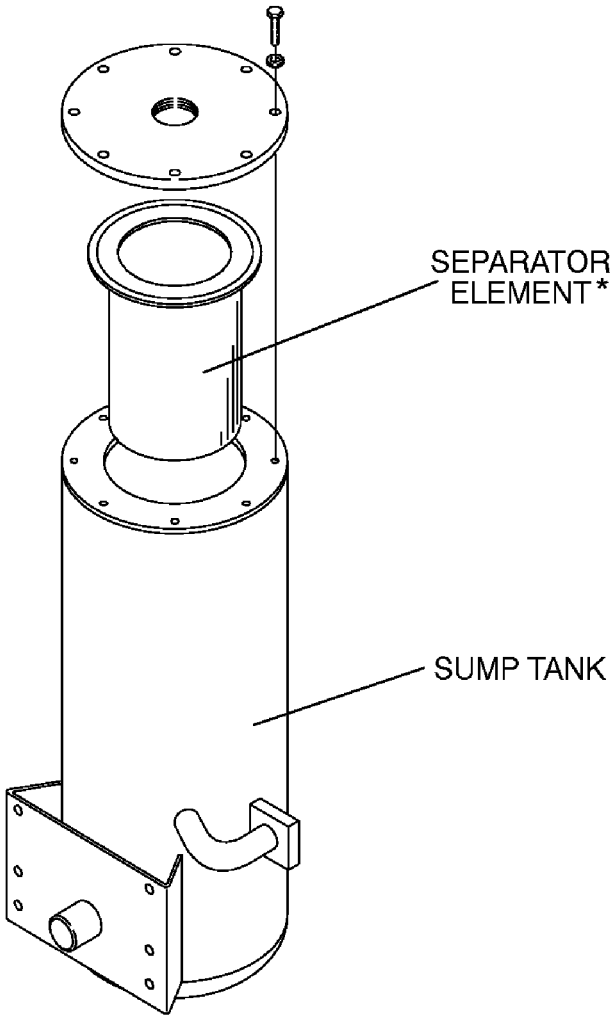
1. Place a bright light inside the element to inspect for damage or leak holes. Concentrated light will shine through the element and disclose any holes.
2. Inspect all gaskets and gasket contact surfaces of the housing. Should faulty gaskets be evident, correct the condition immediately.
3. If the clean 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 all air inlet connections prior to resuming operation.

SEPARATOR ELEMENT REPLACEMENT

Refer to Figure 7–3. The separator elements must be changed when the maintenance gauge shows red, or once a year whichever occurs first. Follow the procedure explained below for separator element replacement.

1. Relieve all pressure from the sump tank and all compressor lines.

Figure 7–3 Separator Element Replacement

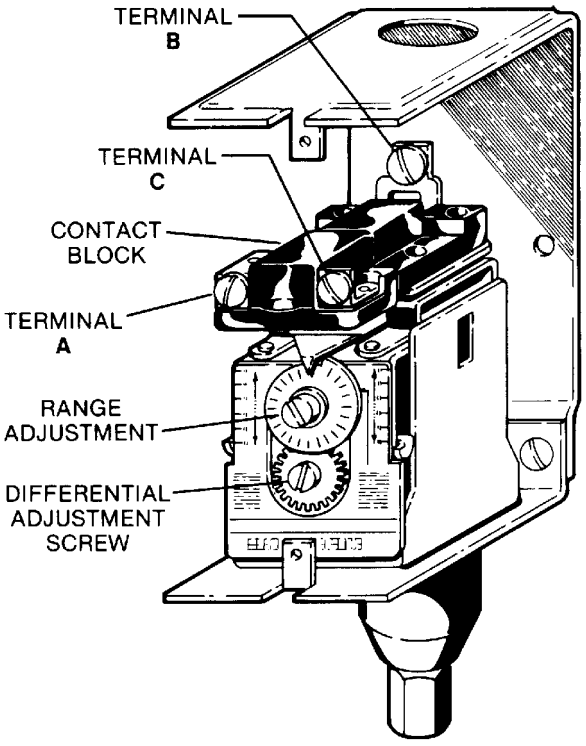


*Replacement Element Kit P/N 02250093–586

2. Disconnect all piping connected to the sump cover to allow removal (return lines, service lines, etc.).
3. Loosen and remove the eight (8) hex head capscrews from the cover plate.
4. Lift the cover plate from the sump.
5. Remove the separator element.
6. Inspect the receiver/sump tank for rust, dirt, etc.
7. Scrape the old gasket material from the cover and flange on the sump. Be careful not to let the scraps fall in the sump.
8. Reinsert the separator element into the sump taking care not to dent it against the tank opening.
9. Clean the underside of the receiver/sump tank cover and remove any rust.
10. Replace the cover plate, washers and capscrews. Torque to 55 ft./lbs. (75 Nm).
11. Reconnect all piping making sure return line tube extend to the bottom or 1/4 " above the bottom of the separator element. This will assure proper fluid return flow to the compressor.
12. Clean the return line strainer before restarting the compressor.

CONTROL SYSTEM ADJUSTMENT
Refer to Figure 7–4. 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 115 to 125 psig (7.9 to 8.6 bar). This information will apply to a compressor with any other operating range excepting the stated pressures.

Figure 7–4 Pressure Switch



Remove the cover of the pressure switch. 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 125 psig (8.6 bar), 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 7–4).

FOR PRESSURE RANGE ADJUSTMENT:
1. Remove cover to pressure switch.
2. Turn the range adjusting screw to the high pressure setting. Turning the screw counterclockwise lowers both the high and low pressure equally.

FOR DIFFERENTIAL ADJUSTMENT:
Differential is the difference between the high and low pressure settings. 10 psig (.7 bar) is typical.

1. Turn the differential adjusting screw to the lower (reset) setting. Turning the screw counterclockwise widens the differential by lowering the reset (lower) setting only.
2. 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 118 psig (8.2 bar). The regulator is adjusted by loosening the jam nut on the end of the cone shaped cover of the pressure regulator. When the jam nut is loose, turn the adjusting screw clockwise to increase or counterclockwise to decrease the setting.
3. To set the regulator, continue closing the service valve, until the line pressure is 118 psig (8.2 bar). At this point regulator should pass a signal to the inlet valve to start closing it. If the line pressure keeps on rising or if the modulation does not begin, adjust the regulator valve as described above. After adjustment line pressure should be approximately 118 psig (8.2 bar) and 1.00 in. Hg vacuum below the inlet.
4. Now close the service valve, line pressure will start rising. When line pressure reaches 125 lbs., the inlet valve will be closed to its maximum position. The inlet vacuum at this point will be around 25 in. Hg. The machine should unload at this point.
5. Open the service valve so the line pressure is 115 psig (7.9 bar). Machine is now set for operation. Recheck the unload pressure by closing of the service valve. Machine should unload via the pressure switch at 125 psig (8.6 bar).

After the control pressures have been adjusted, the "unloaded" sump pressure should be checked. It will be necessary to shut the compressor down, remove the pressure switch cover and disconnect one of the two lead wires that are connected to the micro–switch (contact block). After disconnecting the lead, tape the exposed wire with electricians tape to make sure that it does not come in contact with any metallic surface.

⚠ DANGER

DO NOT touch the electrical contacts, terminal or leads with any metallic object. Severe electrical shock may occur.

With the lead taped, you may start the compressor again. Allow the sump pressure to stabilize.

The sump pressure should read 30 to 35 psig (2.1 to 2.8 bar).

Once this is checked, shut the compressor down once again and reconnect the taped lead and replace the pressure switch cover. At this time, start the compressor and cycle the Control System several times and re–check all pressure settings and adjustments.

⚠ DANGER

DO NOT touch the pressure switch, electrical contacts, terminal board or leads with any part of the body or any uninsulated metallic object. Severe electrical shock may occur.

DRIVE COUPLING INSTALLATION AND MAINTENANCE

There is no coupling to maintain for the compressor/motor connection. There are drive gears on the motor and compressor shafts that are manufactured to need no alignment.

COMPRESSOR/MOTOR REMOVAL

⚠ WARNING

Before doing compressor maintenance, disconnect compressor from power source and lock out power source. Isolate compressor from line pressure by closing recommended discharge shut–off valve and releasing all internal pressure from compressor.

Refer to lifting decal in Decal Section . Should it become necessary to remove the compressor/motor assembly from the compressor package, care must be taken to lift properly.

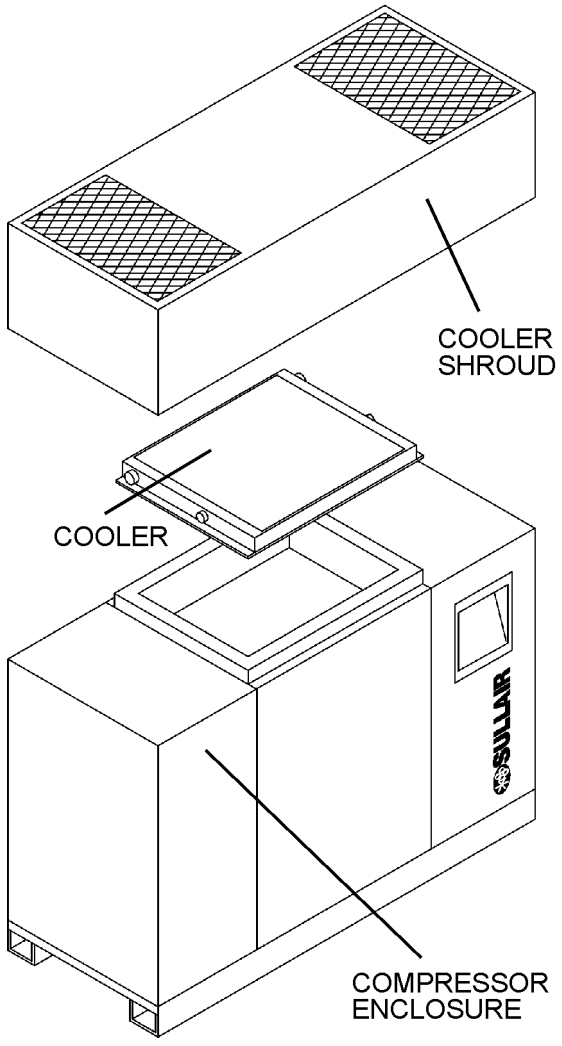
The main lift points on the compressor/motor assembly are at the air inlet mounting hole on top of the main body of the compressor and the eye bolt on top of the motor. Insert a suitable lifting device into the air inlet mounting hole after the inlet valve is removed.

The compressor/motor assembly may also be lifted from beneath using a forklift truck with fork extensions. To lift the entire assembly from beneath the compressor use supporting blocks for the motor and compressor unit. Position the blocks on the forks beneath the motor and compressor unit to assure lifting the assembly level.

⚠ WARNING

Follow all appropriate SAFETY SECTION instructions and practices when lifting this assembly.

Figure 7–5 Cooler Cleaning



COMPRESSOR COOLER CLEANING – AIR-COOLED
Refer to Figure 7–5.

⚠ WARNING

Before doing compressor maintenance, disconnect compressor frompower source and lock out power source. Isolate compressor from line pressure by closing recommended discharge shutoff valve and releasing all internal pressure from compressor.

To access the compressor cooler if cleaning is required follow the procedure below.

1. Remove all necessary hardware fastening cooler shroud to the compressor enclosure.
2. Lift cooler shroud up and away from compressor enclosure and cooler.
3. Disconnect fluid cooler lines that are attached to cooler. Plug cooler and lines to avoid fluid contamination.
4. Flush dirt from the cooler fins with low pressure air or water.
5. Assemble cooler in reverse order of disassembly.
6. Once compressor is assembled, check fluid for proper level.

Figure 7–6A Piping and Instrumentation – Standard Electro–mechanical (Air–cooled)

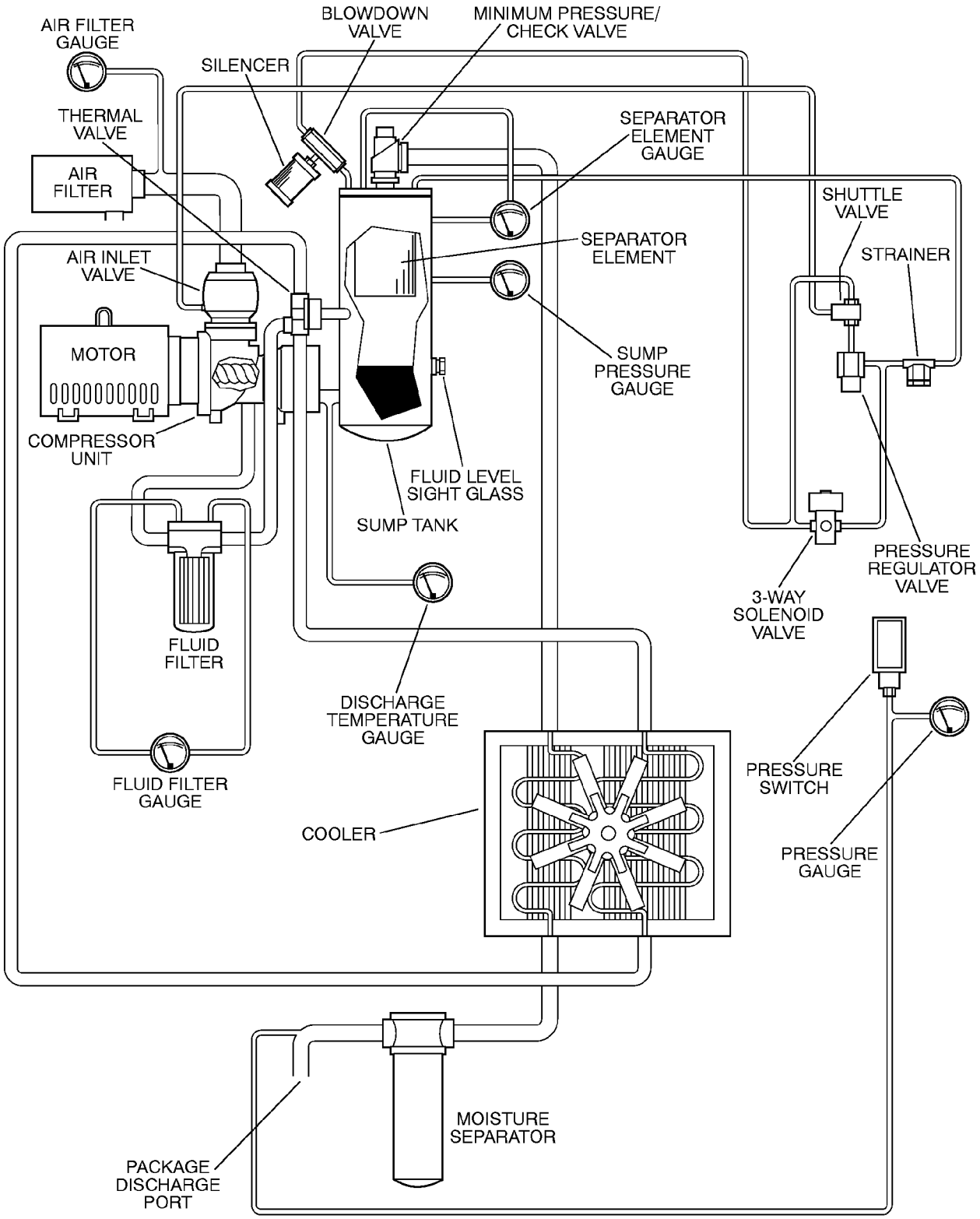
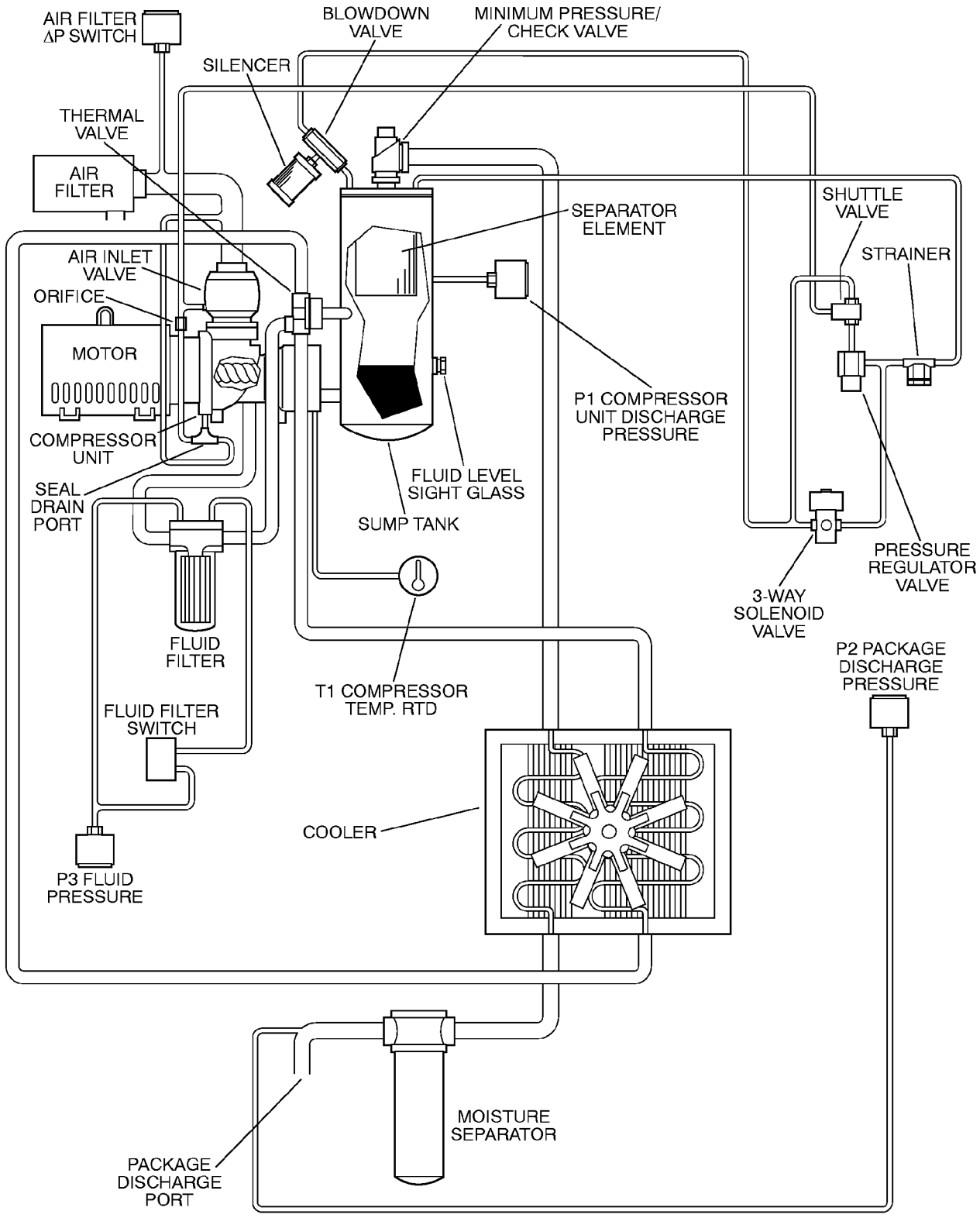


Figure 7−6B Piping and Instrumentation − Supervisor II (Air−cooled)



NOTES

COMPRESSOR TROUBLESHOOTING

8.1 STANDARD ELECTRO–MECHANICAL TROUBLESHOOTING INTRODUCTION

The information contained in the Troubleshooting chart is based upon both the reports about actual field applications, and extensive testing done at the factory. 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 trouble should be systematically analyzed before undertaking any repairs or component replacement procedures.

A detailed visual inspection is worth performing for almost all problems. Doing so can prevent unnecessary damage. Always remember to:

a. Check for loose wiring.
b. Check for damaged piping.
c. 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.

8.2 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 gauge under full load conditions.
		Defective solenoid valve. Repair if defective.
		Defective blowdown valve; blowdown valve should exhaust sump pressure to 30 to 35 psig (2.1 to 2.4 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. (air–cooled only).
		Ambient temperature is too high; provide sufficient ventilation.
		Low fluid level; add fluid.
		Clogged filter; change the fluid filter element if indicated by the maintenance gauge.

8.2 TROUBLESHOOTING (continued)

SYMPTOM	PROBABLE CAUSE	REMEDY
COMPRESSOR SHUTS DOWN WITH AIR DEMAND PRESENT	Discharge Temperature Switch Open	Thermal valve not functioning properly; replace element (air–cooled only).
		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 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 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).
	Defective or Dirty Inlet Valve	Check that valve fully opens when full air demand is present. Repair or clean as necessary.
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 Solenoid Valve	Repair kit available.
	Defective Blowdown Valve	Check that sump pressure is exhausted to the atmosphere when the pressure switch contacts open or repair or replace if necessary (kit available).
EXCESSIVE COMPRESSOR FLUID CONSUMPTION	Separator Element Damaged or Not Functioning Properly	Change element.
	Leak in the Lubrication System	Check all pipes, connections and components.
	Excess Fluid Foaming	Drain and change.
	Fluid Level Too High	Drain to correct level.
PRESSURE RELIEF VALVE OPEN REPEATEDLY	Defective Pressure Relief Valve	Replace pressure relief valve.
	Separator Differential (plugged)	Replace Separator
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 operation 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 regularly.

8.3 OPTIONAL SUPERVISOR II – TROUBLESHOOTING INTRODUCTION

The information contained in the Troubleshooting chart is based upon both the actual applied situations and extensive testing at the factory. 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 trouble should be systematically analyzed before undertaking any repair or component replacement procedures.

A detailed visual inspection is worth performing for almost any problems which may prevent unnecessary damage to the compressor. Always remember to:

a. Check for loose wiring.
b. Check for damaged piping.
c. 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.

8.4 TROUBLESHOOTING – SUPERVISOR II

SYMPTOM (DISPLAY)	PROBABLE CAUSE	REMEDY
T1 HI Message	Discharge Temperature Exceeded 225°F (107°C) for Pre–Alarm	
	Discharge Temperature Exceeded 235°F (113°C) for Shutdown	
	Ambient temperature exceeded 105°F (41°C)	Improve local ventilation (i.e., remote intake of process and/or cooling air).
	Fluid Level in Sump is Too Low	Check/correct fluid level.
	Thermal Valve Malfunctioned	Check/replace thermal valve.
	Cooler Fins are Dirty (air–cooled only)	Clean cooler fins.
	Water Flow is Low (water–cooled packages only)	Check cooling water supply (i.e., closed valves).
	Water Temperature is High (water–cooled packages only)	Increase water flow, lower water temperature.
	Cooler is Plugged (water–cooled packages only)	Clean tubes and/or shell – if tube plugging persists, provide cleaner water.
T1 FAIL	Temperature RTD Malfunction	Check connections from RTD. If connection is good, replace RTD.
P1 HI Message	Discharge Pressure Exceeded Shutdown Level Because:	
	P1 MAX–3psi (0.2 Bar) Exceeded for Pre–Alarm	
	P1 MAX Exceeded for Shutdown	
	Unloading Device (i.e., Blowdown Valve) Failed to Operate	Check operation of unloading device.
P1 HI Message (continued)	Pressure Regulator adjusted incorrectly	Check operation of pressure regulator.
	Solenoid Valve Failed to Operate	Check operation of solenoid valve.
	Control Air Signal Leaks	Check tubework feeding control signal for leaks.
	Control Air Signal Filter Clogged	Service filter assembly.
P1, P2, P3 FAIL	Pressure Transducer Malfunction	Check connections from Transducer. If connections are good, replace Transducer.
P3 LOW	Oil Pressure falls below 10 psig (.7 bar) or less than 1/2 of P1 while compressor is running because:	
	Oil Filter Clogged	Replace filter element
	Sump Oil Level Too Low	Replenish oil level

8.4 TROUBLESHOOTING (Continued)

SYMPTOM (DISPLAY)	PROBABLE CAUSE	REMEDY
SEP MNTN Message	Plugged Separator	Replace separator element.
	△P1 > 10 psi (.7 bar)	Check P1 & P2 pressure transducers.
COMPRESSOR DOES NOT BUILD FULL DISCHARGE PRESSURE	Air Demand Exceeds Supply	Check air service lines for open valves or leaks.
	Inlet Air Filter Clogged	Check for maintenance message on Supervisor display. Inspect and/or change element.
	Inlet Valve Not Fully Open	Check actuation and position.
	Pressure Sensor and/or Connections at Fault	Check connections from trans–ducer. If adequate, replace trans–ducer.
LINE PRESSURE RISES ABOVE UNLOAD SETTING	Pressure Sensor P2 at Fault	Check connections from trans–ducer. If adequate, replace transducer.
	Unloading Device (i.e., Blowdown Valve) Failed to Operate	Check operation of unloading device.
LINE PRESSURE RISES ABOVE UNLOAD SETTING	Solenoid Valve Failed to Operate	Check operation of solenoid valve.
	Control Air Signal Leaks	Check tubework feeding control signal for leaks.
	Control Air Signal Filter Clogged	Service filter assembly.
EXCESSIVE FLUID CONSUMPTION	Damaged or Improperly Gasketed Separator Element	Inspect separator element and gasket. Replace if damaged.
	Fluid System Leaks	Check tube/pipework for leaks.
	Fluid Level Too High	Drain excess fluid.
	Excessive Fluid Foaming	Drain and change fluid.
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 operation 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. Main–tain them regularly.

NOTE ON TRANSDUCERS:

Whenever a sensor is suspected of fault, the recommended cause of action is to measure the signal (pressure, temperature, etc.) with an alternate calibrated instrument and compare readings. If readings conflict, the electrical and/or tubing connections should be inspected, and if no faults are evident, then replace the sensor and re–evaluate against the calibrated instrument.

8.5 CALIBRATION

The Supervisor II has software calibration of the pressure and temperature probes. This calibration affects the offset but not the slope of the pressure and temperature calculations. Because of this, the

most accurate method is to heat or pressurize the transducer to its operating value. If this is too difficult, room temperature/open atmosphere calibration is adequate. Calibration may only be done while machine is stopped and unarmed.

To enter calibration mode, you must press the following keys in sequence while in the default status display mode: " ", "▲", **DSP**, "▼ ☼", **PRG.** Once in calibration mode, you will see a screen like the following:

CAL	P1
0	97

In the above example, "0" refers to the amount of adjustment (in psi or °F, "97" refers to the current value of P1).

To make adjustments, Press the "▲" (UP ARROW) key to increase the value, press the "▼ ☼" (DOWN ARROW / LAMP TEST) key to decrease the value. The number on the left will increase or decrease always showing the total amount of adjustment. Maximum adjustment is ± 7.

The **DSP** key exits, wiping out changes to the current item, while saving changes to any previous items. The **PRG** key saves the current item and advances to the next. All temperatures and pressures may be calibrated individually.

NOTES

9.1 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, fax 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.

The genuine Sullair service parts listed meet or exceed the demands of this compressor. Use of replacement parts other than those approved by Sullair Corporation may lead to hazardous conditions over which Sullair Corporation has no control. Such conditions include, but are not limited to, bodily injury and compressor failure.

SULLAIR CORPORATION
Subsidiary of Sundstrand Corporation
3700 East Michigan Boulevard
Michigan City, Indiana 46360 U.S.A.
Telephone: 1–800–SULLAIR (U.S.A. Only) or
1–219–879–5451
Fax: (219) 874–1273
Fax: (219) 874–1835 (Parts)
Fax: (219) 874–1205 (Service)

SULLAIR ASIA, LTD.
Sullair Road, No. 1
Chiwan, Shekou
Shenzhen, Guangdong PRV.
P.R.C. Post Code 518068
Telephone: 755–6851686
FAX: 755–6853473

SULLAIR EUROPE, S.A.
Zone Des Granges BP 82
42602 Montbrison Cedex, France
Telephone: 33–477968470
Fax: 33–477968499

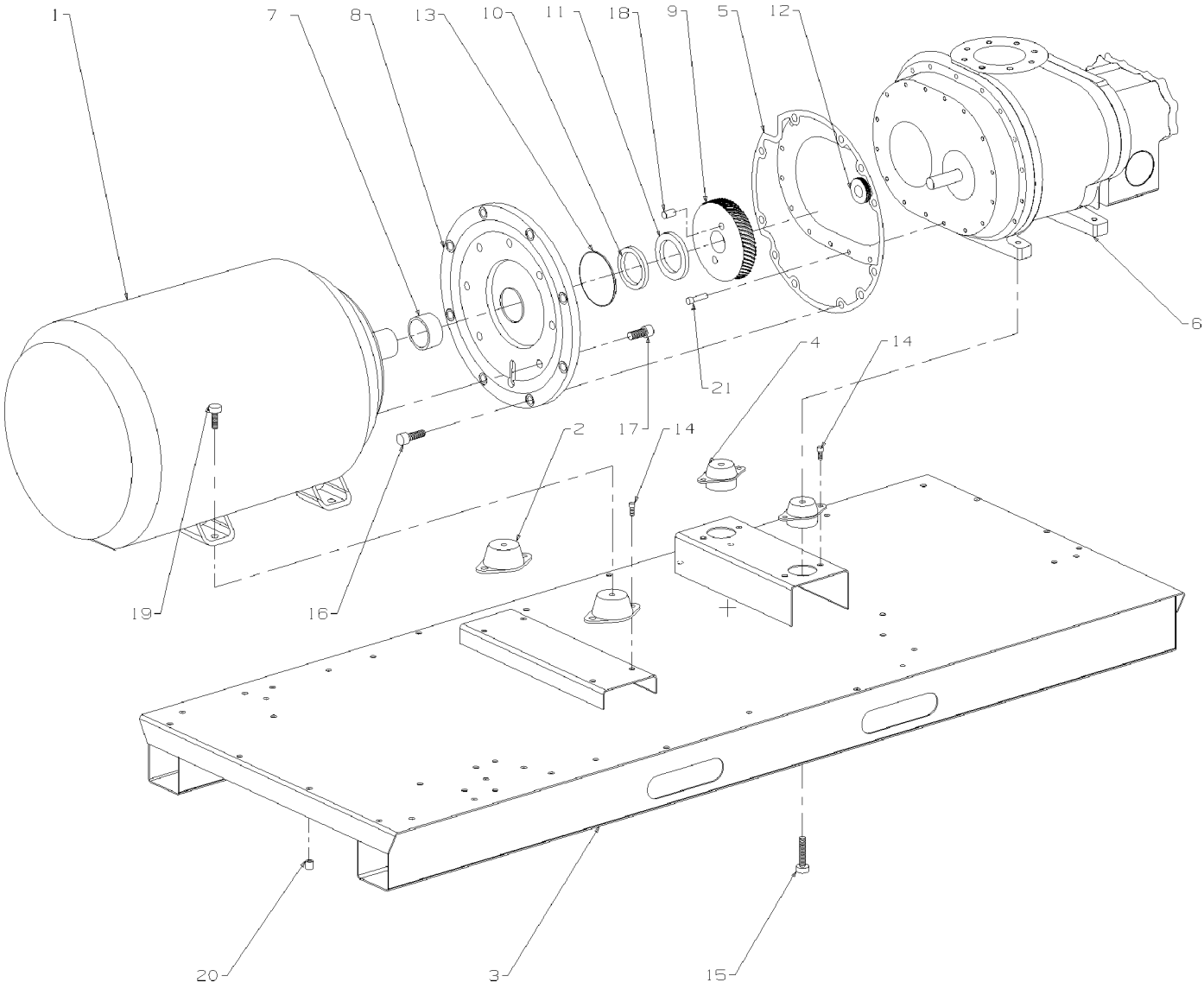
9.2 RECOMMENDED SPARE PARTS LIST

DESCRIPTION	KIT NUMBER	QUANTITY
replacement element for fluid filter 02250054–605	**250025–526**	1
replacement element for air/fluid separator	**02250093–586**	1
replacement element for air filter 02250091–634	**02250093–655**	1
replacement element for thermal valve	**049542**	1
repair kit for blowdown valve 250025–655	**250031–772**	1
repair kit for blowdown valve 250030–276	**02250045–132**	**1**
repair kit for pressure regulator valve 250017–280	**250019–453**	1
repair kit for inlet control valve 250026–779	**250029–249**	1
repair kit for strainer 241771	**241772**	2
repair kit for solenoid valve 250030–164	**250038–849**	1
replacement coil for solenoid valve 250030–164	**250035–292**	1
repair kit for solenoid valve 250038–674	**02250055–940**	1
replacement coil for solenoid valve 250038–674	**250031–738**	1
repair kit for minimum pressure valve 250016–618	**250019–444**	
repair kit for separator/trap 250018–041	**250033–038**	**1**
fluid, SRF 1/4000, 5 gallons(20 liters)	**250019–662**	1
fluid, Sullube 32, 5 gallons(20 liters)	**250022–669**	1
manual, Sequencing & Protocol (I)	**02250057–696**	1

PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR

(I) This document is required to program your personal computer to communicate with the Supervisor II panel.

9.3 FRAME, MOTOR, COMPRESSOR AND PARTS

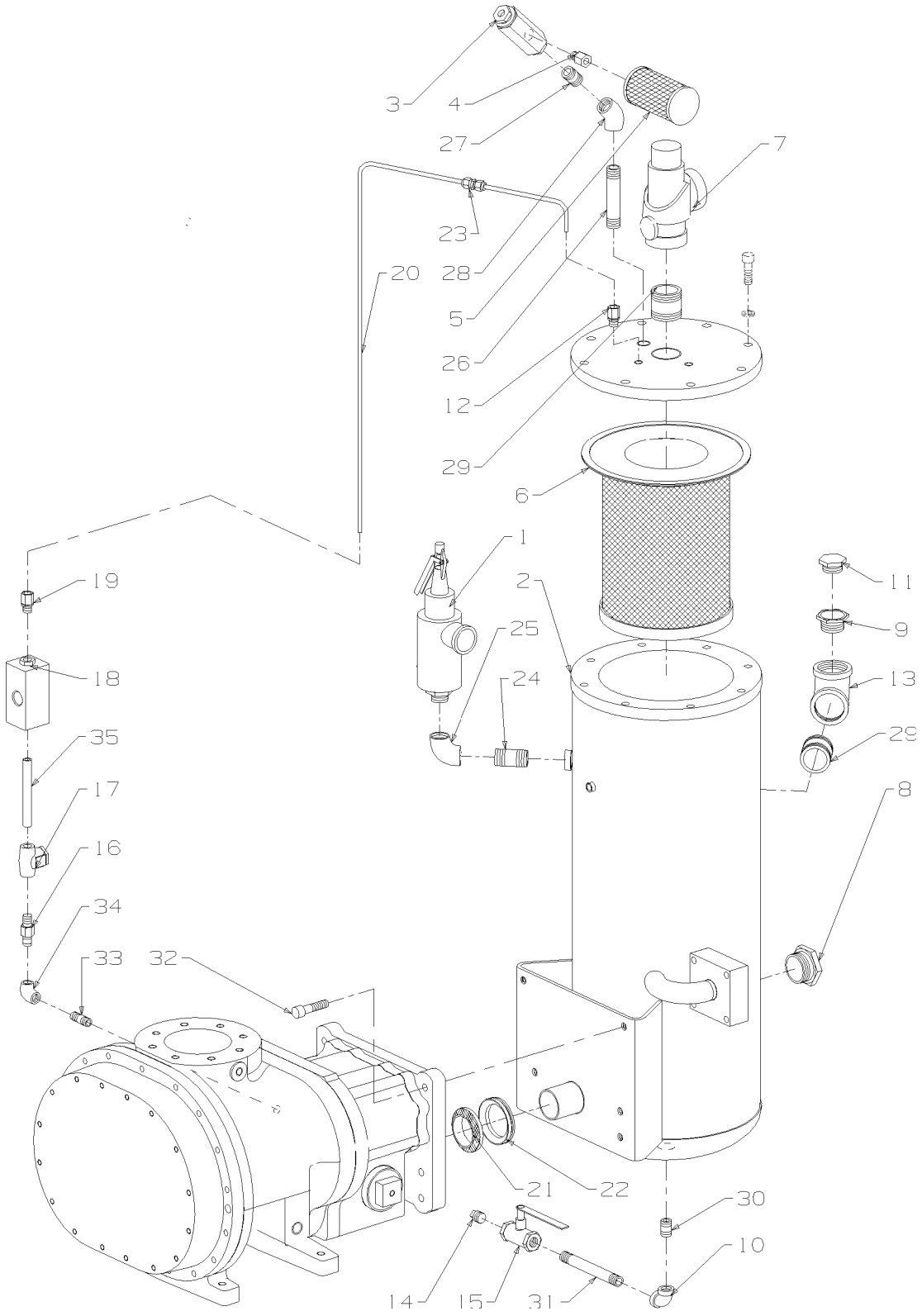


9.3 FRAME, MOTOR, COMPRESSOR AND PARTS

key number	*description*	*part number*	*quantity*
1	motor, drive	Consult Factory	1
2	isolator, vibration	02250092–986	2
3	frame, base	02250092–034	1
4	isolator, vibration	02250085–255	2
5	housing, gear	02250090–287	1
6	unit, compr	Consult Factory	1
7	sleeve, wear–lip 2 3/8x70mmx35mm	02250091–942	1
8	housing, adapter–motor	02250091–523	1
9	gear, drive	Consult Factory	1
10	seal, single 70x90x10 teflon	02250091–938	1
11	seal, double 70x100x10 teflon	02250091–940	1
12	gear, driven	Consult Factory	1
13	o–ring viton 7 1/4 x 1/8”	826502–263	1
14	capscrew, hex gr5 5/16–18 x 3/4”	828605–075	8
15	screw, hx ser wsh 1/2 x 3”	829708–300	2
16	screw, socket iso 4762 m16 x 45–8.8	829316–045	8
17	capscrew, ferry head 5/8–11 x 1 1/2”	828410–150	7
18	screw, set soc iso4029 m16 x 25	865816–025	1
19	screw, hex ser wash 1/2–13 x 1 1/2	829708–150	2
20	insert, 5/16”–18 thrd blind	02250043–765	43
21	capscrew, ferry head 3/8–16 x 1 1/2”	828406–150	16

PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR

9.4 COMPRESSOR DISCHARGE ASSEMBLY AND PARTS



9.4 COMPRESSOR DISCHARGE ASSEMBLY AND PARTS

key number	*description*	*part number*	*quantity*
1	valve, rlf 3/4" 200# 550scfm	250006–989	1
2	tank, separator direct mounted es–16	02250093–082	1
3	valve, 2–way pneumatic 1/2"npt **(I)**	250030–276	1
4	orifice, 1/2m x 1/2f x .156	234125–156	1
5	silencer, air 1/2"	041006	1
6	separator, air/oil primary element **(II)**	02250093–586	1
7	valve, 1–1/2"npt min press chk **(III)**	250016–618	1
8	glass, oil level 1–1/2" sight	040279	1
9	filler, adapter	020044	1
10	elbow, pipe galv 90deg 3/8"	803515–015	1
11	plug, o–ring boss sae 1.25	040029	1
12	connector, flex 1/4t x 1/4p	020169	1
13	elbow, pipe galv 90deg 1–1/2"	803515–060	1
14	plug, pipe 3/8"	807800–015	1
15	valve, ball 3/8" npt	047116	1
16	orifice, .094 .250m 1018stl	022033	1
17	strainer, v–type 300psi x 1/4 **(IV)**	241771	1
18	glass, sight 24kt 1/4"(in–line)	046559	1
19	connector, tube–m 1/4" swglk 316s	250139–016	1
20	tubing, stnls stl 1/4" 20ga(ft)	841215–004	4
21	gasket, flexmaster hitemp 2	046988	1
22	ring, seal rtnr outlet cvr	02250093–123	1
23	union, tube 1/4" swagk 316ss	250631–017	1
24	nipple, pipe 3/4 x 2.0 sc 40 g	823112–020	1
25	elbow, pipe 3/4 galv	803515–030	1
26	nipple, pipe 1/2 x 4.0 sc 40 g	823108–040	1
27	nipple, pipe xs 1/2 x close plt	866408–000	1
28	elbow, pipe galve 45deg 1/2"	803415–020	1
29	nipple, pipe 1–1/2 x cl sc 80	823224–000	2
30	nipple, pipe 3/8 x cl sc 80 ga	823206–000	1
31	nipple, pipe 3/8 x 5.5 sc 40 g	823106–055	1
32	capscrew, ferry head 1/2–13 x 2	828408–200	6
33	nipple, pipe xs 1/4 x 1 1/2"plt	866404–015	1
34	elbow, pipe 90dg 1/4" 150# plt	866215–010	1
35	nipple, pipe 1/4 x 4.5 sc 40 g	823104–045	1

(I) For maintenance on 2–way pneumatic valve no. 250030–276, order repair kit no. 02250045–132.

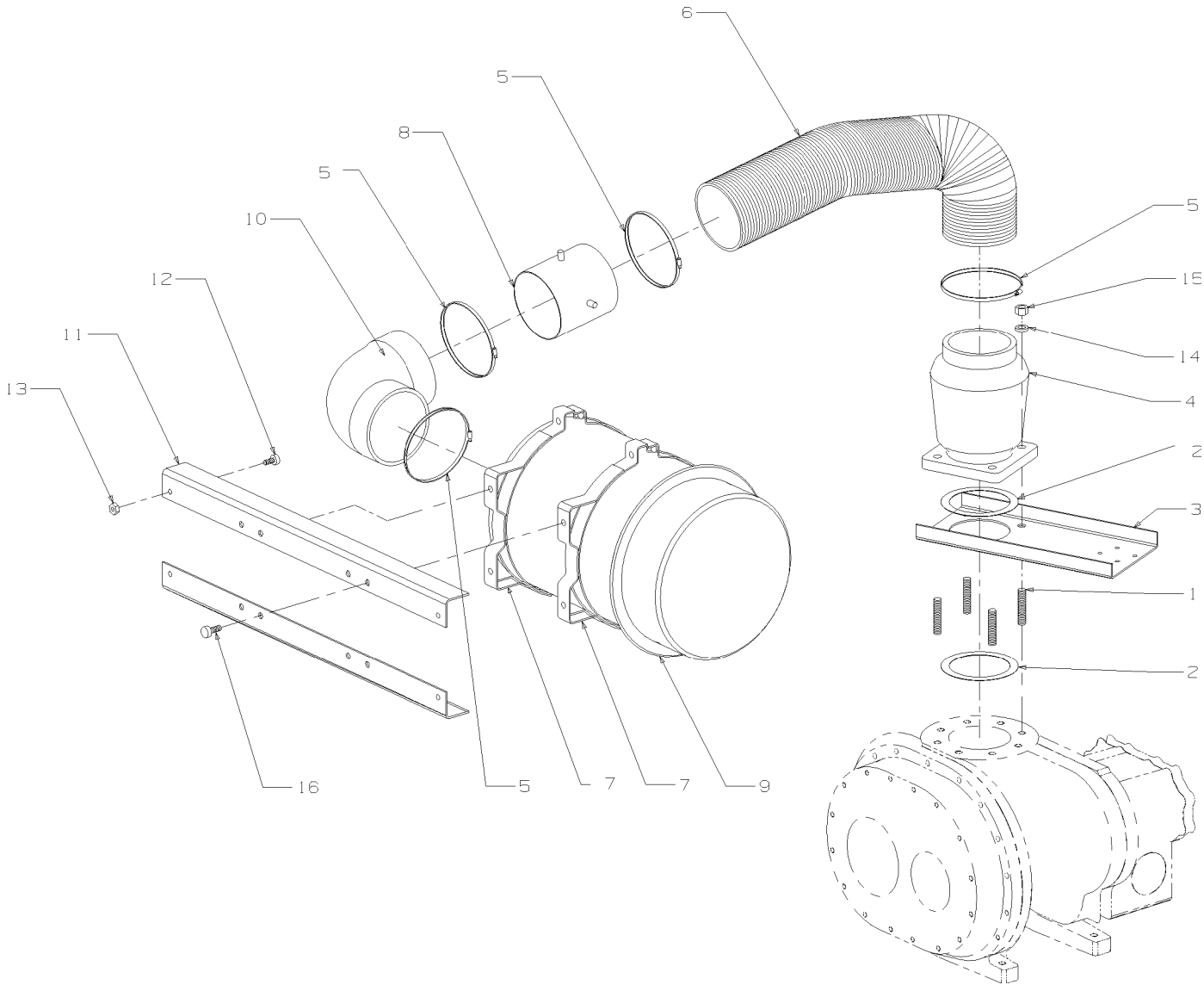
(II) For maintenance on separator, order replacement separator element no. 02250093–586.

(III) For maintenance on minimum pressure check valve no. 250016–618, order repair kit no. 250019–444.

(IV) For maintenance on strainer no. 241771, order repair kit no. 241772.

PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR

9.5 AIR INLET SYSTEM AND PARTS



9.5 AIR INLET SYSTEM AND PARTS

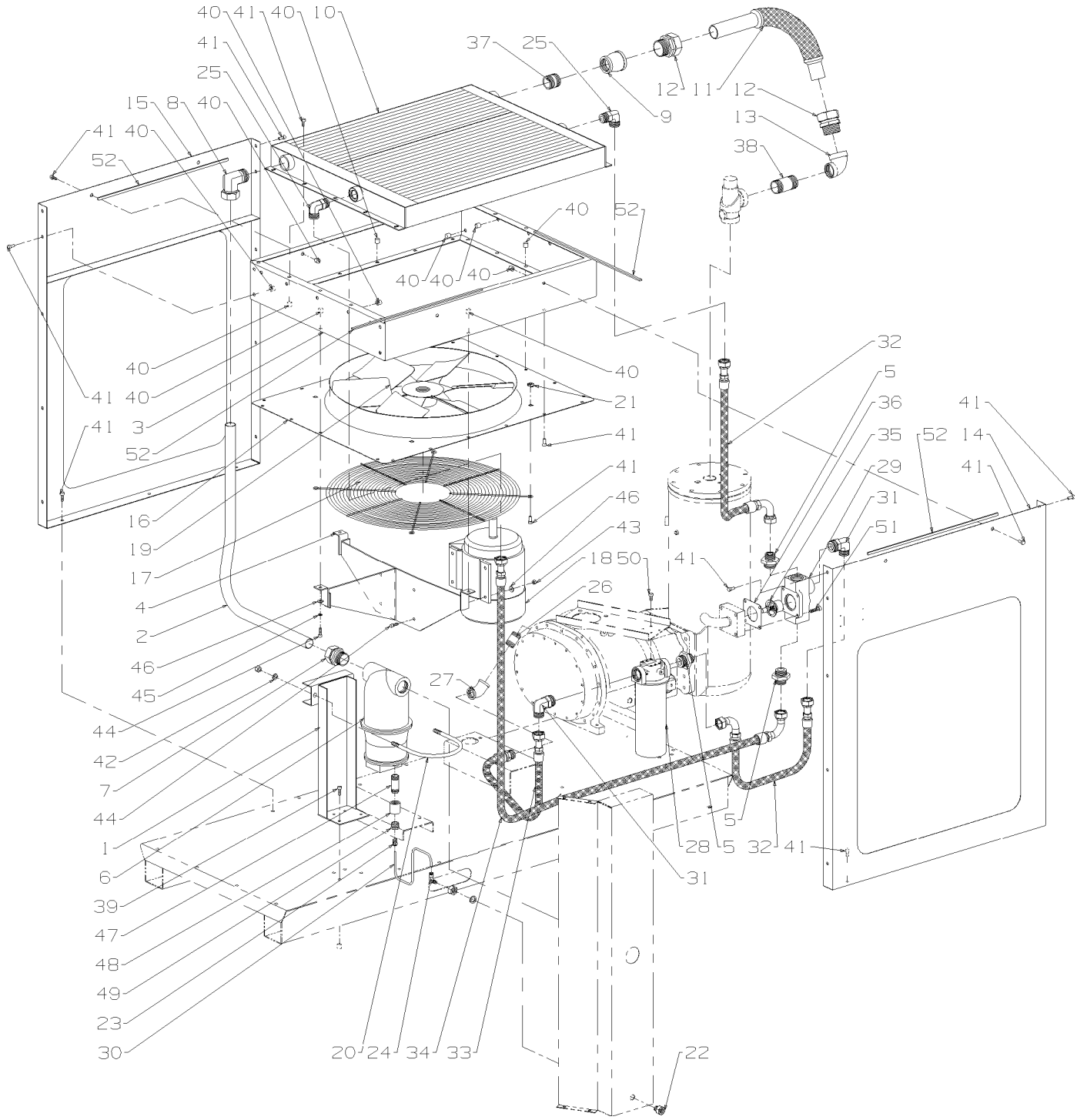
key number	*description*	*part number*	*quantity*
1	stud, threaded 1/2–13 x 2–1/2" gr5	02250093–915	4
2	gasket,1/32 x 5–14x 4–1/8id	040708	2
3	support, bracket oil filter	02250093–792	1
4	valve, air inlet 4" **(I)**	02250083–783	1
5	clamp, hose 6" dia	408153	4
6	hose, flexable 5" id	02250093–920	1
7	band, mounting 12"	040081	2
8	tube, air inlet 5x5 w/1/8" conn	02250093–919	1
9	filter, inl air hd es–16 5" out **(II)**	02250091–634	1
10	elbow, rubber 90deg 5" id	02250061–835	1
11	support, air filter	02250093–803	2
12	screw, hx ser wash 5/16 x 3/4"	829705–075	4
13	nut, hex flgd pltd 5/16–18	825305–283	4
14	washer, sprlock reg pltd 1/2"	837808–125	4
15	nut, hex pltd 1/2–13	825208–448	4
16	screw, hx wash 3/8" x 1"	829706–100	4

(I) For maintenance on air inlet valve no. 02250083–783, order repair kit no. 250029–249.

(II) For maintenance on air filter 02250091–634, order repair kit number 02250093–655.

PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR

9.6 COOLING SYSTEM AND PARTS – AIR–COOLED



9.6 COOLING SYSTEM AND PARTS -- AIR--COOLED

key number	*description*	*part number*	*quantity*
1	support, cond sep	02250093--717	1
2	tube, clr--moist sep	02250093--888	1
3	adapter, clr/venturi	02250091--643	1
4	support, fan motor	Consult Factory	1
5	connector, sae x orfs 1 x 1--1/4"	02250093--806	3
6	separator, comb trap st 1.5npt **(I)**	250018--041	1
7	connector, tube--m 1.5 x 1.5"	810224--150	1
8	elbow, tube--m 1.5 x 1.5"	810524--150	1
9	reducer, pipe galv 2 x 1--1/2" 150#	02250093--786	1
10	cooler, air to air 33 x 31.4"	02250091--628	1
11	joint, expansion	02250093--654	1
12	connector, tube--m 2 x 2"	810232--200	2
13	elbow, red galv 2 x 1--1/2"	803608--060	1
14	support, clr--frnt side	Consult Factory	1
15	panel, clr--back side	02250091--838	1
16	panel, venturi	Consult Factory	1
17	guard, fan	Consult Factory	1
18	motor, cooling fan	Consult Factory	1
19	fan	Consult Factory	1
20	u--bolt, 1/2 x 5" pipe	829008--500	1
21	nut, retainer 5/16--18 .092	861405--092	4
22	bulkhead, pipe 1/4" npt	841500--004	1
23	connector, tube--strt 1/4mnpt x 1/4t	250024--685	1
24	elbow, 90deg m swvl 1/4t x 1/8p	250025--849	1
25	elbow, 90deg sae/orfs 1"hose	02250087--070	2
26	nipple, galv 1 x 2	823116--020	1
27	elbow, pipe 45deg 1" galv	803415--040	1
28	filter, fluid 1--5/8"sae str thrd con **(II)**	02250054--605	1
29	housing, thrml vlv 1--5/8--12 conn	02250092--929	1
30	tubing, thermoplstc 1/4"od	250024--745	1 ft.

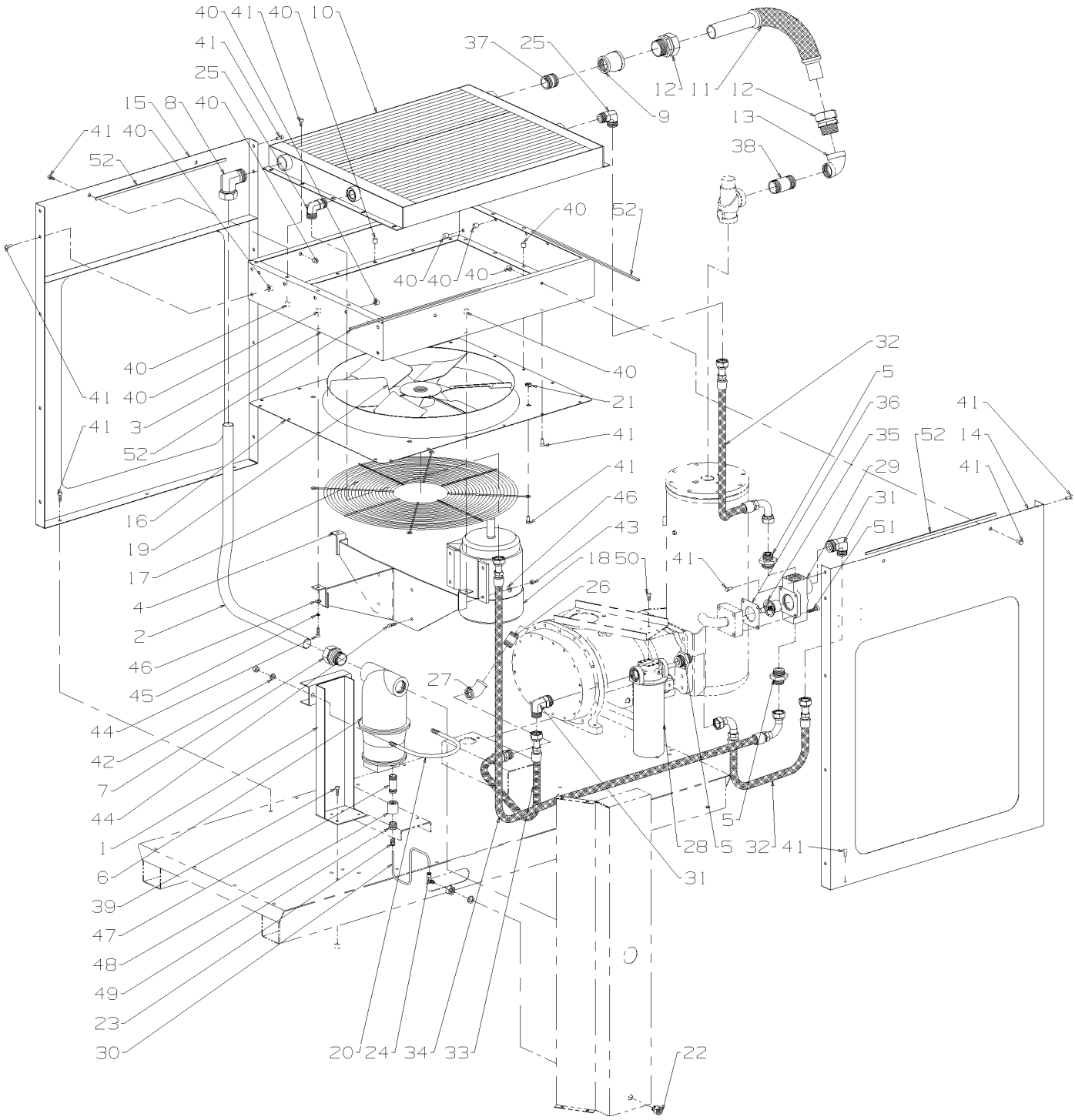
(Continued on page 55)

(I) For maintenance on combination separator/trap no. 250018--041, order repair kit no. 250033--038.

(II) For maintenance on fluid filter no. 02250054--605, order replacement element no. 250025--526.

PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR

9.6 COOLING SYSTEM AND PARTS -- AIR--COOLED



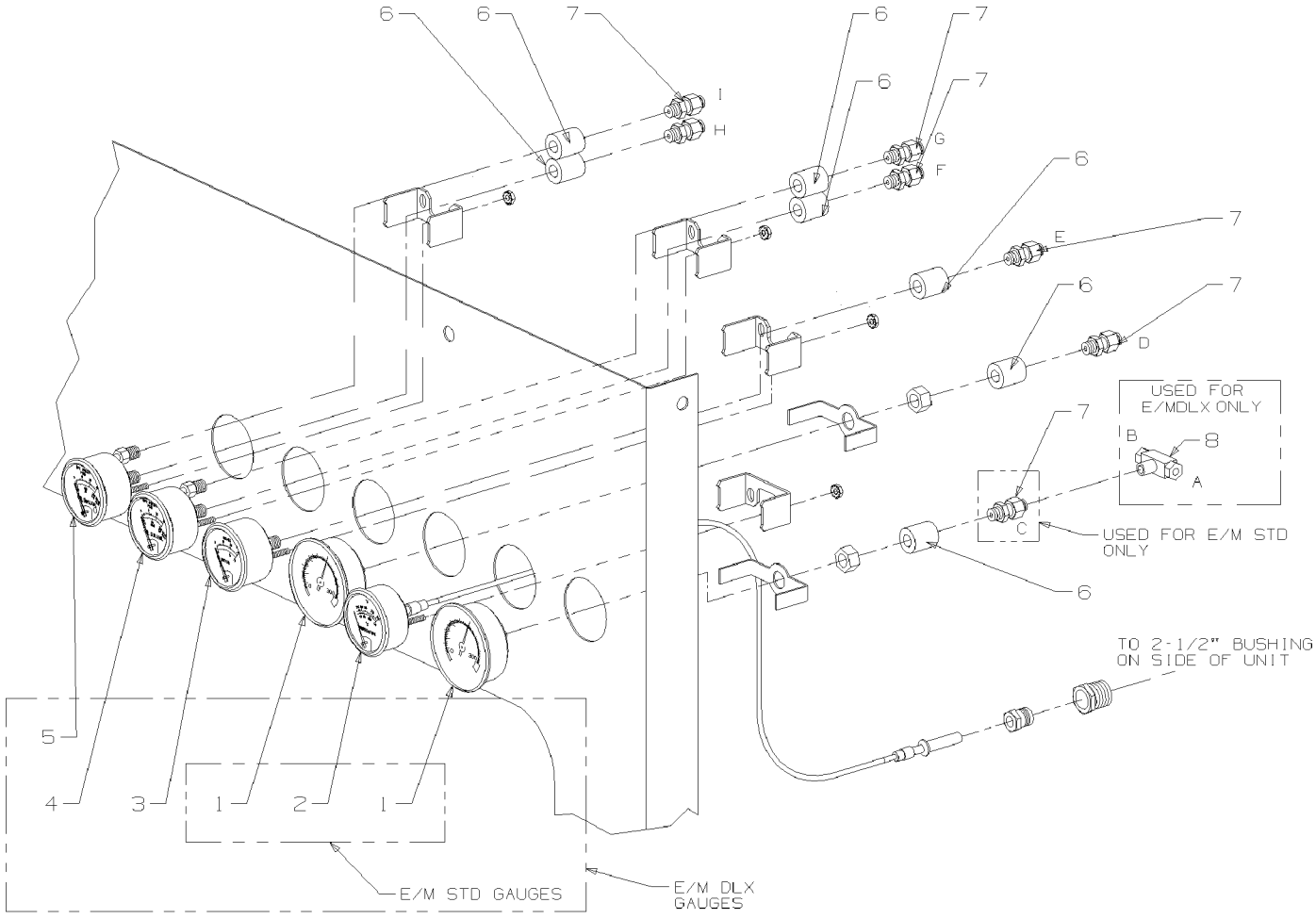
9.6 COOLING SYSTEM AND PARTS -- AIR--COOLED (cont.)

key number	*description*	*part number*	*quantity*
31	elbow, 90deg sae/orfs 1 x 1--1/4	02250093--804	2
32	hose, medium pressure orfs f--swvl end 1	02250094--517	2
33	hose, medium pressure orfs f--swvl end 1	02250094--519	1
34	hose, medium pressure orfs f--swvl end 1	02250094--518	1
35	element, thermal valve (III)	049542	1
36	gasket, thermal valve	02250093--914	1
37	nipple, pipe 1--1/2 x cl sc 80	823224--000	1
38	nipple, pipe 1--1/2 x 3.0 sc 40	823124--030	1
39	screw, hex serr 5/16--18 x 1	829705--100	4
40	insert, 5/16" thrd blnd	02250043--765	52
41	screw, ser wash 5/16x3/4"	829705--075	50
42	washer, spr lock reg pltd 1/2"	837808--125	2
43	nut, hex locking 5/16	825505--166	4
44	capscrew, hx gr 5 5/16 x 1"	828605--100	7
45	washer, sprlock reg pltd 5/16"	837805--078	3
46	washer, pl b reg pltd 5/16"	838205--071	7
47	nipple, pipe 3/4 x 2.5 sc 40 g	823112--025	1
48	coupling, pipe galv 3/4"	803215--030	1
49	bushing, red 3/4x1/4"galv	804103--010	1
50	screw, ser wash 5/16 x 1/2"	829705--050	4
51	capscrew, ferry hd 3/8 x 1 1/2"	828406--150	4
52	weatherstrip, 3/16 x 3/8	250022--436	20 ft

(I) For maintenance on thermal valve, order replacement element no. 049542.

PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR

9.7 CONTROL PANEL ASSEMBLY AND PARTS -- ELECTRO--MECHANICAL STANDARD



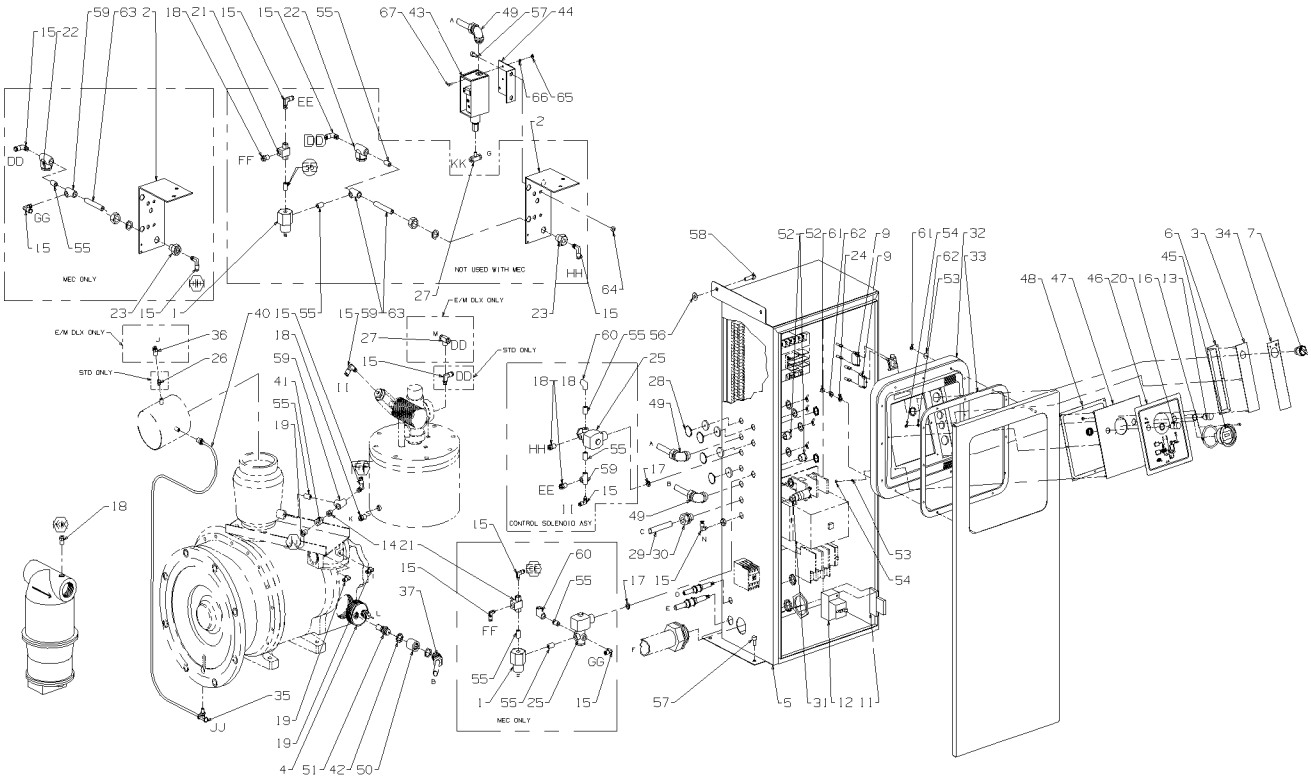
NOTES
1. A = FROM SUMP-WET SIDE-E/M DLX
2. B = BACK TO HIGH SIDE - "DELTA P"
3. C = FROM SUMP-WET SIDE-E/M STD
4. D = FROM LINE PRESSURE SWITCH
5. E = INLET VACUUM
6. F = FROM SUMP PRESSURE TEE - P1
7. G = FROM SUMP - DRY SIDE
8. H = FROM OIL FILTER - HIGH PRESSURE SIDE
9. I = FROM OIL FILTER - LOW PRESSURE SIDE

9.7 CONTROL PANEL ASSEMBLY AND PARTS -- ELECTRO--MECHANICAL STANDARD

key number	*description*	*part number*	*quantity*
1	gauge, press 2"dia 0–230#	250005–185	2
2	gauge, temperature–2"	042582	1
3	gauge, vacuum 0–30" water	250003–797	1
4	gauge, diff press 0–15psi	250003–798	1
5	gauge, diff press 0–30psi	250003–799	1
6	coupling, pipe galv 1/8"	803215–005	7
7	connector, 1/4"tube x 1/8"npt	250018–427	7
8	tee, male 1/4t x 1/8p	250028–581	1

PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR

9.8 ELECTRICAL COMPONENTS AND PARTS – ELECTRO–MECHANICAL – STANDARD

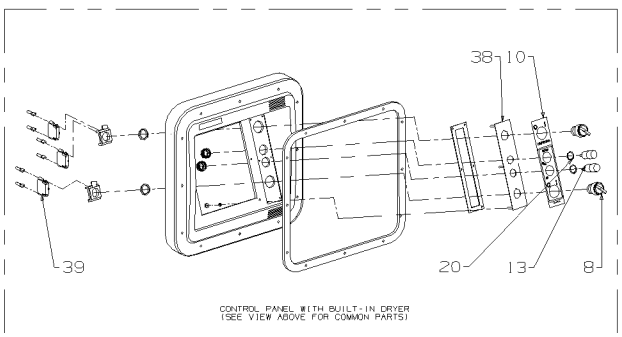


NOTES:

1. ELECTRICAL CONNECTIONS:
   - A = 'P2' PRESSURE SWITCH - LINE PRESSURE
   - B = 'T1' TEMPERATURE SWITCH
   - C = ELECTRIC DRAIN VALVE
   - D = W.C. COOLING FAN
   - E = A.C. COOLING FAN
   - F = MAIN MOTOR
2. TUBING CONNECTIONS:
   - G = TO LINE PRESSURE GAUGE
   - H = 'DELTA P' LOW SIDE OF OIL FLTR(TO DIFF.PRESS.GAUGE)
   - I = 'DELTA P' HIGH SIDE OF OIL FLTR(TO DIFF.PRESS.GAUGE)
   - J = TO VACUUM GAUGE
   - K = TO SUMP PRESSURE GAUGE
   - L = TO TEMPERATURE GAUGE
   - M = "DELTA P" LOW SIDE OF SEP. ELEMENT(TO DIFF.PRESS.GAUGE)
   - N = TO WATER PIPING(W.C. PACKAGE ONLY)
   - (XX) = CONNECTION POINT FOR CONTROL TUBING

(XX) ⟷ (XX)

3. PART NUMBERS LISTED BELOW FOUND IN:
   - M.ELECCTL
   - M.CTLTBG
   - M.DECAL
   - M.PNEUCTL
4. DIFF. PRESSURE SWITCH - OIL FILTER
5. 'P2' PRESSURE SIGNAL - LINE PRESSURE
6. PLUGGED HOLE
7. PLUGGED HOLE
8. LOAD CONTROL SOLENOID VALVE
9. PLUGGED HOLE
10. TEMPERATURE DISCHARGE SWITCH
11. ELECTRIC DRAIN VALVE
12. W.C. COOLING FAN (PUNCH HOLE)
13. WATER PRESSURE SWITCH (PUNCH HOLE)
14. A.C. COOLING FAN(STD) (PLUGGED HOLE IF W.C.)
15. MAIN MOTOR
16. SEQUENCING VALVE (PUNCH HOLE)



CONTROL PANEL WITH BUILT-IN DRYER
(SEE VIEW ABOVE FOR COMMON PARTS)

9.8 ELECTRICAL COMPONENTS AND PARTS -- ELECTRO--MECHANICAL -- STANDARD

key number	*description*	*part number*	*quantity*
1	valve, pressure regulator **(I)**	250017--280	1
2	support, bracket press trans/switch	02250084--823	1
3	plate	02250086--265	1
4	bushing, red 2--1/2 x dbl 1/2	02250094--008	1
5	starter, assy	Consult Factory	1
6	gasket	02250086--269	1
7	switch, selector	02250069--625	1
8	switch, operator	250034--647	1
9	block, contact 1 n.c.	250027--125	2
10	decal	02250086--263	1
11	block, contact aux ino--1nc mot/prot	02250057--765	1
12	starter, man. motor prot.	Consult Factory	1
13	light, pilot assy green	250000--104	2
14	bushing, red 1/4 x 1/8" stl plt	867100--005	1
15	elbow, 1/4t x 1/4npt	250018--430	11
16	gasket, hourmeter	410353	1
17	locknut, cond seal n4 1/2"	02250071--362	2
18	connector, 1/4t x 1/4npt	250018--428	4
19	elbow, 1/4t x 1/8npt	250018--429	3
20	light, pilot assy red	250000--103	2
21	valve, shuttle 1/4"	408893	1
22	strainer, v--type 300psi 1/4" **(II)**	241771	1
23	bulkhead, pipe 1/4" npt	841500--004	1
24	terminal, ring tng 3/8 x 14--16	849306--014	1
25	valve, sol 3w no 150psi pnlmtd **(III)**	250038--674	2
26	plug, pipe 1/8" 3000# stl plt	866900--005	1
27	tee, male branch 1/4t pls 1/8npt	250028--581	2
28	plug, hole	409918--002	4
29	conduit, flex 1/2"	846315--050	6 ft.
30	connector, straight liq--tite 1/2"	846400--050	1
31	switch, press 10 psi n.o.	250017--992	1
32	panel, central box bezel es11	02250089--302	1
33	gasket	02250090--872	1

(I) For maintenance on regulator valve no. 250017--280, order repair kit no. 250019--453.

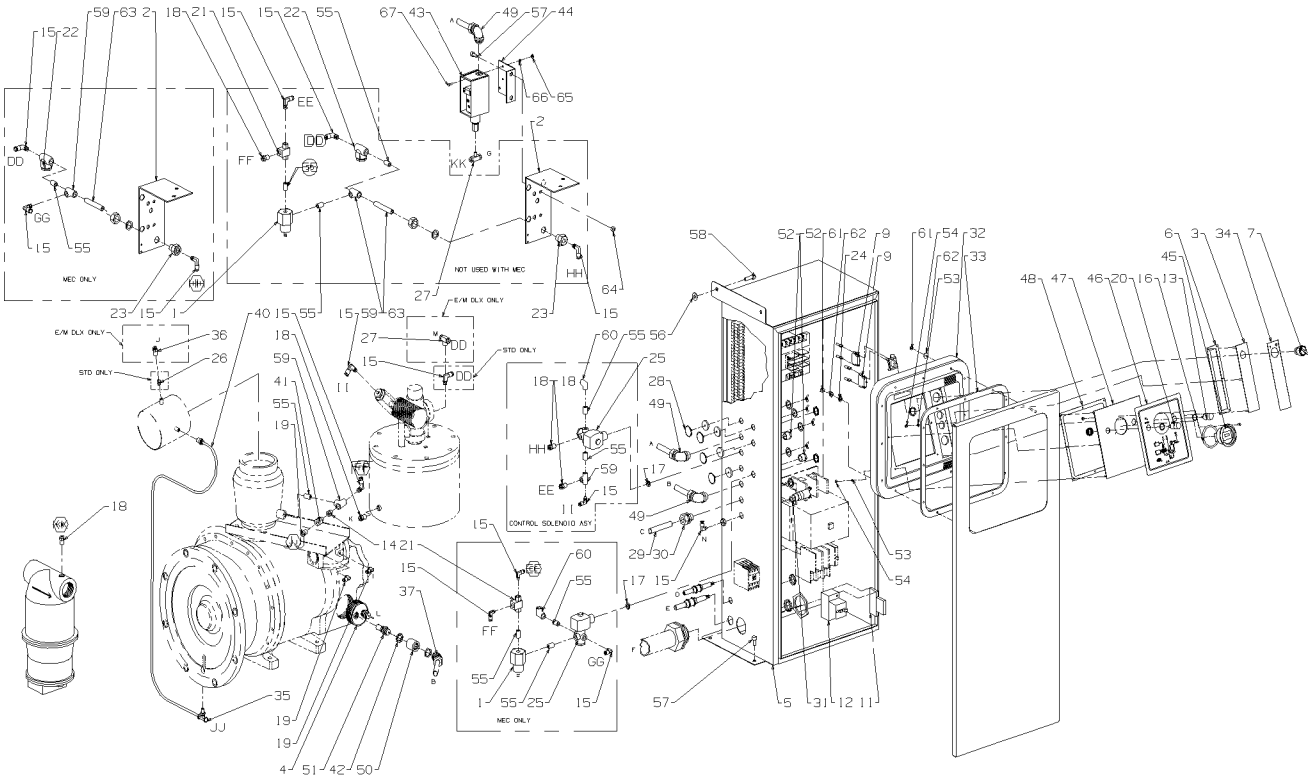
(II) For maintenance on strainer no. 241771, order repair part no. 241772.

(III) For maintenance on solenoid valve no. 250038--674, order repair kit no. 02250055--940, and replacement coil no. 250031--738.

(Continued on page 61)

PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR

9.8 ELECTRICAL COMPONENTS AND PARTS – ELECTRO–MECHANICAL – STANDARD

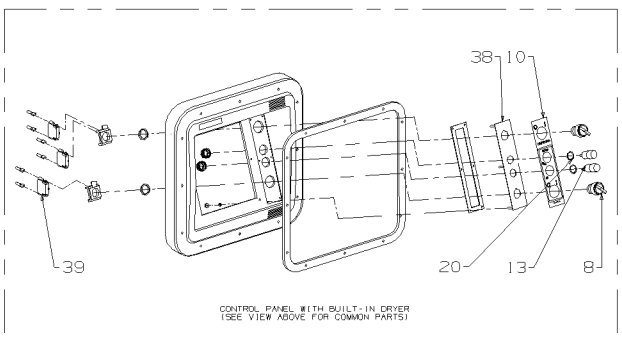


NOTES:

1. ELECTRICAL CONNECTIONS:
   - A = 'P2' PRESSURE SWITCH - LINE PRESSURE
   - B = 'T1' TEMPERATURE SWITCH
   - C = ELECTRIC DRAIN VALVE
   - D = W.C. COOLING FAN
   - E = A.C. COOLING FAN
   - F = MAIN MOTOR
2. TUBING CONNECTIONS:
   - G = TO LINE PRESSURE GAUGE
   - H = 'DELTA P' LOW SIDE OF OIL FLTR(TO DIFF.PRESS.GAUGE)
   - I = 'DELTA P' HIGH SIDE OF OIL FLTR(TO DIFF.PRESS.GAUGE)
   - J = TO VACUUM GAUGE
   - K = TO SUMP PRESSURE GAUGE
   - L = TO TEMPERATURE GAUGE
   - M = "DELTA P" LOW SIDE OF SEP. ELEMENT(TO DIFF.PRESS.GAUGE)
   - N = TO WATER PIPING(W.C. PACKAGE ONLY)
   - (XX) = CONNECTION POINT FOR CONTROL TUBING

(XX) ⟷ (XX)

3. PART NUMBERS LISTED BELOW FOUND IN:
   - M.ELECCTL
   - M.CTLTBG
   - M.DECAL
   - M.PNEUCTL
4. DIFF. PRESSURE SWITCH - OIL FILTER
5. 'P2' PRESSURE SIGNAL - LINE PRESSURE
6. PLUGGED HOLE
7. PLUGGED HOLE
8. LOAD CONTROL SOLENOID VALVE
9. PLUGGED HOLE
10. TEMPERATURE DISCHARGE SWITCH
11. ELECTRIC DRAIN VALVE
12. W.C. COOLING FAN (PUNCH HOLE)
13. WATER PRESSURE SWITCH (PUNCH HOLE)
14. A.C. COOLING FAN(STD) (PLUGGED HOLE IF W.C.)
15. MAIN MOTOR
16. SEQUENCING VALVE (PUNCH HOLE)



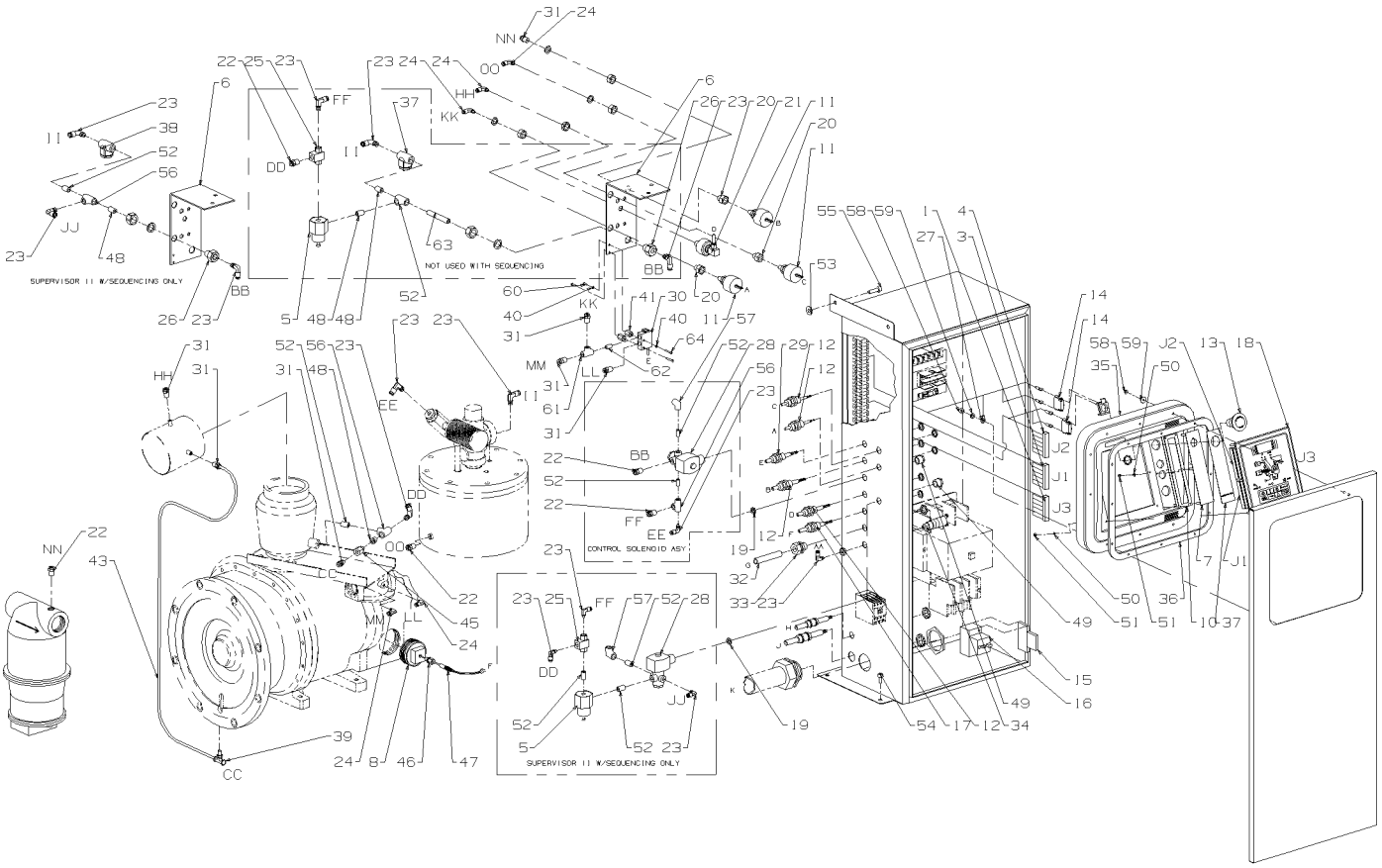
9.8 ELECTRICAL COMPONENTS AND PARTS -- ELECTRO--MECHANICAL -- STANDARD (cont.)

key number	*description*	*part number*	*quantity*
34	decal	02250086--262	1
35	tee, male 1/4t x 1/4npt	250028--582	1
36	connector, 1/4t x 1/8npt	250018--427	2
37	elbow, 45deg lq--tite 1/2"	846500--050	1
38	plate, es11	02250086--266	1
39	block, contact	250027--126	1
40	tube, nyl .25od x .040w blk	02250054--861	40 ft.
41	orifice, .031 .125m x .125f hrs	025690	1
42	locknut, conduit 1/2"	847200--050	1
43	switch, pressure	040694	1
44	bracket, pressure switch	250018--146	1
45	hourmeter	042988	1
46	decal	02250083--361	1
47	panel, instrument 11e e/m	02250077--639	1
48	gasket, panel siidlx	02250048--822	1
49	elbow, 90 lqtite 1/2"	846600--050	3
50	coupling, conduit ridgid 1/2"	250007--179	1
51	switch, temperature 240deg n.c.	040588	1
52	nipple, chase cond 1/2	847815--050	2
53	washer, sprlock reg m4	838804--090	14
54	nut, hex metric m4 x .7	825904--070	14
55	nipple, pipe xs 1/4 x close plt	866404--000	7
56	washer, pl br 5/16"	837205--071	1
57	screw, ser wash 5/16x3/4"	829705--075	6
58	screw, ser wash 5/16--18 x 1--1/4	829705--125	2
59	tee, pipe 1/4" 150# plt	866815--010	3
60	elbow, pipe 90dg 1/4" 150# plt	866215--010	2
61	nut, hex pltd sae #10--32	825801--130	13
62	washer, lock ext tooth 10	838402--025	13
63	nipple, galv 1/4 x 3 1/2"	823104--035	1
64	nut, hex flanged 5/16	825305--283	2
65	nut, hex pltd #10	825202--130	2
66	washer, spr lock reg pltd #10	838502--047	2
67	screw, mach phillips #10--24x1/2	250025--692	2

PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR

ILLUSTRATIONS AND PARTS LIST

9.9 ELECTRICAL COMPONENTS AND PARTS -- SUPERVISOR II -- DELUXE



I) NOTES:

1. PARTS LISTED ARE FOR STANDARD PRESSURE AND MATERIALS. REFER TO BOM FOR ACTUAL PARTS REQ'D.

II) NOTES:

1. ELECTRICAL CONNECTIONS:

A = 'P1' OIL PRESSURE - SUMP
B = 'P2' PRESSURE SIGNAL - LINE PRESSURE
C = 'P3' OIL INJECTION PRESSURE
D = VACUUM SWITCH SIGNAL - INLET
E = DIFF. PRESSURE SWITCH - OIL FILTER
F = 'T1' RTD LEAD - TEMP. DISCHARGE
G = ELECTRIC DRAIN VALVE
H = W.C. COOLING FAN
J = A.C. COOLING FAN
K = MAIN MOTOR

2. TUBING CONNECTIONS:

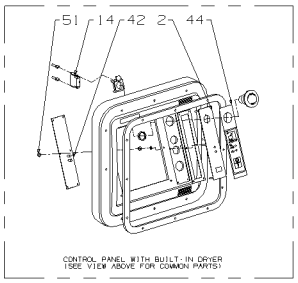
AA = TO WATER PIPING(W.C. PACKAGE ONLY)
LL = 'DELTA P' HIGH SIDE OF OIL FILTER
MM = 'DELTA P' LOW SIDE OF OIL FILTER

(XX) = CONNECTION POINT FOR CONTROL TUBING

(XX) ⟷ (XX)

III) NOTES:

4. DIFF. PRESSURE SWITCH - OIL FILTER
5. 'P2' PRESSURE SIGNAL - LINE PRESSURE
6. LOAD CONTROL SOLENOID VALVE
7. INLET VACUUM SWITCH
8. 'T1' RTD LEAD - TEMPERATURE DISCHARGE
9. ELECTRIC DRAIN VALVE SIGNAL(PUNCH HOLE)
10. 'P1' PRESSURE SIGNAL - SUMP
11. 'P3' OIL INJECTION PRESSURE
12. SEQUENCING VALVE (PUNCH HOLE)
13. W.C. COOLING FAN (PUNCH HOLE)
14. WATER PRESSURE SWITCH (PUNCH HOLE)
15. A.C. COOLING FAN(PLUGGED HOLE IF W.C.)
16. MAIN MOTOR



9.9 ELECTRICAL COMPONENTS AND PARTS -- SUPERVISOR II -- DELUXE

key number	*description*	*part number*	*quantity*
1	block, term	02250051–765	1
2	plate	02250086–268	1
3	harness, wire	02250054–328	1
4	harness, wire	02250054–329	1
5	valve, pressure regulator **(I)**	250017–280	1
6	support, bracket press trans/switch	02250084–823	1
7	plate, es11	02250086–265	1
8	bushing, red 2–1/2 x 1/8	02250093–974	1
9	starter, assy	Consult Factory	1
10	gasket	02250086–269	1
11	transducer, pressure	02250078–933	3
12	grip, cord n4 .187 – .250 x 1/2":	02250071–380	4
13	switch, push button	02250085–504	1
14	block, contact 1 n.c.	250027–125	3
15	block, contact	02250057–765	1
16	starter, man. motor prot.	Consult Factory	1
17	grip, cord n4 .125 – .187 x 1/2"	02250071–379	1
18	controller, assy es11	02250083–801	1
19	locknut, cond seal n4 1/2"	02250071–362	2
20	bulkhead, pipe 1/8" npt	841500–002	3
21	switch, vacuum	02250078–249	1
22	connector, 1/4t x 1/4npt	250018–428	4
23	elbow, 1/4t x 1/4npt	250018–430	11
24	elbow, 1/4t x 1/8npt	250018–429	5
25	valve, shuttle 1/4"	408893	1
26	bulkhead, pipe 1/4" npt	841500–004	1
27	terminal, ring tng 3/8 x 14–16	849306–014	1
28	valve, solenoid **(II)**	250038–674	2
29	connector, cord grip 0.09–0.26	250023–496	1
30	switch, diff pr 20psid 12ft	02250050–154	1

(I) For maintenance on regulator valve no. 250017–280, order repair kit no. 250019–453.

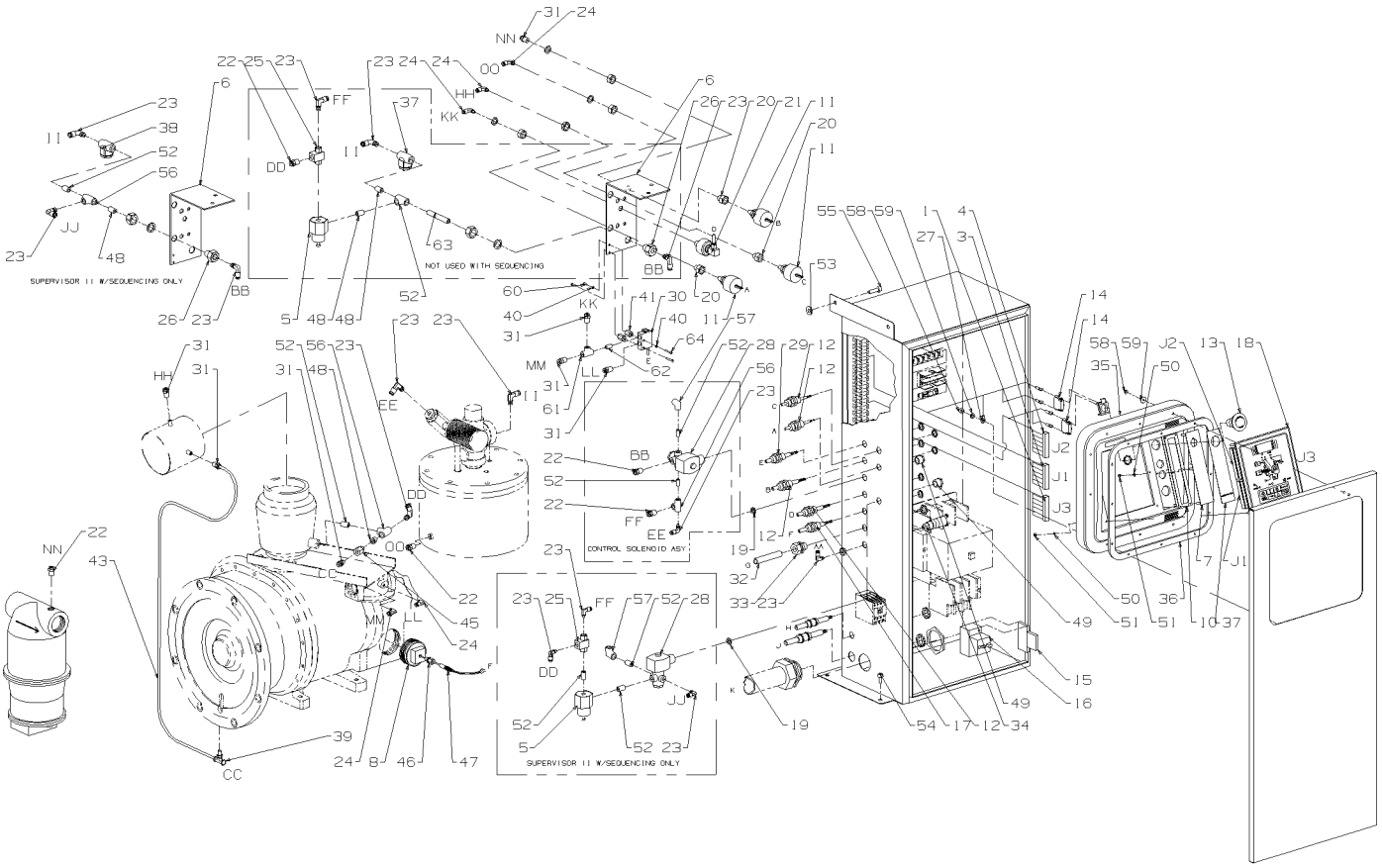
(II) For maintenance on solenoid valve no. 250038–674, order repair kit no. 02250055–940 and replacement coil no. 250031–738.

(Continued on page 65)

PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR

ILLUSTRATIONS AND PARTS LIST

9.9 ELECTRICAL COMPONENTS AND PARTS -- SUPERVISOR II -- DELUXE



I) NOTES:

1. PARTS LISTED ARE FOR STANDARD PRESSURE AND MATERIALS. REFER TO BOM FOR ACTUAL PARTS REQ'D.

II) NOTES:

1. ELECTRICAL CONNECTIONS:

A = 'P1' OIL PRESSURE - SUMP
B = 'P2' PRESSURE SIGNAL - LINE PRESSURE
C = 'P3' OIL INJECTION PRESSURE
D = VACUUM SWITCH SIGNAL - INLET
E = DIFF. PRESSURE SWITCH - OIL FILTER
F = 'T1' RTD LEAD - TEMP. DISCHARGE
G = ELECTRIC DRAIN VALVE
H = W.C. COOLING FAN
J = A.C. COOLING FAN
K = MAIN MOTOR

2. TUBING CONNECTIONS:

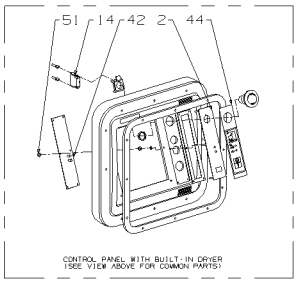
AA = TO WATER PIPING(W.C. PACKAGE ONLY)
LL = 'DELTA P' HIGH SIDE OF OIL FILTER
MM = 'DELTA P' LOW SIDE OF OIL FILTER

(XX) = CONNECTION POINT FOR CONTROL TUBING

(XX) <---> (XX)

III) NOTES:

4. DIFF. PRESSURE SWITCH - OIL FILTER
5. 'P2' PRESSURE SIGNAL - LINE PRESSURE
6. LOAD CONTROL SOLENOID VALVE
7. INLET VACUUM SWITCH
8. 'T1' RTD LEAD - TEMPERATURE DISCHARGE
9. ELECTRIC DRAIN VALVE SIGNAL(PUNCH HOLE)
10. 'P1' PRESSURE SIGNAL - SUMP
11. 'P3' OIL INJECTION PRESSURE
12. SEQUENCING VALVE (PUNCH HOLE)
13. W.C. COOLING FAN (PUNCH HOLE)
14. WATER PRESSURE SWITCH (PUNCH HOLE)
15. A.C. COOLING FAN(PLUGGED HOLE IF W.C.)
16. MAIN MOTOR



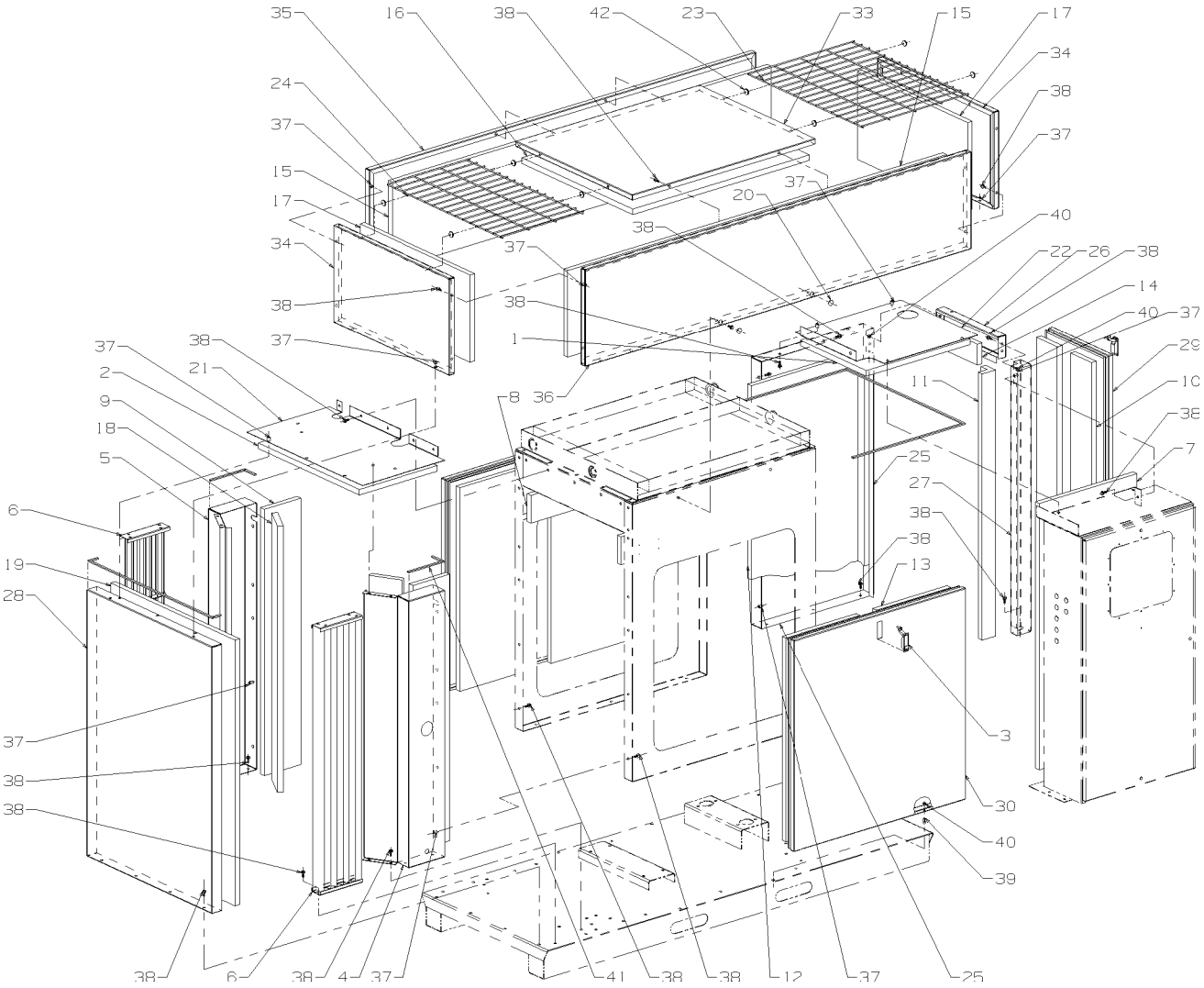
9.9 ELECTRICAL COMPONENTS AND PARTS -- SUPERVISOR II -- DELUXE(cont.)

key number	*description*	*part number*	*quantity*
31	connector, 1/4t x 1/8npt	250018–427	7
32	conduit, flex 1/2”	846315–050	6 ft.
33	connector	846400–050	1
34	switch, press 10 psi n.o.	250017–992	1
35	panel, central box bezel es11	02250089–302	1
36	gasket	02250090–872	1
37	decal	02250086–259	1
38	strainer, v–type 300psi 1/4” **(III)**	241771	1
39	tee, male 1/4t x 1/4npt	250028–582	1
40	washer, lock int tooth #6	837400–021	4
41	spacer, standoff 3/4 x 6–32 hex	02250064–616	2
42	board	02250088–098	1
43	tube, nyl .25od x .040w blk	02250054–861	40 ft.
44	keypad	02250086–264	1
45	orifice, .031 .125m x .125f hrs	025690	1
46	fitting, compress adj	250028–635	1
47	probe, 100 ohm platinum (12”)	250039–909	1
48	bushing, red 1/4 x 1/8” stl plt	867100–005	1
49	nipple, chase cond 1/2	847815–050	2
50	washer, sprlock reg m4	838804–090	14
51	nut, hex metric m4 x .7	825904–070	20
52	nipple, pipe xs 1/4 x close plt	866404–000	8
53	washer, pl br 5/16”	837205–071	1
54	screw, ser wash 5/16x3/4”	829705–075	4
55	screw, ser wash 5/16–18 x 1–1/4	829705–125	2
56	tee, pipe 1/4” 150# plt	866815–010	3
57	elbow, pipe 90dg 1/4” 150# plt	866215–010	2
58	nut, hex pltd sae #10–32	825801–130	13
59	washer, lock ext tooth 10	838402–025	13
60	screw, mach–rd 6–32 x 1/2”	831600–050	2
61	tee, pipe 1/8” 150# plt	866815–005	1
62	nipple, pipe xs 1/8 x close plt	866402–000	1
63	nipple, pipe xs 1/4 x 3.5 plt	866404–035	1
64	screw, mach–rd 6–32 x 1”	831600–100	2

(III) For maintenance on strainer no. 241771, order repair kit no. 241772.

PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR

9.10 CANOPY AND ACOUSTICAL PANELS & PARTS



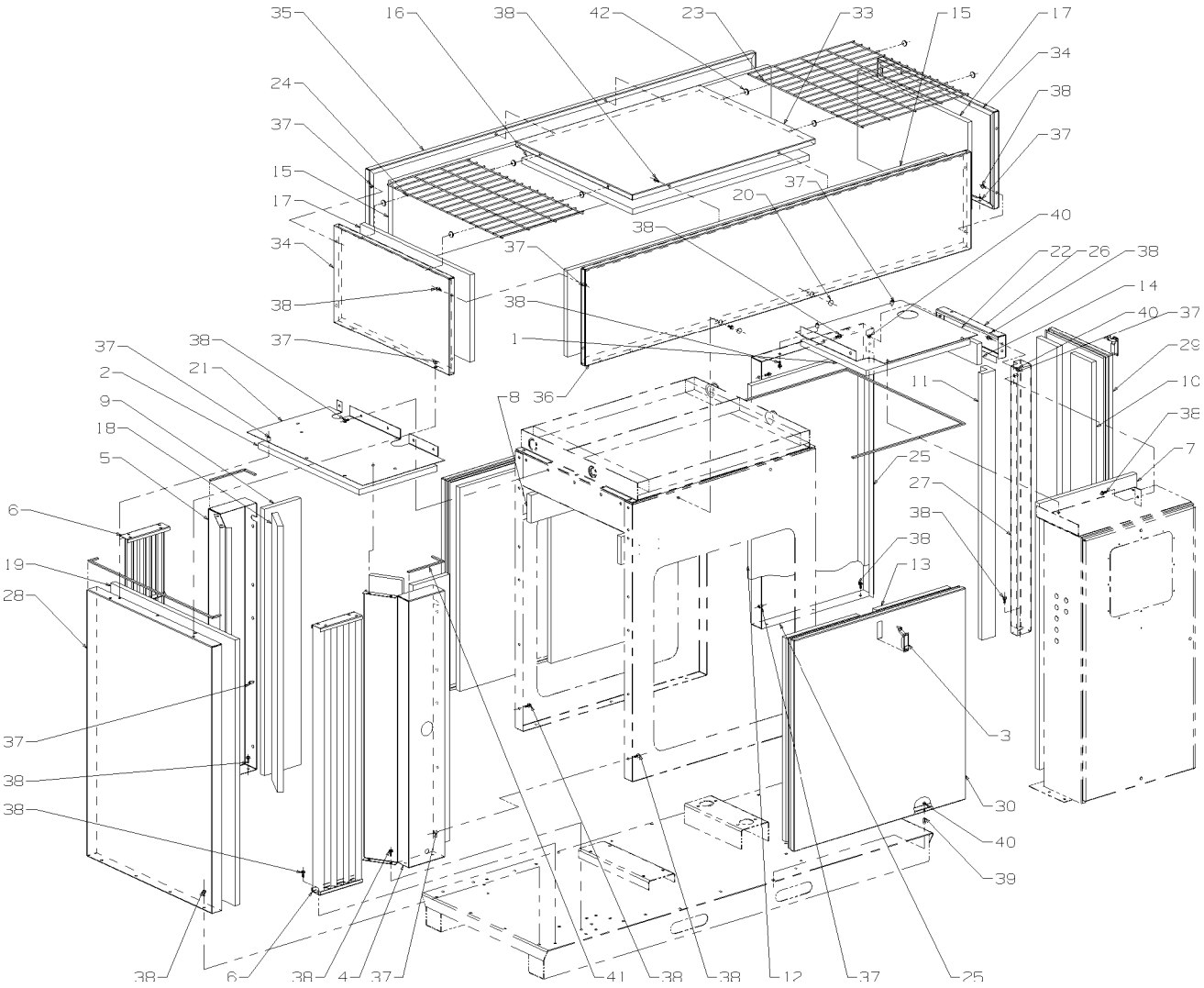
9.10 CANOPY AND ACOUSTICAL PANELS & PARTS

key number	*description*	*part number*	*quantity*
1	pnl, acstfoam 17.50 x 22.25	02250094–571	1
2	pnl, acstfoam 16.88 x 26.63	02250094–570	1
3	latch, adj trigger–lock black	02250094–632	3
4	pnl, frt side mtr end	02250094–074	1
5	pnl, rear side mtr end	02250094–086	1
6	pnl, louver assy	02250094–059	2
7	pnl, acstfoam 21.00 x 47.88	02250093–695	1
8	pnl, acstfoam 39.38 x 5.00	02250093–612	2
9	pnl, acstfoam 7.88 x 47.88	02250093–618	2
10	pnl, acstfoam 5.50 x 42.25	02250093–617	2
11	pnl, acstfoam 5.25 x 47.75	02250093–278	1
12	pnl, acstfoam 25.50 x 47.88	02250093–616	1
13	pnl, acstfoam 16.00 x 36.63	02250093–611	4
14	pnl, acstfoam 16.13 x 3.75	02250093–279	1
15	pnl, acstfoam 81.38 x 15.63	02250093–609	2
16	pnl, acstfoam 38.00 x 29.25	02250093–607	1
17	pnl, acstfoam 29.13 x 15.75	02250093–606	2
18	pnl, acstfoam 5.88 x 47.88	02250093–610	2
19	pnl, acstfoam 32.75 x 47.75	02250093–274	1
20	plug, hole .875 ”DIA	02250093–556	4
21	pnl, top plate motor end	02250092–946	1
22	pnl, top plate unit end	02250092–945	1
23	grl, can air exhaust RH	02250092–800	1
24	grl, can air exhaust LH	02250092–799	1
25	pnl, cor unit/starter end	02250092–767	1
26	pnl, ctr section–unit end	02250092–771	1
27	pnl, cor–unit/starter end	02250092–768	1
28	pnl, end–motor	02250092–429	1
29	pnl, ACS–compr end	02250091–957	1
30	pnl, ACS–front/rear	02250091–943	2
31	pnl, clr–back side	02250091–838	1

(Continued on page 69)

PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR

9.10 CANOPY AND ACOUSTICAL PANELS & PARTS

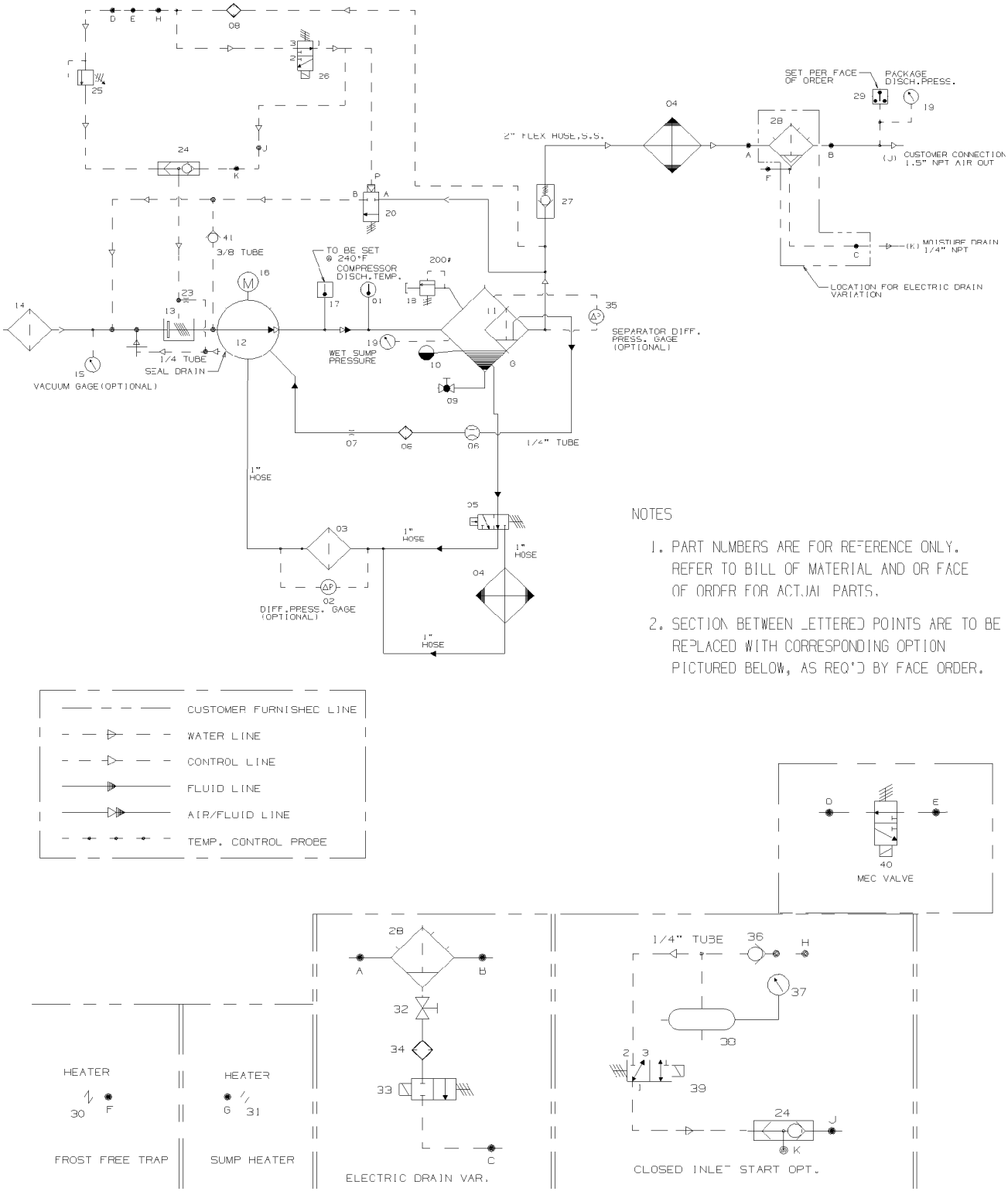


9.10 CANOPY AND ACOUSTICAL PANELS & PARTS (cont.)

key number	*description*	*part number*	*quantity*
32	pnl, clr–front side	02250091–837	1
33	pnl, roof top	02250091–801	1
34	pnl, roof–unit/mtr end	02250091–806	2
35	pnl, roof bask side	02250091–800	1
36	pnl, roof–front side	0225091–798	1
37	insr. 5/16"–18 thrd blind	02250043–765	44
38	screw, hx ser wash 5/16 x 3/4	829705–075	74
39	capscr, soc hd 5/16–18 x 5/8"	828305–062	6
40	nut, hex flgd pltd 5/16–18	825305–283	10
41	weatherstrip, 3/16 x 3/8	250022–436	46 ft.
42	grommet, rubber	040125	8

PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR

9.11 PIPING AND INSTRUMENTATION DIAGRAM -- ELECTRO-MECHANICAL -- STANDARD (AIR-COOLED)

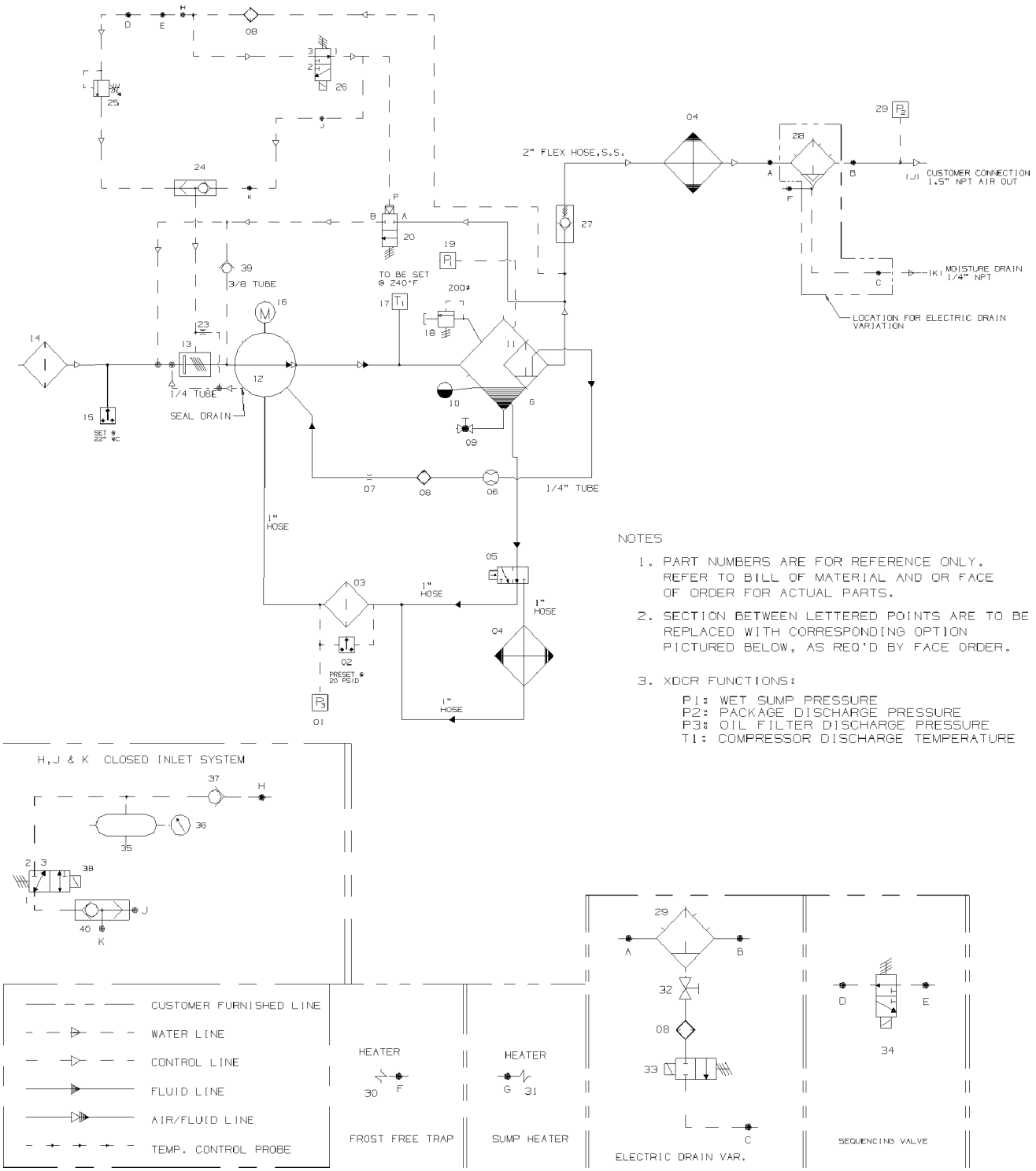


9.11 PIPING AND INSTRUMENTATION DIAGRAM – ELECTRO–MECHANICAL – STANDARD (AIR–COOLED)

key number	*description*	*part number*	*quantity*
1	gauge, temperature –2”	042582	1
2	gauge, dif press 0–30 psi	250003–799	1
3	fltr, fl 1–5/8”sae str thrd con	02250054–605	1
4	clr, air/air 33 x 31.4” es–16	02250091–628	1
5	thermal valve element	049542	1
6	glass, sight–24kt 1/4 (in–line)	046559	1
7	orifice, .094 .z50m 1018stl	22033	1
8	strainer, v–type 300psixi/4	241771	1
9	valve, ball 3/8” npt	047116	1
10	glass, oil level 1 – 1/2” sight	040279	1
11	tnk, sep direct mounted es–16	02250093–082	1
12	compressor	various	1
13	valve, air inlet 4” for SESA	02250083–783	1
14	fltr, inl air hd es–16 5”out	02250091–634	1
15	gauge, vacuum 0 –30” water	250003–797	1
16	motor	various	1
17	switch, temp 240°f nc	040588	1
18	valve, rl f 3/4” zoo # 550scfm	250006–989	1
19	gauge, press 2” dia 0–z30#	250005–185	1
20	valve, 2–way pneumatic 1/2”npt	250030–276	1
23	orifice, .031 .125m x .125f hrs	025690	1
24	valve, shuttle 1/4” (dbl chk)	408893	1
25	valve, pressure regulator	250017–280	1
26	valve, sol 3wno 1/4 gp8320gi94	250038–674	1
27	valve, 1–1/2”npt min press chk	250016–618	1
28	separator, water (sep/trap combo)	250018–041	1
29	switch, press 0–150#spdt n–1	040694	1
30	heater, trap 50watt 120v spcl	02250094–222	1
31	heater, sump 12/16 120v	02250094–223	1
32	valve, ball 1/4”npt	047115	1
33	valve, sol 1/4” w/timer 120v	250038–163	1
34	strainer, v–type 300 psi x 1/4	241771	1
35	gauge, diff. press. 0–15psi	250003–798	1
36	valve, check 1/4”	049905	1
37	gauge, pressure 2” 0–200#	040691	1
38	tube, accum. es8 clinl. 11.75 long	02250102–075	1
39	valve, sol 3wnc 1/4” 8320g182	250038 –755	1
40	valve, sol 3wno 1/4” gp8320g194	250038–674	1
41	valve, inline check (1/4”npt) dc	045244	1

PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR

9.12 PIPING AND INSTRUMENTATION -- SUPERVISOR II-- DELUXE (AIR-COOLED)



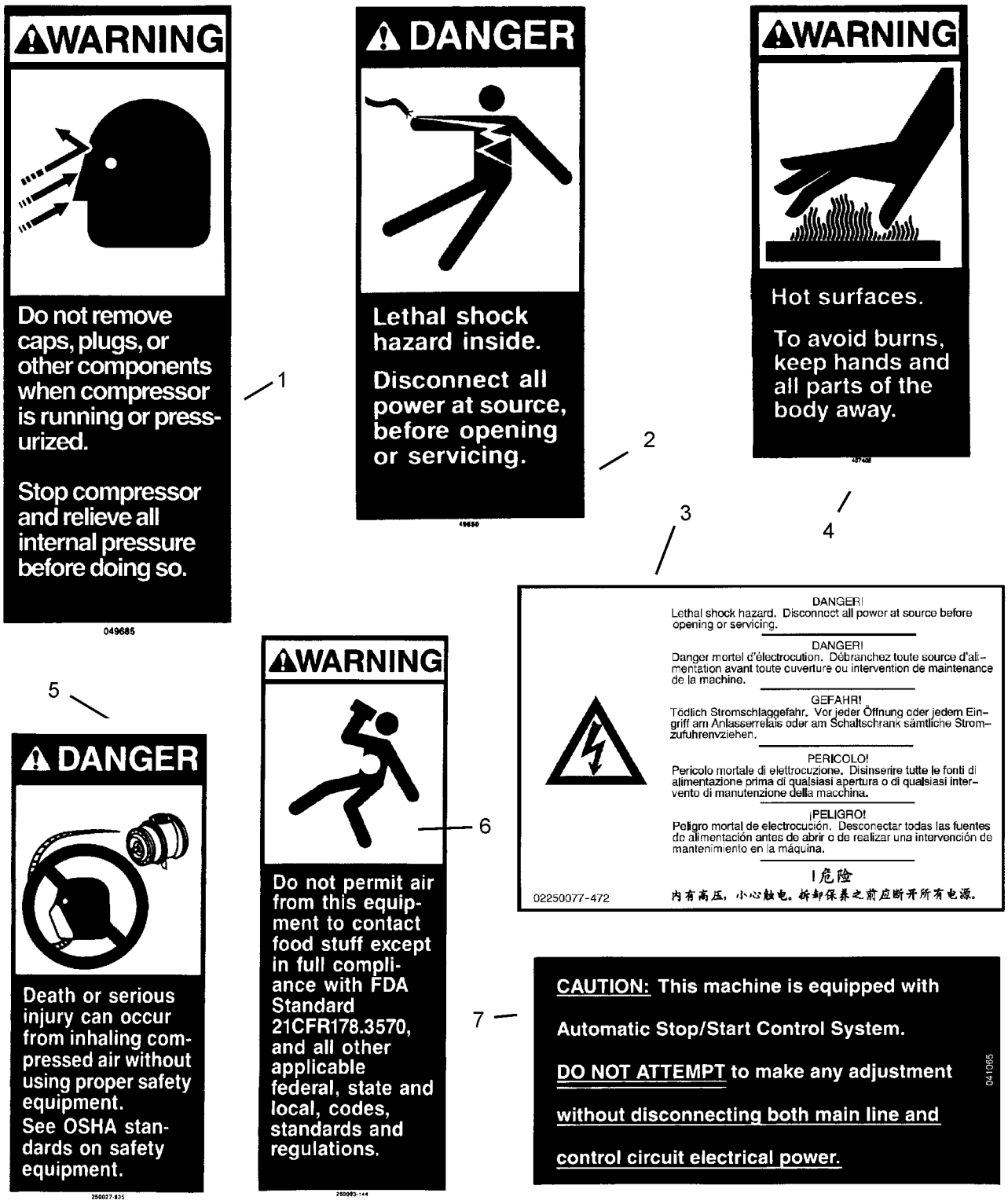
9.12 PIPING AND INSTRUMENTATION -- SUPERVISOR II-- DELUXE (AIR-COOLED)

key number	*description*	*part number*	*quantity*
1	xocr, press 0-250psi 1-5voc n4	02250078-933	1
2	sw, diff press 20psio 12ft or	02250050-154	1
3	fltr, fl 1-5/8"sae str thro con	02250054 -605	1
4	clr, air/air 33 x 31.4" es-16	02250091-628	1
5	thermal valve assembly es-16	various	1
6	glass, sight-24kt 1/4! in-line)	046559	1
7	orifice, .094 .250m 1018stl	022033	1
8	strainer, v-type 300psixi/4	241771	2
9	valve, ball 3/8" npt	047116	1
10	glass, oil level 1-1/2" sight	040279	1
11	tnk, sep direct mounted es-16	02250093-082	1
12	compressor	various	1
13	valve, air inlet 4" for SESA	02250083 -783	1
14	fltr, inl air hd es-16 5"out	02250091-634	1
15	sw, vacuum 22"wc n4 -6 ft cable	02250078-249	1
16	motor	various	1
17	p, rtd 100 ohm platinum 12ft	250039-909	1
18	valve, rlf 3/4'. 200# 550scfm	250006-989	1
19	xdcr, press 0-250psi 1-5vdc n4	02250078-933	1
20	valve, 2-way pneumatic 1/2"npt	250030-276	1
23	orifice, .031 .125m x .125f hrs	025690	1
24	valve, shuttle 1/4" (dbl chk)	408893	1
25	valve, pressure regulator	250017-280	1
26	valve, sol 3w no 1/4 gp8320g194	250038-674	1
27	valve, 1-1/2"npt min press chk	250016-618	1
28	separator, water (sep/trap combo)	250018-041	1
29	xdcr, press 0-250 psi 1-5vdc n4	02250078-933	1
30	heater, trap 50 watt 120v spcl	02250094-222	1
31	heater, sump 12/16 120v	02250094-223	1
32	valve, ball 1/4"npt	047115	1
33	valve, sol 1/4" w/timer 120v	250038-163	1
34	valve, sol 3w n.o. 1/4 gp8320g194	250038-674	1
35	tube, accum es8 clinl, 11.75" long	02250102-075	1
36	gauge, press 2" 0 -200#	040691	1
37	valve, check 1 14"	049905	1
38	valve , sol 3wnc i 14" 8320g182	250038-755	1
39	valve, in-line check (1/4 npt) nc	045244	1
40	valve, shuttle 1/4" (dbl chk)	408893	1

PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR

ILLUSTRATIONS AND PARTS LIST

9.13 DECAL GROUP



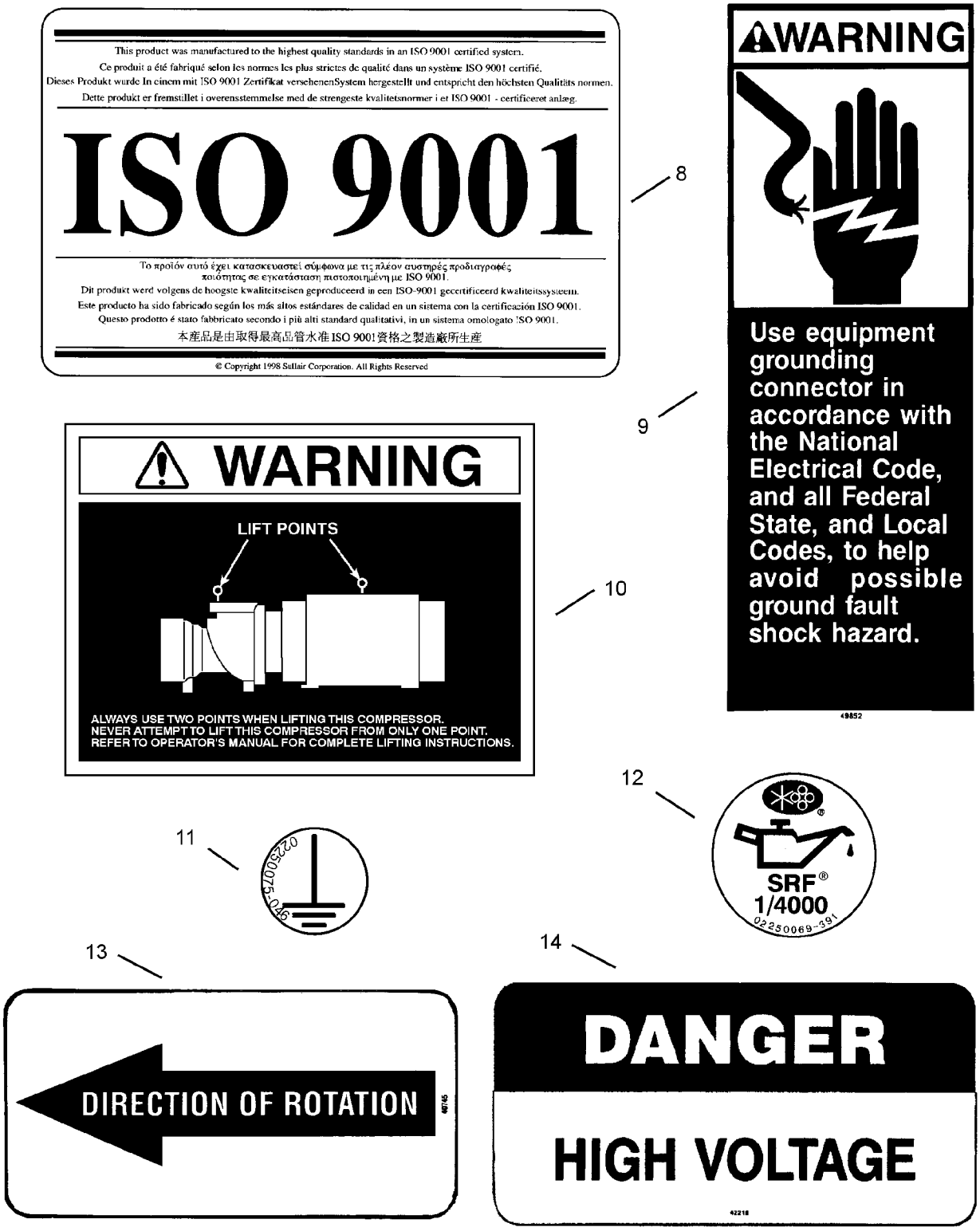
9.13 DECAL GROUP

key number	*description*	*part number*	*quantity*
1	sign, warning – compressor fluid fill cap	049685	1
2	sign, danger electrocution	049850	1
3	decal, electrocution (50 hertz compressors)	02250077–472	1
4	sign, warning – hot surfaces	407408	1
5	decal, danger breath air	250027–935	1
6	sign, warning “food grade” lube	250003–144	1
7	decal, warning auto start	041065	1

(Continued on page 77)

PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR

9.13 DECAL GROUP



9.13 DECAL GROUP (cont.)

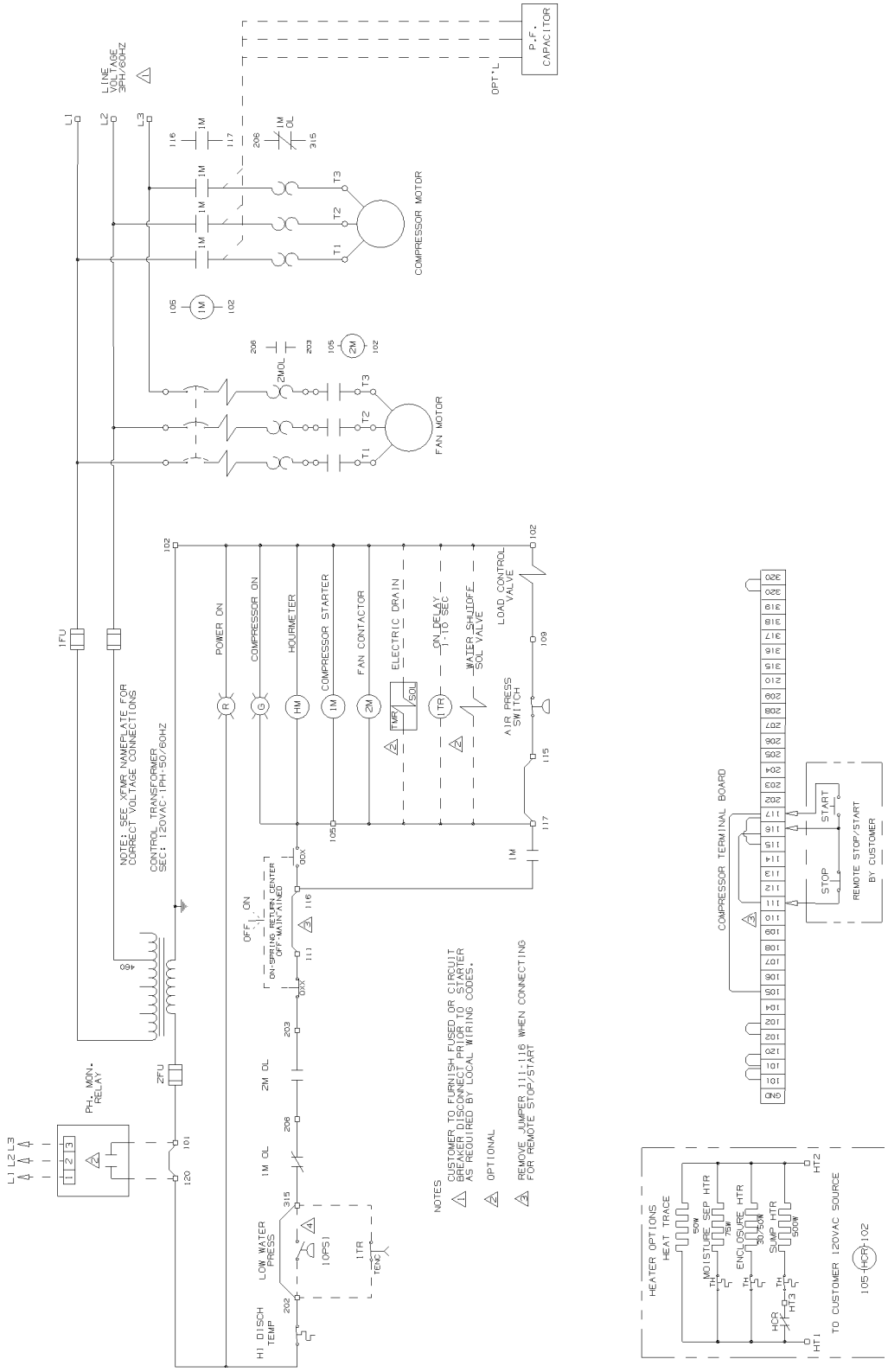
key number	*description*	*part number*	*quantity*
8	decal, ISO 9001	02250059–288	1
9	sign, warning ground fault	049852	1
10	decal, ES–16 warning lift	02250093–716	1
11	decal, earth ground	02250075–046	2
	•decal, protective earth ground **(II)**	02250075–045	1
	•decal, PE designation **(II)**	02250075–540	1
12	decal, compressor fluid SRF 1/4000 **(I)**	02250069–391	1
13	decal, rotation direction	040745	1
14	decal, danger hi voltage	042218	1
15	decal, ES–16 Supervisor II dlx info **(II)**	Consult factory	1
16	decal, ES–16 Supervisor II front (See Figure 6–1 in Operator's Section)	02250083–803	1

(I) Decal will change with fluid requirement.

(II) Not shown.

PLEASE NOTE: WHEN ORDERING PARTS, INDICATE SERIAL NUMBER OF COMPRESSOR

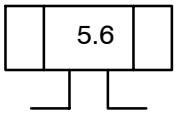
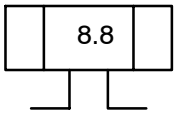
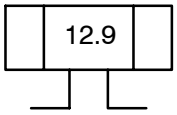
9.14 WIRING DIAGRAM – FULL VOLTAGE – ELECTRO-MECHANICAL – STANDARD



9.15 TORQUE TABLE FOR METRIC FASTENERS (+/– 10%)

SIZE	PROPERTY CLASS 5.6			PROPERTY CLASS 8.8			PROPERTY CLASS 12.9		
	CLAMP LOAD (kN)	TIGHTENING TORQUE (Nm)		CLAMP LOAD (kN)	TIGHTENING TORQUE (Nm)		CLAMP LOAD (kN)	TIGHTENING TORQUE (Nm)	
		DRY	LUB.		DRY	LUB.		DRY	LUB.
M3x0, 5	1.06	.9	.7	2.19	1.8	1.4	3.66	3	2.4
M4x0, 7	1.84	2	1.6	3.82	4.2	3.3	6.39	7	5.4
M5x0, 8	2.98	4	3.1	6.17	8.3	6.4	10.3	14	11
M6x1	4.23	6.8	5.3	8.75	14	11	14.6	24	18
M8x1, 25	7.69	17	13	15.9	34	27	26.6	58	45
M10x1, 5	12.2	33	25	25.2	67	52	42.2	113	87
M12x1, 75	17.7	56	43	36.7	115	89	61.3	193	149
M16x2	32.9	136	104	68.2	281	216	114	471	362
M20x2, 5	51.4	267	205	110	572	440	178	925	711
M24x3	74.0	459	353				256	1592	1223
M30x3, 5	118	911	699				408	3156	2422

Basic pitch diameters are used to calculate torque values. Coefficients of friction used are .2 and .15 for dry and lubricated conditions, respectively. Clamp load is calculated by arbitrarily assuming usable bolt strength is 75% of bolt proof load (PSI) times tensile stress area (IN^2) of thread section of each bolt size.

PROPERTY CLASS	MATERIAL	TENSILE N/mm^2	YIELD N/mm^2	PROOF N/mm^2	SIZE mm	INDENTIFICATION
5.6	ISO 898–1 1988 (E)	500	300	280	Through 39	5.6 
8.8	ISO 898–1 1988 (E)	800 830		580 600	< = 16 > 16 Through 39	8.8 
12.9	ISO 898–1 1988 (E)	1220		970	Through 39	12.9 

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